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(54) **FLUID PRODUCT DISPENSER**

FLÜSSIGKEITSSPENDER

DISTRIBUTEUR D'UN PRODUIT FLUIDE

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## Description

### FIELD OF THE INVENTION

**[0001]** This invention has to do with dispensers for flowable materials, particularly viscous liquids such as gels and creams as typically used in pharmaceuticals, personal care and food products, and pasty materials such as toothpaste.

### BACKGROUND OF THE INVENTION

**[0002]** Pastes and gels have conventionally been dispensed from hand-squeezed plastic tubes with rigid plastic nozzles. More recently, larger paste dispensers have had a dispensing pump at the top of a free-standing upright container, usually a cylindrical container with a base in the form of a follower piston which rises up inside the container as the product is depleted so as to keep the system airless. A recent alternative for airless systems is to have paste in a collapsible bag inside an outer container.

**[0003]** In the prior art, GB 1367057 shows a dispenser for dispensing paste material from an inverted container having at its outlet an elongate resilient tube with a slit opening. One side of this outlet tube rests against a reaction surface. A resilient pusher body can be swung in against the opposite side to squeeze paste out through the tube. At its upstream end the pusher body has a local projection for blocking the tube.

**[0004]** In EP-A-0275836 a rather similar dispenser has, instead of a resilient body, a pair of connected levers the inner one of which acts on the outlet tube. The inner lever is movable relative to the outer - the outer being the actuator which is pushed - and the two are connected by a spring to give resilience and avoid damaging the tube.

**[0005]** In EP-A-0455431 the resilient outlet tube has a duckbill valve at its tip. It is compressed from the side by the perpendicular movement of a plunger with an inclined contact face.

**[0006]** In one aspect (claim 1) the present invention provides a dispenser for dispensing a flowable material from a container, the dispenser having a structure comprising:

(a) a tube having an inlet end and an outlet end and a resiliently deformable wall and defining a discharge flow channel between said inlet and outlet ends;
(b) an actuator element mounted beside the tube and moveable laterally relative to it in a dispensing stroke to engage the resiliently deformable wall of the tube and compress it sideways;

the actuator element comprising a blocking portion and a compression portion,
the blocking portion moving laterally in the dispensing stroke in advance of other parts of the actuating element to block the tube wholly or partially by squeezing it, the compression portion extending along the tube downstream relative to the blocking portion and moving in the dispensing stroke to press along the resiliently deformable wall of the tube;
characterised in that said blocking portion is provided as a longitudinally-localised lateral projection on a resiliently flexible limb which is formed integrally with the actuator element and is resiliently retractable relative to the compression portion thereof during the dispensing stroke.

**[0007]** Another aspect of the invention (claim 16) is a dispenser for dispensing flowable material from a container, the dispenser having a structure comprising

(a) a tube having an inlet end and an outlet end and a resiliently deformable wall, and defining a discharge flow channel between said inlet and outlet ends;
(b) an actuator element mounted beside the tube and being movable laterally relative to the tube in a dispensing stroke, to engage the resiliently deformable wall of the tube and compress it sideways to expel flowable product in said channel from the outlet end of the dispenser in use;

characterised in that
the actuator element comprises a laterally movable button and a leaf spring, the leaf spring being anchored into the button and projecting forwardly from it so as to be engageable with the deformable wall of the tube, a blocking portion being provided by a forwardly-projecting flange of the leaf spring for indenting the tube towards its inlet end, and a compression portion being provided by a flat leaf spring portion extending downstream of the blocking portion, whereby in a dispensing stroke of the actuator element the blocking portion compresses the tube towards its inlet end in advance of its compression by the compression portion downstream.

**[0008]** A dispenser package, comprising a container for flowable product and a dispenser as above mounted on the container, is a further aspect. The actuator element may be movable laterally relative to the tube by means of a sliding or pivoted mounting, to engage its deformable wall and compress it sideways.

**[0009]** The deformable wall, and preferably the entire tube wall (circumferentially) may be of resiliently deformable material e.g. elastomer. The thickness and material of the deformable tube wall may be selected, taking account of the viscosity of the material to be dispensed and the flow characteristics upstream, to give sufficient resilience for the restoration of the deformable wall to its rest condition to refill the discharge channel through its inlet portion after each dispensing. It may be a tube of cylindrical cross-section or of other e.g. oblong cross-section; an oblong cross-section enables a higher dose volume for a given operating stroke (along the minor axis).

**[0010]** For efficient operation it is of course preferable that the resistance to forward flow through the outlet be

less than the resistance to flow back through the inlet. For this purpose an inlet valve function is provided by arranging for a deformable wall portion of the discharge tube, to the upstream of the deformable wall referred to previously, to be displaced by the same action that compresses the tube) to wholly or partially block the tube upstream of the compressed region so inhibiting or preventing flow back through the inlet as the tube is compressed.

**[0011]** This is by arranging for a blocking portion, e.g. a longitudinally-localised lateral projection, of an actuator element as proposed above to move the deformable tube wall at the relatively upstream position in an initial stage of the actuating stroke so as wholly or partially to block off backflow, the remainder of the actuation stroke progressively compressing the tube downstream of the blockage to expel material through the outlet.

**[0012]** Irrespective of whether a block is created towards the inlet side, it is generally preferred that the action of the actuating element(s) is such that at a given stage of the actuating stroke, (preferably for more than half of its extent) the degree of compression of the tube progressively decreases along it in the downstream direction, favouring forward flow.

**[0013]** To keep the system airless and for effective priming, a discharge valve function at the outlet end is desirable. Again, for simplicity we prefer this to be achieved by the resilient deformability of the discharge tube wall. Thus, a discharge opening in the form of a slit through the discharge tube wall, and most preferably a forwardly-directed slit on a nozzle tip e.g. a duckbill formation, is convenient and effective.

**[0014]** This slit valve preferably constitutes the final discharge opening of the dispenser.

**[0015]** Drawing these themes together, a preferred version of our proposals is a dispenser according with claim 1 or 16, e.g. a dispenser for paste material such as gels and creams as typically used in pharmaceuticals, personal care and food products, having a discharge channel consisting essentially of a resilient elastomeric tube with an inlet end connected to receive material from a product container, preferably directly i.e. not via any directional inlet valve. It has an outlet end terminating in a tip with a slit-form opening e.g. a duckbill valve. An actuating element is mounted in the dispenser next to the elastomeric tube to be movable in a dispensing stroke laterally relative to the tube, compressing the tube. The actuating element includes a blocking portion towards the inlet end of the tube which moves laterally in advance of other parts of the actuating element to block the tube wholly or partly by squeezing it. The actuating element has a compression region extending downstream relative to the blocking portion, and preferably elongate in the flow direction, shaped and mounted so as to be brought in to press along the side of the tube and squeeze material from the outlet opening.

**[0016]** Preferably such an actuating element is mounted pivotally in the dispenser, e.g. extending downstream along the discharge tube relative to the pivot point. This can encourage an action tending to squeeze material outwardly. Additionally or alternatively, an engagement face of the actuating element may be inclined away from the tube so that compression is initially greater nearer the inlet than nearer the outlet.

**[0017]** The blocking portion of the actuating element may be formed separately from the compression portion that squeezes the product from the tube. Indeed, they may be on elements which are separate but move together. A construction according with the invention can provide the upstream blocking portion and the downstream compression portion on the same component in one piece. This may be a component pivoted towards the inlet end of the discharge channel. The blocking portion is resiliently retractable relative to the compression portion, so that as the actuating element is pivoted further to deform the tube progressively, the blocking portion does not dig too forcibly into the tube wall and perhaps damage it, and/or hinder further movement of the actuating element.

**[0018]** The dispenser may use one actuating element, preferably with a static reaction abutment supporting the discharge channel from the opposite side, or may use opposed movable actuating elements to squeeze the tube dynamically from opposite sides.

**[0019]** The actuating element(s) may be exposed for direct manual engagement, or may be connected via operating mechanism, e.g. a lever or slider mechanism, to discrete manually-engaged element(s).

**[0020]** The product container (a pack consisting of a dispenser mounted on top of a filled or unfilled container is an aspect of the invention) is preferably of the airless or volume-adjusting kind having a collapsible bag or follower piston. However, other kinds of container may be used. The dispenser may be used either upright or inverted.

**[0021]** An advantage of having a slit or duckbill valve at the outlet is the ability to make a clean cut-off of dispensed products. A duckbill valve has a relatively acute convexity at its tip, leaving little forwardly-directed area for the adherence of dried residues.

**[0022]** Another benefit achievable with this system is that the product need not contact relatively movable discrete parts or metal parts, reducing the likelihood of contamination. Avoiding metal components may also enable recycling.

**[0023]** A further benefit with dispensing through a simple squeezed tube is that, with paste, we find that stripes applied to the paste survive dispensing in good shape, by contrast with piston-cylinder pump dispensers which spoil striping if conventional valves are used. Note that if a one-way follower piston is used in the container (e.g. having a pawl that engages the container wall to prevent reverse movement), inlet valve function at the dispenser inlet can be omitted altogether.

**[0024]** The dispenser may be provided with a closure component for a container, e.g. a snap- or screw-fit cap,

at its inlet end. This may be attached to any suitable container. Indeed, it could be attached to a conventional toothpaste tube in place of its normal screw cap.

**[0025]** The deformable tube may be formed integrally in one piece with a cap or cover to extend over the top of a product container, and optionally including (in one piece) a sealing periphery adapted for sealing engagement around the top of a container, e.g. a cylindrical plastic container.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0026]** Embodiments of the invention are now described by way of example with reference to the accompanying drawings in which

Fig. 1 is an axial cross-section of a dispenser pack embodying the invention;
Fig. 2 shows the Fig. 1 dispenser at the end of a dispensing stroke;
Fig. 3 is an axial cross-section of a second dispenser pack embodying the invention;
Fig. 4(a) shows the top of the Fig. 3 dispenser at the end of its dispensing stroke, while Fig. 4(b) shows a variant construction at the bottom of the pack;
Figs. 5(a) to (d) show an actuating button in top, oblique, side and front views respectively;
Figs. 6(a) and (b) are front and side views of an elastomeric discharge tube unit as seen Figs. 1, 2;
Figs. 7(a) and (b) are front and side views of an alternative embodiment of elastomeric discharge unit;
Fig. 8 is a front oblique view of the dispensing part of the assembly seen in Figs. 3 and 4(a);
Figs. 9 and 10 are axial cross-sections through a third embodiment of dispenser, before and after the dispensing stroke;
Figs. 11 and 12 are schematic axial sections showing a fourth embodiment of dispenser with opposed operating levers, before and after the dispensing stroke (but shown separate from a container);
Figs. 13 and 14 are axial cross-sections of an alternative embodiment of the dispenser pack, without and with a toothpaste tube in place;
Fig. 15 is an exploded view of the components of dispenser pack seen in Figs. 13 and 14;
Fig. 16 is an axial cross-section of an alternative embodiment of the dispenser pack;
Fig. 17 is an exploded view of the components of dispenser pack seen in Fig. 16; and
Figs. 18 and 19 are axial cross-sections of alternative embodiments of the dispenser pack.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

**[0027]** Referring to Figs. 1 and 2, a dispenser pack is designed to hold toothpaste in the internal space 8 of a container 1. In this embodiment the container consists of a collapsible impermeable bag 1 enclosed by a rigid plastic shell 1' with a hole 11 through its base. This is a known mode of containment for viscous products sensitive to air; the bag 1 collapses gradually as product is dispensed while the outer shell 1' protects and supports it.

**[0028]** A pumping arrangement is secured at the top of the container 1, consisting essentially of an elastomeric discharge tube unit 3 secured over the opening of the container 1, and a housing body 2 which locates and supports the tube unit 3 in relation to the container shell 1' and a movable actuating button 5 mounted beside the tube unit 3.

**[0029]** The tube unit 3 is shown in isolation in Fig. 6. It is a one piece elastomeric moulding, e.g. of rubber or thermoplastic elastomer, and has a cylindrical side wall 32 which is tilted away from the upright axis of the dispensing package. The top of the tube converges to a so-called duckbill valve 33, constituted by opposed convergent faces 35 leading to a linear outlet slit 36. In a known manner, this readily opens to allow paste to pass out (arrow A, Fig. 2), but any negative pressure behind the outlet acts, in concert with the material's resilience, to pull the slit 36 firmly shut and make an airtight seal.

**[0030]** The base of the cylindrical tube 32 flares out as an integral annular cap 34 having a peripheral upwardly-opening U-channel 35. In the assembled pack (see Figs. 1, 2) this fits down inside a thickened locating rim 13 of the collapsible bag 1, which in turn fits in a locating groove 12 at the top of the container shell 1'. The lower edge of the body shroud 2 has an annular projection 21 which fits down into the U-channel 35 to lock the assembly together, in combination with a snap engagement between shroud 2 and shell 1'.

**[0031]** This forms a sealed, open communication between the container interior 8 and the cylindrical discharge channel 31 in the elastomeric tube 32, closed at the top end by the slit valve 33.

**[0032]** The body 2 provides a shroud or casing with an eccentric top opening 23 through which the convergent tip of the elastomer tube projects. The body 2 also provides an inclined interior abutment 26 against which one side of the tube 32 rests. Opposite that abutment the housing or body 2 has a side opening 24 which exposes the actuating surface 51 of the actuating element 5. Looking at Fig. 1, 2 in conjunction with Fig. 5 the actuating element 5 is a one-piece plastic unit, mounted pivotingly through studs 52 to either side of the nozzle unit (see also Fig. 8, showing clips 15 to receive the studs 52 pivotably). The element 5 can then be pivoted by pressing on its actuating surface 51 between the positions shown in Fig. 1 and 2.

**[0033]** The operating (front) surface of the element 5 features two downwardly-dependent limbs 54,57 one behind the other. The front limb 54 presents a generally flat engagement surface 55. The rear limb 57 projects to below the bottom edge of the front limb 54 and carries a forwardly-projecting flange 53. The limbs 54,57 are resiliently flexible relative to one another and to the actu-

ating surface 51. In the rest condition (Fig. 1) the dimensions of the element and the positioning of the pivots 52,15 are such that the forwardly-projecting flange 53 indents a lower part of the elastomeric tube wall 32 as seen in Fig. 1. However the tube channel 31 remains substantially open at this region, and most of the tube interior 31 above is fully open.

**[0034]** As the actuator 5 is pushed forwardly, towards the position of Fig. 2, an initial event is further indentation of the lower part of the tube 32 by the projecting flange 53. Assuming an initial condition with the container and nozzle channel 31 full of paste, the effect of this is to tend to block off the escape route from the discharge channel 31 back into the container space 8. As the button 5 is further advanced, the extent of this blockage increases and at the same time, the front engaging surface 55 of the front limb 57 swings into progressive and compressive engagement with the tube wall 32; the opposing abutment 26 reacts to these forces so that the internal discharge channel 31 is gradually compressed and the nozzle tip 33 keeps its position. The flattening of the channel 31 expels paste from the nozzle tip (arrow A in Fig. 2) until the button 5 reaches the limit of its stroke. During the stroke the force against the end of forward flange 53 causes its supporting limb 57 to deflect back relative to the surrounding parts of the element 5. This flexibility avoids excessive forces being applied against the tube wall and hindering the movement of the button.

**[0035]** When the button is released, the resilient re-expansion of the tube wall 32 pushes the button back to its start position and generates a negative pressure which draws paste material up into the nozzle space 31 from the container space 8, the bag 1 collapsing slightly to compensate and venting air entering the intermediate space between bag 1 and shell 1' through vent hole 11.

**[0036]** This dispensing action has a number of advantages, in particular the avoidance of any discrete springs or metal parts in the product path, the absence of discrete valve components, but nevertheless a positive pumping action from the valve effect of the flange 53.

**[0037]** Figs. 3 and 4 show some variants, in which the pumping action is the same as in the first embodiment. In the Fig. 3 embodiment the cylindrical elastomeric tube 32 and its duckbill valve 33 are the same as before, but the lower end stops short instead of flaring to form a cap. The container is a rigid plastics container 101 with a sliding follower piston 102 having a sealing lip 103 forming a movable base. The top of the container is closed by a flat top wall 104 having an oblique spigot 105 onto which the bottom end of the cylindrical elastomer tube 32 fits tightly. In this embodiment an abutment structure 126 to support the tube 32 is formed as integral upward projections from the container roof 104; see also Fig. 8 which shows this embodiment. The clips 15 for the pivoting button can be formed also on the roof 104, whereas for the first embodiment they would project in from the skirt of the housing 2. Note from Fig. 8 that the abutment 126 need not provide an extended surface to support the tube 32 adequately. Here, three edge engagements suffice.

**[0038]** Note also from Fig. 3 that the follower plate has a downwardly-flaring sealing lip 103 which allows minor quantities of trapped air to escape during filling of the pack.

**[0039]** Fig. 4(a) shows the top of the Fig. 3 dispenser at the end of the dispensing stroke. The action is the same as in the first embodiment, except that the tube 32 needs to deform across the top of the spigot 105. In this embodiment the casing 2 is primarily to support the rubber nozzle 33, and for aesthetic purposes.

**[0040]** Fig. 4(b) shows an alternative follower plate construction where the follower plate sealing lips 203 will not allow trapped air to escape and a central vent 205 is provided instead.

**[0041]** Fig. 7 shows an alternative construction of the discharge tube 132, adapted for dispensing a larger volume without increasing the stroke of the actuating element 5. This is done by making the cross-section of the tube 133 generally oblong, with a larger dimension W transverse to the stroke and a smaller dimension D along the stroke. The nozzle outlet is the same size as before, however.

**[0042]** Figs. 9 and 10 show a further embodiment in which, instead of a swinging button 5 acting against a fixed abutment 26, the dispenser provides a pair of similar pivoted buttons 5 to either side of the discharge tube 32 to act counter to one another. Here, the tube 32 is upright (axial to the container) and the buttons 5 are identical. Such a construction may enable a greater relative displacement of the tube wall by the lower flanges (a more positive inlet valve function) and also a more progressive urging of material along the tube channel 31 in the downstream direction as the elements 5 swing together. The body casing 2 has a pair of corresponding openings 24 to expose the two buttons 5.

**[0043]** Figs. 11 and 12 show a further variant. Here the compressible rubber discharge tube 232 is fitted on a top spigot 205 of a screw cap 206 which can be freely transferred from one container to another, e.g. a conventional toothpaste tube. This embodiment features an indirect drive mechanism for the actuating elements 215. A surrounding casing 202 has an upper pivot 71 at which a pair of opposed actuating levers 7 are pivoted so that they can be swung between the raised and lowered positions seen in Fig. 11, 12. A common lower pivot 215 mounts the bottom ends of a pair of opposed actuating elements 215, each having an inwardly bent supporting arm 256 and a medial forwardly-projecting portion 255 adapted to press the respective side of the tube 232. The initial inclination of the actuating portions 255 brings their lower ends 253 into engagement initially with the lower part of the tube 232 to provide an inlet valve effect by partial blockage at the lower end. The upper ends of the support elements 256 enter recesses in the undersides of the operating levers 7 and are retained there in slide tracks 72 for the necessary freedom of action. The lever mechanism gives a significant mechanical advantage,

making this suitable for use by children.

**[0044]** Figures 13, 14 and 15 show a further embodiment, in which the pumping mechanism is different from the previous embodiments. The tube 3, with deformable wall 332 and duckbill valve 333, is the same as before, except the lower end has an annular projection 336. The tube 3 fits tightly over an inner spigot 61 of a container cap 6, with the annular projection 336 of the tube 3 abutting against a flat top portion 62 of the container cap 6. The cap has sidewall 63 with horizontal portions 64 for locating between a rigid container shell 201' and the housing body 2. The inner spigot 61 has an inner screw thread 65, dimensioned such as to allow the container cap 6 to directly replace the cap of a squeeze container containing paste or gel, e.g. a conventional toothpaste tube. Figure 14 shows the arrangement with a toothpaste tube 201 in place.

**[0045]** The one-piece movable actuator element 5 of the previous embodiments, with two downwardly dependent limbs 54, 57, is replaced with a laterally movable button 80 and leaf spring 81. The leaf spring 81 has a forwardly projecting flange 83, for indenting the lower part of the deformable tube wall 332, acting as a blocking portion. Situated above this flange 83 is a flat vertical portion 85, for compressing the tube and expelling flowable product through the duckbill valve 333. A horizontal top portion 84 of the leaf spring 81 is slottedly located between two closely spaced projections 801 of the inner wall of the actuating button 80.

**[0046]** Figures 16 and 17 show a further embodiment, in which the pumping action is different again from the previous embodiments. The dispenser structure is mounted on a container having a follower piston 302. When the tube is compressed by actuating a compression member 405, if the force required to open the duckbill valve 433 is less than the force required to push the follower piston 302 backwards, product will be dispensed through the duckbill opening 436. A specific or discrete blocking portion or inlet valve at the inlet end of the tube 3 is therefore not necessary.

**[0047]** Figures 18 and 19 show further embodiments, in which the tube 3 is formed from a two-shot moulding process and has portions of deformable material X and portions of rigid material Y. The tube comprises a deformable wall 532 of deformable material X. An actuator member 9,9' is disposed behind the deformable wall 532, for deforming it in a similar manner to that described in the previous embodiments of the invention. A ring-shaped elastomeric member 538 with central hole 5381, and a resiliently biased rigid valve member 539 covering the hole 5381, combine to provide an outlet valve to the tube 3. A duckbill valve as used in previously described embodiments could instead be provided at the outlet end, although it is understood that various other types of outlet valve are acceptable.

**[0048]** The remaining parts of the tube 3, including the flare 534 at the base of the tube 3, are of rigid material Y. Using a two-shot moulding process to produce a tube of this kind is substantially cheaper than producing an entirely elastomeric tube, as elastomeric injection form materials tend to be rather expensive.

**[0049]** Figures 18 and 19 also show variations in construction of the movable actuator element 9,9' for providing lateral deformation of the deformable wall 532 of the tube 3. In both examples the pivot point 92,92' of the actuator element is adjacent the outlet end of the tube 3, unlike the embodiments described previously (e.g. Fig 5(c)).

**[0050]** A blocking portion 93,93' is provided at the bottom of the actuator element for indenting the inlet end of the deformable wall 532 of the tube 3, thus acting as an inlet valve. Figure 18 shows a blocking portion 93 projecting from a flexible semicircular portion 931 of the actuator element 9. The flexibility avoids, in use, excessive forces being applied against the tube wall and hindering full movement of the actuator element. Figure 19 shows the blocking portion 93' projecting from a flexible tube portion 931'; a variation to the semicircular region 93 described above.

**[0051]** The actuator elements of Figures 18 and 19 have different structures. Figure 18 shows an actuator element 9 with an arcuate compression portion 95 that, as it rotates around the pivot point 92, pushes a flexible projection 94 that extends from the rigid flare 534 at the base of the tube 3 such that its flat front facet 96 lies against the deformable wall 532 of the tube 3. Such a construction enables a progressive urging of material in the downstream direction.

**[0052]** The actuator element shown in Figure 19 comprises, as a compression portion, a flexible limb 95' extending upwardly from an upstream region, with a flat front facet 96' for engagement with the deformable wall 532 of the tube 3 as the actuator element rotates around the pivot point 92'. Such a construction again enables a progressive urging of material in the downstream direction.

## Claims

1. A dispenser for dispensing a flowable material from a container, the dispenser having a structure comprising:

   (a) a tube (3) having an inlet end and an outlet end and a resiliently deformable wall and defining a discharge flow channel (31) between said inlet and outlet ends;
   (b) an actuator element (5) mounted beside the tube and moveable laterally relative to it in a dispensing stroke to engage the resiliently deformable wall of the tube and compress it sideways;

   the actuator element comprising a blocking portion (53) and a compression portion (54,55),
   the blocking portion moving laterally in the dispens-

ing stroke in advance of other parts of the actuating element to block the tube wholly or partially by squeezing it, the compression portion (54,55) extending along the tube downstream relative to the blocking portion (53) and moving in the dispensing stroke to press along the resiliently deformable wall of the tube;
**characterised in that** said blocking portion is provided as a longitudinally-localised lateral projection on a resiliently flexible limb (57) which is formed integrally with the actuator element and is resiliently retractable relative to the compression portion thereof during the dispensing stroke.

**2.** A dispenser as claimed in claim 1 in which the actuating element has a one-piece plastics unit, comprising said limb carrying the blocking portion integrally with a second limb which constitutes the compression portion, and an actuating surface.

**3.** A dispenser as claimed in claim 2 in which the limb carrying the blocking portion lies behind the limb constituting the compression portion.

**4.** A dispenser as claimed in any one of the preceding claims in which the actuator element is exposed for direct manual engagement.

**5.** A dispenser as claimed in any one of the preceding claims comprising a static reaction abutment on the opposite side of said tube from the actuator element, to support the tube against the action of the actuator element.

**6.** A dispenser as claimed in any one of the preceding claims comprising an additional actuator element opposed to the said actuator element on the opposite side of the tube, and laterally movable relative to the tube, for the tube to be compressed between said actuator element and said additional actuator element.

**7.** A dispenser as claimed in any one of the preceding claims in which the outlet end of the tube has a slit opening, constituting both a discharge opening and discharge valve of the dispenser.

**8.** A dispenser as claimed in any one of the preceding claims in which the outlet end of the tube has a duckbill valve formation integral with the deformable wall of the tube and constituting the discharge opening of the dispenser.

**9.** A dispenser as claimed in any one of the preceding claims in which the tube is a one-piece elastomeric entity.

**10.** A dispenser as claimed in any one of the preceding claims comprising, at its inlet end, a closure cap for a container.

**11.** A dispenser according to any one of the preceding claims comprising
a first and a second of said actuator elements (5,7) opposed to one another on opposite sides of the tube, the actuator elements being movable laterally relative to the tube in a dispensing stroke to deform the tube between them and thereby compress the discharge flow channel to expel flowable product therein from the outlet end in use.

**12.** A dispenser as claimed in claim 11 in which each of said actuator elements comprises a resiliently flexible limb carrying a longitudinally-localised lateral projection constituting said blocking portion, and a further limb constituting the compression portion.

**13.** A dispenser as claimed in either of claims 11 or 12 in which each of said actuator elements is made from a one-piece plastics unit comprising said limbs and a manually-engageable actuating surface.

**14.** A dispenser as claimed in any one of the preceding claims in which the actuator element(s) is/are mounted pivotally in the dispenser.

**15.** A dispenser as claimed in claim 14 in which pivotal mounting(s) of the actuator element(s) is/are adjacent the inlet end of the tube.

**16.** A dispenser for dispensing flowable material from a container, the dispenser having a structure comprising

(a) a tube (3) having an inlet end and an outlet end and a resiliently deformable wall, and defining a discharge flow channel (31) between said inlet and outlet ends;
(b) an actuator element (5) mounted beside the tube and being movable laterally relative to the tube in a dispensing stroke, to engage the resiliently deformable wall of the tube and compress it sideways to expel flowable product in said channel from the outlet end of the dispenser in use;

**characterised in that**
the actuator element (5) comprises a laterally movable button (80) and a leaf spring (81), the leaf spring being anchored into the button and projecting forwardly from it so as to be engageable with the deformable wall of the tube (332), a blocking portion being provided by a forwardly-projecting flange (83) of the leaf spring for indenting the tube towards its inlet end, and a compression portion being provided by a flat leaf spring portion (85) extending down-

stream of the blocking portion, whereby in a dispensing stroke of the actuator element (5) the blocking portion compresses the tube towards its inlet end in advance of its compression by the compression portion downstream.

**17.** A dispenser package comprising a container for flowable product, and a dispenser as claimed in any one of the preceding claims mounted on the container.

**18.** A dispenser package according to claim 17 in which the container is airless, or volume-adjusting, having a collapsible bag or follower piston.

**19.** A toothpaste dispenser package according to either of claims 17 or 18.

**Patentansprüche**

**1.** Spender zur Abgabe eines fließfähigen Materials aus einem Behältnis, wobei der Spender eine Struktur aufweist, die Folgendes umfasst:

(a) eine Röhre (3), die ein Einlassende und ein Auslassende sowie eine elastisch verformbare Wand aufweist und einen Ausströmkanal (31) zwischen dem Einlass- und dem Auslassende definiert;
(b) ein Aktuatorelement (5), das neben der Röhre angebracht und, im Zuge eines Hubs zur Abgabe, in Bezug auf diese seitwärts bewegbar ist, um in die elastisch verformbare Wand der Röhre einzugreifen und diese seitlich zusammenzudrücken;

wobei das Aktuatorelement einen Sperrabschnitt (53) und einen Drückabschnitt (54, 55) aufweist,
wobei sich der Sperrabschnitt im Zuge des Abgabehubs vor anderen Teilen des Aktuatorelements seitwärts bewegt, um die Röhre durch Quetschen selbiger vollständig oder teilweise abzusperren, und wobei sich der Drückabschnitt (54, 55) entlang der Röhre in Bezug auf den Sperrabschnitt (53) stromabwärts erstreckt und sich im Zuge des Abgabehubs bewegt, um entlang der elastisch verformbaren Wand der Röhre Druck auszuüben;
**dadurch gekennzeichnet, dass** der Sperrabschnitt als ein längs angeordneter, seitlicher Vorsprung an einem elastisch biegsamen Glied (57) bereitgestellt ist, welches einstückig mit dem Aktuatorelement ausgebildet und während des Abgabehubs in Bezug auf den Drückabschnitt desselben elastisch einziehbar ist.

**2.** Spender nach Anspruch 1, worin das Aktuatorelement eine einstückige Kunststoffeinheit, welche das Glied, das den Sperrabschnitt trägt, in einstückiger Ausbildung mit einem zweiten Glied, das den Drückabschnitt bildet, umfasst, sowie eine Aktuatoroberfläche aufweist.

**3.** Spender nach Anspruch 2, worin das Glied, das den Sperrabschnitt trägt, hinter dem Glied, das den Drückabschnitt bildet, liegt.

**4.** Spender nach einem der vorangegangenen Ansprüche, worin das Aktuatorelement für einen direkten händischen Eingriff freiliegt.

**5.** Spender nach einem der vorangegangenen Ansprüche, umfassend ein unbewegliches Reaktionswiderlager an der dem Aktuatorelement gegenüberliegenden Seite der Röhre, um die Röhre entgegen der Wrkung des Aktuatorelements abzustützen.

**6.** Spender nach einem der vorangegangenen Ansprüche, umfassend ein zusätzliches Aktuatorelement gegenüber dem Aktuatorelement an der gegenüberliegenden Seite der Röhre, das in Bezug auf die Röhre seitwärts bewegbar ist, damit die Röhre zwischen dem Aktuatorelement und dem zusätzlichen Aktuatorelement zusammendrückbar ist.

**7.** Spender nach einem der vorangegangenen Ansprüche, worin das Auslassende der Röhre eine Schlitzöffnung aufweist, die sowohl eine Ausströmöffnung als auch ein Ausströmventil des Spenders bildet.

**8.** Spender nach einem der vorangegangenen Ansprüche, worin das Auslassende der Röhre eine Entenschnabel-Ventilausbildung aufweist, die mit der verformbaren Wand der Röhre einstückig ausgebildet ist und die Ausströmöffnung des Spenders bildet.

**9.** Spender nach einem der vorangegangenen Ansprüche, worin die Röhre eine einstückige Elastomereinheit ist.

**10.** Spender nach einem der vorangegangenen Ansprüche, umfassend eine Verschlusskappe für ein Behältnis an seinem Einlassende.

**11.** Spender nach einem der vorangegangenen Ansprüche, umfassend
ein erstes und ein zweites der genannten Aktuatorelemente (5, 7), die einander an gegenüberliegenden Seiten der Röhre gegenüberliegen, wobei die Aktuatorelemente im Zuge eines Abgabehubs in Bezug auf die Röhre seitwärts bewegbar sind, um die Röhre zwischen sich zu verformen und **dadurch** den Ausströmkanal zusammenzudrücken, um bei der Verwendung ein darin enthaltenes fließfähiges Produkt aus dem Auslassende auszustoßen.

**12.** Spender nach Anspruch 11, worin jedes der Aktua-

torelemente ein elastisch biegsames Glied, das einen längs angeordneten, seitlichen Vorsprung trägt; welcher den Sperrabschnitt bildet, und ein weiteres Glied, das den Drückabschnitt bildet, umfasst.

**13.** Spender nach einem der Ansprüche 11 oder 12, worin jedes der Aktuatorelemente aus einer einstückigen Kunststoffeinheit hergestellt ist, welche die Glieder und eine händisch einzugreifende Aktuatoroberfläche umfasst.

**14.** Spender nach einem der vorangegangenen Ansprüche, worin das/die Aktuatorelement(e) schwenkbar im Spender befestigt ist/sind.

**15.** Spender nach Anspruch 14, worin die schwenkbare(n) Befestigung(en) an das Eingangsende der Röhre angrenzt/angrenzen.

**16.** Spender zur Abgabe eines fließfähigen Materials aus einem Behältnis, wobei der Spender eine Struktur aufweist, die Folgendes umfasst:

(a) eine Röhre (3), die ein Einlassende und ein Auslassende sowie eine elastisch verformbare Wand aufweist und einen Ausströmkanal (31) zwischen dem Einlass- und dem Auslassende definiert;
(b) ein Aktuatorelement (5), das neben der Röhre angebracht und, im Zuge eines Hubs zur Abgabe, in Bezug auf die Röhre seitwärts bewegbar ist, um in die elastisch verformbare Wand der Röhre einzugreifen und diese seitlich zusammenzudrücken, um bei der Verwendung ein fließfähiges Produkt im Kanal zum Austritt aus dem Auslassende des Spenders auszustoßen;

**dadurch gekennzeichnet, dass**
das Aktuatorelement (5) einen seitwärts bewegbaren Knopf (80) und eine Blattfeder (81) umfasst, wobei die Blattfeder im Knopf verankert ist und von diesem aus nach vorne vorsteht, sodass sie mit der verformbaren Wand der Röhre (232) in Eingriff bringbar ist, wobei ein Sperrabschnitt durch einen nach vorne vorstehenden Flansch (83) der Blattfeder bereitgestellt ist, um die Röhre zu ihrem Einlassende hin einzudrücken, und wobei ein Drückabschnitt durch eine flachen Blattfederabschnitt (85) bereitgestellt ist, der sich vom Sperrabschnitt stromabwärts erstreckt, wodurch der Sperrabschnitt, im Zuge des Abgabehubs des Aktuatorelements (5), die Röhre zu ihrem Einlassende hin zusammendrückt, bevor diese stromabwärts durch den Drückabschnitt zusammengedrückt wird.

**17.** Spenderpackung, umfassend ein Behältnis für ein fließfähiges Produkt und einen Spender nach einem der vorangegangenen Ansprüche, der am Behältnis angebracht ist.

**18.** Spenderpackung nach Anspruch 17, worin das Behältnis luftleer oder volumeneinstellbar ist, und einen entleerbaren Beutel oder einen Folgekolben aufweist.

**19.** Zahnpastaspenderpackung gemäß einem der Ansprüche 17 oder 18.

**Revendications**

**1.** Distributeur permettant de distribuer un matériau liquide d'un récipient, le distributeur ayant une structure comprenant:

(a) un tube (3) ayant une extrémité d'entrée et une extrémité de sortie et une paroi élastiquement déformable et définissant un canal d'écoulement de décharge (31) entre lesdites extrémités d'entrée et de sortie;
(b) un élément actionneur (5) monté à côté du tube et mobile de manière latérale par rapport à celui-ci dans une phase de distribution pour mettre en prise la paroi élastiquement déformable du tube et la comprimer latéralement;

l'élément actionneur comprenant une partie de blocage (53) et une partie de compression (54, 55),
la partie de blocage se déplaçant latéralement dans la phase de distribution avant les autres pièces de l'élément d'actionnement pour bloquer le tube complètement ou partiellement en le serrant, la partie de compression (54, 55) s'étendant le long du tube en aval par rapport à la partie de blocage (53) et en se déplaçant dans la phase de distribution pour se comprimer le long de la paroi élastiquement déformable du tube;
**caractérisé en ce que** ladite partie de blocage est prévue comme étant une saillie latérale positionnée de manière longitudinale sur un membre (57) élastiquement flexible qui est formé de manière solidaire avec l'élément actionneur et qui est élastiquement rétractable par rapport à sa partie de compression pendant la phase de distribution.

**2.** Distributeur selon la revendication 1, dans lequel l'élément d'actionnement comprend une unité en matière plastique d'un seul tenant, comprenant ledit membre supportant la partie de blocage de manière solidaire avec un second membre qui constitue la partie de compression, et une surface d'actionnement.

**3.** Distributeur selon la revendication 2, dans lequel le membre supportant la partie de blocage se trouve derrière le membre constituant la partie de compres-

sion.

**4.** Distributeur selon l'une quelconque des revendications précédentes, dans lequel l'élément actionneur est exposé pour la mise en prise manuelle directe.

**5.** Distributeur selon l'une quelconque des revendications précédentes, comprenant une butée de réaction statique sur le côté opposé dudit tube par rapport à l'élément actionneur, pour supporter le tube contre l'action de l'élément actionneur.

**6.** Distributeur selon l'une quelconque des revendications précédentes, comprenant un élément actionneur supplémentaire opposé audit élément actionneur sur le côté opposé du tube, et mobile latéralement par rapport au tube, pour que le tube soit comprimé entre ledit élément actionneur et ledit élément actionneur supplémentaire.

**7.** Distributeur selon l'une quelconque des revendications précédentes, dans lequel l'extrémité de sortie du tube comprend une ouverture fendue, constituant à la fois une ouverture de décharge et une valve de décharge du distributeur.

**8.** Distributeur selon l'une quelconque des revendications précédentes, dans lequel l'extrémité de sortie du tube comprend une formation de valve en bec de canard solidaire avec la paroi déformable du tube et constituant l'ouverture de décharge du distributeur.

**9.** Distributeur selon l'une quelconque des revendications précédentes, dans lequel le tube est une entité élastomère d'un seul tenant.

**10.** Distributeur selon l'une quelconque des revendications précédentes, comprenant au niveau de son extrémité d'entrée, un capuchon de fermeture destiné à un récipient.

**11.** Distributeur selon l'une quelconque des revendications précédentes, comprenant un premier et un second élément desdits éléments actionneurs (5, 7) opposés entre eux sur les côtés opposés du tube, les éléments actionneurs étant mobiles latéralement par rapport au tube dans une phase de distribution pour déformer le tube entre eux et comprimer ainsi le canal d'écoulement de décharge pour expulser le produit liquide contenu à l'intérieur par l'extrémité de sortie, à l'usage.

**12.** Distributeur selon la revendication 11, dans lequel chacun desdits éléments actionneurs comprend un membre élastiquement flexible supportant une saillie latérale positionnée de manière longitudinale constituant ladite partie de blocage, et un autre membre constituant la partie de compression.

**13.** Distributeur selon l'une des revendications 11 ou 12, dans lequel chacun desdits éléments actionneurs est réalisé à partir d'une unité en matière plastique d'un seul tenant comprenant lesdits membres et une surface d'actionnement pouvant être mise en prise manuellement.

**14.** Distributeur selon l'une quelconque des revendications précédentes, dans lequel l'élément (les éléments) actionneur(s) est / sont monté(s) de manière pivotante dans le distributeur.

**15.** Distributeur selon la revendication 14, dans lequel le (les) montage(s) pivotant(s) de l'élément (des éléments) actionneur(s) est / sont adjacent(s) à l'extrémité d'entrée du tube.

**16.** Distributeur permettant de distribuer un matériau liquide d'un récipient, le distributeur ayant une structure comprenant:

(a) un tube (3) ayant une extrémité d'entrée et une extrémité de sortie et une paroi élastiquement déformable et définissant un canal d'écoulement de décharge (31) entre lesdites extrémités d'entrée et de sortie;
(b) un élément actionneur (5) monté à côté du tube et étant latéralement mobile par rapport au tube dans une phase de distribution, pour mettre en prise la paroi élastiquement déformable du tube et la comprimer latéralement pour expulser le produit liquide dans ledit canal par l'extrémité de sortie du distributeur, à l'usage;

**caractérisé en ce que**:

l'élément actionneur (5) comprend un bouton (80) latéralement mobile et un ressort à lames (81), le ressort à lames étant ancré dans le bouton et faisant saillie vers l'avant à partir de celui-ci afin de pouvoir se mettre en prise ave la paroi déformable du tube (332), une partie de blocage étant prévue par un rebord (83) en saillie vers l'avant du ressort à lames pour renforcer le tube vers son extrémité d'entrée, et une partie de compression étant prévue par une partie de ressort à lames plate (85) s'étendant en aval de la partie de blocage, moyennant quoi dans une phase de distribution de l'élément actionneur (5), la partie de blocage comprime le tube vers son extrémité d'entrée avant sa compression par la partie de compression en aval.

**17.** Emballage de distributeur comprenant un récipient pour produit liquide, et un distributeur selon l'une quelconque des revendications précédentes monté sur le récipient.

**18.** Emballage de distributeur selon la revendication 17, dans lequel le récipient est dépourvu d'air ou réglable en volume, comprenant un sac repliable ou un piston suiveur.

**19.** Emballage de distributeur de dentifrice selon l'une des revendications 17 ou 18.

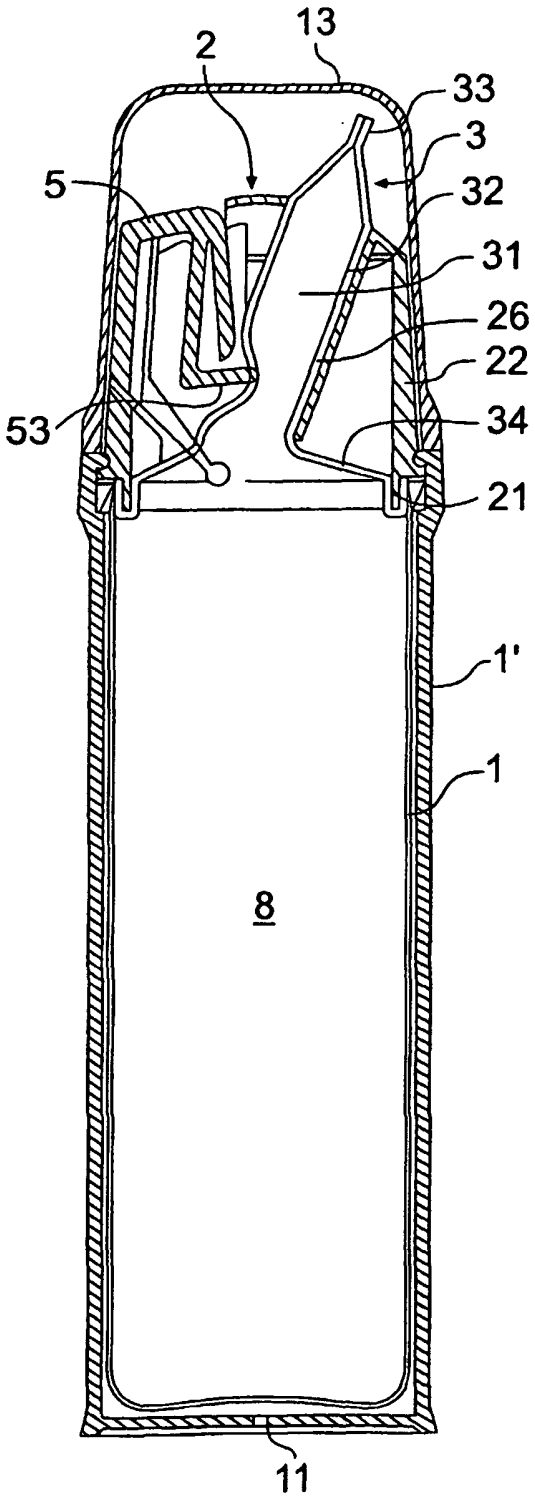

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Fig. 1

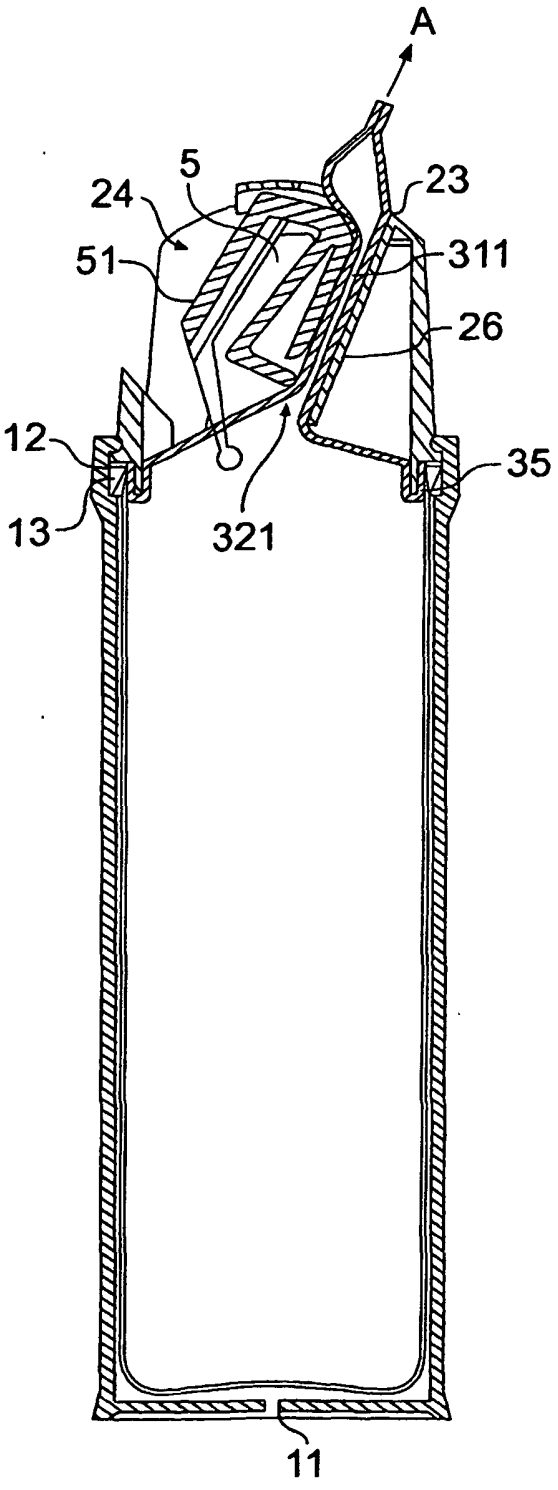

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Fig. 2

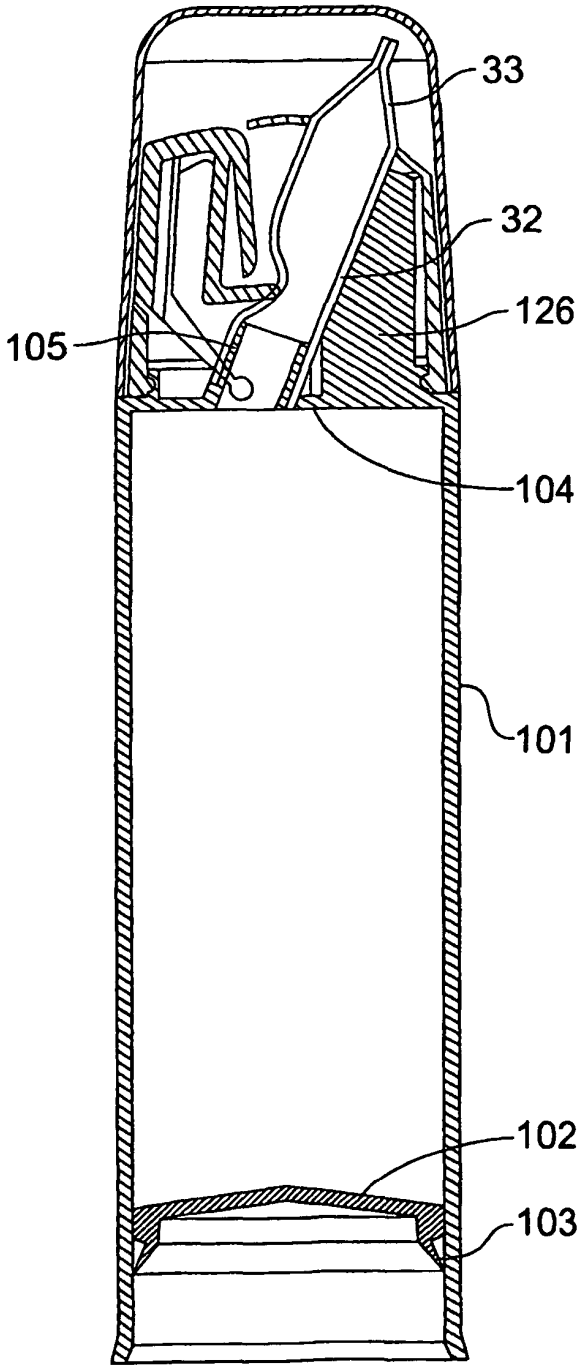



Fig. 3

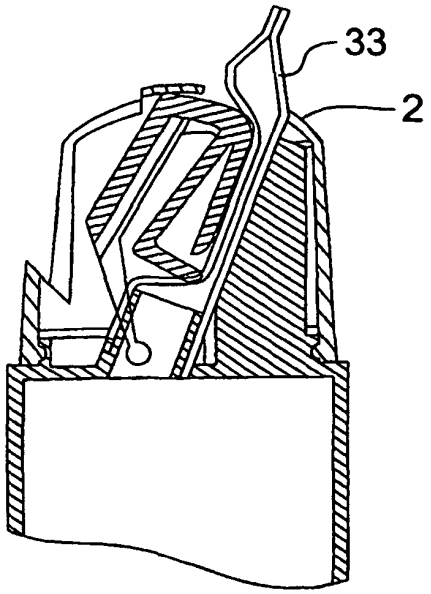



Fig. 4a

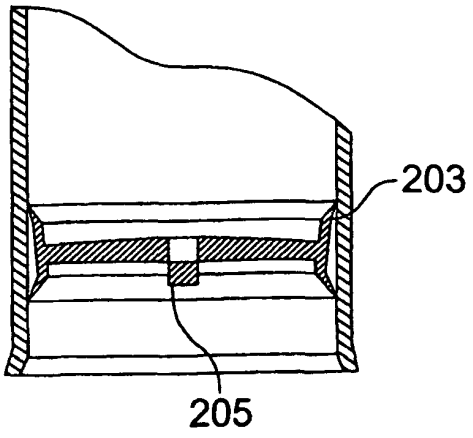



Fig. 4b

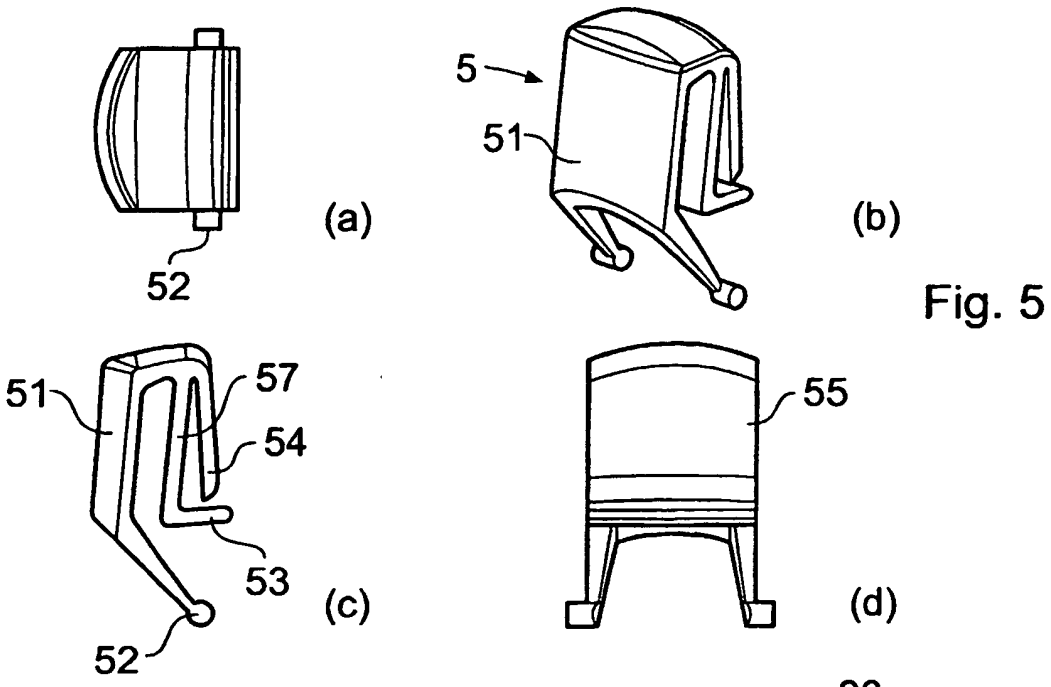



Fig. 5

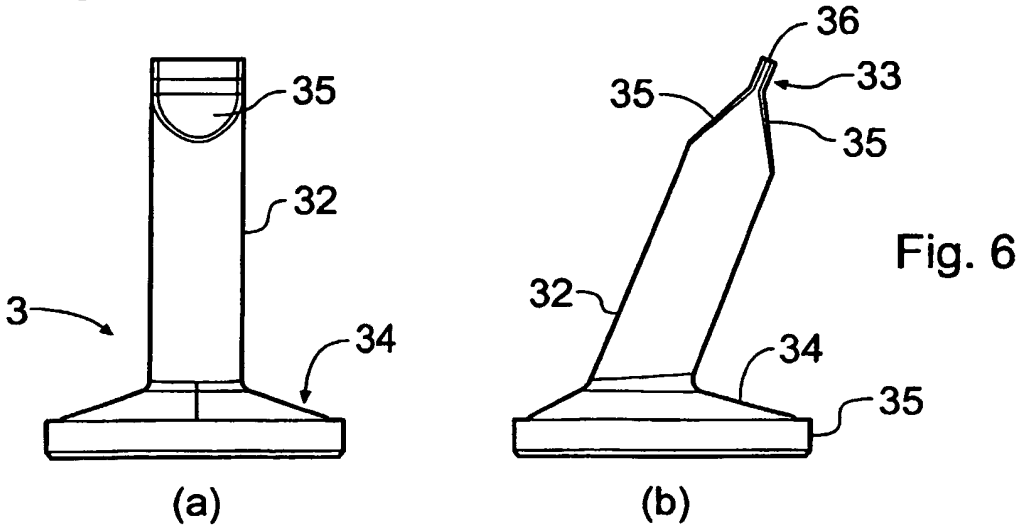



Fig. 6

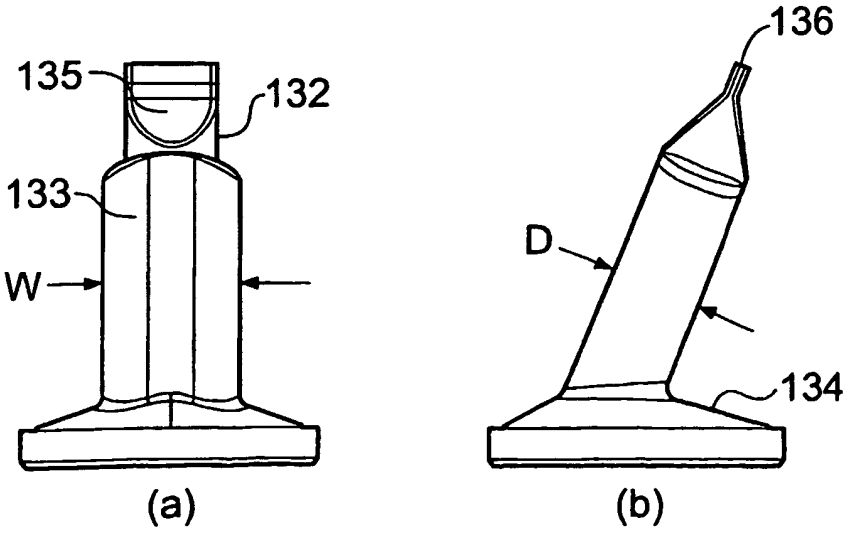



Fig. 7

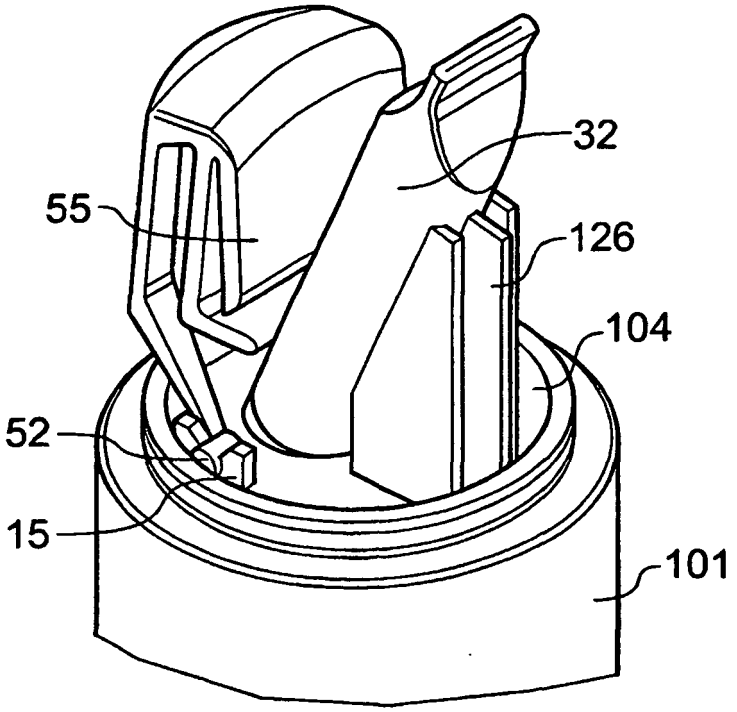



Fig. 8

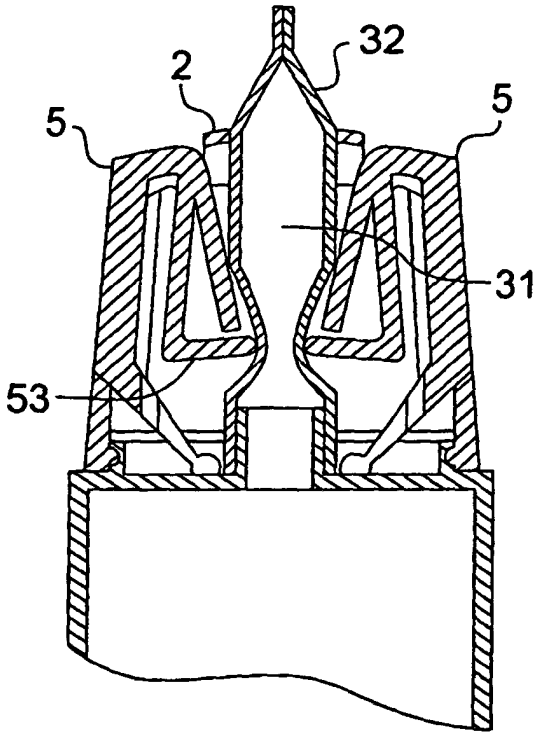



Fig. 9

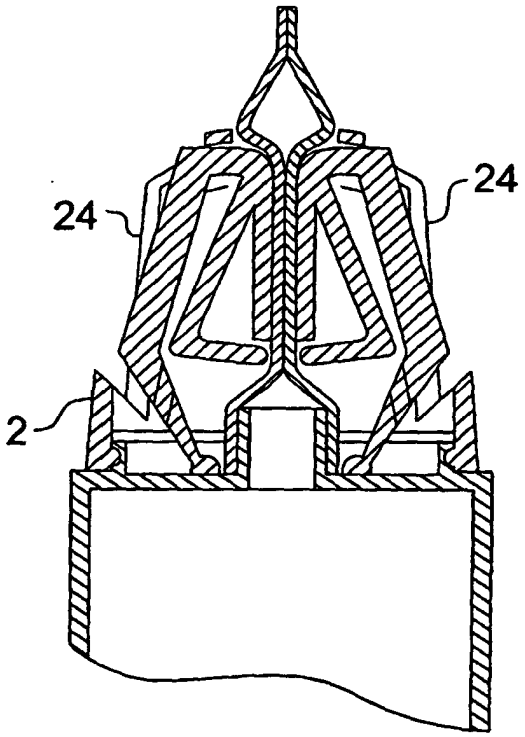



Fig. 10

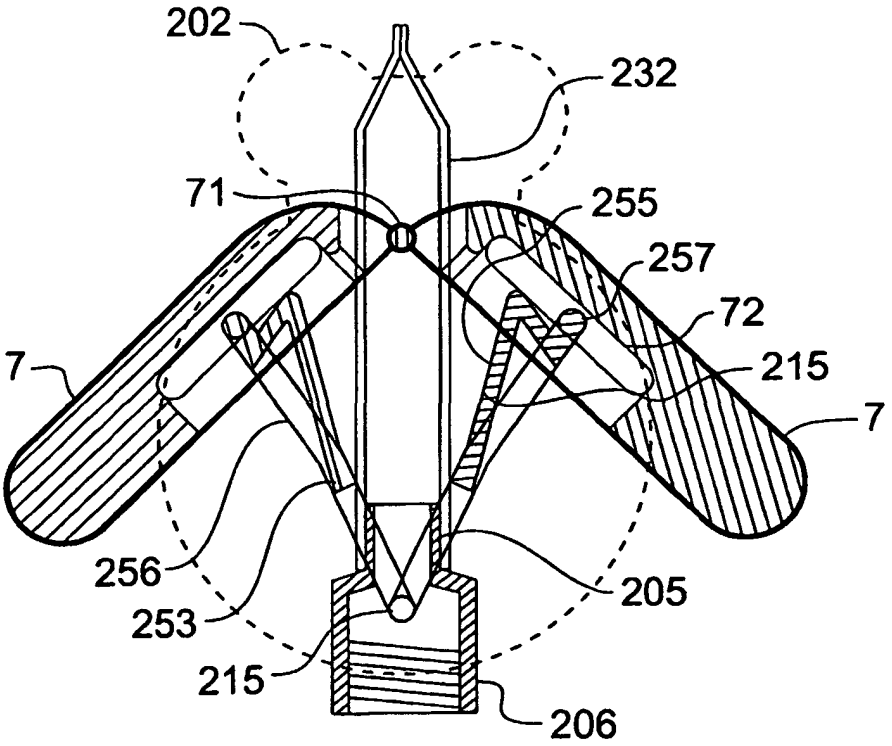



Fig. 11

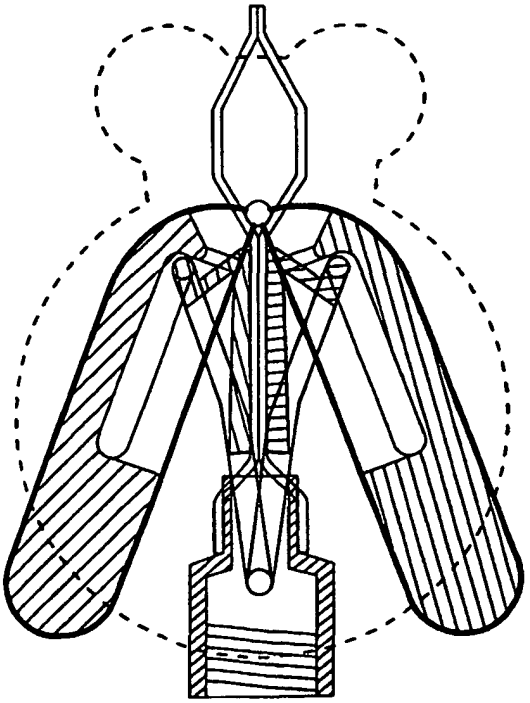


Fig. 12

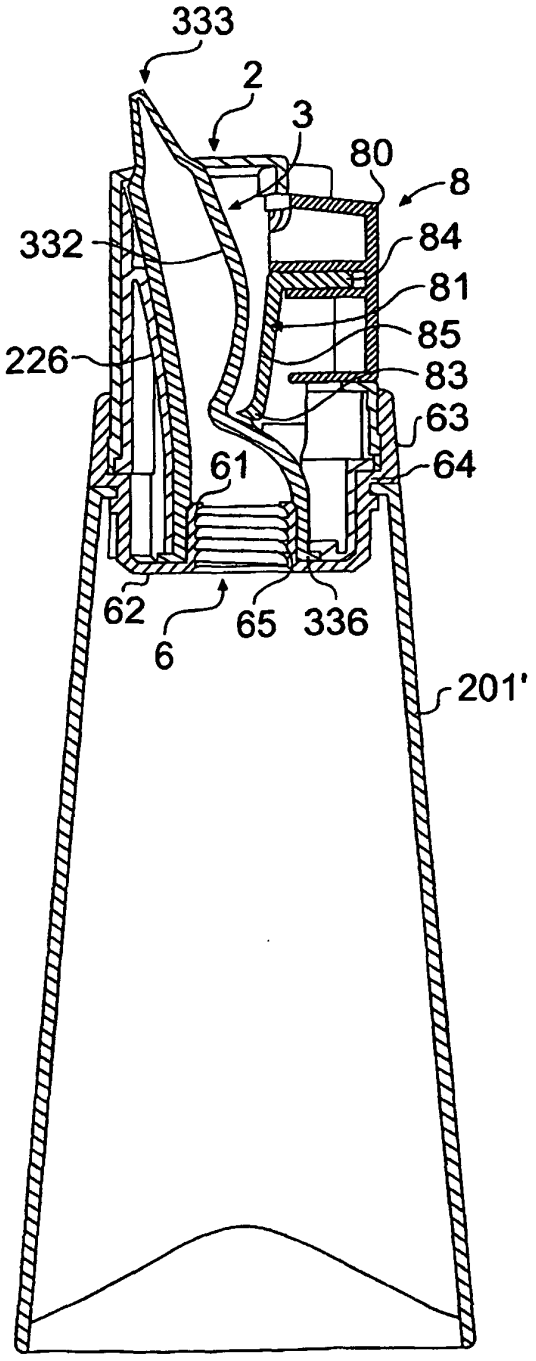



Fig. 13

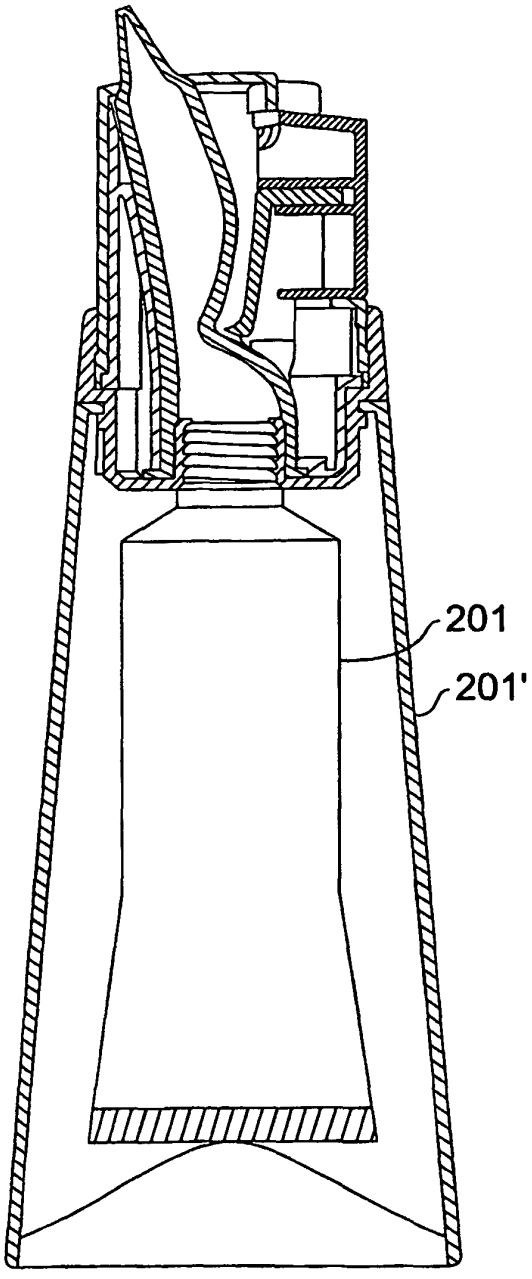



Fig. 14

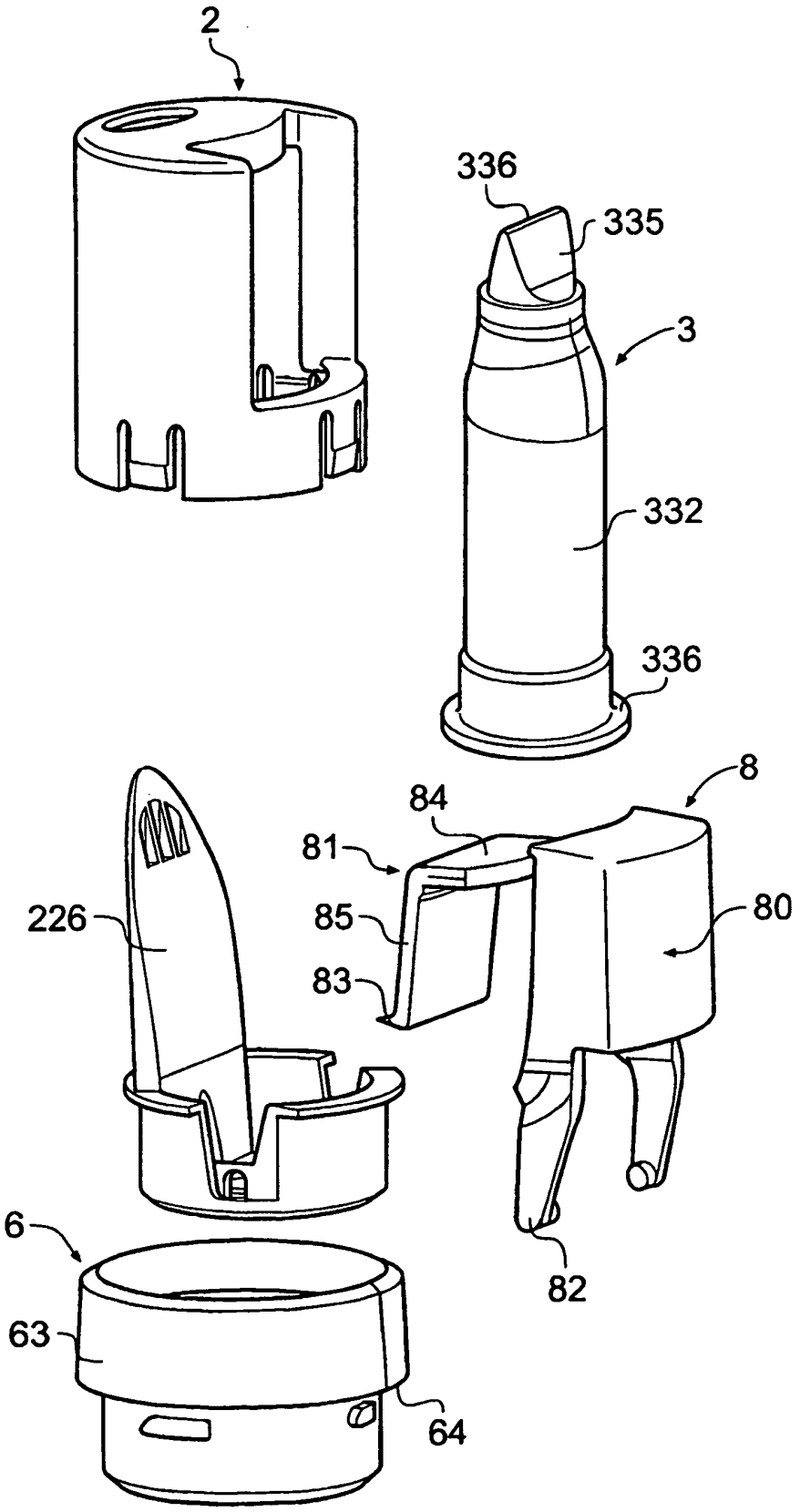



Fig. 15

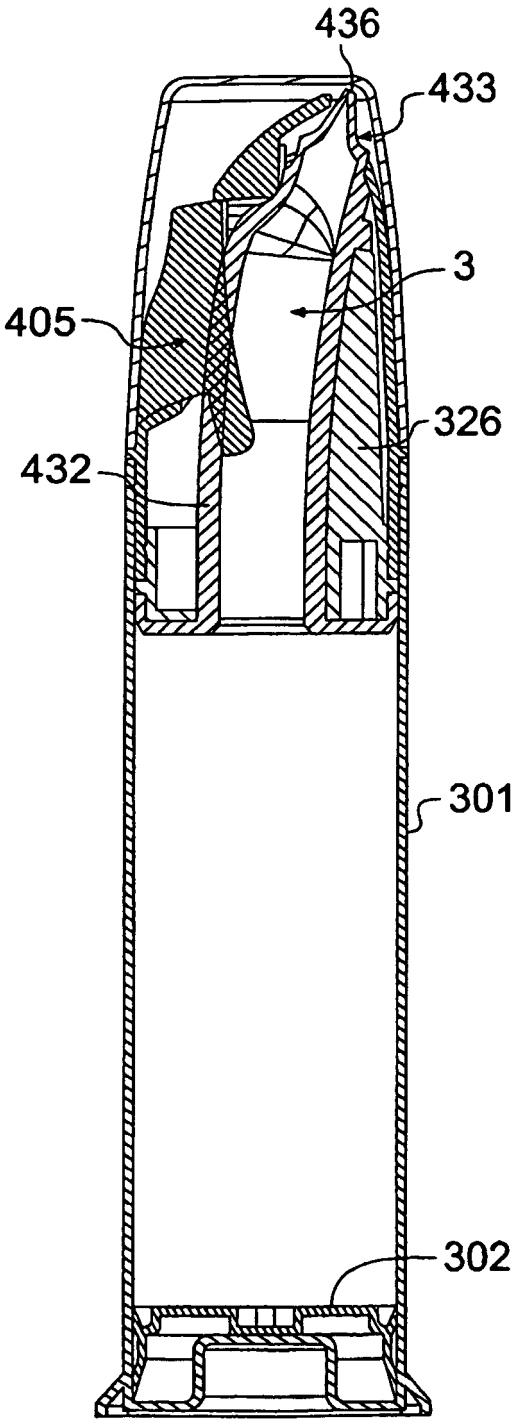



Fig. 16

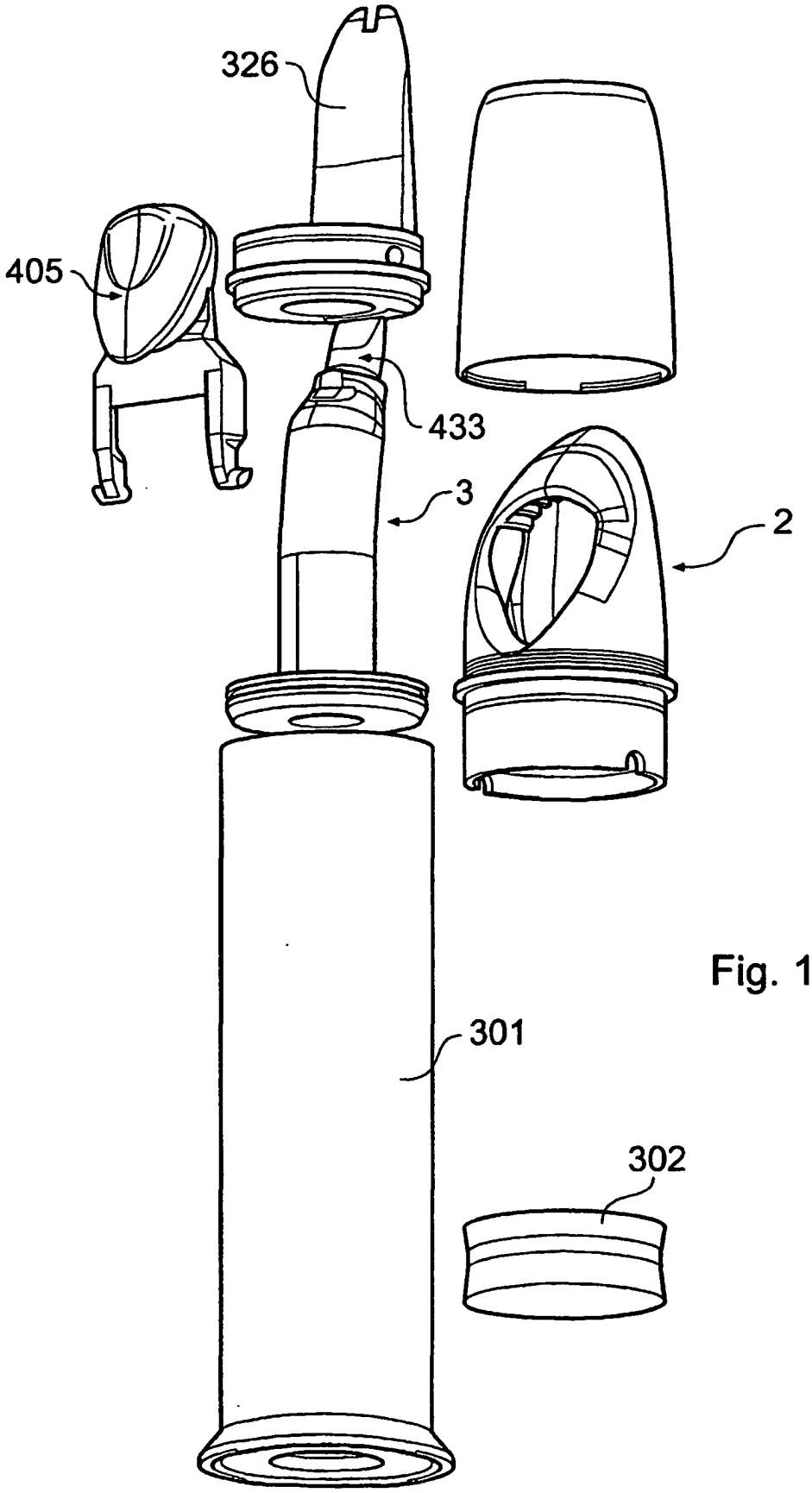



Fig. 17

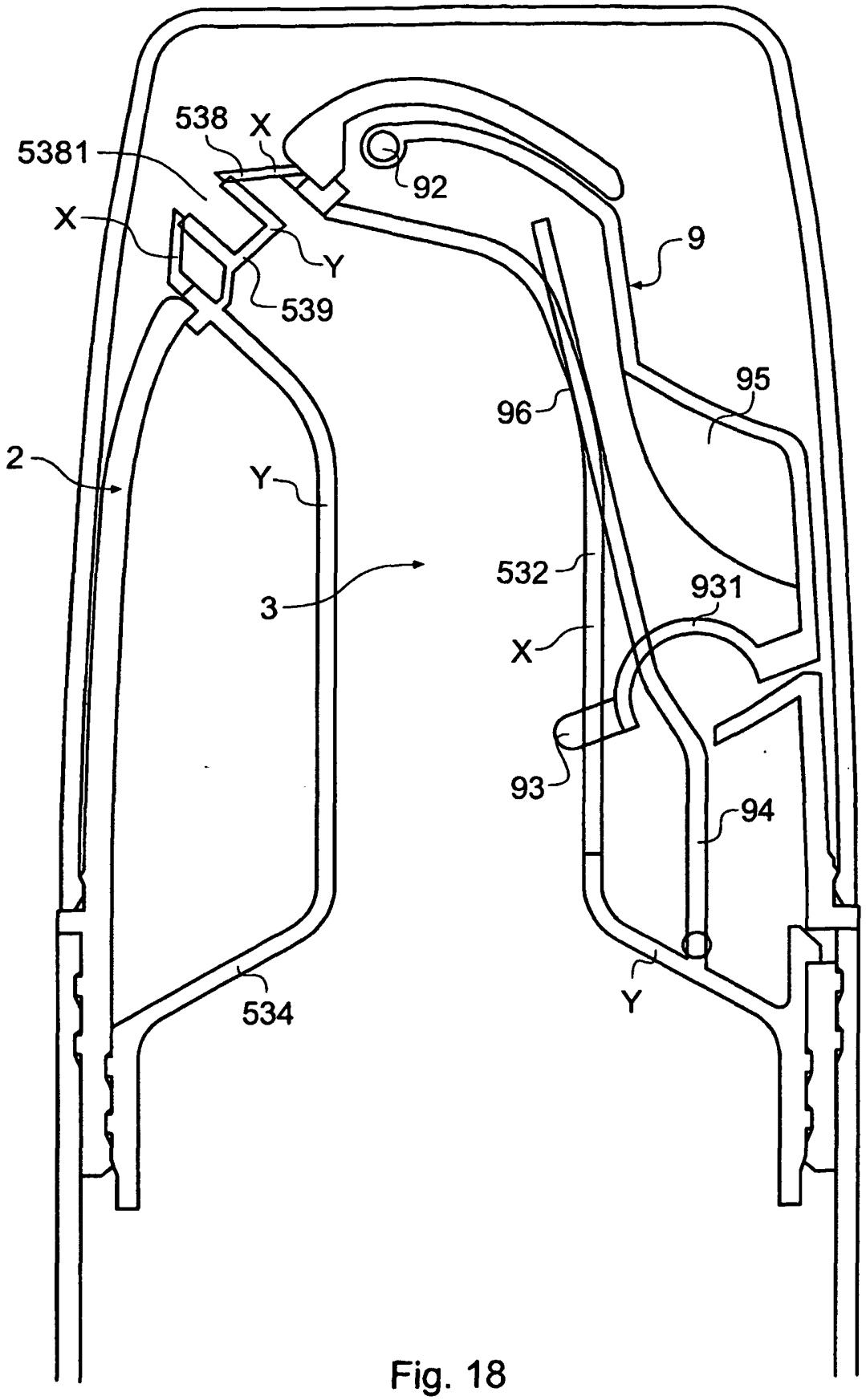



Fig. 18

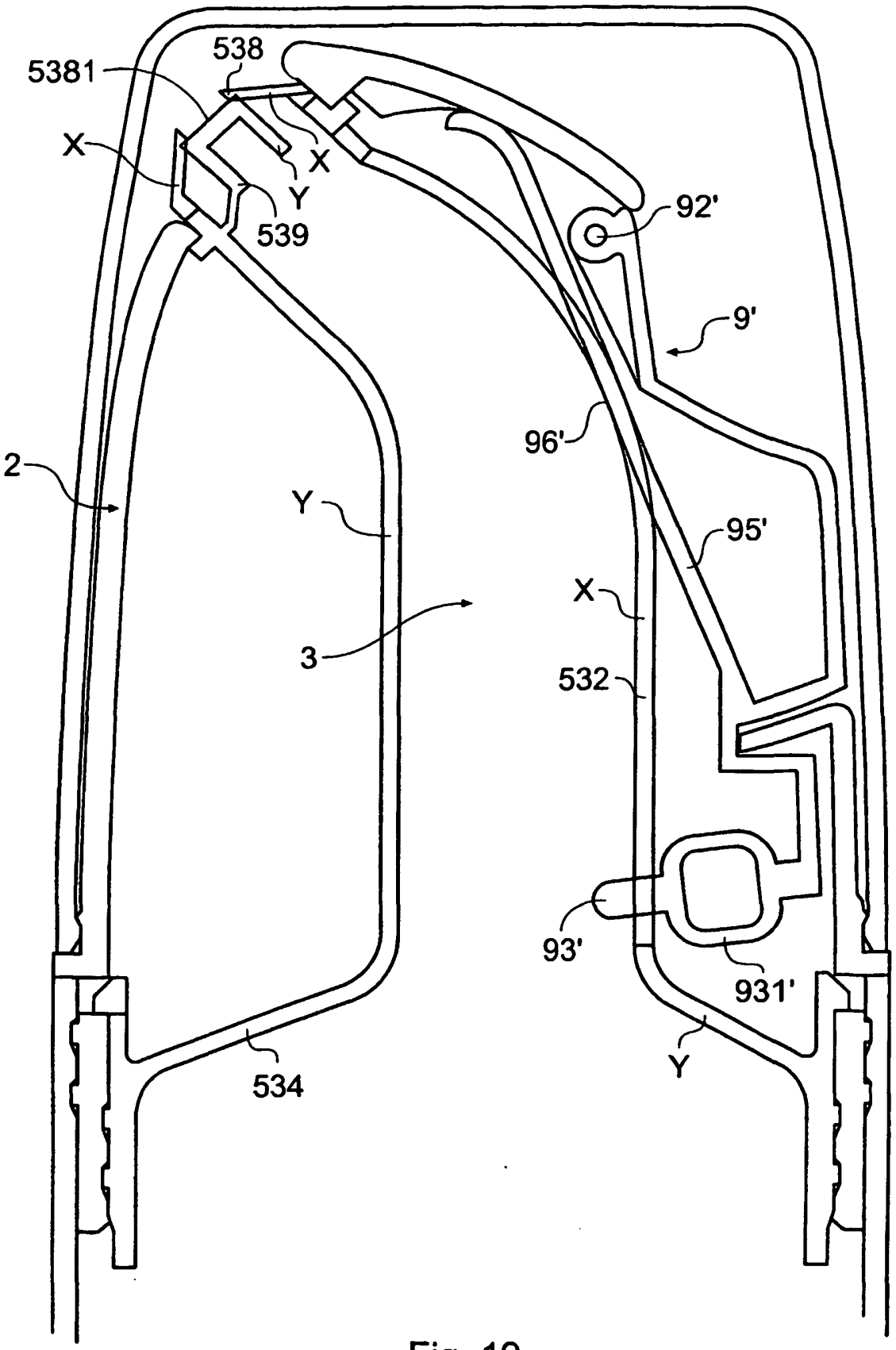



Fig. 19