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(54) **Dispensing head for dispensing a viscous material from a container**

(57) The invention relates to a dispensing head (2) for dispensing a viscous material from a container (1) comprising a body (20) having an engagement structure (224) for attaching the dispensing head (2) to the container (1). It further comprises an applicator surface (210) arranged at a distal end of the body. The body (20) comprises a channel the distal end of which opens out into the applicator surface (210). The inner wall (22) of the channel has an engagement contour (220, 221) thereon for a sealing member (12) to be removed from the con-

tainer (1). The dispensing head (2) further comprising a valve member (23) movably arranged in the channel between a first end position, in which the valve member (23) is retracted in the channel and a second end position, in which the valve member (23) covers the engagement contour (220, 221). At its distal end the valve member has an outer shape that corresponds to the shape of the engagement contour (220, 221) and comprises lips (233) which are resiliently flexible away inwardly.

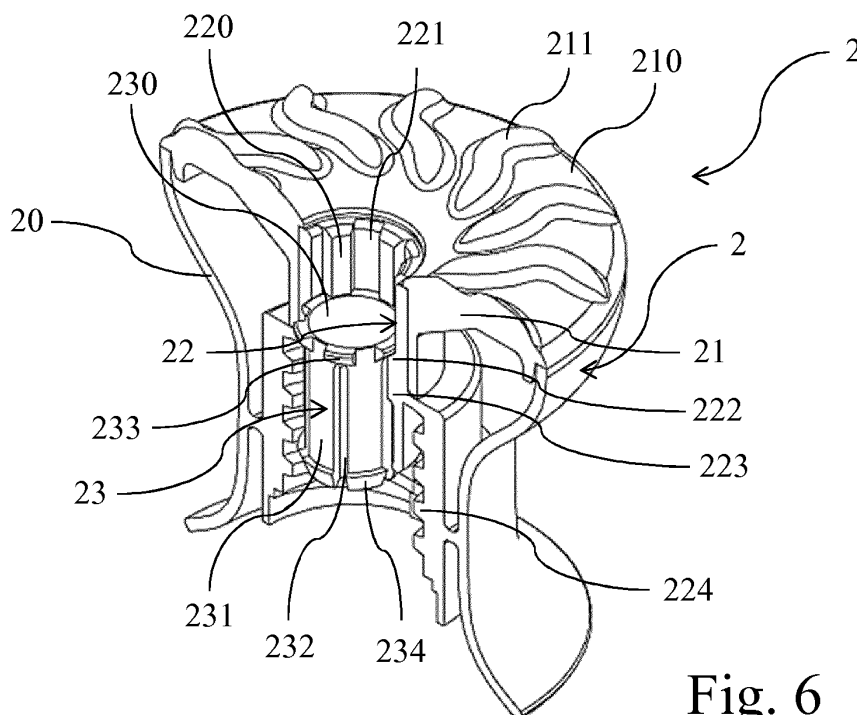


Fig. 6

Description

[0001] The present invention relates to a dispensing head for dispensing a viscous material from a container in accordance with the independent claim directed to the dispensing head.

[0002] Such viscous materials comprise for example creams, gels or pastes. They are typically stored in a container which may be a flexible squeezable tube or may be a rigid container from which the viscous material must be dispensed for being used in its respective field of application. Although the invention is applicable for numerous different types of viscous materials (e.g. lubricants, cleaning pastes, etc.) in various fields of application, one specific application is the dispensing of a cream or gel which is to be applied to the skin of a patient suffering from arthritis.

[0003] Such creams or gels may be provided in flexible tubes the neck of which is sealed at its top with an aluminum foil, with a cap being screwed onto the neck. For first use, the cap is unscrewed and the aluminum foil at the top of the neck must be pierced to form an outlet opening through which the cream or gel may then be dispensed by squeezing the tube. After use the opening formed in the aluminum foil remains unsealed, however, it is covered by screwing the cap onto the neck again.

[0004] It is also known to attach a dispensing cap to the container after having opened the container. The dispensing cap at its distal end comprises a valve having a cylindrical fixedly arranged central post which is surrounded by a resilient lip lying flat against the outer surface of the fixedly arranged central post, so that in the pressure-released state the container is closed by the lip lying flat against the post. Pressing the viscous material toward the resilient lip causes the resilient lip to laterally outwardly flex away from the post thus allowing the viscous material to flow through the gap formed between the flexed away lip and the post. Once the pressure is released again, the resilient lip returns back inwardly to lie flat against the outer wall of the post again, thus re-closing the container.

[0005] In addition, flexible tubes are known which are closed by a sealing member made of plastic which is integrally formed at the top of the tube's neck, instead of an aluminum foil that must be pierced. Integrally formed sealing members are advantageous as the piercing tool for piercing the aluminum foil is often provided at the top of the cap (so that the cap is unscrewed and turned upside down to allow the piercing tool to penetrate the aluminum foil) and gets soiled when penetrating the aluminum foil, since during penetration of the aluminum foil the piercing tool is dipped into the viscous material contained in the tube. On the other hand, integrally formed sealing members must be removed by a separate tool to generate an outlet opening at the top of the neck.

[0006] Sealing members integrally formed at the top of the tube's neck and having an outer engagement contour are also known. In particular, they may have a star-

like or other outer engagement contour allowing it to be engaged by a suitable tool and to be sheared off of the tube's neck. However, this would require a specifically shaped tool for shearing off the sealing member before first use. The cream or gel (or the viscous material in general) can then be pressed out of the tube through the outlet opening by squeezing the tube. If it is desired that the cream or gel be applied to the skin and concurrently massage the skin, the cream or gel must be pressed out of the tube through the outlet opening onto a separate applicator having a massager surface.

[0007] Or in more general terms, for a targeted application of the viscous material to a destination surface the viscous material must be removed from the container and applied to an applicator surface of a separate applicator first, with the aid of which the viscous material is then applied to the destination surface.

[0008] This is cumbersome, since several separate items are required for the targeted application of the viscous material to a destination surface. Firstly, a tool is required for shearing the sealing member off of the neck of the container. Secondly, a dispensing head for dispensing the viscous material is required. Thirdly, a separate applicator is required to the applicator surface of which the viscous material is to be dispensed, and from which the viscous material is then applied to the destination surface. And, finally, a cap is required for re-closing the tube after use. Also, handling of these various items is quite cumbersome.

[0009] The present invention overcomes the aforementioned drawbacks. In one aspect, the present invention is directed to a dispensing head as it is specified by the features of the independent claim directed thereto. The dispensing head according to the present invention serves as a tool for removing the sealing member, as a dispenser for dispensing the viscous material to an applicator surface, as an applicator from the applicator surface of which the viscous material is applied to the destination surface, and as a cap for closing the container, so that in general the dispensing head according to the invention it is the only item needed to perform all these operations.

[0010] In particular, the dispensing head for dispensing a viscous material from a container according to the invention comprises a body which is open at a proximal end of the body and comprises an engagement structure for attaching the dispensing head to the container. The body is closed by an applicator surface at a distal end of the body. The body further comprises a channel extending through the body. The distal end of the channel opens out into the applicator surface. The inner wall of the channel at the distal end of the channel has an engagement contour thereon for engaging a corresponding outer contour of a sealing member to be removed from the outlet of the container. The dispensing head further comprises a valve member movably arranged in the channel between a first end position, in which the valve member is retracted in the channel to expose the engagement con-

tion on the inner wall of the distal end of the channel, and a second end position, in which the movably arranged valve member covers the engagement contour on the inner wall of the distal end of the channel. At its distal end the valve member has an outer shape that corresponds to the shape of the engagement contour on the inner wall of the distal end of the channel to fit the engagement contour on the inner wall when the valve member is in the second end position. At its distal end the valve member comprises lips which are resiliently flexible away inwardly from the inner wall of the distal end of the channel. The valve member is sized and shaped to define one or more dispensing channels extending from the proximal end of the valve member to the lips when the valve member is in the second end position.

[0011] According to one aspect of the dispensing head according to the invention, the applicator surface comprises a massage structure provided thereon, for example ridges, bumps, spikes, or annular rings.

[0012] According to a further aspect of the dispensing head according to the invention, the dispensing head has an outer shape of an hourglass.

[0013] According to a still further aspect of the dispensing head according to the invention, the dispensing head has an outer shape having a polygonal portion.

[0014] According to yet another aspect of the dispensing head according to the invention, the engagement contour on the inner wall of the distal end of the channel has a gear-shaped profile, and the valve member at its distal end has a corresponding gear-shape with the lips forming the teeth of the gear.

[0015] According to a further aspect of the dispensing head according to the invention, the valve member comprises latches arranged at the proximal end of the valve member and protruding radially outwardly away from the valve member. The inner wall of the channel is provided with first and second abutment shoulders which are arranged at different axial positions along the inner wall of the channel. In the first end position of the valve member the lips at the distal end of the valve member abut against the first abutment shoulder while in the second end position of the valve member the latches abut against the second abutment shoulder.

[0016] According to a still further aspect of the dispensing head according to the invention, the engagement structure for attaching the dispensing head to the container comprises an inner thread.

[0017] According to a yet further aspect of the dispensing head according to the invention, the valve member and the applicator surface are made of an elastomeric plastic material, and the body is made of a thermosetting plastic material.

[0018] According to another aspect of the dispensing head according to the invention, the valve member comprises a cylindrical peg having a sidewall in the outer surface of which grooves are provided extending from the proximal end of the valve member in the axial direction toward the distal end of the valve member to a loca-

tion beneath the flexible lips. The grooves in the outer surface of the sidewall form part of the dispensing channels between the proximal end of the valve member and the lips at the distal end of the valve member.

[0019] In accordance with yet another aspect of the dispensing head according to the invention, the dispensing head further comprises a removable separate overcap covering at least the applicator surface.

[0020] The term "viscous material" as used herein is to be understood to denote a material (a viscous fluid/liquid or a paste, cream or gel) having a viscosity which is such that the viscous material is flowable through the dispensing channels upon the application of pressure, however, it does not itself flow through these channels by gravitational forces only. The viscosity may generally be in the range of 300 centipoise (cP) and 500000 centipoise (cP), and more preferably is in the range of 5000 centipoise (cP) and 10000 centipoise (cP), although not being limited to these ranges.

[0021] Generally, it is conceivable that the sealed container and the dispensing head be delivered with the dispensing head attached to the container or as separate items of a kit of parts. In the first case, the dispensing head must be detached from the container before the sealing member can be removed from the container using the dispensing head turned upside down by 180°, whereupon the dispensing head is attached to the container again for making the container ready to dispense the viscous material. In the latter case, the (already detached) dispensing head is directly used to remove the sealing member and is then attached to the container for making the container ready to dispense the viscous material.

[0022] The dispensing head may have any suitable shape. However, shapes enabling an easy handling of the dispensing head are preferred. For example, the dispensing head may have the outer shape of an hourglass, which can be easily gripped by a consumer. Alternatively, it may have an outer shape having a polygonal portion, for example a triangularly shaped portion which can be easily gripped by a consumer and which is advantageous in that forces can be easily applied resulting in the rotation of the dispensing head relative to the container (either for removing the seal or for screwing the dispensing head onto the container, as will be discussed below). However, any other suitable shapes such as cylinders or asymmetrical shapes such as ellipses are possible.

[0023] The engagement structure of the body of the dispensing head may be any suitable structure such as a thread, a bayonet catch, a snap lock, etc., engaging a corresponding attachment structure provided on the container to attach the dispensing head to the container.

[0024] At the distal end, the body of the dispensing head has an applicator surface. This applicator surface may either form an integral part of the body (forming the distal end surface of the body) or may be the outer surface of a separate applicator piece firmly mounted to the body (the body must then be open at its distal end to allow for

mounting of the applicator piece to the body). The applicator surface may be adapted to the specific type of application of the viscous material, as will be discussed in more detail below. For example, in the case of a cream or gel for the treatment of osteoarthritis the applicator surface may comprise a massage structure provided thereon, and this massage structure may comprise ridges, bumps, spikes annular rings, or any other structure useful in massaging. Of course, for other applications the structure on the applicator surface may be quite different or no such structure may be present on the applicator surface.

[0025] The body further comprises a channel extending through the body, and the distal end of this channel opens out into the applicator surface. This channel allows the viscous material to be dispensed from the interior of the container and to flow through the channel onto the applicator surface upon the application of pressure on the viscous material. Application of pressure on the viscous material may be achieved in different ways, for example movement of a piston in the interior of the container towards the distal end of the container may generate the pressure, but in case of flexible tubes as containers pressure on the viscous material can be applied manually by squeezing the flexible tube.

[0026] At the distal end of the channel an engagement contour is provided on the inner wall of the channel. This engagement contour is intended for engaging a corresponding outer contour of a sealing member which is provided on outlet of the container and seals the container, for example the flexible tube. By way of example, such engagement contour on the inner wall of the channel has a gear-shaped profile and, correspondingly, the outer contour of the sealing member is also a gear-shaped. Thus, inserting the sealing member into the distal end of the channel results in engagement of the outer contour of the sealing member and the engagement contour on the inner wall at the distal end of the channel, so that subsequently twisting the dispensing head clockwise or counterclockwise results in the sealing member being sheared off of the container, thus severing the sealing member from the container.

[0027] In the channel of the dispensing head there is arranged a valve member which can be moved between a first end position and a second end position. In the first end position, the valve member is retracted in the channel to expose the afore-mentioned engagement structure on the distal end of the inner wall of the channel. In this first end position, the sealing member can be inserted into the distal end of the channel whereupon the dispensing head can be twisted to shear the sealing member off of the container, as has been described above. Once this has been performed, the sealing member is severed from the container but is still arranged in the distal end of the channel. The dispensing head is subsequently turned upside down by 180°, and the engagement structure of the dispensing head is brought into engagement with the attachment structure on the container. For example, the

dispensing head is screwed onto the neck of the container. By doing this, the valve member is moved axially from its first end position to its second end position, since the neck of the container abuts against the proximal end of the valve member, so that screwing the dispensing head onto the neck of the container causes a relative axial movement of the neck of the container towards the distal end of the dispensing head.

[0028] For establishing well-defined first and second end positions of the valve member, the channel may be provided with first and second abutment shoulders which are arranged at different axial positions along the channel. The valve member may comprise latches arranged at the proximal end of the valve member, and these latches may protrude radially outwardly away from the valve member. At the distal end, the valve member comprises lips which are resiliently flexible away inwardly from the inner wall of the distal end of the channel. When the valve member is in the first end position, these lips abut against the first abutment shoulder. In the second end position of the valve member, the latches abut against the second abutment shoulder.

[0029] The lips at the distal end of the valve member have an outer shape, for example the afore-described gear shape, which corresponds to the shape of the engagement contour on the inner wall of the channel at the distal end of the channel, so that the valve member fits the engagement contour on the inner wall of the channel when the valve member is in the second end position. However, the valve member in its entirety is sized and shaped to define one or more dispensing channels extending from the proximal end of the valve member to the lips when the valve member is in the second end position. The dispensing channels comprise spaces formed between the outer contour of the valve member and the inner wall of the channel, but may comprise additional structures such as grooves provided in the outer wall of the valve member, as will be discussed in more detail below. Upon the application of pressure to the viscous material (for example by pressing the flexible tube in which the viscous material is contained), the viscous material is squeezed through the outlet opening in the neck of the tube and pressed through the dispensing channels towards the lips. Upon reaching the lips, the viscous material under pressure flexes the lips inwardly away from the inner wall of the channel, thus forming gaps allowing the viscous material to pass through onto the applicator surface. Once sufficient viscous material has been dispensed onto the applicator surface, the pressure is released (for example squeezing of the tube is terminated) and the application surface is placed on the destination surface (for example the skin of the user) to apply the viscous material to the destination surface, and this may be performed, for example, in combination with a massaging action.

[0030] The valve member can be made of an elastomeric material, for example a thermoplastic elastomer, a thermoplastic poly-urethane, nitrile rubber, SEBS pol-

ymers (styrene-ethylene/butylene-styrene, e.g. Kraton® G SEBS polymers available from the company Kraton Polymers U.S. LLC, Houston, Texas, United States of America), a fluoroelastomer, thermoset polyurethanes, or silicone. The effective durometer (softness) of the valve member may be between 20 Shore-A to 90 Shore-A, for example. The applicator surface, in particular the afore-mentioned massager surface, may be composed of the same plastic material as the valve member (for reasons of economic production), but may also be composed of a rigid plastic or even of a metal or a ceramic so as to have a cooling effect, for example.

[0031] Optionally, the dispensing head may comprise an overcap which may be placed over the dispensing head after use of the dispensing head while the dispensing head remains attached to the container (for example to the flexible tube). Such overcap provides for additional protection of the applicator surface against soiling and/or contamination, although generally the resilient lips at the distal end of the valve member provide for sufficient protection against contamination of the viscous material in the container. Such overcap may advantageously be made from a plastic material (easy to manufacture) but may also be made from any suitable material other than plastic.

[0032] While generally the overcap may be a simple overcap comprising a top surface and a cylindrical skirt only, the overcap may additionally be provided with a centrally arranged spike depending downwardly from the top surface of the overcap parallel to the skirt. In this case, the valve member may be provided with a central axially running blind hole for accommodating the spike as the overcap is placed over the dispensing head, and this blind hole may have an inner diameter that tightly fits the outer diameter of the spike. Upon insertion of the spike into the blind hole the valve member may slightly be expanded outwardly to press the valve member against the inner wall of the channel so as to further improve the seal provided by the valve member or to reduce the gap between the valve member and the inner wall of the channel.

[0033] As already mentioned, another aspect of the invention relates to a kit of parts, wherein the kit comprises a container containing the viscous material and a dispensing head as described above with respect to various different aspects, the kit comprising the container and the dispensing head as separate disassembled parts. The container comprises a container body containing the viscous material, an attachment structure and an outlet sealed by a sealing member having an outer contour. As regards the dispensing head, the engagement contour on the inner wall of the distal end of the channel through the body of the dispensing head is shaped to correspond to the outer contour of the sealing member sealing the outlet of the container. The engagement structure of the dispensing head is shaped to engage the attachment structure on the container for attachment of the dispensing head to the container, so that after removal of the

sealing member (to open the container) the dispensing head can be mounted to the container for dispensing the viscous material.

[0034] Another aspect of the invention relates to a container containing a viscous material and a dispensing head as described above with respect to various different aspects, the container and the dispensing head being pre-assembled. The container comprises a container body containing the viscous material, an attachment structure and an outlet sealed by a sealing member having an outer contour. The dispensing head is attached to the container through engagement of the engagement structure of the dispensing head with the attachment structure of the container. The engagement contour on the inner wall of the distal end of the channel through the body of the dispensing head is shaped to correspond to the outer contour of the sealing member sealing the outlet of the container. To open the container, the dispensing head must be detached from the container first (for example by unscrewing it from the neck of the container) and must be turned upside down by 180°. The sealing member is then inserted into the distal end of the channel bringing the outer contour of the sealing member into engagement with the engagement contour provided on the inner wall of the distal end of the channel. Upon twisting the dispensing head the sealing member is then sheared off of the container (severed from the container) to create an outlet opening for the viscous material. The dispensing head is then turned back again by 180° and mounted to the container (e.g. it is screwed onto the neck of the container). The valve member is thereby pushed into the second end position and the sealing member is ejected through the distal end of the channel, as this has already been described above. The container with the dispensing head mounted thereto is now ready for dispensing.

[0035] Yet another aspect of the invention relates to a method for applying a viscous material contained in a container to a destination surface. The method comprises the steps of

- providing a container comprising a container body containing the viscous material, an attachment structure and an outlet sealed by a sealing member having an outer contour;
- providing a dispensing head as described above with respect to various different aspects, the engagement contour on the inner wall of the distal end of the channel through the body of the dispensing head corresponding to the outer contour of the sealing member sealing the container, and the engagement structure of the dispensing head being shaped to engage the attachment structure of the container;
- inserting the sealing member into the distal end of the inner wall of the channel of the dispensing head with the valve member being in the first end position

so that the outer contour of the sealing member and the engagement contour on the distal end of the inner wall of the channel through the body of the dispensing head are fittingly engaged;

- twisting the dispensing head and the container relative to each other either clockwise or counter-clockwise about a longitudinal axis of the dispensing head to sever the sealing member from the container;
- turning the dispensing head upside down and bringing the engagement structure of the dispensing head into engagement with the attachment structure of the container to attach the dispensing head to the container and to move the valve member to its second end position, thereby ejecting the severed sealing member through the distal end of the channel;
- applying pressure to the viscous material contained in the body of the container thereby dispensing the viscous material through the dispensing channels towards the resiliently flexible lips at the distal end of the valve member and causing the lips to flex inwardly for allowing the viscous material to flow through to the applicator surface, and
- placing the applicator surface with the viscous material thereon on the destination surface.

[0036] According to another aspect of the method according to the invention, the container is a tube made of a flexible material, and the step of applying pressure to the viscous material contained in the body of the container is performed by squeezing the tube.

[0037] Further advantageous aspects of the invention will become apparent from the following description of embodiments of the invention with the aid of the drawings in which:

Fig. 1 shows a perspective view of a flexible tube (container) with an embodiment of a dispensing head according to the invention screwed onto the neck of the flexible tube;

Fig. 2 shows a perspective view of the flexible tube of Fig. 1 without the dispensing head;

Fig. 3 shows a perspective view of the dispensing head of Fig. 1 only;

Fig. 4 shows in a perspective view the dispensing head of Fig. 1 turned upside down by 180°, with the sealing member of the flexible tube of Fig. 2 being inserted into the distal end of the channel of the dispensing head for removal of the sealing member;

Fig. 5 shows the dispensing head of Fig. 1 attached

to the flexible tube again with the removed sealing member being pushed out of the channel;

Fig. 6 shows a sectional view of the dispensing head of Fig. 3 with the valve member in a first end position;

Fig. 7 shows a sectional view of the dispensing head of Fig. 3 with the valve member in the second end position;

Fig. 8 shows a perspective view of the dispensing head of Fig. 3 with an overcap; and

Fig. 9 shows a sectional view of the dispensing head of Fig. 8 with an overcap and with the valve member in the second end position.

[0038] In Fig. 1 a container embodied as a flexible tube 1 is shown which is generally known per se and to which an embodiment of a dispensing head 2 according to the invention is attached. The viscous material is contained in the body 10 of the flexible tube 1. Attachment of the dispensing head 2 to the flexible tube 1 may be performed by a threaded connection, as will be explained in more detail below. This is an example of how a cream or gel for the treatment of arthritis may be provided to patients through pharmacies or suitable shops while the flexible tube 1 is sealed by a sealing member, as will be explained in more detail below. Alternatively, dispensing head 2 and flexible tube 1 can be delivered as separated parts in a kit of parts, so that no unscrewing of dispensing head 2 from flexible tube 1 is required. This separated delivery of the dispensing head 2 and the flexible tube 1 may be preferred, since in this case the tube is sealed by the sealing member, and the dispensing head 2 can be provided in a thin sealed plastic cover which need only be opened before first use and may remain sealed until first use. Another advantage of the separated delivery of the flexible tube 1 and the dispensing head 2 is that the dispensing head 2 can be delivered with the valve member being in the first end position already which may not possible if the flexible tube 1 is delivered with the dispensing head being attached thereto, as will become apparent from the more detailed description below.

[0039] Although the invention will be explained with particular reference to a cream or gel for the treatment of arthritis, it is to be understood that this field of application is exemplary only and other fields of application are of course intended to be encompassed by the present invention.

[0040] In case the patient wants to apply the cream or gel contained in the body 10 of the flexible tube 1 to his or her skin covering the joint or bones to be treated and the flexible tube 1 is delivered with the dispensing head 2 being screwed thereon, the patient first has to remove dispensing head 2 from the flexible tube 1 through unscrewing, as this is schematically indicated by the hands

shown in Fig. 1. In case the dispensing head 2 and the flexible tube 1 are already delivered separated from each other, no unscrewing of the dispensing head 2 from the flexible tube 1 is required. Depending on whether or not the dispensing head 2 is covered by a thin plastic foil, such plastic foil must eventually be removed.

[0041] Once the dispensing head 2 and the flexible tube 1 are available as separated parts (either by unscrewing the dispensing head 2 from tube 1, or by delivery of dispensing head 2 and tube 1 as separated parts), the neck 11 of the tube 1 sealed by a sealing member 12 integrally connected to the neck 11 at the top end thereof (that end remote from the body 10 of the tube 1) is exposed, as can be seen best in Fig. 2. While generally the sealing member 12 can have various outer contours, in the embodiment shown in **Fig. 2** the sealing member 12 is embodied to have a gear-shaped outer contour having six gear teeth 120 equally distributed around the circumference.

[0042] Dispensing head 2 is shown in **Fig. 3** (with the valve member in the first end position, i.e. retracted in the channel as will be described further below with reference to Fig. 6) and has the shape of an hourglass, although other shapes are also intended to be covered by the invention (see further above). Dispensing head 2 comprises a body 20 which is open at its proximal end (not visible in Fig. 3, refer to Fig. 6) and which is closed at its distal end by an applicator piece 21 having an applicator surface 210. Applicator surface 210 - in the embodiment shown - is the outer surface of a separately manufactured applicator piece 21 firmly mounted to the body 20 of dispensing head 2 so that the applicator piece 21 and the body 20 of dispensing head 2 together form a single item. In the embodiment shown, the applicator piece 21 has a shape similar to a mushroom (see Fig. 6 or Fig. 7). A massage structure such as curved ridges 211, bumps, spikes, annular rings, or any other suitable massage structure may be provided on the applicator surface 210.

[0043] A channel extends through the body 20 of dispensing head 2, and the distal end of this channel opens out into the applicator surface 210. At least at the distal end of the channel, the inner wall 22 of the channel is provided with an engagement contour comprising six axially extending ribs 220 and recesses 221, which in the embodiment shown are alternately and equidistantly arranged on the inner wall 22 of the channel when viewed in circumferential direction, so that the inner wall 22 of the channel at least at its distal end exhibits a gear-shaped profile that corresponds to the outer contour formed by the gear teeth 120 of sealing member 12 sealing the flexible tube 1 before first use.

[0044] To open the flexible tube 1 the dispensing head 2 must be turned upside down by 180° (relative to the dispensing position or orientation) and the sealing member 12 inserted into the distal end of the channel of dispensing head 2, as this can be seen best in **Fig. 4**. In case dispensing head 2 is delivered as a separate part,

the valve member 23 may already be in the first end position (see Fig. 6) to expose the ribs 220 and recesses 221 provided on the inner wall 22 at the distal end of the channel. In case the dispensing head 2 has been unscrewed from the neck 11 of the container 1, it may be necessary before or during insertion of the sealing member 12 into the distal end of the channel to push valve member 23 into its first end position in which it is retracted in the channel to expose the ribs 220 and recesses 221.

[0045] This first end position of the valve member 23 is shown in detail in **Fig. 6**. As can be seen there, the valve member 23 comprises a cylindrical solid peg 230 in the outer surface of the sidewall 231 of which axially running grooves 232 are provided. In the embodiment shown, the grooves 232 are running straight and extend from the proximal end of the peg 230 to a location beneath resiliently flexible lips 233 which are equidistantly arranged about the circumference of the peg 230 at the distal end thereof. These resiliently flexible lips 233 closely fit the recesses 220 formed in the inner wall 22 of the distal end of the channel, as will be explained in more detail below. At its proximal end, peg 230 comprises latches 234 protruding radially outwardly away from peg 230.

[0046] As can be seen further from Fig. 6, a first abutment shoulder 222 is provided on the inner wall 22 of the channel at a first axial position along the inner wall 22 of the channel, and a second abutment shoulder 223 is provided at a second axial position along the inner wall 22 of the channel. In the first end position of the valve member 23 shown in Fig. 6 the flexible lips 233 arranged at the distal end of peg 230 abut against the first abutment shoulder 222 preventing valve member 23 from being pushed further into the channel. In the second end position of valve member 23 (see Fig. 7) the latches 234 arranged at the proximal end of peg 230 abut against the second abutment shoulder 223 preventing valve member 23 from being pushed out through the distal end of the channel. Thus, the valve member 23 can be mounted to the dispensing head 20 by inserting it into the distal end of the channel with the proximal end of valve member 23 first and pushing valve member 23 forward towards the proximal end of dispensing head 2 until the latches 234 snap over the second abutment shoulder 223 and further until the resiliently flexible lips 233 abut against the first abutment shoulder 222. The valve member 23 is now in its first end position in which the sealing member 12 can be inserted into the channel to bring the gear teeth 120 of the sealing member 12 on the tube neck 11 into engagement with the engagement contour (the axially extending ribs 220 and 221 provided on the inner wall 22 at the distal end of the channel).

[0047] Turning back to **Fig. 4**, once the engagement contour (the axially extending ribs 220 and recesses 221) provided on the inner wall 22 at the distal end of the channel is in engagement with the gear teeth 120 of the sealing member 12 sealing the outlet of the tube 1, dispensing head 2 and tube 1 are twisted relative to each other either

clockwise or counter-clockwise, for example by a half turn of the tube 1. This twisting movement causes the sealing member 12 to be sheared off of the neck 11 of the flexible tube 1 (the sealing member 12 is severed from the neck 11) thus creating an outlet opening (a hole surrounded by a rim) in the neck 11 of the flexible tube 1.

[0048] The sealing member 12 severed from the neck 11 is then still arranged in the channel and, for the time being, remains in the channel of the dispensing head 2. Dispensing head 2 is then turned back again 180° to its dispensing position and is screwed onto the tube with the aid of the outer threads 110 provided on the neck 11 of flexible tube 1 and the inner threads 224 (see Fig. 6) provided in the channel in the interior of the body 20 of dispensing head 2. In doing this, the rim around the outlet of the tube (generated by shearing off the sealing member 12) abuts against the lowermost surfaces of the latches 234 at the proximal end of the peg 230 and screwing the dispensing head onto the neck 11 of the tube 1 action makes the valve member 23 move from its first end position to its second end position thereby ejecting the severed sealing member 12 through the distal end of the channel, as this is shown in Fig. 5, and making the tube with the attached dispensing head 2 ready for dispensing the cream or gel.

[0049] This second end position of the valve member 23 is shown in detail in Fig. 7. As can be seen there, the valve member 23 (or to be more precise, the distal end thereof) practically forms an integral part of the applicator surface 210. The resiliently flexible lips 233 arranged at the distal end of peg 230 about the circumference thereof are closely fitting into the recesses 221 provided on the inner wall 22 at the distal end of the channel, and similarly the ribs 220 provided between the recesses 221 are closely fitting to the sidewall 231 of the peg 230 between the flexible lips 233. In this second end position, the valve member 23 covers the engagement contour at the distal end of the channel. As a result, the flexible tube 1 is sealed against contamination due to the close fit of the valve member 23 and the engagement contour on the inner wall 22 of the distal end of the channel (ribs 220 on inner wall 22 and sidewall 231 of peg 230; recesses 221 on inner wall 22 and resiliently flexible lips 233 of peg 230). Nevertheless, it is possible to dispense the cream or gel onto the applicator surface 210 as will be explained below.

[0050] When the valve member is in the afore-described second end position, due to the close fit of the ribs 220 on inner wall 22 and the sidewall 231 of peg 230 there are practically no gaps between the sidewall 231 and the ribs 220. However, gaps are formed between the sidewall 231 of peg 230 and the recesses 221 on inner wall 22, and in addition the axially running grooves 232 starting at the proximal end of the peg 230 and extending to a location just beneath the flexible lips 233 increase the depth of the gaps. The axially running grooves 232 and the gaps formed between the sidewall 231 of peg 230 and the recesses 220 together form dis-

persing channels for the cream or gel contained in the flexible tube, and these dispensing channels extend from the proximal end of the valve member 23 to a location directly beneath the resiliently flexible lips 233.

[0051] Accordingly, upon squeezing the flexible tube 1 the cream or gel is expelled through the outlet opening of the tube 1 and flows through the axially running grooves 232 and the gaps between the sidewall 231 of peg 230 and the recesses 221 until the cream or gel reaches the flexible lips 233. Continued application of pressure then leads to the resiliently flexible lips 233 flexing away inwardly from the inner wall 22 thus creating a gap between the flexible lips 233 and the recesses 221 and allowing the cream or gel to pass through to the applicator surface 210. This application of cream or gel to the applicator surface 210 continues until pressure is released (i.e. until squeezing of the tube 1 is terminated). Once pressure is released, the resiliently flexible lips 233 return to their original position reclosing the gap between the resiliently flexible lips 233 and the recesses 221 so that the flow of cream or gel to the applicator surface is terminated. The tube 1 is then automatically sealed again by the fitting shapes of the outer contour of the valve member 23 and the engagement contour on the inner wall 22 at the distal end of the channel (ribs 220 on inner wall 22 and sidewall 231 of peg 230; recesses 221 on inner wall 22 and resiliently flexible lips 233 of peg 230).

[0052] Optionally (as shown in Fig. 8 and Fig. 9), an overcap 3 may be placed over the applicator surface 210 to provide for an additional seal. While generally such overcap 3 may be a simple overcap comprising a top surface 31 and a cylindrical skirt 30 only, the overcap may additionally be provided with a centrally arranged spike 32 depending downwardly from the top surface 31 of the overcap parallel to the skirt 30. In this case, the valve member may optionally be provided with a central axially running blind hole for accommodating the spike as the overcap is placed over the dispensing head, and this blind hole may have an inner diameter that tightly fits the outer diameter of the spike. Upon insertion of the spike into the blind hole, the valve member 23 may slightly be expanded outwardly to further press the valve member 23 against the inner wall 22 of the channel so as to further improve the seal provided by the outer shape of the valve member 23 and the engagement contour on the inner wall 22 or to reduce the gap between the valve member and the inner wall of the channel. Also optionally, the overcap may additionally or alternatively to the spike be provided with a centrally arranged cylinder wall 33 which, if the centrally arranged spike 32 is present circumferentially surrounds the spike and, is also depending downwardly from the top surface 31 of the overcap parallel to the skirt 30. In this case, an additional seal is provided for the valve member 23 over about the area of the distal end of peg 230, where the cylinder wall 33 engages with the applicator surface 210 around the distal end of the channel extending through the body 20 of dispensing head 2, where the channel is opening out into

the applicator surface 210.

[0053] An embodiment of the invention has been described with the aid of the drawings in order to illustrate the operating principle of the invention. However, the invention is not intended to be limited to this embodiment, but rather various modifications are conceivable without departing from the teaching of the instant invention. Only by way of example, it is conceivable that flexible straps are provided connecting the applicator surface and the valve member. These flexible straps are resiliently stretchable. Upon moving the valve member to its first end position, the straps are stretched and once the valve member is returned to its second end position the valves contract again to their original shape and configuration. Such a variant is advantageous in that the applicator piece and the valve member can be manufacture as a single integral piece rather than being two pieces which are separately manufactured. Other variants include different geometries of the grooves provided in the sidewall of the peg. As has been mentioned, these variants are not an exhaustive list of variants but are mentioned only by way of example in order to show that numerous variants are possible without departing from the teaching of the instant invention. Therefore, the scope of protection is defined only by the appended claims.

Claims

1. Dispensing head (2) for dispensing a viscous material from a container (1), the dispensing head (2) comprising a body (20), which is open at a proximal end of the body (20) and comprises an engagement structure (224) for attaching the dispensing head (2) to the container (1), and which is closed by an applicator surface (210) at a distal end of the body, the body (20) further comprising a channel extending through the body, with the distal end of the channel opening out into the applicator surface (210) and with the inner wall (22) of the channel at the distal end of the channel having an engagement contour (220, 221) thereon for engaging a corresponding outer contour (120) of a sealing member to be removed from the outlet of the container (1), the dispensing head (2) further comprising a valve member (23) movably arranged in the channel between a first end position, in which the valve member (23) is retracted in the channel to expose the engagement contour (220, 221) on the inner wall (22) of the distal end of the channel, and a second end position, in which the movably arranged valve member (23) covers the engagement contour (220, 221) on the inner wall (22) of the distal end of the channel, wherein the valve member (23) at its distal end has an outer shape that corresponds to the shape of the engagement contour (220, 221) on the inner wall (22) of the distal end of the channel to fit the engagement contour (220, 221) on the inner wall (22) when the valve member (23)

is in the second end position, and wherein the valve member (23) at its distal end comprises lips (233) which are resiliently flexible away inwardly from the inner wall (22) of the distal end of the channel, and wherein further the valve member (23) is sized and shaped to define one or more dispensing channels extending from the proximal end of the valve member (23) to the lips (233) when the valve member (23) is in the second end position.

2. Dispensing head according to claim 1, wherein the applicator surface (210) comprises a massage structure (211) provided thereon, for example ridges, bumps, spikes, or annular rings.
3. Dispensing head according to anyone of the preceding claims, wherein the dispensing head (2) has an outer shape of an hourglass.
4. Dispensing head according to anyone of claims 1 or 2, wherein the dispensing head (2) has an outer shape having a polygonal portion.
5. Dispensing head according to anyone of the preceding claims, wherein the engagement contour on the inner wall (22) of the distal end of the channel has a gear-shaped profile (220, 221), and wherein the valve member (23) at its distal end has a corresponding gear-shape with the lips (233) forming the teeth of the gear.
6. Dispensing head according to anyone of the preceding claims, wherein the valve member (23) comprises latches (234) arranged at the proximal end of the valve member (23) and protruding radially outwardly away from the valve member, wherein the inner wall (22) of the channel is provided with first and second abutment shoulders (222, 223) which are arranged at different axial positions along the inner wall (22) of the channel, and wherein in the first end position of the valve member (23) the lips (233) at the distal end of the valve member abut against the first abutment shoulder (222) while in the second end position of the valve member (23) the latches (234) abut against the second abutment shoulder (223).
7. Dispensing head according to anyone of the preceding claims, wherein the engagement structure for attaching the dispensing head to the container comprises an inner thread (224).
8. Dispensing head according to anyone of the preceding claims, wherein the valve member (23) and the applicator surface (210) are made of an elastomeric plastic material, and wherein the body (220) is made of a thermosetting plastic material.
9. Dispensing head according to anyone of the preced-

- ing claims, wherein the valve member (23) comprises a cylindrical peg (230) having a sidewall (231) in the outer surface of which grooves (232) are provided extending from the proximal end of the valve member (23) in the axial direction toward the distal end of the valve member (23) to a location beneath the flexible lips (233), the grooves (233) in the outer surface of the sidewall (231) forming part of the dispensing channels between the proximal end of the valve member and the lips (233) at the distal end of the valve member.
10. Dispensing head according to claim 9, further comprising a removable separate overcap (3) covering at least the applicator surface (210).
11. Kit comprising a container (1) containing a viscous material, the container comprising a container body (10) containing the viscous material, an attachment structure (110) and an outlet sealed by a sealing member (12) having an outer contour (120), the kit further comprising a dispensing head (2) according to anyone of the preceding claims, wherein the engagement contour (220, 221) on the inner wall (22) of the distal end of the channel through the body (20) of the dispensing head (2) is shaped to correspond to the outer contour (120) of the sealing member (12) sealing the outlet of the container (1), and wherein the engagement structure (224) of the dispensing head (2) is shaped to engage the attachment structure (110) on the container (1) for attachment of the dispensing head (2) to the container (1).
12. Container (1) containing a viscous material, comprising a container body (10) containing the viscous material, an attachment structure (110) and an outlet sealed by a sealing member (12) having an outer contour (120), and further comprising a dispensing head (2) according to anyone of claims 1 to 10 attached to the container (1) through engagement of the engagement structure (224) of the dispensing head (2) with the attachment structure (110) of the container (1), wherein the engagement contour (220, 221) on the inner wall (22) of the distal end of the channel through the body (20) of the dispensing head (2) is shaped to correspond to the outer contour (120) of the sealing member (12) sealing the outlet of the container (1).
13. Method for applying a viscous material contained in a container to a destination surface, the method comprising
- providing a container (1) comprising a container body (10) containing the viscous material, an attachment structure (110) and an outlet sealed by a sealing member (12) having an outer contour (120);
 - providing a dispensing head (2) according to anyone of claims 1 to 10, the engagement contour (220, 221) on the inner wall (22) of the distal end of the channel through the body (22) of the dispensing head (2) corresponding to the outer contour (120) of the sealing member (12) sealing the container, and the engagement structure (224) of the dispensing head (2) being shaped to engage the attachment structure (110) of the container (1);
 - inserting the sealing member (120) into the distal end of the inner wall (22) of the channel of the dispensing head (2) with the valve member (23) being in the first end position so that the outer contour (120) of the sealing member (12) and the engagement contour (220, 221) on the distal end of the inner wall (22) of the channel through the body (20) of the dispensing head (2) are fittingly engaged;
 - twisting the dispensing head (2) and the container (1) relative to each other either clockwise or counter-clockwise about a longitudinal axis of the dispensing head (2) to sever the sealing member (120) from the container (1);
 - turning the dispensing head (2) upside down and bringing the engagement structure (224) of the dispensing head (2) into engagement with the attachment structure (110) of the container (1) to attach the dispensing head (2) to the container (1) and to move the valve member (23) to its second end position, thereby ejecting the severed sealing member (12) through the distal end of the channel;
 - applying pressure to the viscous material contained in the body (10) of the container (1) thereby dispensing the viscous material through the dispensing channels towards the resiliently flexible lips (233) at the distal end of the valve member (23) and causing the lips (233) to flex inwardly for allowing the viscous material to flow through to the applicator surface (210), and
 - placing the applicator surface (210) with the viscous material thereon on the destination surface.
14. Method according to claim 13, wherein the container is a tube (1) made of a flexible material, and wherein the step of applying pressure to the viscous material contained in the body of the container is performed by squeezing the tube (1).

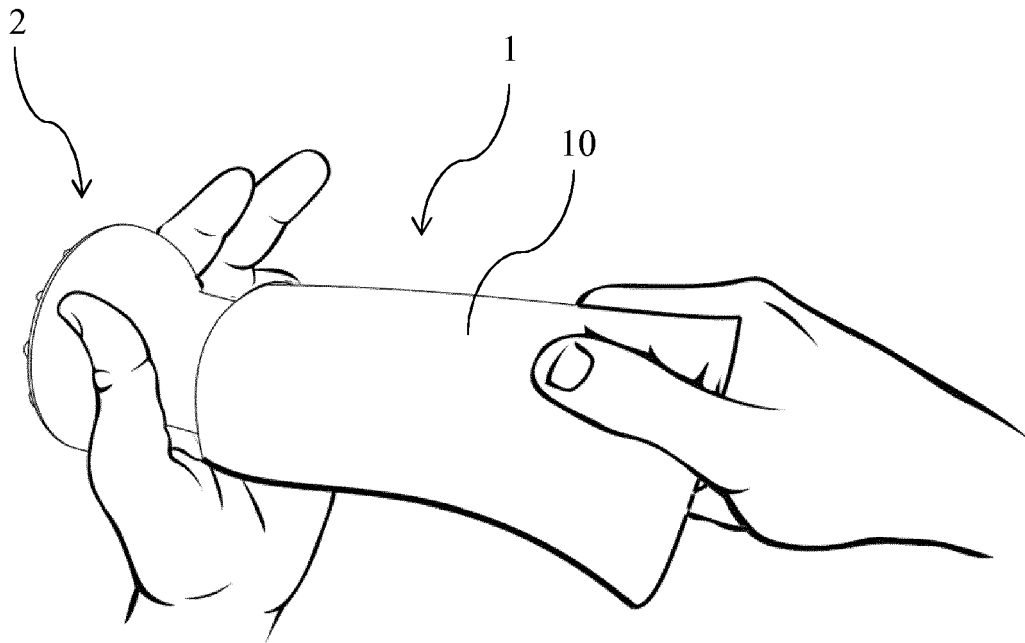


Fig. 1

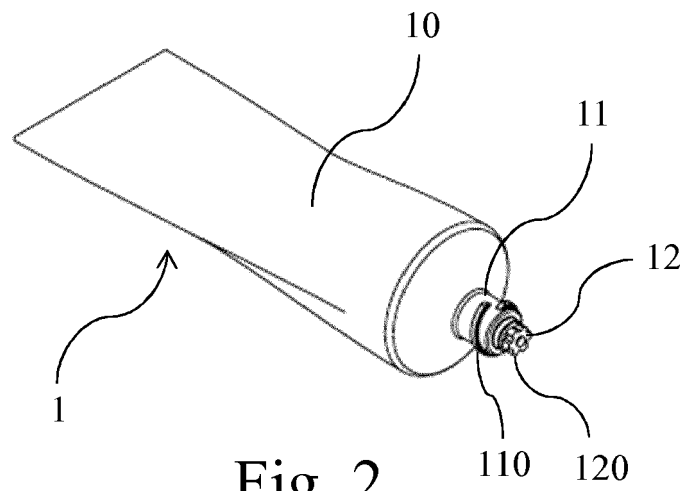


Fig. 2

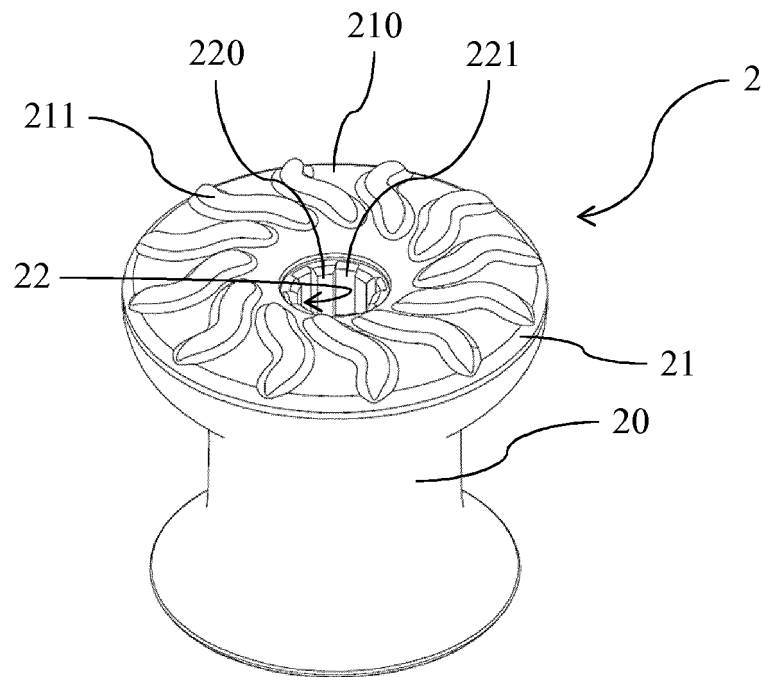


Fig. 3

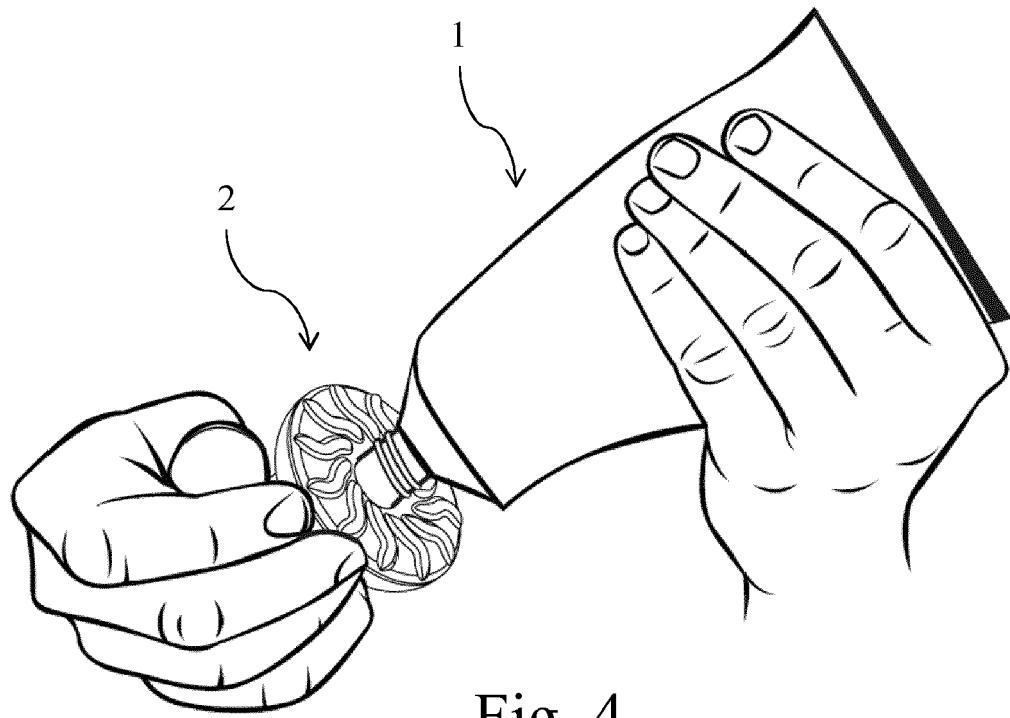


Fig. 4

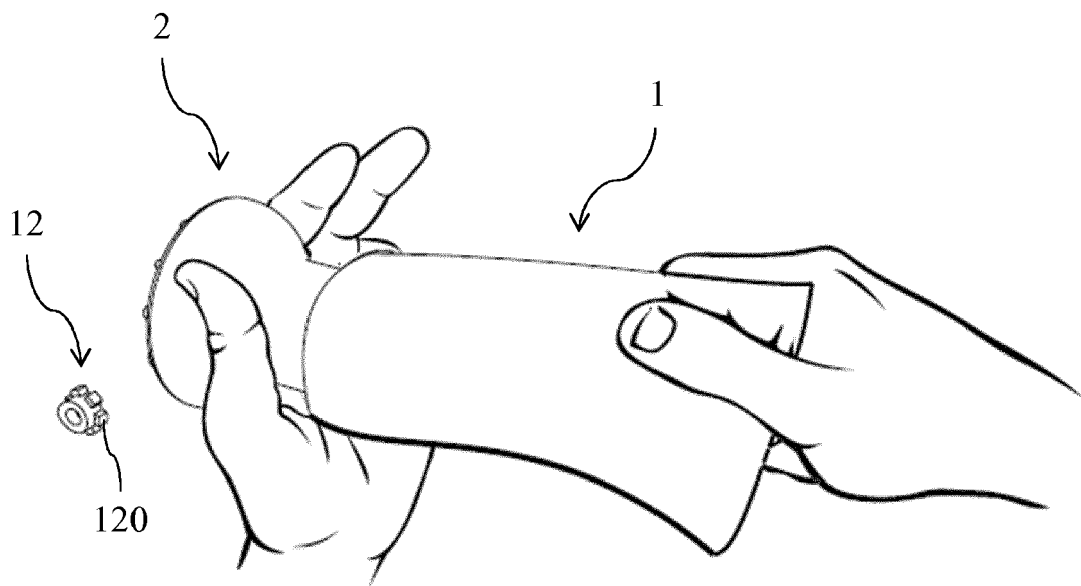
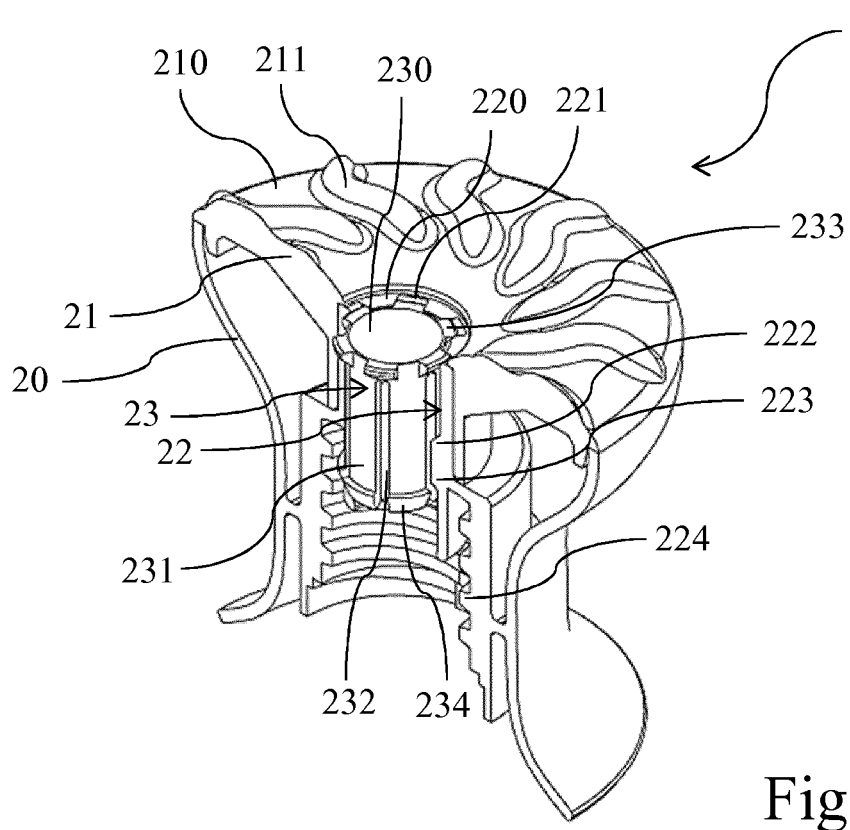
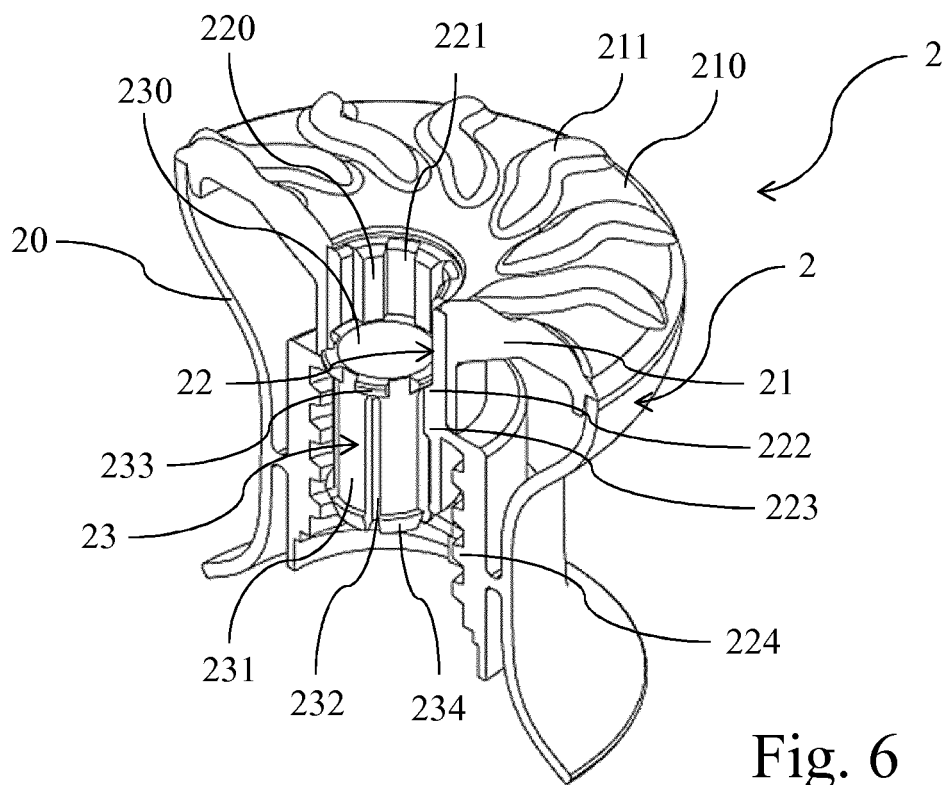


Fig. 5



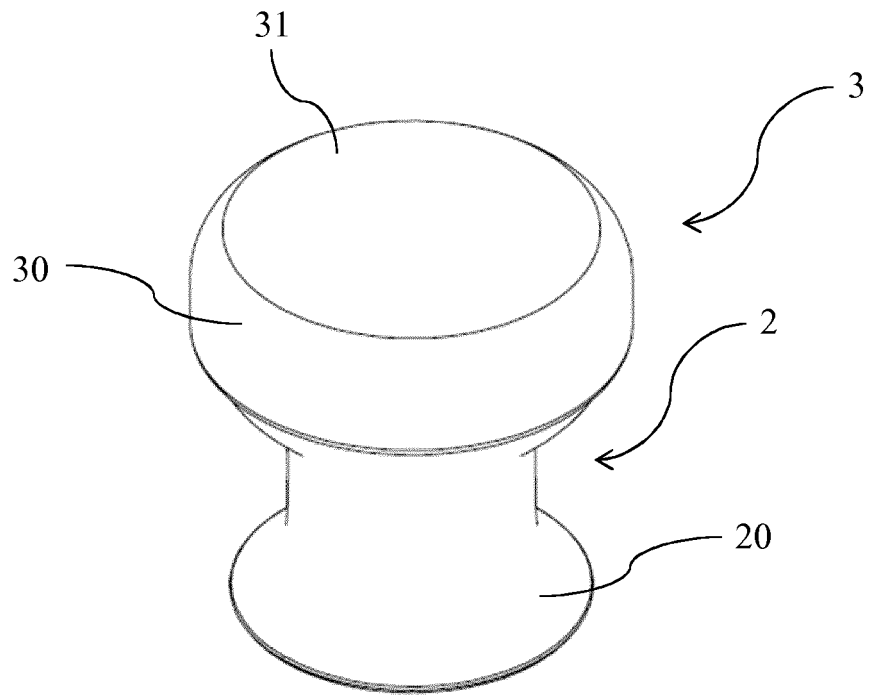


Fig. 8

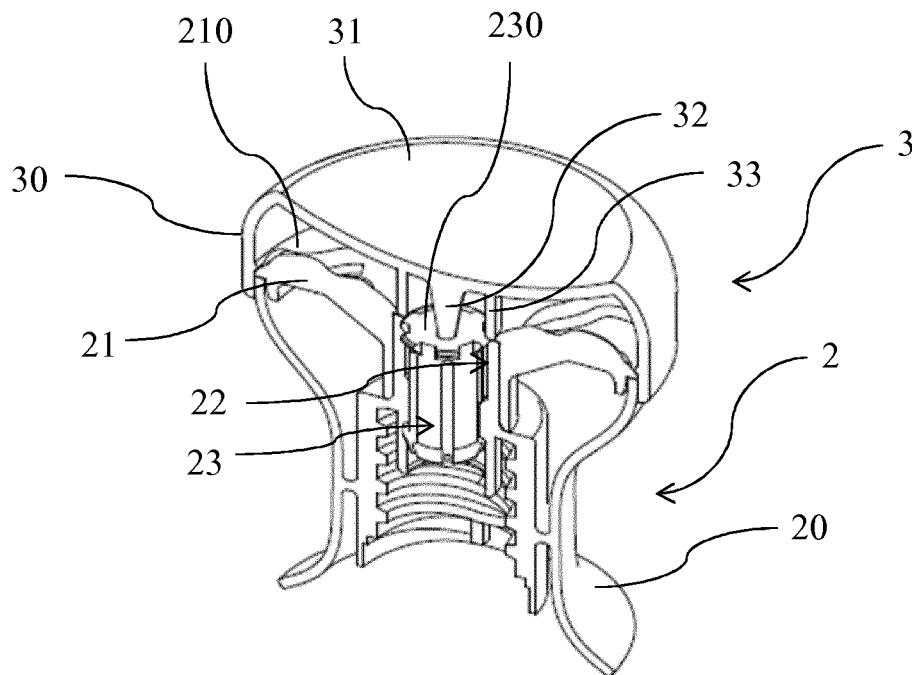


Fig. 9



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