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(54) **CAP FOR AN AEROSOL CAN**

(57) It is provided a cap for protecting a vent (42) of an aerosol can (44), comprising a circumferential cap wall (12) and an actuation head (16) for actuating the vent (42) in a mounted state, wherein the actuation head (16) is connected with the cap wall (12) via breakable bridges (28, 36) in an attached state, wherein the actuation head (16) comprises a cover (18) for covering a stem (46) of the vent (42) in the attached state, an inlet channel for being mechanically and fluidly connected with the stem in the mounted state and an outlet channel (20) fluidly connected with the inlet channel (50) and protruding radially outwards from the cover (18), wherein

the cap wall (12) comprises a recess (34) for receiving the outlet channel (20) in mounted state in a lower discharge position, wherein the actuation head (16) comprises a stopper (38) for blocking a turning of the discharge channel (20) out of the recess (34) of the cap wall (12) in mounted state in a higher closing position. The stopper (38) prevents a blocking of the intended actuation stroke and enables a facilitated mounting and actuating of the actuation head (16), so that an easy and cost efficient handling of discharging an aerosol can (44) is enabled.

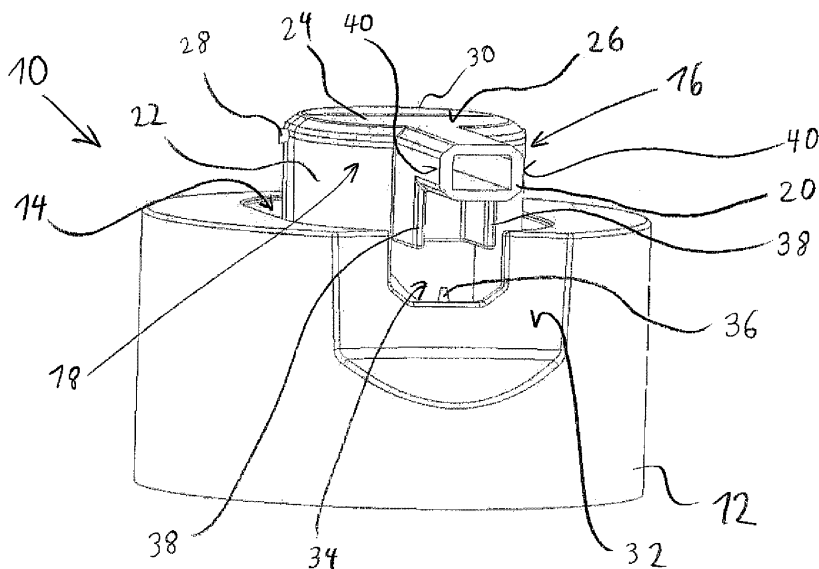


Fig. 2

Description

[0001] The invention relates to a cap for an aerosol can by which a vent for dispensing a content of the aerosol can is protected.

[0002] EP 1 247 758 A1 discloses a cap for an aerosol can which can be clipped to the aerosol can. The cap comprises an actuation head arranged inside a circumferential cap wall which is connected to the cap wall via breakable bridges. When the actuation head is broken from the cap wall the actuation head can be connected with a stem of a vent of the aerosol can. The actuation head comprises an outlet channel protruding radially outwards at a level above the upper rim of the cap wall when not actuated. The actuation head can be pushed downwards for opening the vent and discharging the content of the aerosol can via the outlet channel, wherein the protruding outlet channel engages into a recess inside the cap wall so that the actuation head can perform a full actuation stroke without being blocked by the cap wall.

[0003] There is a permanent need for facilitating the handling of discharging an aerosol can in a cost efficient manner.

[0004] It is an object of the invention providing measures enabling an easy and cost efficient handling of discharging an aerosol can.

[0005] The solution of this object is provided according to an aspect of the invention by a cap according to the features of claim 1. Preferred embodiments of the invention are given by the dependent claims and the following description, which can constitute each solely or in combination an aspect of the invention.

[0006] An aspect of the invention is directed to a cap for protecting a vent of an aerosol can, comprising a circumferential cap wall for covering a lateral area of the vent and an actuation head for actuating the vent in a mounted state, wherein the actuation head is connected with the cap wall via breakable bridges in an attached state, wherein the actuation head comprises a cover for covering a stem of the vent in the attached state of the actuation head, an inlet channel for being mechanically and fluidly connected with the stem in the mounted state of the actuation head and an outlet channel fluidly connected with the inlet channel and protruding radially outwards from the cover for discharging a content of the aerosol can radially outside the cap wall, wherein the cap wall comprises a recess for receiving the outlet channel in mounted state of the actuation head in a lower discharge position, wherein the actuation head comprises a stopper for blocking a turning of the discharge channel out of the recess of the cap wall in mounted state of the actuation head in a higher closing position.

[0007] The cap wall and the actuation head can be one-piece in the attached state, so that the whole cap can be produced one-piece by plastic injection die casting in a cost efficient manner. The cap can be connected to the head of the aerosol can, so that the vent of the aerosol can is arranged inside the cap and protected by

the cap wall as well as by the actuation head which may cover the vent. The aerosol can and the connected cap can constitute an aerosol can arrangement which can be shipped and sold without the risk that the vent is opened accidentally. When the aerosol can is used and the content of the aerosol should be discharged, the actuation head can be detached from the cap wall by breaking the bridges of the actuation head while being connected with the cap wall in the attached state. The stem of the vent is freely accessible after braking the actuation head from the cap wall, which is still connected to the aerosol can, and allows to remove the actuation head from the space enclosed by the cap wall. The stem of the vent may be connected to a specific discharging device for discharging the content of the aerosol can, which is quite common in the hair dressing field. However, it should still be possible to discharge the content of the aerosol can without an additional discharging device. In this case, the removed actuation head can be utilized for actuating the vent of the aerosol can by connecting the inlet channel of the actuation head with the stem of the vent providing the mounted state of the actuation head. The actuation head is connected to the cap wall via bridges in the attached state, while the inlet channel of the actuation head is disconnected from the stem in the attached state of the actuation head. When the bridges between the actuation head and the cap wall are broken, the inlet channel of the actuation head is connected to the stem of the vent in the mounted state. After the actuation head is mounted with the vent, the vent can be opened by pushing the actuation head and the stem downwards, so that the vent opens and the content of the aerosol can flows via the vent and the inlet channel to the outlet channel of the actuation head, where the content leaves the actuation head at an outlet opening of the outlet channel. When the actuation head is pushed downwards the protruding outlet channel is received by the recess of the cap wall, so that a full actuation stroke can be performed without being blocked by the upper edge of the cap wall.

[0008] The discharge channel is arranged at a level above the upper edge of the cap wall, when the actuation head is not pushed down into its discharge position but left in the elevated closing position, due to the restricted building space in axial direction of the cap and the providing of a significant high actuation stroke. The intended actuation stroke requires a significant axial distance between the higher closing position and the lower discharge position of the discharge channel, which particularly corresponds to the maximal axial displacement of the stem inside the vent. Due to the stopper outside the cover and below the outlet channel it is prevented, that the outlet channel turns in the peripheral direction into a position where the outlet channel is displaced with respect to the recess. The outlet channel can be positioned within a peripheral angle where the outlet channel is aligned in line with the recess in the cap wall. It is prevented that the outlet channel meets the upper rim of the cap wall next to the recess, which would block the downward

movement of the actuation head and would prevent reaching the discharge position of the actuation head. Before the actuation head would turn away from the recess inside the cap wall in the elevated closing position, where the outlet channel is arranged above the upper rim of the cap wall, the stopper would abut at the material of the cap wall bordering the recess in the cap wall. Even when the outlet channel is positioned outside the recess and above the upper rim of the cap wall, the stopper is still positioned inside the recess for blocking a turning of the outlet channel away from the recess.

[0009] It is used the insight that a connection of the actuation head with the stem of the valve is facilitated, when the actuation head protrudes a little bit upwards from the cap wall in the mounted state, so that an upper part of the actuation head could be easily held, when the connection of the inlet channel of the actuation head with the stem of the vent is performed. Further it is facilitated to actuate the vent, when an upper part of the actuation head protrudes upwards with respect to the upper rim of the cap wall, so that the actuation head is well accessible. Since the discharge channel should be arranged inside the recess of the cap wall in the attached state for saving building space, the outlet channel is particularly positioned as high as possible, so that the outlet channel would be arranged above the upper rim of the cap wall automatically, when a part of the actuation head should protrude from the level of the upper rim of the cap wall. It is further used the insight that the stem of the vent is usually axially symmetrical, so that a connection technique for connecting the actuation head with the stem may allow a turning of the actuation head around the longitudinal axis of the stem. When the actuation head is pushed downwards by a user, the user may easily apply not only a force downwards but also a force in tangential direction to the actuation head, so that the user himself may turn the actuation head away from the recess when pushing the actuation head. However, the stopper blocks a turning of the actuation head by abutting the material of the cap wall bordering the recess, so that the actuation head together with the outlet channel may protrude upwards from the level of the upper rim of the cap wall, while a blocking of the intended actuation stroke is prevented at the same time. The stopper prevents a blocking of the intended actuation stroke and enables a facilitated mounting and actuating of the actuation head, so that an easy and cost efficient handling of discharging an aerosol can is enabled.

[0010] The cover of the actuation head may comprise a circumferential cover wall, which is closed at the top by a top wall providing a top face pointing upwards. The inlet channel may be provided not centrally to the center of area of the top wall but offset, particularly along the cover wall. Particularly, the cover wall may provide a part of the inlet channel. The flow cross section of the inlet channel may be bordered partially by the cover wall. The outlet channel may be provided along the top wall, wherein the outlet channel penetrates the cover wall, so that a

part of the outlet channel protrudes from the cover wall. Particularly, the top wall may provide a part of the outlet channel. The flow cross section of the outlet channel may be bordered partially by the cover wall. The upper face of the protruding part of the outlet channel may be mainly in the same plane as the nearby part of the top face of the top wall. The inlet channel may be aligned mainly in axial direction, wherein the outlet channel is aligned mainly in radial direction. The inlet channel and the outlet channel are connected with each other so that the flow cross section of the inlet channel may communicate with the flow cross section of the outlet channel. The discharged content of the aerosol may perform a deflection by mainly 90°, when the content flows from the inlet channel to the outlet channel.

[0011] When the actuation head is in its attached state and connected to the cap wall via the breakable bridges, the stem of the vent may extend into a free volume inside the cap of the actuation head radially offset to the inlet channel. The vent is not only protected by the cap wall but also by the cover of the actuation head. When the inlet channel is connected to the stem of the vent in the mounted state of the actuation head, the actuation head is displaced in radial direction with respect to its position in the attached state. Since the majority of the outlet channel or the whole outlet channel can be located radial inside the cap wall, the packaging size of the cap can be small in the attached state. Due to the radial displacement of the actuation head between the attached state and the mounted state the outlet channel may significantly protrude from the cap wall in radial direction for facilitating the discharge of the aerosol content without soiling the cap or the aerosol can.

[0012] The aerosol can is mainly cylindrical designed, so that the aerosol can and the cap comprise a mainly circular cross section perpendicular to its longitudinal direction. An "axial" direction is understood as a direction in the longitudinal direction of the aerosol can and/or the cap or cap wall. The cover of the actuation head may or may not comprise a circular cross section, wherein an axial direction with respect to the actuation head is understood as a direction parallel to the axial direction of the aerosol can or the cap. A "radial direction" is understood as an direction perpendicular to the respective axial direction of the considered part. When the aerosol can is placed onto a horizontal plane upright, the cap is positioned at the upper top of the aerosol can. Hence, "up", "top", "high" are understood as a position or direction against the direction of gravity, when the aerosol can with the connected cap is placed on the horizontal plane upright. "Down", "bottom", "low" are understood as a position or direction in the direction of gravity, when the aerosol can with the connected cap is placed on the horizontal plane upright. This understanding is also applied, when the aerosol can is aligning in a different position with respect to gravity, for example when a user holds the aerosol can upside down for applying the content of the aerosol can.

[0013] Particularly the stopper is arranged outside the cover and below the discharge channel, wherein the stopper is positioned completely radially inside the cap wall in the attached state of the actuation head and inside the recess in the mounted state of the actuation head. Since the stopper cannot contact the cap wall in radial, axial or tangential direction in the attached state of the actuation head, the actuation head can be positioned in a lower sunken position in the attached state with respect to the lower discharge position of the actuation head in the mounted state, so that the packaging size of the cap can be reduced and the vent of the aerosol can be better protected. When the actuation head is in its mounted state, the stopper is arranged at least partially over the full actuation stroke of the actuation head inside the recess of the cap wall for blocking a displacement of the actuation head in peripheral direction and keeping the outlet channel in a common peripheral angel with the recess of the cap wall enabling the axial movement of the outlet channel over the full actuation stroke inside the recess. The extension of the stopper in radial direction may be significantly smaller than the extension of the outlet channel in radial direction.

[0014] Preferably the stopper is connected with the cover as well as with the outlet channel, wherein particularly the stopper fills a corner between the cover and the outlet channel. Generally, it is possible providing the stopper as a part protruding downwards from the outlet channel in a restricted part in radial direction of the protruding part of the outlet channel, so that the stopper is only provided along a radial part of the outlet channel for guaranteeing that the stopper is arranged within the recess of the cap wall in the mounted state of the actuation head. However, when the extension of the stopper in radial direction is so long that the stopper meets the cover wall of the cover, the connection of the outlet channel with the cover is improved. Particularly it is possible to apply a significant force at the free end of the outlet channel for braking at least one bridge in the attached state of the actuation head without breaking the outlet channel.

[0015] Particularly preferred the stopper is formed as a flat flap. The thickness of the stopper may correspond mainly to the wall thickness of the outlet channel and/or to the wall thickness of the cover. A large material accumulation for providing the stopper may be prevented so that the risk of shrink holes in the stopper is prevented. The design of the actuation head may be optimized for plastic injection die casting due to the flat design of the at least one stopper.

[0016] Particularly the outlet channel comprises two side walls pointing in mainly tangential direction of the cap wall, wherein two stoppers are provided at each one of the different side walls, wherein particularly each stopper forms a common face with the associated side wall. Due to the two stoppers spaced to each other in circumferential direction the outlet channel is further stiffened. Particularly a turning of the outlet channel around its radial longitudinal axial is prevented. Further it is possible,

that no part of the outlet channel protrudes in tangential direction from the plane of the associated stopper in a direction away from both stoppers, so that no part of the outlet channel is present which may about the upper rim of the cap wall and block the axial movement of the outlet channel within the recess of the cap wall. At the same time, it is not necessary that the stopper protrudes from the outlet channel in tangential direction so that the whole clearance between the outlet channel and the material of the cap wall bordering the recess can be used by the outlet channel. The risk that the outlet channel could be clamped in the recess is prevented.

[0017] Preferably the stopper comprises a stop face pointing downwards for butting at a rim of the recess in the lower discharge position of the actuation head. It is not necessary providing slits or further recesses for receiving the respective stopper. Instead of letting the outlet channel abutting the rim of the recess in the lower discharge position, it is the at least one stopper abutting the rim of the recess in the lower discharge position. The recess is designed such that the rim of the recess pointing upwards is positioned low enough that the stopper only abuts the rim when the intended full actuation stroke of the actuation head is performed. This in turn leads to a quite long extension of the recess in axial direction which facilitates a manipulation of the outlet channel, particularly for providing a sufficient access to the outlet channel for a force at the outlet channel in the attached state of the actuation head for breaking at least one bridge by means of the force applied to the outlet channel.

[0018] Particularly preferred the cover of the actuation head is connected with the cap wall via two breakable first bridges arranged at opposing sides of the cover in the attached state, wherein the first bridges are arranged in line with a swivel axis aligned between the inlet channel and the protruding part of the outlet channel outside the cap wall. The first bridges may be designed as long bars with a small cross section, so that the first bridges can be easily broken. However, the first bridges can be twisted by torsion so that the actuation head can be swiveled around the swivel axis provided by the longitudinal direction of the mainly coaxial arranged first bridges. The first bridges can be weaken and finally broken by easily swiveling the actuation head back and forth. The swivel axis provided by the first bridges is provided such, that enough space is present inside the volume bordered by the cap wall that the actuation head may swivel by a significant angle until the first bridges are finally broken. Further the swivel axis may be provided such, that the inlet channel or the cover wall does not hit the stem of the vent. Preferably the swivel axis is positioned such, that the cover meets the cap wall of the aerosol can before the inlet channel or the cover would meet the stem. The position of the first bridges and the swivel axis in axial direction as well as in the plane perpendicular to the axial direction is correspondingly chosen. Particularly the actuation head may be swiveled by applying a force to the free end of the outlet channel upwards and downwards.

The breaking of the bridges for removing the actuation head out of the attached state is facilitated.

[0019] Particularly the cover comprises a depression for being pressed by human finger at a top face of the cover, wherein the depression is located at a part of the top face beyond the swivel axis and the protruding part of the outlet channel outside the cap wall. A user may apply a force at the free end of the outlet channel upwards and a force at the depression in the top wall of the cover simultaneously for increasing the torque applied to the first bridges. The stiffness of the first bridges is higher at the first swivel movement of the actuation head than afterwards, since the first swivel movement of the pump already provides significant weakening of the first bridges. The breaking of the first bridges is facilitated by the depression which provides an intuitive increase of the applied forces and the provided torque to the first bridges.

[0020] Preferably the discharge channel of the actuation head is connected with the cap wall within the recess via a breakable second bridge, particularly arranged below the discharge channel, in the attached state. Particularly, the second bridge is provided significantly spaced to the first bridges so that a swiveling of the actuation head by accident can be prevented. The second bridge can be broken by applying a sufficient force to the free end of the outlet channel upwards and/or by turning the actuation head back and forth by an amount provided by the clearance of the outlet channel within the recess of the cap wall. Particularly it is provided only one second bridge aligned in mainly axial direction between the outlet channel and the rim of the recess pointing upwards. In the alternate it is possible to provide one or two second bridges aligned in tangential direction between the outlet channel and the rim(s) of the recess pointing in tangential direction. Preferably the longitudinal extension of the second bridge is larger than the longitudinal extension of the first bridge, so that the second bridge can be easier broken by applying forces in longitudinal direction than the first bridge which should be weakened by twisting and applying a torque.

[0021] Particularly preferred a space is provided between the discharge channel and a rim of the recess for inserting a tool and/or a human finger for swiveling the discharge channel upwards above the cap wall in order to break the second bridge. The tool or the finger can be inserted between the rim of the recess pointing upwards and a wall of the outlet channel pointing downwards. This enables a good grip for a user for applying a significant force for breaking the second bridge.

[0022] Particularly a gap is provided between the cover and the cap wall for turning the actuation head when the discharge channel runs above the cap wall in order to break bridges. The gap between the cover of the actuation head and the cap wall is at least so large that the actuation head can swiveled by an angle big enough that the outlet channel is aligned in a direction by which the outlet channel points above the upper rim of the cap wall. The actuation head can be swiveled so far in a first step

that the actuation head can be turned around an axial axis in a second step without being blocked by the outlet channel abutting the edge of the recess in the cap wall. This facilitates the breaking of the bridges.

[0023] Preferably the inlet channel of the actuation head comprises a fastening means, particularly a clip connector, for fastening the actuation head with the stem of the vent in the mounted state of the actuation head, wherein the inlet channel comprises a, particularly annular, press face for pressing the stem downwards into an open state, wherein the press face is different from the fastening means. The inlet channel can be connected with the stem such that the inlet channel is mainly coaxially arranged to the stem by means of the fastening means. If so, the fastening means may provide an axial clearance with the stem. For example, the stem may comprise a circumferential notch, into which a snap tab of the fastening means, which is designed as clip connector, is inserted. The fastening means, particularly the snap tab, may be rounded at its free end for facilitating the fastening. Since the pressing force for pressing the stem downwards is not provided by the fastening means but by the press face of the inlet channel, it is prevented that a significant force aligned downwards has to be applied via the fastening means, so that it is prevented to impair the connection of the fastening means with the stem or to impair a proper application of the provided press force. The press face can be provided by a step due to a change of the inner diameter of the inlet channel.

[0024] Particularly preferred the bridges comprise a cross section, which is small enough for being broken by hand and big enough for allowing a mass flow during plastic injection die casting. Particularly a ratio of a diameter d of the bridge to a material thickness s of the cover is $0.1 \leq d/s \leq 1.0$, preferably $0.3 \leq d/s \leq 0.8$ and particularly preferred $0.5 \leq d/s \leq 0.6$. This ratio may provide a cross section of the bridges, which is small enough for being broken by hand and big enough for allowing a mass flow during plastic injection die casting. This leads to a facilitated production process without hindering the breaking of the bridges.

[0025] Particularly the cap wall is mainly annular formed except within a limited peripheral angle, where the recess is provided within a recessed circumferential part, wherein the discharge channel is arranged within an outer diameter of the cap wall in the attached state of the actuation head, wherein particularly the discharge channel terminates at the outer diameter of the cap wall in the attached state of the actuation head. The circumferential part of the cap wall, where the recess is located, may be a straight secant or concave rounded. The outlet channel may protrude from the cap wall outwards even in the attached state of the actuation head without increasing the packaging size of the mainly cylindrical cap. The breaking of the bridges is facilitated due to the protruding part of the outlet channel at its free end in the attached state of the actuation head.

[0026] A further aspect of the invention is directed to

an aerosol can arrangement comprising an aerosol can for storing an aerosol content, a vent for discharging the content out of the aerosol can, wherein the vent comprises a base part connected to the aerosol can and a stem for opening the vent in a downwards pressed state, and a cap, which may be designed as previously described, for protecting the vent, wherein the cap is connected, particularly clipped, to the aerosol can, wherein the stem of the vent comprises an opening pointing upwards for communicating with the inlet channel of the actuation head in the mounted state of the actuation head. The stopper of the cap prevents a blocking of the intended actuation stroke and enables a facilitated mounting and actuating of the actuation head with the stem, so that an easy and cost efficient handling of discharging an aerosol can is enabled.

[0027] 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. 1: is a schematic perspective top view of a cap in an attached state for an aerosol can,

Fig. 2: is a schematic side of the cap of Fig. 1 in a higher closing position in mounted state,

Fig. 3: is a schematic sectional view of an aerosol can arrangement with the cap of Fig. 1 in the attached state,

Fig. 4: is a schematic sectional view of the aerosol can arrangement of Fig. 3 with the cap in the higher closing position in mounted state and

Fig. 5: is a schematic sectional view of the aerosol can arrangement of Fig. 3 with the cap in a lower discharge position in mounted state.

[0028] The cap 10 as illustrated in Fig. 1 and Fig. 2 comprises a mainly ring-like circular cap wall 12 bordering an inner volume 14, into which an actuation head 16 is arranged. The actuation head 16 comprises a cover 18 as well as an outlet channel 20 protruding radially outwards from a cover wall 22 of the cover 18. The cover wall 22 is designed roughly elliptic and closed at its upper end by a top wall 24 providing a top face 26 pointing upwards. The cover wall 22 is connected by two breakable first bridges 28 to the cap wall 12, so that the actuation head 16 is releasably fixed with the cap wall 12 forming a one-piece cap 10. The two first bridges 28 are arranged in one line defining a swivel axis around which the actuation head 16 can be swiveled for weakening and finally breaking the first bridges 28. A depression 30 is provided in the part of the top wall 24 which is located away from the protruding part of the outlet channel 20 with respect to the swivel axis defined by the longitudinal extension of the first bridges 28. The actuation head 16 can be swiveled by pressing a finger in axial direction into the depression 16.

[0029] The cap wall 12 comprises a recessed circum-

ferential part 32, where the otherwise circular cap wall 12 is formed concave in a limited peripheral angle of the cap wall 12 for providing the recessed circumferential part 32 of the cap wall. A recess 34 is provided within this recessed circumferential part 32 for receiving the protruding part of the outlet channel 20. The outlet channel and the cap wall 12 can be connected with each other via a breakable second bridge 36. Stoppers 38 are provided in a corner between the outlet channel 20 and the cover wall 22. Each stopper 38 is formed as flat flap and arranged mainly flush with each corresponding side wall 40 of the outlet channel 20. The stoppers 38 are arranged radially inside the cap wall 12 in the attached state of the actuation head 16, when the bridges 28, 36 are not broken, (Fig. 1) and inside the recess 34 of the cap wall 12, when the bridges 28, 36 are broken and the actuation head 16 connected with a vent 42 of an aerosol can 44, (Fig. 2).

[0030] As illustrated in Fig. 3, a stem 46 of the vent 42 may reach into the cover 18 when the actuation head 16 is in its attached state and connected with the aerosol can 44 for providing an aerosol can arrangement 48. An inlet channel 50 is provided along a radial inner face of the cover wall 12 opposite to the protruding part of the outlet channel 20. The inlet channel 50 and the outlet channel 50 are fluidly connected with each other inside the cover 18 at a corner between the cover wall 22 and the top wall 24. The inlet channel 50 is located significantly offset to the stem 46 in radial direction, when the actuation head 16 is in its attached state. When the actuation head 16 is in its mounted state, as illustrated in Fig. 4, the inlet channel 50 can be clipped with a circumferential notch 52 of stem 46 by means of a fastening means 54, which is designed as a clip connector. The actuation head 16 is shifted towards the recess 34 compared to the actuation head 16 in the attached state, so that the stoppers 38 are arranged inside the recess 34 and the outlet channel 20 protrudes from the outer diameter of the cap wall 12. In addition, the actuation head 16 is positioned higher than in the attached state, so that the whole outlet channel 20 is arranged at a height above the upper rim of the cap wall 12. Since the stoppers 38 are arranged inside the recess 34 of the cap wall 12 even in the elevated closing position as illustrated in Fig. 3, it is prevented that the outlet channel 20 may abut the cap wall 12 outside the recess 34 and may block a downward movement into the lower discharge position.

[0031] When the actuation head 16 is pressed downwards for reaching its lower discharge position, as illustrated in Fig. 4, the stem 46 is pressed into the vent 42 for opening the vent. 42. The required pressing force can be applied from a user at the top face 26 of the cover 18 and transmitted to the stem 46 via a press face 56 provided inside the inlet channel 50 by a step provided by a change of the inner diameter of the inlet channel 50.

Claims

1. Cap for protecting a vent (42) of an aerosol can (44), comprising

a circumferential cap wall (12) for covering a lateral area of the vent (42) and
an actuation head (16) for actuating the vent (42) in a mounted state,
wherein the actuation head (16) is connected with the cap wall (12) via breakable bridges (28, 36) in an attached state,
wherein the actuation head (16) comprises

a cover (18) for covering a stem (46) of the vent (42) in the attached state of the actuation head (16),
an inlet channel for being mechanically and fluidly connected with the stem in the mounted state of the actuation head (16) and
an outlet channel (20) fluidly connected with the inlet channel (50) and protruding radially outwards from the cover (18) for discharging a content of the aerosol can (44) radially outside the cap wall (12),

wherein the cap wall (12) comprises a recess (34) for receiving the outlet channel (20) in mounted state of the actuation head (16) in a lower discharge position,
wherein the actuation head (16) comprises a stopper (38) for blocking a turning of the discharge channel (20) out of the recess (34) of the cap wall (12) in mounted state of the actuation head (16) in a higher closing position.

2. Cap according to claim 1 wherein the stopper (38) is arranged outside the cover (18) and below the discharge channel (20), wherein the stopper (38) is positioned completely radially inside the cap wall (12) in the attached state of the actuation head (16) and inside the recess (34) in the mounted state of the actuation head (16).
3. Cap according to claim 1 or 2 wherein the stopper (38) is connected with the cover (18) as well as with the outlet channel (20), wherein particularly the stopper (38) fills a corner between the cover (18) and the outlet channel (20).
4. Cap according to anyone of claims 1 to 3 wherein the stopper (38) is formed as a flat flap.
5. Cap according to anyone of claims 1 to 4 wherein the outlet channel (20) comprises two side walls (40) pointing in mainly tangential direction of the cap wall (12), wherein two stoppers (38) are provided at each one of the different side walls (40), wherein particu-

larly each stopper (38) forms a common face with the associated side wall (40).

6. Cap according to anyone of claims 1 to 5 wherein the stopper (38) comprises a stop face pointing downwards for butting at a rim of the recess (34) in the lower discharge position of the actuation head (16).
7. Cap according to anyone of claims 1 to 6 wherein the cover (18) of the actuation head (16) is connected with the cap wall (12) via two breakable first bridges (28) arranged at opposing sides of the cover (18) in the attached state, wherein the first bridges (28) are arranged in line with a swivel axis aligned between the inlet channel (50) and the protruding part of the outlet channel (20) outside the cap wall (12).
8. Cap according to claim 7 wherein the cover (18) comprises a depression (30) for being pressed by human finger at a top face (26) of the cover (18), wherein the depression (30) is located at a part of the top face (26) beyond the swivel axis and the protruding part of the outlet channel (20) outside the cap wall (20).
9. Cap according to anyone of claims 1 to 8 wherein the discharge channel (20) of the actuation head (16) is connected with the cap wall (12) within the recess (34) via a breakable second bridge (36), particularly arranged below the discharge channel (20), in the attached state.
10. Cap according to claim 9 wherein a space is provided between the discharge channel (20) and a rim of the recess (34) for inserting a tool and/or a human finger for swiveling the discharge channel (20) upwards above the cap wall (12) in order to break the second bridge (36).
11. Cap according to anyone of claims 1 to 10 wherein a gap is provided between the cover (18) and the cap wall (12) for turning the actuation head (16) when the discharge channel (20) runs above the cap wall (12) in order to break bridges (26).
12. Cap according to anyone of claims 1 to 11 wherein the inlet channel (50) of the actuation head (16) comprises a fastening means (54), particularly a clip connector, for fastening the actuation head (16) with the stem (46) of the vent (42) in the mounted state of the actuation head (16), wherein the inlet channel (50) comprises a, particularly annular, press face (56) for pressing the stem (46) downwards into an open state, wherein the press face (56) is different from the fastening means (54).
13. Cap according to anyone of claims 1 to 12 wherein

the bridges (28, 36) comprise a cross section, which is small enough for being broken by hand and big enough for allowing a mass flow during plastic injection die casting, wherein particularly a ratio of a diameter d of the bridge (28, 36) to a material thickness s of the cover (18) is $0.1 \leq d/s \leq 1.0$, preferably $0.3 \leq d/s \leq 0.8$ and particularly preferred $0.5 \leq d/s \leq 0.6$.

14. Cap according to anyone of claims 1 to 13 wherein the cap wall (12) is mainly annular formed except within a limited peripheral angle, where the recess (34) is provided within a recessed circumferential part (32), wherein the discharge channel (20) is arranged within an outer diameter of the cap wall (12) in the attached state of the actuation head (16), wherein particularly the discharge channel (20) terminates at the outer diameter of the cap wall (20) in the attached state of the actuation head (16).
15. Aerosol can arrangement comprising an aerosol can (44) for storing an aerosol content, a vent (42) for discharging the content out of the aerosol can (44), wherein the vent (42) comprises a base part connected to the aerosol can (44) and a stem (46) for opening the vent (42) in a downwards pressed state, and a cap (10) according to anyone of claims 1 to 14 for protecting the vent (42), wherein the cap (10) is connected, particularly clipped, to the aerosol can (44), wherein the stem (46) of the vent (42) comprises an opening pointing upwards for communicating with the inlet (50) channel of the actuation head (16) in the mounted state of the actuation head (16).

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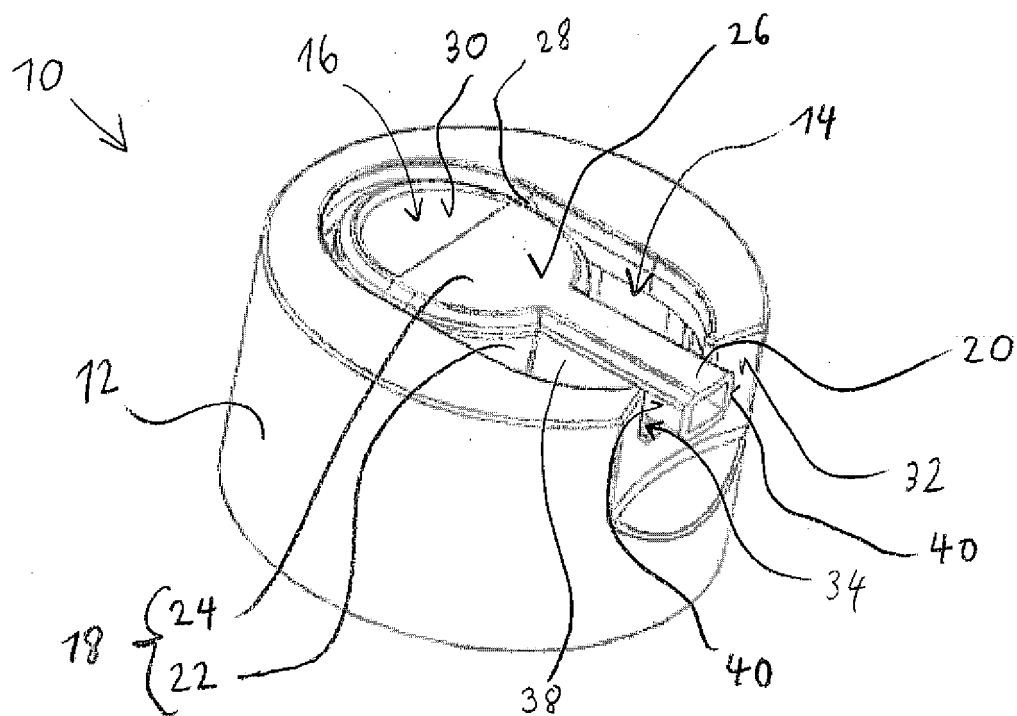


Fig. 1

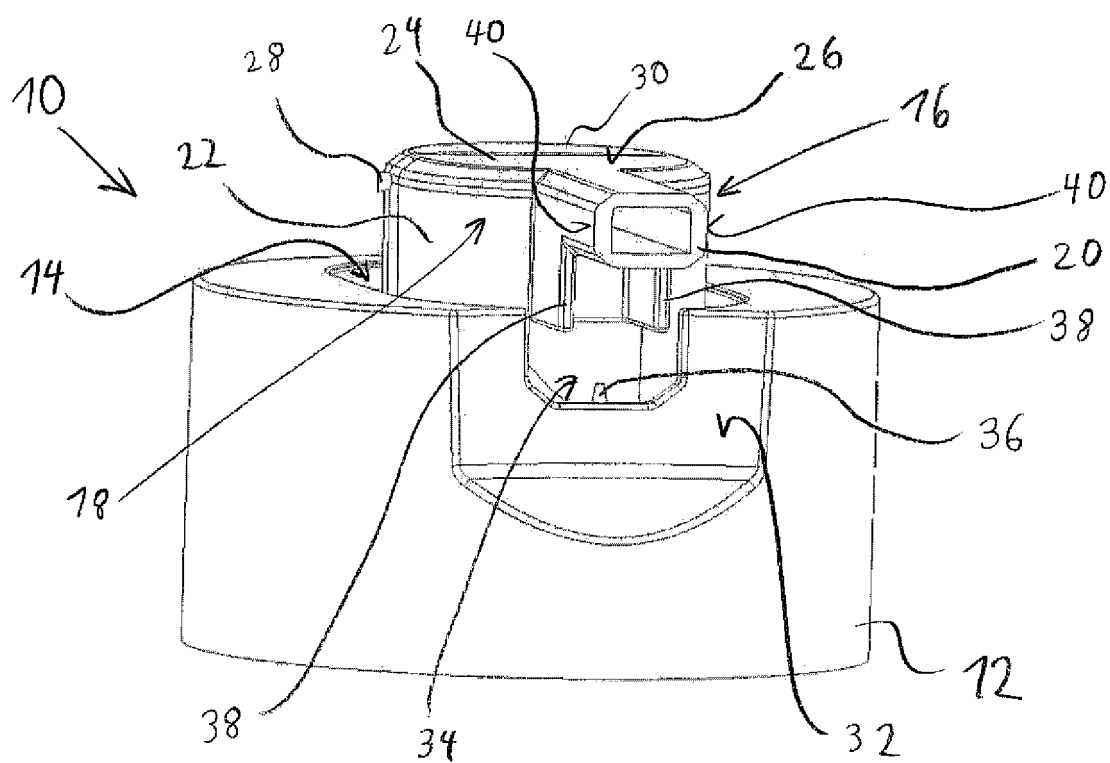


Fig. 2

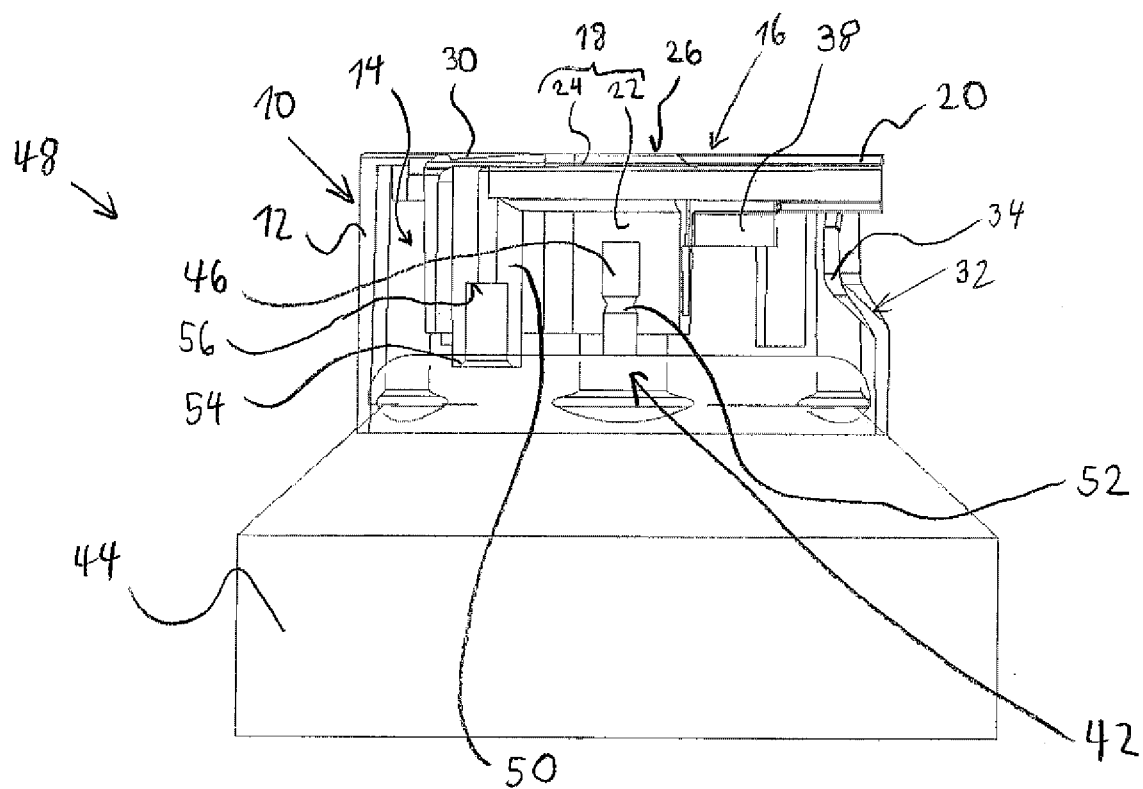


Fig. 3

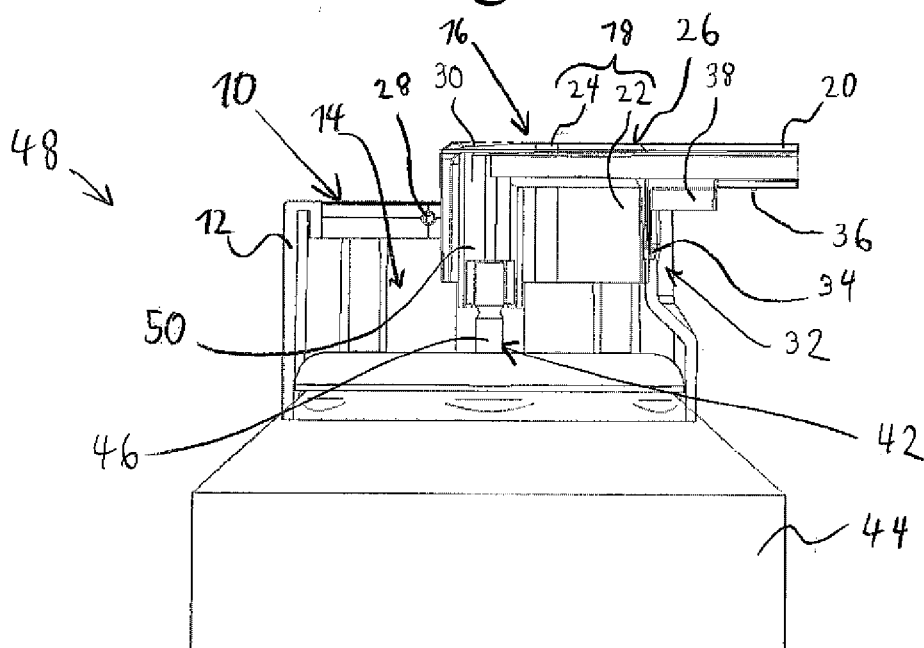


Fig. 4

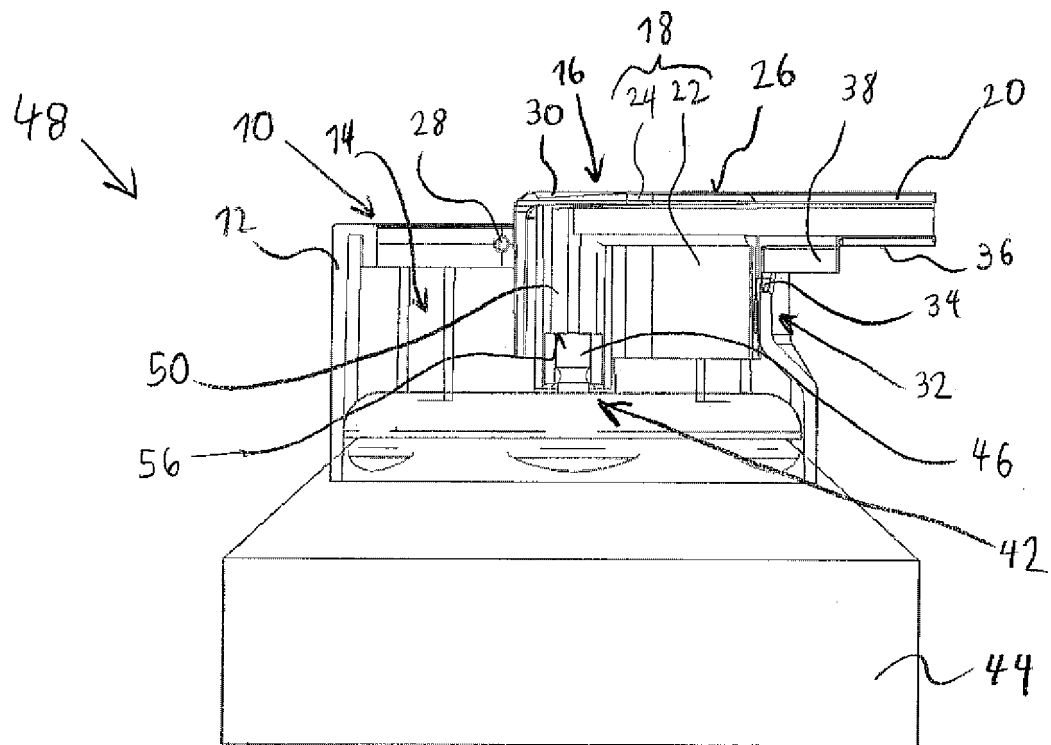


Fig. 5



EUROPEAN SEARCH REPORT

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 540 624 A (GREEN EDWARD H) 17 November 1970 (1970-11-17)	1,7,8, 13,15	INV. B65D83/22
Y	* the whole document *	12	
Y	US 2004/035892 A1 (SCHNEIDER HEINZ [DE]) 26 February 2004 (2004-02-26)	12	ADD. B65D83/20
A	* figures 9, 11 *	1	
A	EP 0 160 816 A2 (COSTER GMBH) 13 November 1985 (1985-11-13)	13	
	* page 7, line 19 - page 8, line 14; claim 1 *		
X	US 2018/244461 A1 (KALAGHER THOMAS G [US] ET AL) 30 August 2018 (2018-08-30)	1	
A	* the whole document *	11	
X	US 4 095 725 A (GONCALVES ANTONIN L) 20 June 1978 (1978-06-20)	1,9,10, 14	
Y	* the whole document *	2-6	
A		11	TECHNICAL FIELDS SEARCHED (IPC)
Y	JP 2017 171366 A (FUMAKILLA LTD) 28 September 2017 (2017-09-28)	2-6	B65D
	* the whole document *		
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 September 2020	Examiner Bork, Andrea
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ON EUROPEAN PATENT APPLICATION NO.**

EP 20 16 6986

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-09-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3540624 A	17-11-1970	NONE	
US 2004035892 A1	26-02-2004	AU 7980101 A CA 2419832 A1 CN 1484603 A DE 10042302 A1 DE 19927381 A1 EP 1313652 A2 JP 2004507408 A US 2004035892 A1 WO 0218234 A2	13-03-2002 18-02-2003 24-03-2004 04-04-2002 16-11-2000 28-05-2003 11-03-2004 26-02-2004 07-03-2002
EP 0160816 A2	13-11-1985	AT 54283 T DE 8414326 U1 EP 0160816 A2	15-07-1990 28-06-1984 13-11-1985
US 2018244461 A1	30-08-2018	NONE	
US 4095725 A	20-06-1978	DE 2654657 A1 GB 1555717 A US 4095725 A	21-07-1977 14-11-1979 20-06-1978
JP 2017171366 A	28-09-2017	JP 6732491 B2 JP 2017171366 A	29-07-2020 28-09-2017

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1247758 A1 [0002]