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(54) **Cover for a tilt valve of an aerosol can**

Abdeckung für ein Kipp-Ventil einer Aerosoldose

Couvercle destiné à une valve à basculement d'une bombe aérosol

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Description

[0001] The invention relates to a valve assembly for being connected with a can body of an aerosol can as well as a use of a cover by means of which a tilt valve of an aerosol can can be covered.

[0002] US 3,658,294 shows a tilt valve fixed to a can body of an aerosol can by means of a base plate of the tilt valve. The base plate covers a sealing assembly for sealing an outlet passage for discharging a pressurized aerosol wherein the outlet passage is arranged inside a valve stem. The valve stem can be tilted with respect to the base plate between a position, where the outlet passage is closed by the sealing assembly, and an opened position, where the outlet passage is not closed by the sealing assembly allowing a discharging of the aerosol provided inside the can body via the outlet passage. The plate cover comprises a slit through which the valve stem is led. The slit is bordered by a part of the base plate formed away from the sealing assembly providing a protruding border rim. The slit allows tilting the valve stem between the closed and the opened position, wherein the maximum movement of the valve stem is restricted by the protruding border rim. The valve stem is fixed to a plastic head which can be operated by hand for tilting the valve stem.

[0003] US 4,426,026 shows a tilt valve fixed to a can body of an aerosol can by means of a base plate of the tilt valve. The tilt valve comprises a valve stem which can be tilted with respect to the base plate between a position, where an outlet passage of valve stem is closed, and an opened position, where the outlet passage is opened allowing a discharging of a pressurized aerosol provided inside the can body via the outlet passage. The valve stem is fixed to a conical plastic head by which the valve stem can be tilted. Further a cap is connected to the can body covering the tilt vent. The cap comprises a pivotable actuating part with a slit. The actuating part can be pivoted such that the conical plastic head of the valve stem is inserted into the slit of the actuating part during pivoting the actuating part, so that a border edge of the slit is pressed against the conical plastic head for moving the valve stem in the opened position while the border edge of the slit slides downwards the conical plastic head.

[0004] WO 2007/037489 A1 and WO 2005/082743 A2 each discloses a tilt valve connected to an aerosol can, wherein a plastic head is connected to a tiltable valve stem of the tilt valve. The plastic head protrudes through an opening of a cap which is connected to the can body of the aerosol can so that the plastic head may abut a part of the cap inside the opening for limiting the tilting of the valve stem. The plastic head comprises a finger depression for receiving a human finger so that the valve stem can be operated via the plastic head by hand.

[0005] There is a permanent need that a user can operate aerosol cans with a low risk of soiling or damaging a tilt valve in a simple and cost efficient manner.

[0006] It is an object of the invention providing meas-

ures enabling an operation of aerosol cans with a low risk of soiling or damaging a tilt valve in a simple and cost efficient manner.

[0007] The solution of this object is provided according to the invention by a valve assembly according to the features of claim 1. Preferred embodiments of the invention are given by the dependent claims, which can constitute each solely or in combination an aspect of the invention.

[0008] An aspect of the invention is directed to a valve assembly for being connected with a can body of an aerosol can comprising a tilt valve, wherein the tilt valve comprises a base plate fixable with the can body and a valve stem tiltable with respect to the base plate for opening and/or closing an outlet passage of the tilt valve, and a cover for covering the base plate, wherein the valve stem is received by a guiding slit of the cover, wherein the cover for the tilt valve of an aerosol can, comprises a sidewall for connecting the cover with a base plate of the tilt valve and/or with a can body of the aerosol can, a top wall for covering the base plate, wherein the whole top wall is mainly unmovable with respect to the sidewall, wherein the top wall comprises the guiding slit for receiving a valve stem of the tilt valve, wherein the guiding slit comprises a length along an actuation direction for tilting the valve stem between a closed position, where an outlet passage of the tilt valve is closed, and an opened position, where the outlet passage of the tilt valve is opened, with respect to the base plate, wherein the top wall and/or the sidewall comprise a three-dimensional forming by which a finger depression for receiving a human finger, particularly a human thumb, is provided, wherein the finger depression extends up to a starting area of the guiding slit, where the valve stem is located in closed position, wherein the design of the cover is such that the tilt valve is operated by applying an actuating force directly to the valve stem without an additional part between the finger of a user and the valve stem.

[0009] The sidewall and the top wall may cover a large part of the tilt valve. Particularly $\geq 80\%$, preferably $\geq 90\%$, particularly preferred $\geq 95\%$ and most preferred $\geq 97\%$ of the area of the tilt valve may be covered by the cover. Due to the guiding slit it is possible that particularly $\geq 15\%$, preferably $\geq 7\%$, particularly preferred $\geq 3\%$ and most preferred $\geq 1\%$ of the area of the tilt valve are uncovered by the cover. This allows protecting the tilt valve from soiling or damaging the tilt valve particularly due to condensed agents which can be applied by means of the used aerosol can. Thus, it is possible that the tilt valve stays operable during the operating life time of the aerosol can.

[0010] Due to the three-dimension forming of the finger depression a user will intuitively rest his finger, particularly his thumb, at the finger depression. The finger depression may be designed such that at least a part of the finger depression follows a part of the form of the human finger. For operating the tilt valve the user only have to slide his resting finger above a rest surface of the finger

depression for reaching the valve stem so that operating the aerosol can is facilitated. Due to the guiding slit a predefined moving of the valve stem along a predefined actuation direction is given so that a misuse of the tilt vent by a user may be prevented. Particularly it is possible optimizing the design of the tilt vent with respect to the restricted predefined movably. Since the finger depression extends at least up to the guiding slit a border or protruding rim is prevented so that a facilitated accessibility of the valve stem for a human finger of the user is given. Disturbing protruding parts of the cover in the area of the top wall between the finger depression and the guiding slit which may block or hamper the movement of the finger towards the valve stem can be omitted. If so, the length of the valve stem can be shortened. Preferably the finger depression reaches not only up to the starting area of the guiding slit but extends at least partially along the guiding slit. Particularly preferred the finger depression extends at least up to an area, where the finger rests, when the valve stem is tilted in its maximum opened position, where a further tilting of the valve stem is blocked. Compared to a cap strictly designed like a mathematical cylinder the finger depression provides a three dimensional design mainly optimized to the ergonomic needs for sliding a human finger, particularly a human thumb along the surface of the finger depression without the need of changing the position of other fingers of the user holding the can body of the aerosol can. It is not necessary providing pivotable or elastically deformable parts in the cover in order to provide the facilitated use of the aerosol can. Thus, the design of the cover is simplified and cost efficient. Preferably the whole cover can be designed stiff and rigid. Particularly preferred the cover is made one-piece particularly of a thermoplastic plastic material like PE, PA, PP, PS.

[0011] In the case of a mainly cylindrical aerosol can positioned upright the sidewall of the cover may be mainly a closed ring extending in vertical direction, wherein the upper edge of the sidewall, particularly the whole upper edge of the sidewall, is connected to the top wall. Particularly the top wall may be connected to the sidewall in a way that the whole top wall is mainly unmovable with respect to the sidewall leading to a stiff and rigid design of the cover. The top wall closes an aperture defined by the upper edge of the sidewall, wherein the top wall itself may comprise apertures, particularly the guiding slit. The top wall may extend both in horizontal and vertical direction for providing the three-dimensional shape of the finger depressions.

[0012] The tilt valve may comprise a sealing assembly for sealing the outlet passage provided inside the valve stem, wherein in the closed position the outlet passage is sealed by the sealing assembly and in the opened position the outlet passage is opened allowing a communication with a receiving volume inside the can body for discharging the content of the aerosol can, particularly a pressurized aerosol like a hair treatment agent. For instance the outlet passage of the valve stem can be sealed

by means of a diaphragm, wherein the valve stem can be tilted by such an angle that the diaphragm can not seal the out passage anymore in the opened position of the valve stem. Preferably the valve stem has to be tilted against an elastic force for moving the valve stem from the closed position to the opened position so that the tilt valve is normally closed when no actuating force is applied to the valve stem. Due to the design of the cover the tilt valve may be operated by applying an actuating force directly to the valve stem without an additional part between the finger of a user and the valve stem. A plastic head connected to the valve stem for operating the tilt valve by hand may be omitted. The base plate of the tilt valve may cover or contain the sealing assembly. Particularly the base plate is fixed to the can body for instance by crimping. Preferably the base plate of the tilt valve is fixed to a hollow cylinder part of the can body so that the base plate provides at least partially a front side for the can body bordering the receiving volume of the aerosol can.

[0013] The guiding slit may be by a linear guiding blocking the movement of the valve stem perpendicular to the actuation direction. A clearance fit may be provided between the guiding slit and the valve stem. Generally it is possible that the guiding slit follows a linear curvature. Preferably the guiding slit is straight, wherein the guiding slit is particularly arranged radially. Particularly preferred the valve stem in its closed position is arranged mainly centered and/or coaxial to the can body pointing mainly in axial direction. The starting area of the guiding slit may comprise the area of the guiding slit where the valve stem is positioned in closed position. An ending area of the guiding slit is located where the valve stem is positioned in its maximum opened position. The ending area of the guiding slit can be bordered partially or completely by the top wall and/or the sidewall. The ending area of the guiding slit is chosen such that the valve stem is located completely inside the top wall in top view, this means it is prevented that the valve stem protrudes radially from the top wall in top view.

[0014] The wording "finger depression" is understood in a way that in comparison to a cap strictly designed like a mathematical cylinder the finger depression is a cut away part of the mathematical cylinder. The finger depression may comprise a three dimensional curvature wherein the finger depression may also be provided by a straight inclination. In a preferred embodiment the finger depression comprises a curvature which particularly may be chosen for following the movement of a human finger sliding over the surface of the finger depression for reaching the valve stem. The finger depression may be adapted to ergonomic needs of a human hand.

[0015] Preferably the finger depression comprises an at least partially, particularly fully closed, rest surface for resting the human finger in the finger depression, wherein the three-dimensional forming of the top wall, particularly the finger depression, and a friction coefficient of the rest surface are chosen for allowing a sliding of the human

finger along the rest surface towards the guiding slit and/or along the guiding slit. The rest surface may define the way that a human finger, particularly thumb, has to follow for reaching and actuating the valve stem of the tilt valve. The design and the provided friction of the rest surface of the finger depression and/or the remaining top wall may hinder a movement of the finger of the user in an unwanted direction. The finger depression may provide a haptic feedback due to the three-dimensional design only, wherein the haptic feedback may provide an intuitively recognizable position of the finger of the user. In a further not mandatory embodiment the haptic feedback may be improved by providing different friction coefficients for the finger depression and the remaining top wall. For example the user may experience a haptic feedback due to different friction coefficients when his finger is moved in a direction which may hamper a movement of the valve stem in actuation direction. This leads to an intuitively correct use of the aerosol can which reduces the risk of a misuse which may lead to a damage of the tilt valve. Particularly the ratio of the friction coefficient μ_{rs} of the rest surface and the friction coefficient μ_{tw} of the remaining top wall is $0.5 \leq \mu_{rs}/\mu_{tw} \leq 1.0$ preferably $0.6 \leq \mu_{rs}/\mu_{tw} \leq 0.9$ and most preferred $0.7 \leq \mu_{rs}/\mu_{tw} \leq 0.8$.

[0016] Further preferred the finger depression comprises in cross sectional side view a curvature which falls mainly asymptotically together with the remaining top wall in an area where the finger depression meets the guiding slit. Due to the asymptotical course of the finger depression a very smooth transition between the finger depression and the remaining top wall in the area of the guiding slit may be given. When actuating the tilt valve the finger of the user may slide over the curved rest surface of the finger depression towards the valve stem. Due to the mainly asymptotically course of the finger depression the finger of the user may intuitively follow the guiding slit for tilting the valve stem in the actuation direction. If so, the guiding slit also may guide the finger of the user along the guiding slit particularly until the valve stem reaches its opened position.

[0017] Particularly the finger depression may comprise in cross sectional side view a curvature which comprises firstly a part with a positive curvature number and subsequent a part with a negative curvature number coming from the sidewall inwards towards the guiding slit. The curvature of the finger depression may look in cross sectional side view like a lying S and/or like the course of a lying trigonometric tangent/cotangent. Due to this design of the finger depression the finger of the user may rest at the first part with a positive curvature number facilitating a secure grip of the aerosol can. When the finger slides towards the valve stem the reaching of the valve stem is facilitated after passing the inflection point of the curvature. The curvature number is understood as a number which would be received by the second derivation of a formula describing the course of surface of the finger depression in cross sectional side view.

[0018] Preferably the finger depression comprises at

least one blocking wall for blocking a movement of the human finger perpendicular to the actuation direction. A movement of the finger of the user in an unwanted direction can be prevented so that the risk of a misuse of the tilt vent is reduced. Further a smooth transition between the blocking wall and the rest surface may be provided so that the finger of the user may rest in the transition area. This may facilitate a secure grip of the aerosol can for the user when the tilt valve is not actuated.

[0019] In a further embodiment the finger depression comprises a slit, wherein the length and the width of the slit is chosen for providing an additional guiding slit direction for tilting the valve stem between the closed position and another opened position. The slit provided in the finger depression may guide the finger of the user along the actuating direction so that an intuitive movement of the finger of the user may be supported by the slit. The finger of the user may slide along the edges of the slit. In addition the slit of the finger depression may comprise a width that the valve stem can be received by this slit so that the slit of finger depression may provide a guiding slit for the valve stem. Preferably the slit of the finger depression as well as the guiding slit comprise the same width facilitating the production of the cover as well as the tilting of the valve stem between the guiding slit and the slit of the finger depression. Due to this design of the finger depression the valve stem may be tilted at least in two different actuation directions from one closed position to at least two different opened positions.

[0020] Particularly at least two, particularly mainly straight, guiding slits may be provided arranged angled, particularly perpendicular, to each other. Due to the different guiding slits the aerosol can may be operated at corresponding different peripheral angles. Different positions of the aerosol can are suitable for operating the aerosol can.

[0021] Preferably the sidewall comprises an upper part for receiving the base plate of the tilt valve and a lower part for receiving the can body of the aerosol can, wherein particularly the upper part is frictionally engaged with the base plate and/or the lower part is frictionally engaged with the can body. If so, the lower part or the upper part may provide a rough centering of the cover relative to the aerosol can wherein the other part provides a frictional engagement. Particularly preferred the sidewall, particularly the lower part of the sidewall, comprise at least one nose pointing radially inwards for providing a clip connection. In this case it is preferred that the nose is not provided by means of a circumferential rim so that the sidewall may elastically be deformed when the cover is clipped with the can body of the aerosol can and/or with the base plate of the tilt valve.

[0022] Particularly the valve assembly may comprise a sealing assembly for sealing the valve stem of the tilt valve, wherein preferably the sealing assembly is integrated into the tilt valve. The valve assembly enables an operation of aerosol cans with a low risk of soiling or damaging the tilt valve in a simplified and cost efficient

manner.

[0023] Preferably the valve stem comprises at least one resistance element for providing a contact surface for a human finger, particularly thumb, in order to tilt the valve stem with respect to the base plate, wherein the resistance element is particularly one-piece with the valve stem. Due to the resistance element the risk may be reduced that a finger of a user slips unintentionally from the valve stem and/or slips unintentionally over the valve stem close to the outlet of the outlet passage of the valve stem. An unintentionally misuse of the tilt valve may be prevented. Particularly it is possible that the finger of the user is not soiled by the content of the aerosol can leaving the receiving volume of the aerosol can via the outlet passage of the valve stem. Since it is possible providing the resistance element, particularly a plurality of resistance elements, one-piece with the valve stem the production of the tilt valve is not significantly complicated.

[0024] In a not mandatory embodiment it is preferred that the resistance element may be designed as a protruding ring surrounding the valve stem and/or is designed as depression surrounding the valve stem. The protruding ring and/or the depression may be arranged mainly in radial direction with respect to the valve stem so that the protruding ring and/or the depression may be oriented mainly perpendicular with respect to the outlet passage. It is possible that a part of the protruding ring and/or the depression may be arranged mainly perpendicular with respect to the actuation direction and/or the moving direction of a finger of the user tilting the valve stem. Since the surface of the valve stem may be not even but irregular a sufficient resistance can be provided against a further sliding of the finger of the user along the valve stem.

[0025] Preferably the valve stem rests on a stop of the guiding slit in opened position and/or the valve stem comprises a particularly protruding stopper resting on the base plate in opened position. Due to the contact between the valve stem and the stop of the guiding slit and/or the contact between the stopper of the valve stem and the base plate a predefined position of the valve stem in opened position is given. It can be prevented tilting the valve stem too much so that the risk of damaging the tilt valve is reduced. Particularly it is possible designing the tilt valve with respect to the reduced tilting angle provided by the stop or stopper so that a simplified and/or more cost efficient design for the tilt valve may be chosen.

[0026] Further preferred the valve stem rests on a stop of the guiding slit in closed position. Due to the contact between the valve stem and the stop a predefined position of the valve stem in closed position is given. Particularly an elastic force may be applied to the valve stem for pressing the valve stem automatically in the closed position against the stop. A residual elastic force may be remain in the closed position of the valve stem so that an unintentionally tilting of the valve stem for instance during transport may be prevented. Particularly an additional securing element fixing the valve stem in closed

position until first use may be omitted.

[0027] A further aspect of the invention is directed to an aerosol can, particularly for applying a pressurized hair care agent, comprising a can body for providing a receiving volume and a valve assembly which may be designed as previously described connected to the can body for sealing the receiving volume, wherein the tilt valve comprises an outlet passage communicating with the receiving volume in opened position of the tilt valve, wherein the outlet passage is sealed in closed position of the tilt valve. The aerosol can enables an operation with a low risk of soiling or damaging the tilt valve in a simplified and cost efficient manner.

[0028] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter, wherein the described features can constitute each solely or in combination an independent aspect of the invention. In the drawings:

Fig. 1a: is a schematic perspective view of a cover in a first embodiment,

Fig. 1b: is a schematic side view of the cover of Fig. 1a,

Fig. 1c: is a schematic top view of the cover of Fig. 1a,

Fig. 2a: is a schematic perspective view of a tilt valve,

Fig. 2b : is a schematic cross sectional side view of tilt valve of Fig. 2a in closed position and

Fig. 2c : is a schematic cross sectional side view of an aerosol can with the tilt valve of Fig. 2a in opened position,

Fig. 3 : is a schematic perspective view of an aerosol can with a cover according to Fig. 1 by way of example,

Fig. 4 : is a schematic cross sectional side view of the aerosol can of Fig. 3,

Fig. 5a : is a schematic perspective view of a cover in a second embodiment,

Fig. 5b : is a schematic side view of the cover of Fig. 5a,

Fig. 5c : is a schematic top view of the cover of Fig. 5a,

Fig. 6a : is a schematic perspective view of a cover in a third embodiment,

Fig. 6b : is a schematic cross sectional side view of the cover of Fig. 6a,

Fig. 7a : is a schematic perspective view of a cover in a fourth embodiment,

Fig. 7b: is a schematic top view of the cover of Fig. 7a

Fig. 8a: is a schematic perspective view of a tilt valve in a second embodiment and

Fig. 8b: is a schematic cross sectional side view of tilt valve of Fig. 8a,

[0029] The first embodiment of the cover 10 as illustrated in Fig. 1a, Fig. 1b and Fig. 1c comprises a mainly annular sidewall 12 which is closed by a top wall 14 one-piece with the sidewall 12. The cover 10 may be made by injection moulding of a thermoplastic plastic material.

The cover 10 is mainly rigid, this means mainly no part of the top wall 14 may experience a relative movement to the sidewall 12. The sidewall 12 may be clipped or clamped to a crimping rim 16 of a base plate 18 of a tilt valve 20 as illustrated in Fig. 2a and Fig. 2b. The top wall 14 comprises a guiding slit 22 for receiving a tiltable valve stem 24 of the tilt valve 20. The guiding slit 22 guides the valve stem 24 between a closed position, where an outlet passage 26 is closed by a sealing assembly 28, and an opened position, where the outlet passage 26 is opened and not closed by the sealing assembly 28 anymore. In the closed position the valve stem 24 may be aligned mainly coaxial to a can body 30 of an aerosol can 32. In the closed position the valve stem 24 is located in an starting area 33 of the guiding slit 22. The top wall 14 comprises a three-dimensional forming for providing a finger depression 34. The finger depression 34 is formed for resting a human finger, particularly thumb. The finger depression comprises in cross sectional side view a curvature 36 extending from radially outward until a part of the guiding slit 22. The curvature comprises a first part 38 with a positive curvature number and after an inflection point 40 a second part with a negative curvature number. The curvature 36 of the finger depression 34 meets the area surrounding a part of the guiding slit 22 mainly asymptotically. Due to this design of the finger depression 34 a user may rest his thumb on a rest surface 44 of the finger depression 34. For actuating the aerosol can 32 the thumb of the user may slide over the rest surface 44 along the curvature 36 until reaching the valve stem 24. Then the user may tilt the valve stem 24 guided by the guiding slit 22 so that the valve stem 24 is moved by tilting along an actuation direction 46.

[0030] The valve stem 24 of the tilt valve 20 illustrated in Fig. 2a particularly comprises a length that the valve stem 24 can be tilted by the finger of a user between the closed position as illustrated in Fig. 2b and the opened position as illustrated in Fig. 2c without the risk, that the finger of a hand holding the can body 30 of the aerosol can 32 may slip over an outlet 50 of the outlet passage 26 of the valve stem 24. The tilt valve 20 may be crimped with the can body 30 of the aerosol can 32 as illustrated in Fig. 8c and subsequently provided with one of the above described cover 10.

[0031] In assembled state as illustrated in Fig. 3 and Fig. 4 the cover 10 and the tilt valve 20 define a valve assembly 54 which may be connected to the can body 30 of the aerosol can 32. The can body 30 comprises a receiving volume 56 which may be filled with a pressurized aerosol, for instance a hair care agent. The base plate 18 may be crimped with the can body 30 so that the tilt valve 20 may provide a front side for the can body 30 bordering the receiving volume 56 of the aerosol can 32. The crimping rim 16 of the base plate 18 may be crimped to a conical part 60 of the can body 30, wherein the sidewall 12 of the cover 10 may be connected to the crimping rim 16 and/or the can body 30 for example by friction and/or by means of a clip connection.

[0032] The cover 10 previously described may be exchanged by one of the covers 10 described subsequently. The cover 10 as illustrated in Fig. 5a, Fig. 5b and Fig. 5c comprises a top wall 14 with a different three-dimensional shape as the cover illustrated in Fig. 1a, Fig. 1b and Fig. 1c. Due to this shape the finger depression 34 comprises blocking walls 62 blocking a movement of a human finger perpendicular to the actuation direction. The blocking walls 62 may provide a part of the resting surface 44. The blocking walls 62 may be curved so that a smooth transition is given between the blocking walls 62 and the remaining finger depression 34.

[0033] The cover 10 illustrated in Fig. 6a and Fig. 6b comprises a three-dimensional design which is much compacter than the design of the cover 10 illustrated in Fig. 1a, Fig. 1b and Fig. 1c. The curvature 36 of the finger depression 34 comprises a course from radially outward to radially inward with only a negative curvature number. The sliding of a human finger over the rest surface 44 of the finger depression 34 is facilitated due to this design of the finger depression 34. Particularly the whole or a main part of the guiding slit 22 may be located inside the finger depression 34.

[0034] The cover 10 illustrated in Fig. 7a and Fig. 7b comprises in comparison to the cover 10 as illustrated in Fig. 6a and Fig. 6c more than one guiding slit 22. In the illustrated embodiment two different actuation directions 46 aligned perpendicular to each other are provided. In addition the associated finger depression 34 itself comprises a slit 64 designed mainly identical to the corresponding guiding slit 22 so that the valve stem 24 may be tilted back and forth in two opposing directions for opening the outlet passage 26 of the tilt valve 20. The valve stem 24 may comprise a diameter that the guiding slit 22 may comprise a width which enables a guiding of a human finger along the corresponding actuation direction 46 by means of the slit 64. In the alternate it is preferred that the slits 64 are omitted so that the finger depression 34 comprises a mainly fully closed rest surface 44 from radially outward to radially inward until reaching an area of the top wall 14 surrounding the guiding slit 22 in an starting area 33 where the valve stem 24 is located in closed position.

[0035] As illustrated in Fig. 8a and Fig. 8b the valve stem 24 may comprise resistance elements formed as one-piece circumferential protruding rings 48 in addition to the tilt valve as illustrated in Fig. 2 and Fig. 2b. Due to the protruding rings 48 the thumb of the user does not slide along the whole valve stem 24 to the outlet 50 of the outlet passage 26. Further the valve stem 24 may comprise a protruding stopper 52 which may meet the base plate 18 in the maximum opened position. In the alternate or in addition the guiding slit 22 may comprise a stop 58 provided by the top wall 14 and/or the sidewall 12 for blocking a further movement of the valve stem. Preferably an elastic force provided by the sealing assembly 28 or an additional elastic element is applied to the valve stem 24 for pressing the valve stem 24 in closed

position when no actuation force is applied to the valve stem 24 by the user.

Claims

1. Valve assembly for being connected with a can body (30) of an aerosol can (32) comprising a tilt valve (20), wherein the tilt valve (20) comprises a base plate (18) fixable with the can body (30) and a valve stem (24) tiltable with respect to the base plate (18) for opening and/or closing an outlet passage (26) of the tilt valve (20), a cover (10) for covering the base plate (18), wherein the valve stem (24) is received by a guiding slit (22) of the cover (10), wherein the cover (10) for the tilt valve (20) of an aerosol can (32), comprises
 - a sidewall (12) for connecting the cover (10) with a base plate (18) of the tilt valve (20) and/or with a can body (30) of the aerosol can (32),
 - a top wall (14) for covering the base plate (18), wherein the whole top wall (14) is mainly unmovable with respect to the sidewall (12), wherein the top wall (14) comprises the guiding slit (22) for receiving a valve stem (24) of the tilt valve (20), wherein the guiding slit (22) comprises a length along an actuation direction (46) for tilting the valve stem (24) between a closed position, where an outlet passage (26) of the tilt valve (20) is closed, and an opened position, where the outlet passage (26) of the tilt valve (20) is opened, with respect to the base plate (18), wherein the top wall (14) and/or the sidewall (12) comprise a three-dimensional forming by which a finger depression (34) for receiving a human finger, particularly a human thumb, is provided, wherein the finger depression (34) extends up to a starting area (33) of the guiding slit (22), where the valve stem (24) is located in closed position,
 - wherein the design of the cover (10) is such that the tilt valve (20) is operated by applying an actuating force directly to the valve stem (24) without an additional part between the finger of a user and the valve stem (24).
2. Valve assembly according to claim 1 wherein in comparison to a cap strictly designed like a mathematical cylinder the finger depression (34) is a cut away part of the mathematical cylinder.
3. Valve assembly according to anyone of claims 1 to 2 wherein the finger depression (34) comprises an at least partially, particularly fully closed, rest surface (44) for resting the human finger in the finger depression (24), wherein the three-dimensional forming of the top wall (14), particularly the finger depression (34), and a friction coefficient of the rest surface (44) are chosen for allowing a sliding of the human finger along the rest surface (44) towards the guiding slit (22) and/or along the guiding slit (22).
4. Valve assembly according to anyone of claims 1 to 3 wherein the finger depression (34) comprises in cross sectional side view a curvature (36) which falls mainly asymptotically together with the remaining top wall (44) in an area where the finger depression (34) meets the guiding slit (22).
5. Valve assembly according to anyone of claims 1 to 4 wherein the finger depression (34) comprises in cross sectional side view a curvature (36) which comprises firstly a part (38) with a positive curvature number and subsequent a part (42) with a negative curvature number coming from the sidewall (12) inwards towards the guiding slit (22).
6. Valve assembly according to anyone of claims 1 to 5 wherein the finger depression (34) comprises at least one blocking wall (62) for blocking a movement of the human finger perpendicular to the actuation direction (46).
7. Valve assembly according to anyone of claims 1 to 6 wherein the finger depression (34) comprises a slit (64), wherein the length and the width of the slit (64) is chosen for providing an additional guiding slit direction for tilting the valve stem (24) between the closed position and another opened position.
8. Valve assembly according to anyone of claims 1 to 7 wherein at least two, particularly mainly straight, guiding slits (22) are provided arranged angled, particularly perpendicular, to each other.
9. Valve assembly according to anyone of claims 1 to 8 wherein the sidewall (12) comprises an upper part for receiving the base plate (18) of the tilt valve (20) and a lower part for receiving the can body (30) of the aerosol can (32), wherein particularly the upper part is frictionally engaged with the base plate (18) and/or the lower part is frictionally engaged with the can body (30).
10. Valve assembly according to anyone of claims 1 to 9 wherein the valve stem (24) comprises at least one resistance element (48) for providing a contact surface for a human finger, particularly thumb, in order to tilt the valve stem (24) with respect to the base plate (18), wherein the resistance element (48) is particularly one-piece with the valve stem (24).

11. Valve assembly according to anyone of claims 1 to 10 wherein the resistance element is designed as a protruding ring (48) surrounding the valve stem (24) and/or is designed as depression surrounding the valve stem (24). 5
12. Valve assembly according to anyone of claims 1 to 11 wherein the valve stem (24) rests on a stop (58) of the guiding slit (22) in opened position and/or the valve stem (24) comprises a particularly protruding stopper (52) resting on the base plate (18) in opened position. 10
13. Valve assembly according to anyone of claims 1 to 12 wherein the valve stem (24) rests on a stop of the guiding slit (22) in closed position. 15
14. Aerosol can, particularly for applying a pressurized hair care agent, comprising a can body (30) for providing a receiving volume (56) and a valve assembly (54) according to anyone of claims 1 to 13 connected to the can body (30) for sealing the receiving volume (56), wherein the tilt valve (20) comprises an outlet passage (26) communicating with the receiving volume (56) in opened position of the tilt valve (20), wherein the outlet passage (26) is sealed in closed position of the tilt valve (20). 20 25

Patentansprüche 30

1. Ventilanordnung zum Verbundenwerden mit einem Dosenkörper (30) einer Aerosoldose (32), umfassend:

ein abgeschrägtes Ventil (20), wobei das abgeschrägte Ventil (20) eine Basisplatte (18) umfasst, die an dem Dosenkörper (30) befestigbar ist, und einen Ventilschaft (24), der mit Bezug auf die Basisplatte (18) zum Öffnen und/oder Schließen einer Auslasspassage (26) des abgeschrägten Ventils (20) abschrägbar ist, eine Abdeckung (10) zum Abdecken der Basisplatte (18), wobei der Ventilschaft (24) durch einen Führungsschlitz (22) der Abdeckung (10) aufgenommen wird, wobei die Abdeckung (10) für das abgeschrägte Ventil (20) einer Aerosoldose (32) Folgendes umfasst:

eine Seitenwand (12) zum Verbinden der Abdeckung (10) mit einer Basisplatte (18) des abgeschrägten Ventils (20) und/oder mit einem Dosenkörper (30) der Aerosoldose (32),
eine obere Wand (14) zum Abdecken der Basisplatte (18), wobei die gesamte obere Wand (14) in Bezug auf die Seitenwand (12)

weitestgehend unbeweglich ist, wobei die obere Wand (14) den Führungsschlitz (22) zum Aufnehmen eines Ventilschafts (24) des abgeschrägten Ventils (20) umfasst, wobei der Führungsschlitz (22) eine Länge entlang einer Betätigungsrichtung (46) zum Abschrägen des Ventilschafts (24) in Bezug auf die Basisplatte (18) zwischen einer geschlossenen Position, wo eine Auslasspassage (26) des abgeschrägten Ventils (20) geschlossen ist, und einer geöffneten Position, wo die Auslasspassage (26) des abgeschrägten Ventils (20) geöffnet ist, umfasst, wobei die obere Wand (14) und/oder die Seitenwand (12) eine dreidimensionale Formung umfassen, durch die eine Fingervertiefung (34) zum Aufnehmen eines menschlichen Fingers, insbesondere eines menschlichen Daumens, vorgesehen ist, wobei sich die Fingervertiefung (34) nach oben in einen Anfangsbereich (33) des Führungsschlitzes (22) erstreckt, wobei sich der Ventilschaft (24) in geschlossener Position befindet,

wobei die Gestaltung der Abdeckung (10) so ist, dass das abgeschrägte Ventil (20) durch Anwenden einer Betätigungskraft direkt auf den Ventilschaft (24) ohne ein zusätzliches Teil zwischen dem Finger eines Benutzers und dem Ventilschaft (24) betätigt wird.

2. Ventilanordnung nach Anspruch 1, wobei im Vergleich mit einer Kappe, die strikt wie ein mathematischer Zylinder gestaltet ist, die Fingervertiefung (34) ein von dem mathematischen Zylinder abgeschnittener Teil ist. 35
3. Ventilanordnung nach einem der Ansprüche 1 bis 2, wobei die Fingervertiefung (34) eine mindestens teilweise, insbesondere vollständig geschlossene, Ablageoberfläche (44) zum Ablegen des menschlichen Fingers in die Fingervertiefung (34) umfasst, wobei die dreidimensionale Formung der oberen Wand (14), insbesondere die Fingervertiefung (34), und ein Reibungskoeffizient der Ablageoberfläche (44) so gewählt sind, dass ein Verschieben des menschlichen Fingers entlang der Ablageoberfläche (44) in Richtung des Führungsschlitzes (22) und/oder entlang des Führungsschlitzes (22) erlaubt ist. 40 45 50
4. Ventilanordnung nach einem der Ansprüche 1 bis 3, wobei die Fingervertiefung (34) in der Querschnitts-Seitenansicht eine Wölbung (36) umfasst, die hauptsächlich asymptotisch mit der verbleibenden oberen Wand (44) in einem Bereich zusammenfällt, wo die Fingervertiefung (34) den Führungsschlitz (22) trifft. 55

5. Ventilanordnung nach einem der Ansprüche 1 bis 4, wobei die Fingervertiefung (34) in einer Querschnitts-Seitenansicht eine Wölbung (36) umfasst, die als erstes ein Teil (38) mit einer positiven Wölbungszahl und nachfolgend ein Teil (42) mit einer negativen Wölbungszahl, kommend von der Seitenwand (12) nach innen in Richtung des Führungsschlitzes (22), umfasst.
6. Ventilanordnung nach einem der Ansprüche 1 bis 5, wobei die Fingervertiefung (34) mindestens eine blockierende Wand (62) zum Blockieren einer Bewegung des menschlichen Fingers senkrecht zu der Betätigungsrichtung (46) umfasst.
7. Ventilanordnung nach einem der Ansprüche 1 bis 6, wobei die Fingervertiefung (34) einen Schlitz (64) umfasst, wobei die Länge und die Breite des Schlitzes (64) gewählt wird, um eine zusätzliche Führungsschlitzrichtung zum Abschrägen des Ventilschafts (24) zwischen der geschlossenen Position und einer anderen, geöffneten Position bereitzustellen.
8. Ventilanordnung nach einem der Ansprüche 1 bis 7, wobei mindestens zwei, insbesondere hauptsächlich gerade, Führungsschlitz (22) bereitgestellt sind, die abgewinkelt, insbesondere senkrecht, zueinander angeordnet sind.
9. Ventilanordnung nach einem der Ansprüche 1 bis 8, wobei die Seitenwand (12) einen oberen Teil zum Aufnehmen der Basisplatte (18) des abgeschrägten Ventils (20) und ein unteres Teil zum Aufnehmen des Dosenkörpers (30) der Aerosoldose (32) umfasst, wobei sich insbesondere der obere Teil in einem Reibungseingriff mit der Basisplatte (18) befindet und/oder sich der untere Teil in einem Reibungseingriff mit dem Dosenkörper (30) befindet.
10. Ventilanordnung nach einem der Ansprüche 1 bis 9, wobei der Ventilschaft (24) mindestens ein Widerstandselement (48) zum Bereitstellen einer Kontaktfläche für einen menschlichen Finger, insbesondere Daumen, umfasst, um den Ventilschaft (24) in Bezug auf die Basisplatte (18) abzuschragen, wobei das Widerstandselement (48) insbesondere einstückig mit dem Ventilschaft (24) ist.
11. Ventilanordnung nach einem der Ansprüche 1 bis 10, wobei das Widerstandselement als ein vorstehender Ring (48) gestaltet ist, der den Ventilschaft (24) umgibt, und/oder als eine Vertiefung gestaltet ist, die den Ventilschaft (24) umgibt.
12. Ventilanordnung nach einem der Ansprüche 1 bis 11, wobei der Ventilschaft (24) auf einem Anschlag (58) des Führungsschlitzes (22) in geöffneten Position

tion ruht und/oder der Ventilschaft (24) einen besonders vorstehenden Anschlag (52) umfasst, der auf der Basisplatte (18) in geöffneten Position ruht.

13. Ventilanordnung nach einem der Ansprüche 1 bis 12, wobei der Ventilschaft (24) auf einem Anschlag (22) des Führungsschlitzes in geschlossener Position ruht.
14. Aerosoldose, insbesondere für das Anwenden eines druckbeaufschlagten Haarpflegemittels, umfassend einen Dosenkörper (30) zum Bereitstellen eines aufnehmenden Volumens (56) und eine Ventilanordnung (54) nach einem der Ansprüche 1 bis 13, verbunden mit dem Dosenkörper (30) zum Abdichten des aufnehmenden Volumens (56), wobei das abgeschrägte Ventil (20) eine Auslasspassage (26) im Austausch mit dem aufnehmenden Volumen (56) in geöffneten Position des abgeschrägten Ventils (20) umfasst, wobei die Auslasspassage (26) in geschlossener Position des abgeschrägten Ventils (20) abgedichtet ist.

25 Revendications

1. Ensemble valve destiné à être relié à un corps de bombe (30) d'une bombe aérosol (32) comprenant une valve à basculement (20), la valve à basculement (20) comprenant une plaque de base (18) pouvant être fixée au corps de bombe (30) et une tige de valve (24) pouvant basculer par rapport à la plaque de base (18) pour ouvrir et/ou fermer un passage de sortie (26) de la valve à basculement (20), un couvercle (10) pour recouvrir la plaque de base (18), la tige de valve (24) étant reçue par une fente de guidage (22) du couvercle (10), le couvercle (10) de la valve à basculement (20) d'une bombe aérosol (32), comprenant
 - une paroi latérale (12) pour relier le couvercle (10) à une plaque de base (18) de la valve à basculement (20) et/ou à un corps de bombe (30) de la bombe aérosol (32),
 - une paroi supérieure (14) pour recouvrir la plaque de base (18), la paroi supérieure (14) entière étant principalement immobile par rapport à la paroi latérale (12),
 - la paroi supérieure (14) comprenant la fente de guidage (22) pour recevoir une tige de valve (24) de la valve à basculement (20), la fente de guidage (22) comprenant une longueur suivant une direction d'actionnement (46) pour incliner la tige de valve (24) entre une position fermée, dans laquelle un passage de sortie (26) de la valve à basculement (20) est fermé, et une position ouverte, dans laquelle le passage de sortie (26) de la valve à basculement (20) est ouvert, par

rapport à la plaque de base (18), la paroi supérieure (14) et/ou la paroi latérale (12) comprenant une formation tridimensionnelle par laquelle une dépression à doigt (34) destinée à recevoir un doigt humain, en particulier un pouce humain, est prévue, la dépression à doigt (34) s'étendant jusqu'à une zone de départ (33) de la fente de guidage (22), où la tige de valve (24) est située en position fermée,

la conception du couvercle (10) étant telle que la valve à basculement (20) est actionnée en appliquant une force d'actionnement directement sur la tige de valve (24) sans pièce supplémentaire entre le doigt d'un utilisateur et la tige de valve (24).

2. Ensemble valve selon la revendication 1, par rapport à un capuchon strictement conçu comme un cylindre mathématique, la dépression à doigt (34) étant une partie découpée du cylindre mathématique.
3. Ensemble valve selon la revendication 1 ou 2, la dépression à doigt (34) comprenant une surface de repos (44) au moins partiellement, particulièrement entièrement, fermée pour reposer le doigt humain dans la dépression à doigt (24), la formation tridimensionnelle de la paroi supérieure (14), en particulier la dépression à doigt (34), et un coefficient de friction de la surface de repos (44) étant choisis pour permettre un glissement du doigt humain le long de la surface de repos (44) vers la fente de guidage (22) et/ou le long de la fente de guidage (22).
4. Ensemble valve selon l'une quelconque des revendications 1 à 3, la dépression à doigt (34) comprenant, en vue latérale en coupe transversale, une courbure (36) qui tombe principalement asymptotiquement avec la paroi supérieure (44) restante dans une zone où la dépression à doigt (34) rencontre la fente de guidage (22).
5. Ensemble valve selon l'une quelconque des revendications 1 à 4, la dépression à doigt (34) comprenant, en vue latérale en coupe transversale, une courbure (36) qui comprend d'abord une partie (38) ayant un nombre de courbure positif et ensuite une partie (42) ayant un nombre de courbure négatif venant de la paroi latérale (12) vers l'intérieur vers la fente de guidage (22).
6. Ensemble valve selon l'une quelconque des revendications 1 à 5, la dépression à doigt (34) comprenant au moins une paroi de blocage (62) pour bloquer un mouvement du doigt humain perpendiculaire à la direction d'actionnement (46).
7. Ensemble valve selon l'une quelconque des revendications 1 à 6, la dépression à doigt (34) compre-

nant une fente (64), la longueur et la largeur de la fente (64) étant choisies pour fournir une direction de fente de guidage supplémentaire pour basculer la tige de valve (24) entre la position fermée et une autre position ouverte.

8. Ensemble valve selon l'une quelconque des revendications 1 à 7, au moins deux fentes de guidage (22), en particulier principalement droites, étant disposées en angle, en particulier perpendiculairement l'une à l'autre.
9. Ensemble valve selon l'une quelconque des revendications 1 à 8, la paroi latérale (12) comprenant une partie supérieure pour recevoir la plaque de base (18) de la valve à basculement (20) et une partie inférieure pour recevoir le corps de bombe (30) de la bombe aérosol (32), en particulier la partie supérieure étant en prise par friction avec la plaque de base (18) et/ou la partie inférieure étant en prise par friction avec le corps de bombe (30).
10. Ensemble valve selon l'une quelconque des revendications 1 à 9, la tige de valve (24) comprenant au moins un élément de résistance (48) pour fournir une surface de contact pour un doigt humain, en particulier le pouce, afin de basculer la tige de valve (24) par rapport à la plaque de base (18), l'élément de résistance (48) étant en particulier d'une seule pièce avec la tige de valve (24).
11. Ensemble valve selon l'une quelconque des revendications 1 à 10, l'élément de résistance étant conçu sous la forme d'une bague saillante (48) entourant la tige de valve (24) et/ou étant conçu sous la forme d'une dépression entourant la tige de valve (24).
12. Ensemble valve selon l'une quelconque des revendications 1 à 11, la tige de valve (24) reposant sur une butée (58) de la fente de guidage (22) en position ouverte et/ou la tige de valve (24) comprenant une butée (52) en particulier saillante reposant sur la plaque de base (18) en position ouverte.
13. Ensemble valve selon l'une quelconque des revendications 1 à 12, la tige de valve (24) reposant sur une butée de la fente de guidage (22) en position fermée.
14. Bombe aérosol, en particulier pour l'application d'un agent de soin capillaire sous pression, comprenant un corps de bombe (30) pour fournir un volume de réception (56) et un ensemble valve (54) selon l'une quelconque des revendications 1 à 13 relié au corps de bombe (30) pour rendre étanche le volume de réception (56), la valve à basculement (20) comprenant un passage de sortie (26) en communication avec le volume de réception (56) en position ouverte

de la valve à basculement (20), le passage de sortie (26) étant fermé de façon étanche en position fermée de la valve à basculement (20).

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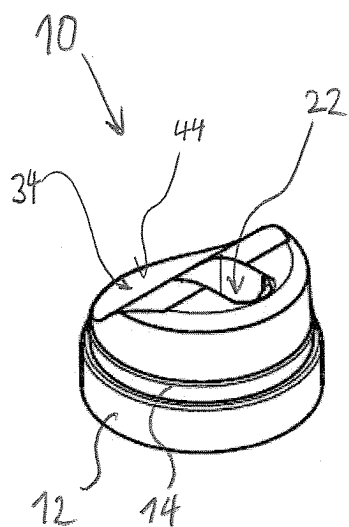


Fig. 1a

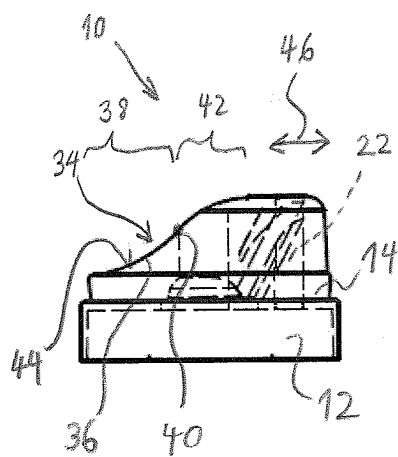


Fig. 1b

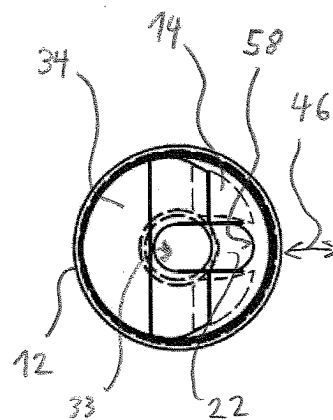


Fig. 1c

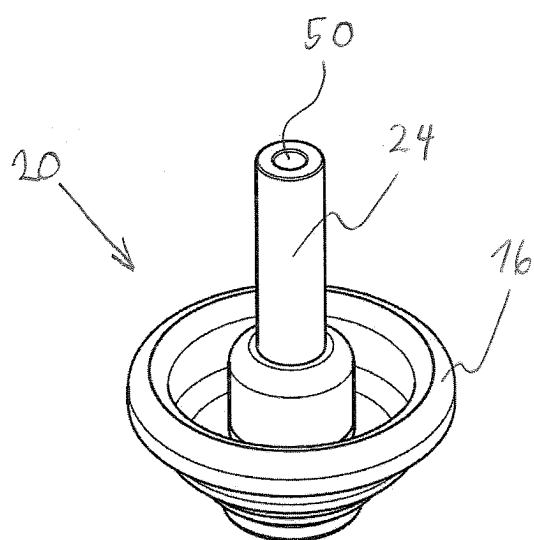


Fig. 2a

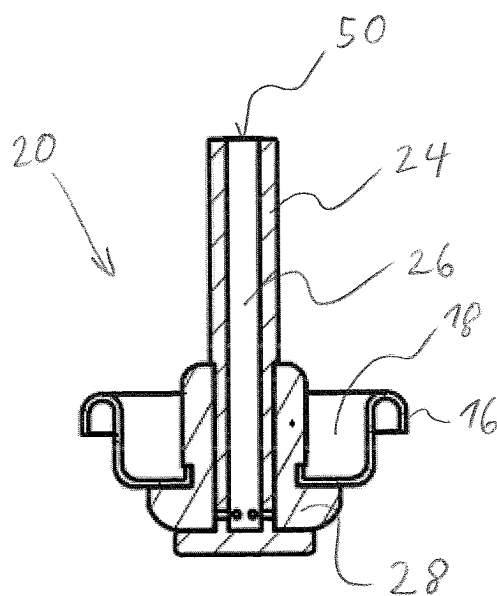


Fig. 2b

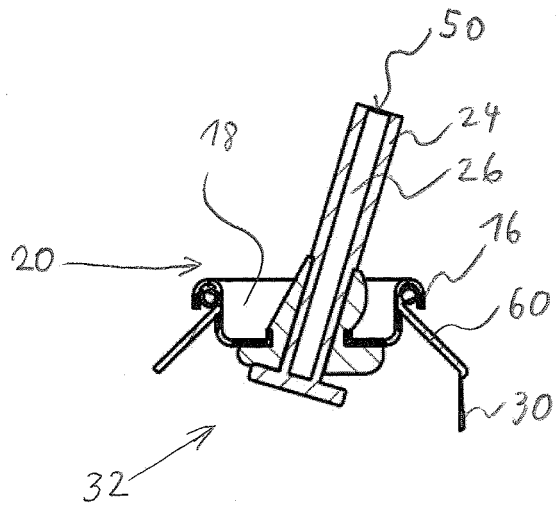


Fig. 2c

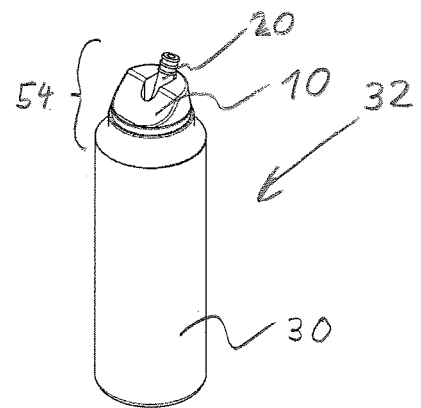


Fig. 3

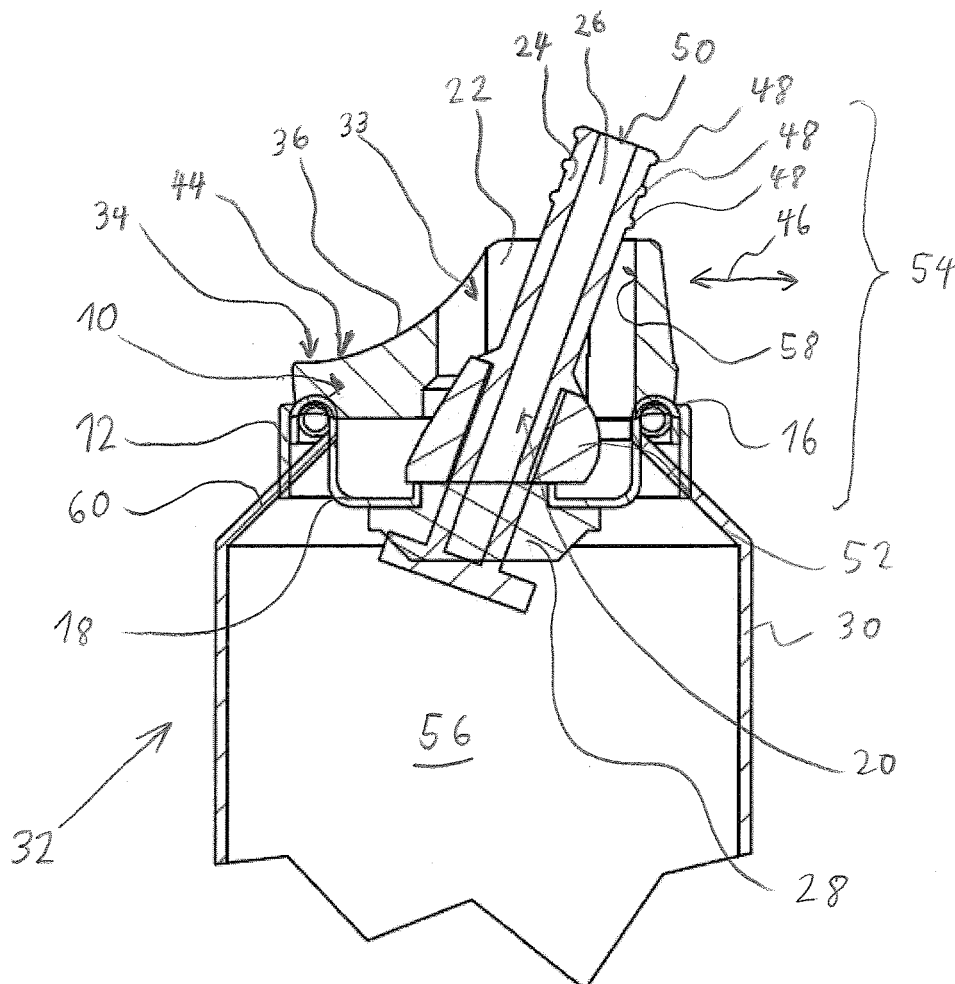


Fig. 4

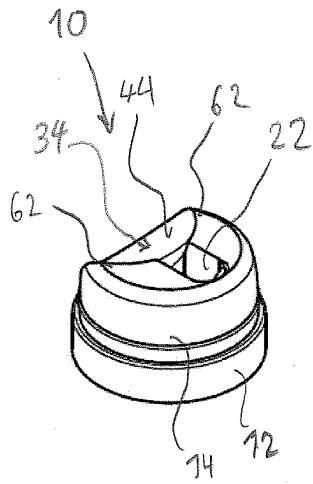


Fig. 5a

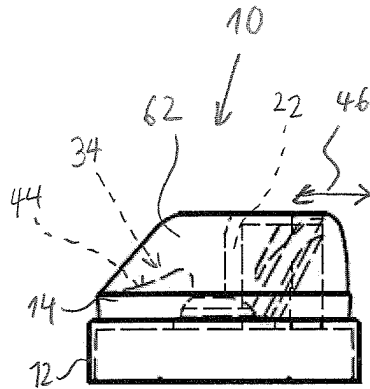


Fig. 5b

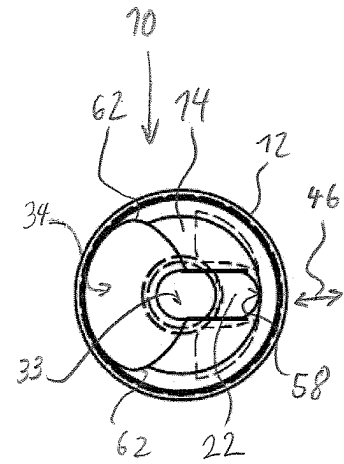


Fig. 5c

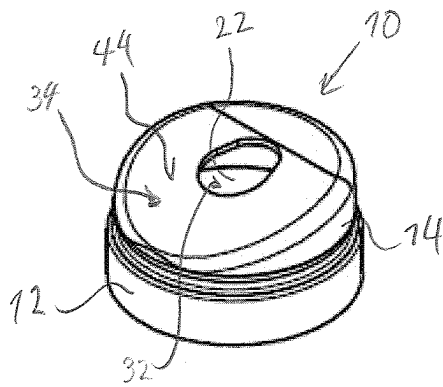


Fig. 6a

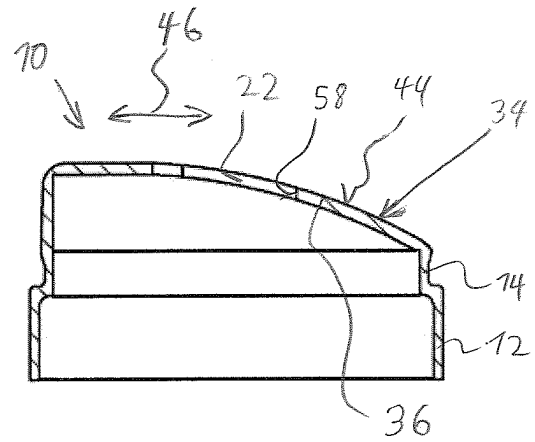


Fig. 6b

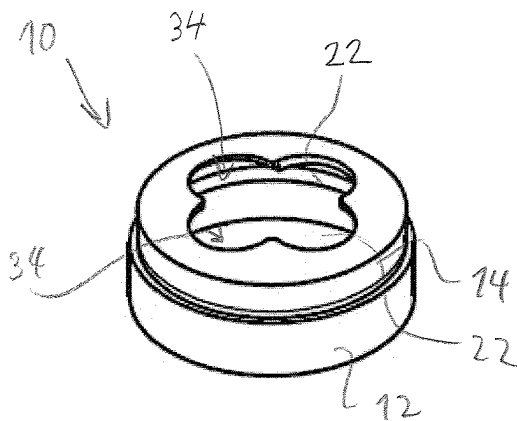


Fig. 7a

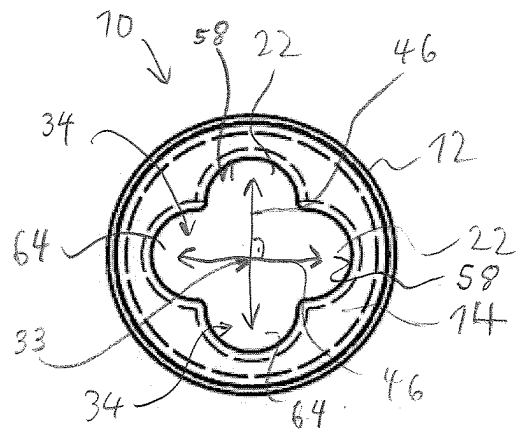


Fig. 7b

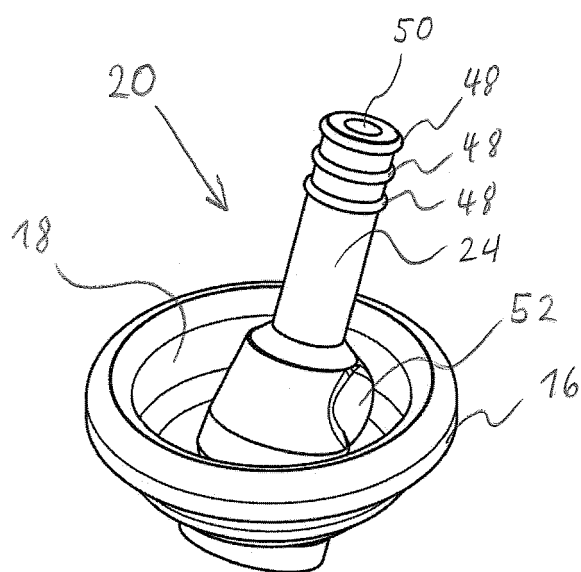


Fig. 8a

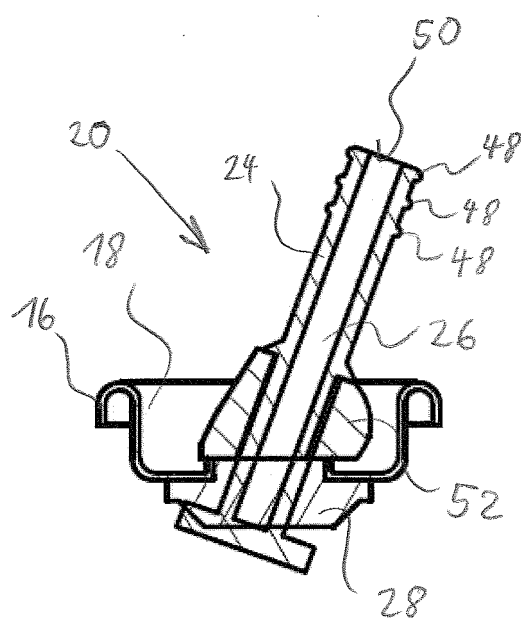


Fig. 8b

REFERENCES CITED IN THE DESCRIPTION

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