



EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.11.2023 Bulletin 2023/46

(51) International Patent Classification (IPC):
A24F 40/42 ^(2020.01) **A24F 40/10** ^(2020.01)

(21) Application number: **22172705.0**

(52) Cooperative Patent Classification (CPC):
A24F 40/42; A24F 40/10

(22) Date of filing: **11.05.2022**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(54) **AN AEROSOL GENERATING DEVICE CARTRIDGE COMPRISING AN EXPANSION CHAMBER, AND ASSOCIATED AEROSOL GENERATING SET**

(57) The cartridge (14) for an aerosol generating device comprises a storage portion (56) for storing a liquid vaporizable material and a sealed expansion chamber (80) delimiting an internal volume (84) configured to expand or shrink to compensate pressure differences between the inside of the storage portion (56) and the outside of the cartridge (14).

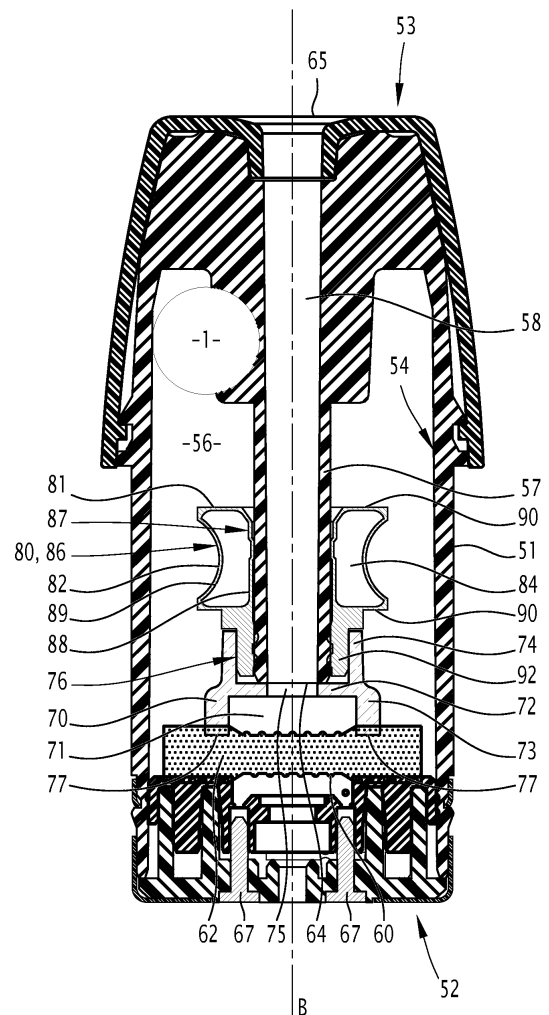


FIG.3

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a cartridge for an aerosol generating device and an associated aerosol generating set.

BACKGROUND OF THE INVENTION

[0002] Different types of aerosol generating devices are already known in the art. Generally, such devices comprise a storage portion for storing a vaporizable material, also known as aerosol forming precursor, which can comprise for example a liquid. A heating system is formed of one or more electrically activated resistive elements arranged to heat said precursor to generate the aerosol. The aerosol is released into a flow path extending between an inlet and outlet of the device. The outlet may be arranged in a mouthpiece, through which a user inhales for delivery of the aerosol.

[0003] The aerosol generating devices comprise generally a battery able to power the heating system. The powering may be controlled by a control module connecting the heating system to the battery via an electric circuit.

[0004] For example, the electrically activated resistive elements of the heating system are wound around a wick or ceramic heater. Said heater is connected to the flow path.

[0005] However, such cartridge may suffer from leakage. Indeed, during its lifetime, pressure inside the storage portion varies regularly. These pressure variations derive from vaping and/or from temperature variations. For example, when the user vapes, air is entering the storage portion and forms bubbles. When the temperature decreases, these air bubbles tend to shrink. This leads to under pressure inside the storage portion and to more air being sucked in the storage portion via the heater. According to another example, when the user vapes and when the temperature rises, air bubbles within the storage portion expand. This leads to overpressure inside the storage portion and to leakage of liquid through the wick or ceramic heater.

[0006] There is thus a need to improve the impermeability of cartridges. This can for example lead to extended cartridge lifetime and to reduction of liquid loss.

SUMMARY OF THE INVENTION

[0007] One of the aims of the present invention is to propose a cartridge with improved impermeability of the storage portion.

[0008] For this purpose, the invention relates to a cartridge for an aerosol generating device, comprising:

- a storage portion for storing a liquid vaporizable material;
- a sealed expansion chamber delimiting an internal

volume configured to expand or shrink to compensate pressure differences between the inside of the storage portion and the outside of the cartridge.

[0009] Provided with these features, the impermeability of the cartridge is improved. The risk of liquid leakage is reduced, as is the risk of air being sucked in the storage portion.

[0010] According to some embodiments, the expansion chamber is arranged at least partially in the storage portion.

[0011] Provided with these features, the cartridge is more compact.

[0012] According to some embodiments, the internal volume of the expansion chamber is delimited by at least one flexible wall, said flexible wall being deformable so that the internal volume of the expansion chamber is able to expand or shrink.

[0013] Provided with these features, the expansion chamber presents a simple mechanism that can lead to expansion or shrinkage of the internal volume of the expansion chamber. The deformation rate of the flexible material can be adapted so as to ensure the necessary expansion and shrinkage.

[0014] According to some embodiments, the flexible wall is made up of silicone, the flexible wall having a thickness between 0.05 mm and 1 mm, preferably between 0,1 mm and 0,6 mm.

[0015] Provided with these features, the flexible wall is made up with a durable, reliable and biocompatible material. Furthermore, silicone is particularly stretchable and resistant at relatively small thicknesses so providing a relatively small element inside the chamber. Other possible materials may be thermoplastic elastomers (TPE).

[0016] According to some embodiments, the cartridge further comprises a wick element interposed between an opening of the storage portion and the inside of the storage portion ; the expansion chamber defining a deformation resistance, said deformation resistance being lower than the resistance of pushing the liquid vaporizable material through the wick element in absence of airflow inside the cartridge.

[0017] Provided with these features, the deformation of the expansion chamber prevents the leakage of liquid vaporizable material through the wick or ceramic element.

[0018] According to some embodiments, the ratio of volume of the expansion chamber to volume of the storage portion is between 1:20 and 1:2, preferably between 1:10 and 1:4.

[0019] Provided with these features, the expansion chamber is easily fittable within the storage portion.

[0020] According to some embodiments, the internal volume of the expansion chamber is filled with a gas or comprises a vacuum.

[0021] When using a gas, the manufacturing of the expansion chamber is made easier. When implementing a

vacuum, the expansion and shrinkage rates of the expansion chamber are only defined by the nature of the materials forming the expansion chamber. For example, in case of a flexible wall, these rates can be perfectly predicted, substantially independently from the environmental conditions (temperature, pressure, etc.).

[0022] When the expansion chamber is filled with a gas, the nature of the gas can be adapted to ensure the necessary expansion and shrinkage rates of the expansion chamber. These rates are determined based on the nature of the gas as well as the nature of the materials forming the expansion chamber. For example, in case of a flexible wall, these rates can be predicted by analyzing expansion/shrinkage rates of both flexible wall and gas.

[0023] According to some embodiments, the expansion chamber is entirely formed by a dedicated expansion chamber part, said dedicated expansion chamber part being entirely arranged within the inside of the storage portion.

[0024] Provided with these features, the deformability of the expansion chamber is finely tunable, since the entire dedicated expansion chamber part can be precisely manufactured to reach a desired deformability. Also, the expansion chamber is then protected from environmental factors such as dirt accumulation and/or interaction with external objects that could damage the expansion chamber. In some cases, the expansion chamber may be formed in hollow parts of already existing design of cartridges. Thus, in such a case, only few modifications are necessary in this design to implement the invention.

[0025] According to some embodiments, the cartridge further comprises an airflow duct delimiting an airflow channel extending through the storage portion ; wherein the dedicated expansion chamber part extends around the airflow duct, the internal volume of the expansion chamber having an annular shape, the dedicated expansion chamber part presenting a through-hole, the airflow duct extending through the through-hole.

[0026] Provided with these features, the cartridge presents a reduced size. The compactness of the cartridge is further improved.

[0027] According to some embodiments, the cartridge further comprises an airflow duct delimiting an airflow channel extending through the storage portion; the expansion chamber being delimited by at least one rigid wall of the airflow duct.

[0028] Provided with these features, the manufacturing of the expansion chamber requires less material since the expansion chamber is at least partially delimited by a preexisting part of the cartridge.

[0029] According to some embodiments, the internal volume of the expansion chamber is delimited by at least one wall of the storage portion.

[0030] Provided with these features, the manufacturing of the expansion chamber requires less material since the expansion chamber is at least partially delimited by a preexisting part of the cartridge.

[0031] According to some embodiments, the cartridge

further comprises an airflow duct delimiting an airflow channel extending through the storage portion; the expansion chamber extending around the airflow channel.

[0032] Provided with these features, the cartridge presents a reduced size. The compactness of the cartridge is further improved.

[0033] According to some embodiments, the internal volume of the expansion chamber is configured to expand or shrink to compensate pressures differences between the inside of the storage portion and the outside of the cartridge, when no liquid vaporizable material is turned into aerosol.

[0034] Provided with these features, the cartridge presents a compensation of pressure differences between the inside of the storage portion and the outside of the cartridge, even when the aerosol generating device is not operated to generate aerosol. Thus, the cartridge provides leakage prevention even when the cartridge is not used (for example such a leakage can be caused by temperature or atmospheric pressure variations).

[0035] The invention also relates to an aerosol generating set comprising:

- a cartridge as defined above;
- an aerosol generating device adapted to operate with the cartridge.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] The invention and its advantages will be better understood upon reading the following description, which is given solely by way of non-limiting example and which is made with reference to the appended drawings, in which:

- Figure 1 is a schematic diagram showing an aerosol generating set comprising a cartridge according to the invention; and
- Figure 2 is a cross-sectional view of a first embodiment of the cartridge of Figure 1, illustrating a situation wherein air bubbles have formed within the storage portion;
- Figure 3 is a cross-sectional view of the cartridge of Figure 2, illustrating a situation wherein the internal volume of the expansion chamber has shrunk;
- Figure 4 is a cross-sectional view of the cartridge of Figure 2, illustrating a situation wherein the internal volume of the expansion chamber has expanded;
- Figure 5 is a cross-sectional view of a second embodiment of the cartridge of Figure 1, illustrating a situation wherein air bubbles have formed within the storage portion.

DETAILED DESCRIPTION OF THE INVENTION

[0037] Before describing the invention, it is to be understood that it is not limited to the details of construction set forth in the following description. It will be apparent to those skilled in the art having the benefit of the present disclosure that the invention is capable of other embodiments and of being practiced or being carried out in various ways.

[0038] As used herein, the term "**aerosol generating device**" or "**device**" may include a vaping device to deliver an aerosol to a user, including an aerosol for vaping, by means of aerosol generating unit (e.g. an aerosol generating element which generates vapor which condenses into an aerosol before delivery to an outlet of the device at, for example, a mouthpiece, for inhalation by a user). The device may be portable. "Portable" may refer to the device being for use when held by a user. The device may be adapted to generate a variable amount of aerosol, e.g. by activating a heating system for a variable amount of time (as opposed to a metered dose of aerosol), which can be controlled by a trigger. The trigger may be user activated, such as a vaping button and/or inhalation sensor. The inhalation sensor may be sensitive to the strength of inhalation as well as the duration of inhalation to enable a variable amount of vapor to be provided (so as to mimic the effect of smoking a conventional combustible smoking article such as a cigarette, cigar or pipe, etc.). The device may include a temperature regulation control to drive the temperature of the heater and/or the heated aerosol generating substance (aerosol precursor) to a specified target temperature and thereafter to maintain the temperature at the target temperature that enables efficient generation of aerosol.

[0039] As used herein, the term "**aerosol**" may include a suspension of precursor as one or more of: solid particles; liquid droplets; gas. Said suspension may be in a gas including air. Aerosol herein may generally refer to/include a vapor. Aerosol may include one or more components of the precursor.

[0040] As used herein, the term "**vaporizable material**" or "**aerosol-forming precursor**" may refer to one or more of a: liquid; solid; gel; mousse; foam or other substances. The vaporizable material may be processable by the heating system of the device to form an aerosol as defined herein. The vaporizable material may comprise one or more of: nicotine; caffeine or other active components. The active component may be carried with a carrier, which may be a liquid. The carrier may include propylene glycol or glycerin. A flavoring may also be present. The flavoring may include Ethylvanillin (vanilla), menthol, Isoamyl acetate (banana oil) or similar.

[0041] Figure 1 shows an aerosol generating set 10 comprising an aerosol generating device 12 and a cartridge 14 configured to operate with the aerosol generating device 12. The cartridge is preferentially a removable cartridge that can be plugged and unplugged on the aerosol generating device 12.

[0042] As shown on Figure 1, the aerosol generating device 12 extends along a device axis A and comprises a housing 21 delimiting a cavity 23 configured to receive, at least partially, the cartridge 14. The cavity 23 extends for example according to the device axis A and is delimited by a bottom wall 25 substantially perpendicular to the device axis A and at least one side wall 27 extending substantially along the device axis A.

[0043] The housing 21 delimits an internal space of the device 12 receiving various elements designed to carry out different functionalities of the device 12. The internal space can for example receive a power block 31 for powering the device 12, a control module 32 for controlling the operation of the device 12 and at least a device part 39 of a heating system configured to heat a vaporizable material contained in the cartridge 14 as it will be explained in further details below. The internal space of the housing 21 may further comprise other internal components performing different functionalities of the device 12 known *per se*. These internal components will not be explained in detail below.

[0044] It should also be noted that Figure 1 presents only a schematic diagram of different components of the aerosol generating set 10 and does not necessarily show the real physical arrangement and dimension of said components. Particularly, such an arrangement can be chosen according to the design of the aerosol generating set and technical features of its components.

[0045] The power block 31 comprises a battery 35 and a battery charger 36. The battery 35 is for example a known battery designed to be charged using the power supply furnished by an external source and to provide a direct current of a predetermined voltage. The battery charger 36 is able to connect the battery 35 to the external source and comprises for this purpose a power connector (for example a mini-USB or USB-C connector) or wireless charging connector.

[0046] The control module 32 is configured to control the operation of the aerosol generating device 12 and notably, of the heating system to generate aerosol by controlling the powering of this heating system by the battery 35. For this purpose, the control module 32 is connected to the battery 35. The control performed by the control module 32 is known *per se* and will not be detailed hereinafter.

[0047] As it is shown on Figure 1, the cartridge 14 extends along a cartridge axis B which, when the cartridge 14 is inserted at least partially in the cavity 23 of the housing 21 of the device 12, is parallel to the device axis A. The cartridge 14 comprises a body 51, or cartridge body 51, having a shape at least partially complementary to the shape of the cavity 23. Thus, the cartridge 14 can be received at least partially inside the cavity 23 of the aerosol generating device 12. As it is shown on Figures 2 to 5, the cartridge body 51 extends between a proximal end 52 designed to be received entirely in the cavity 23 and a distal end 53 designed to protrude from the cavity 23. Alternatively, the distal end 53 is designed to be re-

ceived in the cavity 23. When the distal end 53 is designed to protrude from the cavity 23, the distal end 53 forms a mouthpiece designed to be in contact with the user's mouth and/or lips during a vaping session. The proximal end 52 forms a contact surface 55 extending substantially perpendicularly to the cartridge axis B when the cartridge 14 is received in the cavity 23 and designed to be in contact with the bottom wall 25 of the cavity 23.

[0048] The cartridge 14 comprises a storage portion 56 and a sealed expansion chamber 80. Advantageously, the cartridge 14 has other internal elements including notably an airflow duct 57 defining an airflow channel 58, a cartridge part 59 of the heating system and a vaporizing chamber 70. The cartridge 14 further defines an internal surface 54 delimiting at least some of its internal components, as it will be explained in further detail below.

[0049] The storage portion 56 is configured for storing the vaporizable material in a liquid form (or liquid vaporizable material) and is delimited by at least a part of the internal surface 54.

[0050] The airflow duct 57 extends for example substantially parallel to the cartridge axis B. It comprises a cylindrical rigid wall. Here, "rigid" means that the cylindrical rigid wall has a rigidity that is greater than the rigidity of a flexible wall 82 of the sealed expansion chamber 80 (which will be described in detail below). The airflow duct 57 also comprises an inlet 64 and an outlet 65 connected to the airflow channel 58. The inlet 64 is connected to the vaporizing chamber 70. The outlet 65 extends at the distal end 53 of the cartridge body 51 and is designed to be fluidically connected with the user's mouth during vaping sessions.

[0051] According to the examples shown on Figures 2 to 5, the cartridge part 59 of the heating system comprises a heater 60 and a liquid transport element 62 such as a capillary wick element which can be made from a porous material such as fabric or ceramics. For instance, said wick element is interposed between an opening of the storage portion 56 and the inside of the storage portion 56. In particular, the wick element is interposed between an opening leading to the airflow channel 58 and the inside of the storage portion 56. As will be described in detail below, the wick element extends through at least one opening 77 delimited by the vaporizing chamber 70. As shown on the examples of Figures 2 to 5, the wick element extends through two openings 77 delimited by the vaporizing chamber 70.

[0052] For instance, both cartridge part 59 and device part 39 of the heating system may comprise a pair of contacts 67 protruding respectfully from the contact surface 55 of the cartridge 14 and from the bottom wall 25 of the cavity 23 (the contacts 67 of the device are not illustrated here). Said contacts 67 make it possible to power the heater 60 from the battery of the device 12, and thus vaporize the vaporizable material delivered by the liquid transport element 62.

[0053] According to another example of the invention, the cartridge part 59 of the heating system may comprise

susceptors. These susceptors can be arranged and/or distributed in the storage portion 56 of the cartridge 14. In this case, the device part 39 of the heating system may comprise electromagnetic emitter(s) configured to produce an electromagnetic field when powered by the battery. Such an emitter can comprise for example a magnetic coil configured to be arranged around the cartridge 14. Thus, when an electromagnetic field is created by the coil, eddy currents appear in the susceptor that leads to their heating.

[0054] According to still another example of the invention, each of the cartridge part 59 and device part 39 of the heating system may comprise a heating plate which is intended to be engaged with the heating plate of the other part to transfer heat to the vaporizable material.

[0055] According to still another embodiment, no cartridge part 59 of the heating system can be provided. In this case, the device part 39 of the heating system, like for example a heating blade, may be configured to penetrate the storage portion 56 of the cartridge 14 to heat directly the vaporizable material.

[0056] Other examples of the heating system are still possible.

[0057] Referring again to the examples of Figure 2 to 5, the airflow channel 58 extends from the vaporizing chamber 70 to the distal end 53 and aims at guiding an airflow loaded with vaporized material, to the user's mouth, during a vaping session. For instance, as shown on Figures 2 to 5, the airflow channel 58 extends through the storage portion 56. In the embodiment of Figure 2 to 5, an external surface of the airflow duct 57 delimits partially the storage portion 56 and makes for example a part of the internal surface 54.

[0058] According to an example of the invention, the internal surface 54 of the cartridge body 51 is composed of any surface which is intended to be in contact with the vaporizable material. For example, in this case, the internal surface 54 can comprise the surface delimiting the storage portion 56 (including the external surface of the airflow duct 58).

[0059] Advantageously, the vaporizing chamber 70 delimits a vaporizing enclosure 71 fluidically connected with the airflow channel 58 and with the cartridge part 59 of the heating system. Said vaporizing chamber 70 comprises a transverse annular ring 72, a lower skirt 73 and an upper skirt 74. The transverse annular ring 72 delimits an axial opening 75 that fluidically connects the vaporizing enclosure 71 with the airflow channel 58. The lower skirt 73 extends from the annular ring 66 towards the cartridge part 59 of the heating system and delimits the vaporizing enclosure 65. Advantageously, the lower skirt 73 delimits each opening 77 through which the wick element extends. The upper skirt 74 extends opposite the lower skirt 73, towards the distal end 53. The upper skirt 74 and the airflow channel 58 delimit between them an annular space 76.

[0060] The cartridge 14 further comprises a sealed expansion chamber 80 delimiting an internal volume 84

configured to expand or shrink. Here, "sealed" means that the expansion chamber 80 is devoid of any opening that would connect the internal volume 84 of the expansion chamber 80 with the outside of the expansion chamber.

[0061] For instance, the expansion chamber 80 is arranged at least partially in the storage portion 56. The expansion chamber 80 comprises walls 81 delimiting the internal volume 84. Advantageously, the expansion chamber 80 comprises at least one flexible wall 82 deformable so that the internal volume 84 of the expansion chamber 80 is able to expand or shrink. Advantageously, as already said before, the flexible wall has a thickness between 0.05 mm and 1 mm, preferably between 0,1 mm and 0,6 mm. For instance, the flexible wall 82 is made up of silicone or TPE, such as polyamide block copolymers like polyester-amide, polyether-esteramide or polyether-amide block or such as copolyester elastomers (COPE) like polyether-ester copolymers (TPC-ET). Polyamide block copolymers and copolyester elastomers have advantageous chemical, heat and wear properties with great flexibility and resistance to flex fatigue. Preferably, the expansion chamber 80 is made of silicone or TPE. According to the examples shown on Figures 2 to 5, the expansion chamber 80 extends around the airflow channel 58. The expansion chamber 80 defines a deformation resistance, said deformation resistance being lower than the resistance of pushing the liquid vaporizable material through the liquid transport element 62, for instance the wick or ceramic element, in absence of airflow inside the cartridge 14. Thanks to that, a pressure increase inside the storage portion 56 leads to a deformation of the expansion chamber 80 rather than to a leakage of liquid vaporizable material through the wick element. Therefore, when air 1 enters into the storage portion 56, bubbles of air 1 expand within the inside of the storage portion 56, the sealed expansion chamber 80 will tend to shrink before liquid vaporizable material leaks through the liquid transport element 62. The deformation of the expansion chamber 80 thus reduces the risk of leakage of liquid vaporizable material through the liquid transport element 62. Also, a pressure decrease inside the storage portion 56 leads to a deformation of the expansion chamber 80 rather than to air being sucked in the storage portion through the wick or ceramic material.

[0062] The internal volume 84 of the expansion chamber 80 is configured to expand or shrink to compensate pressure differences between the inside of the storage portion 56 and the outside of the cartridge 14, for instance when no liquid vaporizable material is turned into aerosol, in other terms when the aerosol generating device 12 is not operated to generate aerosol. As shown on Figures 2 to 5, the internal volume 84 of the expansion chamber 70 is entirely arranged within the inside of the storage portion 56. For example, the internal volume 84 of the expansion chamber 80 is variable between a minimum internal volume (as shown on Figure 3) and a maximum

internal volume (as shown on Figure 4). The ratio between the maximum internal volume and the minimum internal volume is for example comprised between 1,05 and 2, advantageously between 1,1 and 1,9, and is for example equal to 1,5. In Figure 5, the shape of the flexible wall 82 is shown in dotted lines when the internal volume is maximum and minimum. The minimum internal volume is defined as the maximum possible volume of air 1 inside the storage portion 56. Advantageously, the internal volume 84 of the expansion chamber 80 is delimited by at least the flexible wall 82. The internal volume 84 can reach the minimum internal volume or the maximum internal volume thanks to the deformation of the flexible wall 82. For instance, the internal volume 84 of the expansion chamber 80 is filled with a gas, for example nitrogen N₂, carbon dioxide CO₂, oxygen O₂, nitrous oxide N₂O, Argon Ar, sulfur oxide SO₂, helium He and/or other gases, or comprises a vacuum. The expansion rate of the flexible wall 82 and if applicable of the gas, defines the ratio between the maximum internal volume and the minimum internal volume of the expansion chamber 80.

FIRST EMBODIMENT OF THE INVENTION

[0063] According to a first embodiment illustrated on Figures 2 to 4, the expansion chamber 80 is entirely formed by a dedicated expansion chamber part 86 arranged entirely within the inside of the storage portion 56. Advantageously, the internal volume 84 of the dedicated expansion chamber part 86 has an annular shape. The dedicated expansion chamber 86 presents a through-hole 87 through which the airflow duct 57 extends. In particular, the dedicated expansion chamber part 86 has an inner annular wall 88 applied against the airflow duct 57 and delimiting the through-hole 87, an outer annular wall 89 and two transverse annular walls 90 connecting the inner and outer annular walls 88, 89. The internal volume 84 is delimited by the inner annular wall 88, the outer annular wall 89 and the two transverse annular walls 90. According to the example shown on Figures 2 to 4, the outer annular wall 89 is the flexible wall 82. In a variant, the inner annular wall 88, the outer annular wall 89 and the transverse annular walls are all flexible walls 82, in particular made up of silicon or similar flexible material such as TPE. The dedicated expansion chamber part 86 also comprises a proximal skirt 92 extending from a transverse annular wall 90 towards the vaporizing chamber 70. As shown on Figures 2 to 4, the proximal skirt 92 extends in a snap-fit way with the annular space 76 defined by the vaporizing chamber 70. In other words, the proximal skirt 92 is compressed between the airflow duct 57 and the upper skirt 74 of the vaporizing chamber 70 so that the expansion chamber 80 is fixed to the vaporizing chamber 70. For instance, the inner annular wall 88 is further glued to the airflow duct 57 or fixed in any other suitable manner.

SECOND EMBODIMENT OF THE INVENTION

[0064] According to a second embodiment illustrated on Figure 5, the expansion chamber is delimited by at least one rigid wall of the airflow duct 57. Here, "rigid" means that the at least one rigid wall of the airflow duct 57 has a rigidity that is greater than the rigidity of the flexible wall 82 of the sealed expansion chamber 80. In other word, the at least one rigid wall is less deformable than the flexible wall 82. For instance, as shown on Figure 5, the internal volume 84 of the expansion chamber 80 is delimited by at least one wall of the storage portion 56. According to the example of Figure 5, the internal volume 84 of the expansion chamber 80 is delimited by the airflow duct 57, the internal surface 54 of the cartridge body 51 and a flexible membrane 96 which is here the flexible wall 82. For instance, as shown on Figure 5, the expansion chamber 80 is arranged in a distal end of the storage portion 56. The flexible membrane 96 extends substantially perpendicular to the device axis A in a rest position (shown on Figure 5) in which no overpressure or under pressure reigns within the storage portion. For example, the internal volume 84 of the expansion chamber 80 is variable between a minimum internal volume and a maximum internal volume for both of which the shape of the flexible membrane 96 is shown in dotted lines on Figure 5.

Claims

1. A cartridge (14) for an aerosol generating device (12), comprising:
 - a storage portion (56) for storing a liquid vaporizable material;
 - a sealed expansion chamber (80) delimiting an internal volume (84) configured to expand or shrink to compensate pressure differences between the inside of the storage portion (56) and the outside of the cartridge (14).
2. The cartridge (14) according to any one of the preceding claims, wherein the expansion chamber (80) is arranged at least partially in the storage portion (56).
3. The cartridge (14) according to claim 1 or 2, wherein the internal volume (84) of the expansion chamber (80) is delimited by at least one flexible wall (82), said flexible wall (82) being deformable so that the internal volume (84) of the expansion chamber (80) is able to expand or shrink.
4. The cartridge (14) according to claim 3, wherein the flexible wall (82) is made up of silicone, the flexible wall having a thickness between 0.05 mm and 1 mm, preferably between 0,1 mm and 0,6 mm.
5. The cartridge (14) according to any one of the preceding claims, further comprising a wick element interposed between an opening of the storage portion (56) and the inside of the storage portion (56); the expansion chamber (80) defining a deformation resistance, said deformation resistance being lower than the resistance of pushing the liquid vaporizable material through the wick element in absence of airflow inside the cartridge (14).
6. The cartridge (14) according to any one of the preceding claims, wherein the ratio of volume of the expansion chamber (80) to volume of the storage portion (56) is between 1:20 and 1:2, preferably between 1:10 and 1:4.
7. The cartridge (14) according to any one of the preceding claims, wherein the internal volume (84) of the expansion chamber (80) is filled with a gas or comprises a vacuum.
8. The cartridge (14) according to any one of the preceding claims, wherein the expansion chamber (80) is entirely formed by a dedicated expansion chamber part (86), said dedicated expansion chamber part (86) being entirely arranged within the inside of the storage portion (56).
9. The cartridge (14) according to claim 8, further comprising an airflow duct (57) delimiting an airflow channel (58) extending through the storage portion (56); wherein the dedicated expansion chamber part (86) extends around the airflow duct (57), the internal volume (84) of the expansion chamber (80) having an annular shape, the dedicated expansion chamber part (86) presenting a through-hole (87), the airflow duct (57) extending through the through-hole (87).
10. The cartridge (14) according to any one of claims 1 to 7, further comprising an airflow duct (57) delimiting an airflow channel (58) extending through the storage portion (56); the expansion chamber (80) being delimited by at least one rigid wall of the airflow duct (57).
11. The cartridge (14) according to any one of claims 1 to 7 or 10, wherein the internal volume (84) of the expansion chamber (80) is delimited by at least one wall of the storage portion (56).
12. The cartridge (14) according to claim 10 or 11, further comprising an airflow duct (57) delimiting an airflow channel (58) extending through the storage portion (56); the expansion chamber (80) extending around the airflow channel (58).
13. The cartridge (14) according to any one of the pre-

ceding claims, wherein the internal volume (84) of the expansion chamber (80) is configured to expand or shrink to compensate pressures differences between the inside of the storage portion (56) and the outside of the cartridge (14), when no liquid vaporizable material is turned into aerosol. 5

14. An aerosol generating set (10) comprising:

- a cartridge (14) according to any one of the preceding claims; 10
- an aerosol generating device (12) adapted to operate with the cartridge (14).

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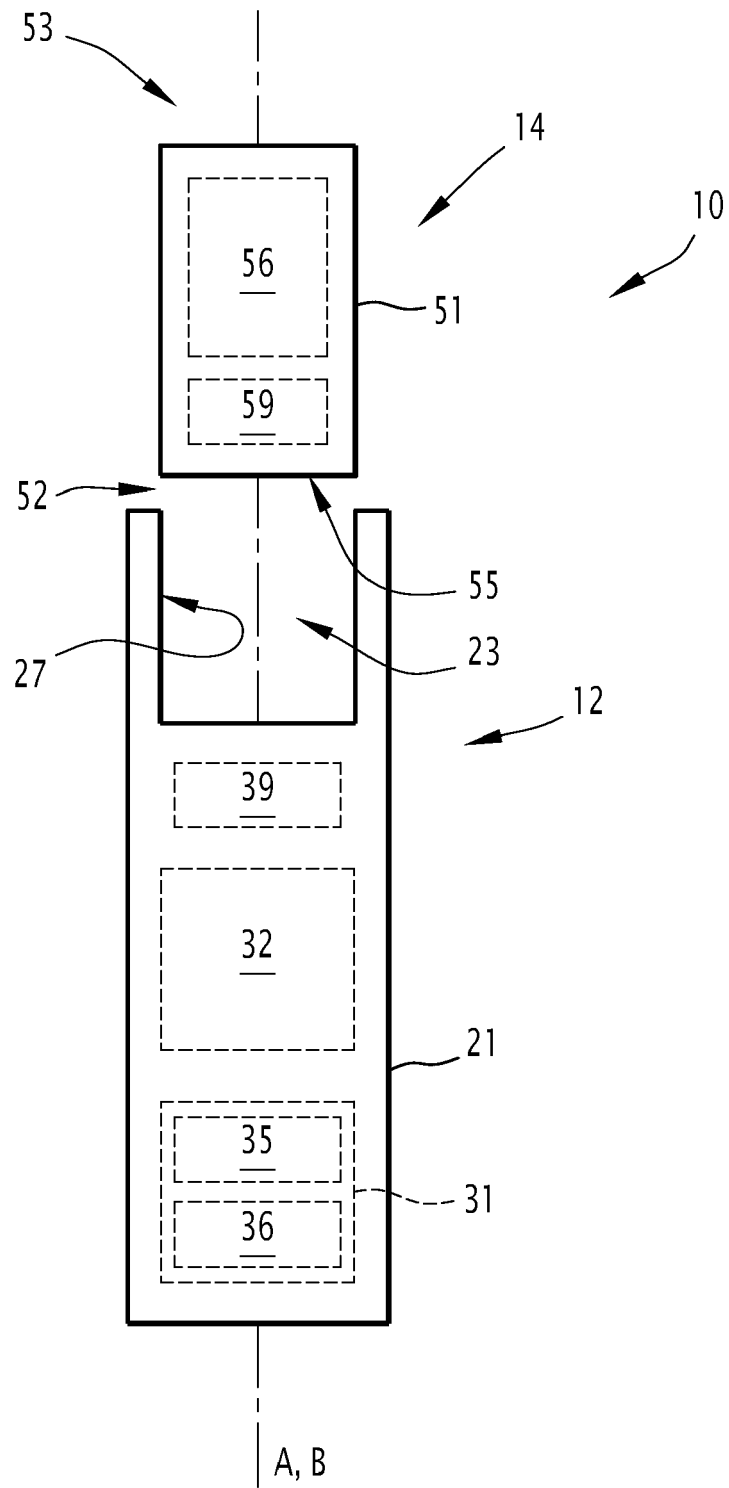
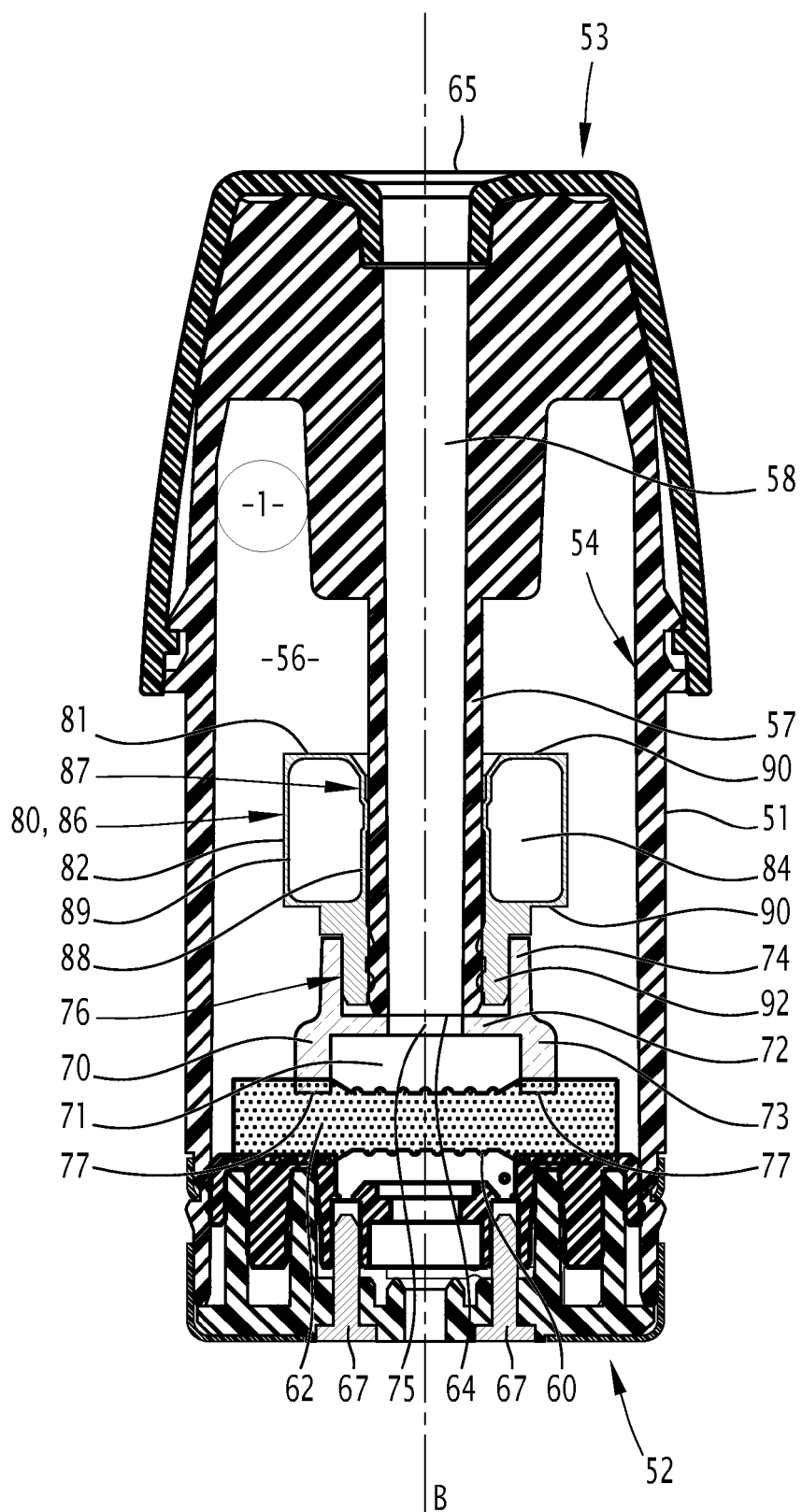


FIG.1



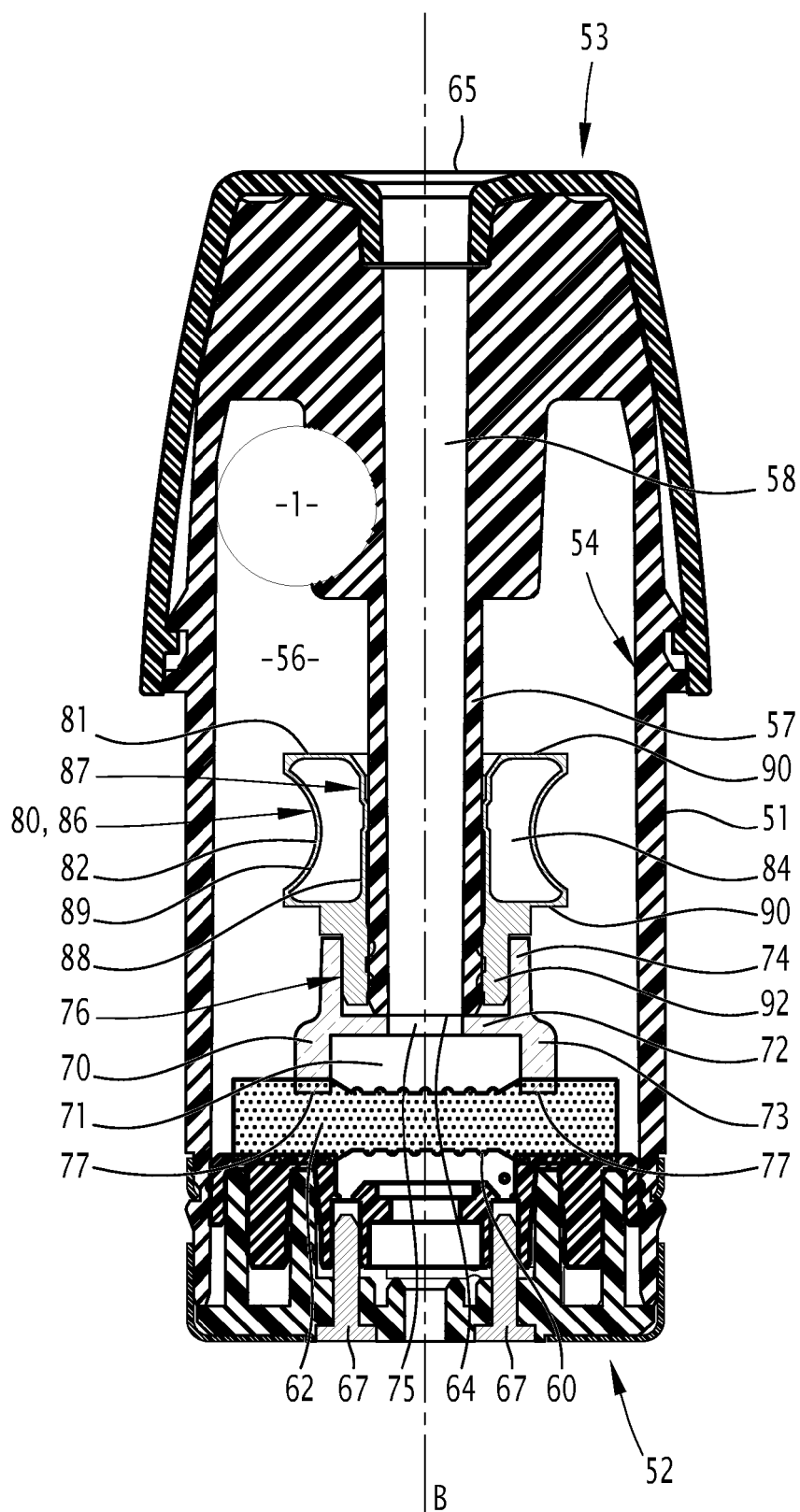


FIG.3

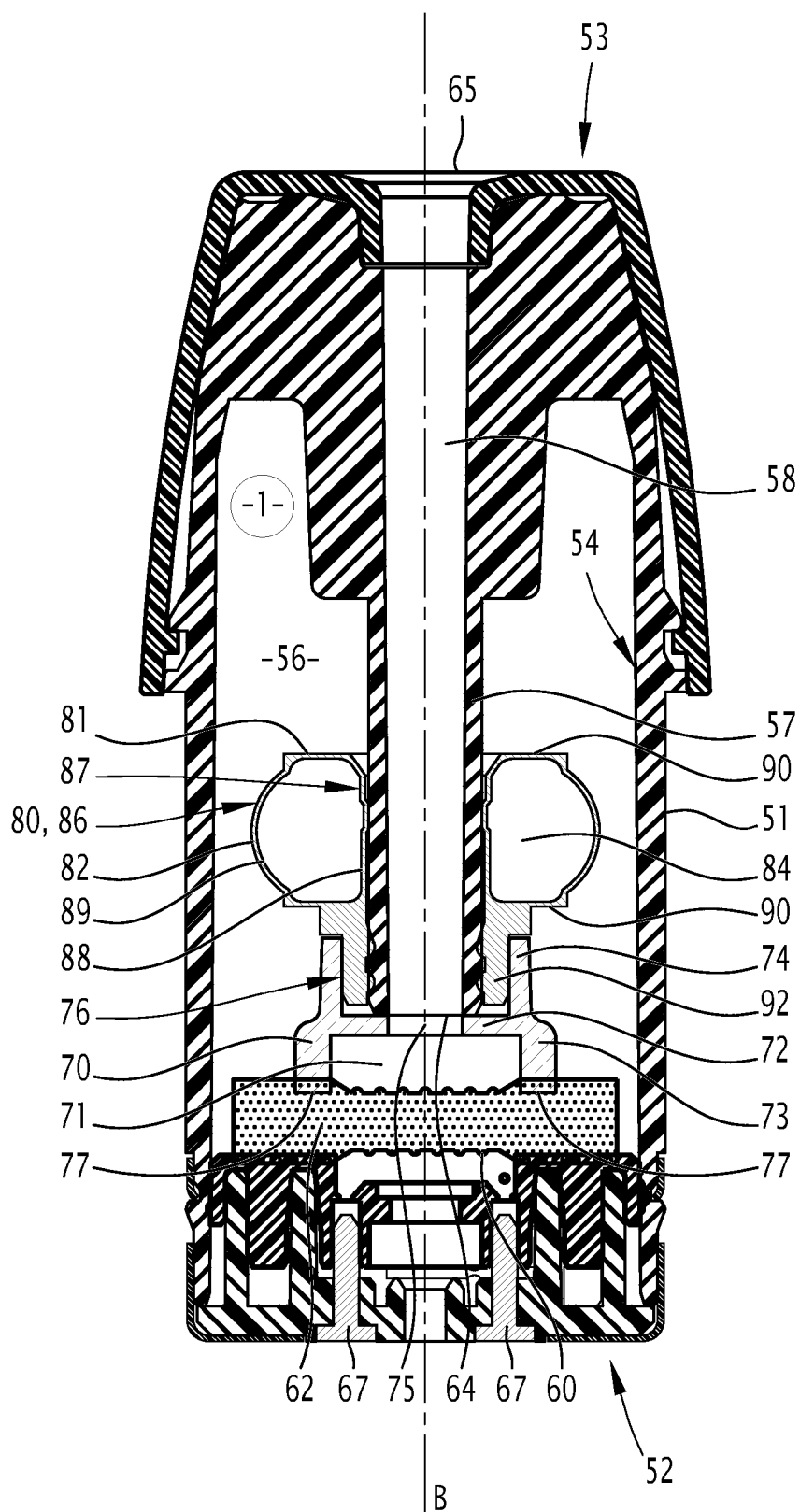


FIG.4

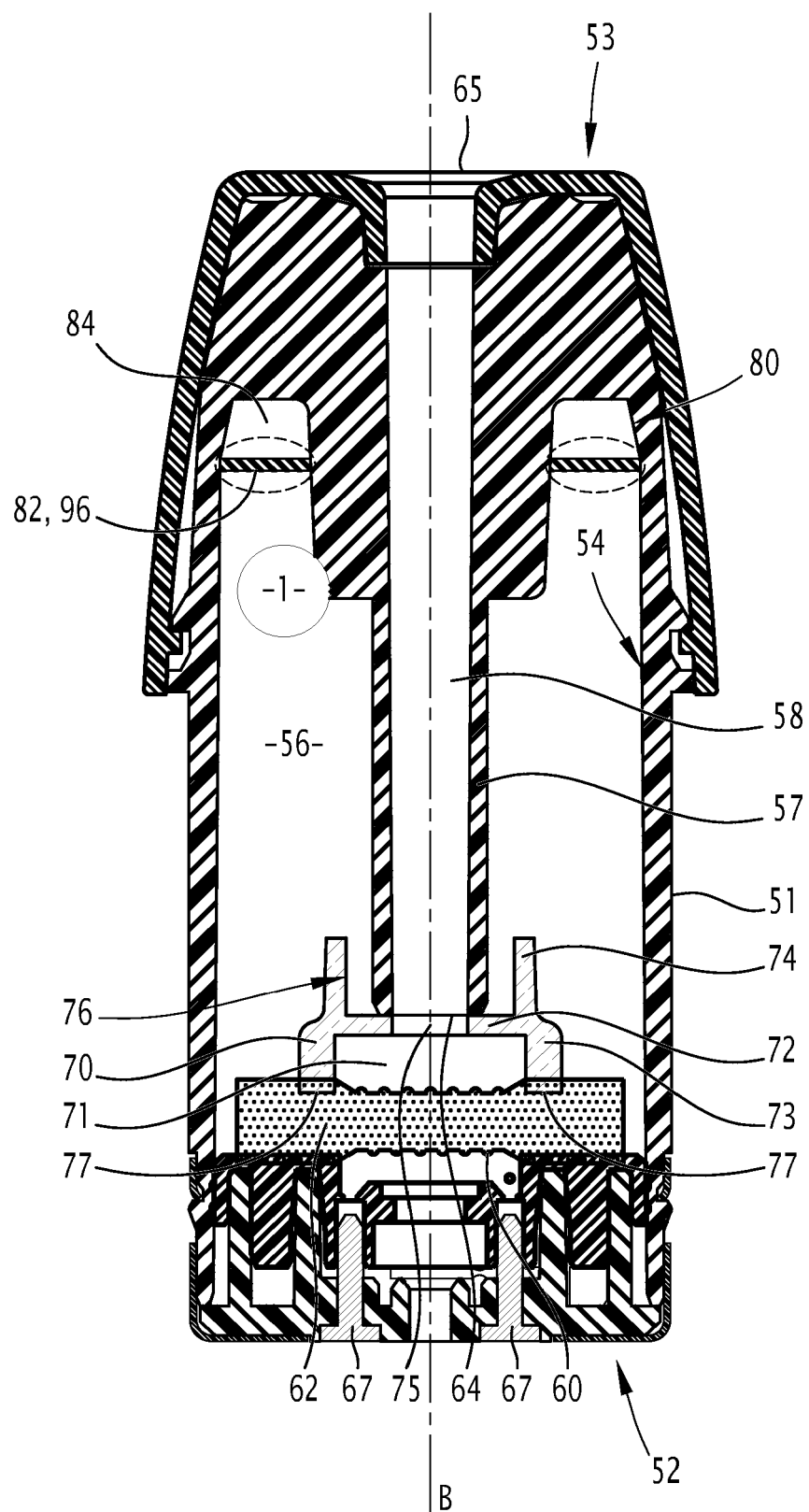


FIG.5



EUROPEAN SEARCH REPORT

Application Number

EP 22 17 2705

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	CN 112 315 034 A (SHENZHEN SMOORE TECHNOLOGY LTD) 5 February 2021 (2021-02-05) * paragraph [0034] - paragraph [0071]; figures 7, 9 *	1-14	INV. A24F40/42 ADD. A24F40/10
X	WO 2021/089656 A1 (JT INT SA [CH]) 14 May 2021 (2021-05-14) * page 5, line 27 - page 11, line 6; figure 4 *	1, 3-7, 11, 13, 14	
A		2, 8-10, 12	
X	US 2018/035717 A1 (BATISTA RUI NUNO [CH]) 8 February 2018 (2018-02-08) * paragraph [0031] - paragraph [0035]; figure 5 *	1, 3-7, 11, 13, 14	
A		2, 8-10, 12	
			TECHNICAL FIELDS SEARCHED (IPC)
			A24F A61M
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		21 October 2022	Koob, Michael
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	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 17 2705

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.

21-10-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 112315034 A	05-02-2021	NONE	
WO 2021089656 A1	14-05-2021	NONE	
US 2018035717 A1	08-02-2018	CA 2963734 A1	23-06-2016
		CN 107072321 A	18-08-2017
		EP 3232835 A1	25-10-2017
		JP 6803841 B2	23-12-2020
		JP 2017537635 A	21-12-2017
		KR 20170094145 A	17-08-2017
		RU 2017125151 A	17-01-2019
		US 2018035717 A1	08-02-2018
		WO 2016096762 A1	23-06-2016