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(54) **Title:** NON-REINSERTABLE AEROSOL GENERATION ARTICLE AFTER USE IN AN AEROSOL GENERATION DEVICE

(57) **Abstract:** An aerosol generation article (2) can be used in an aerosol generation device (1) comprising a heating chamber (7), and comprises a wrapper (4) containing an aerosol generation substrate (8) and comprising a deformable circumferential portion (5) configured to be deformed from a first shape into a second shape after having been inserted and heated at a heating temperature in the heating chamber (7) during aerosol generation.

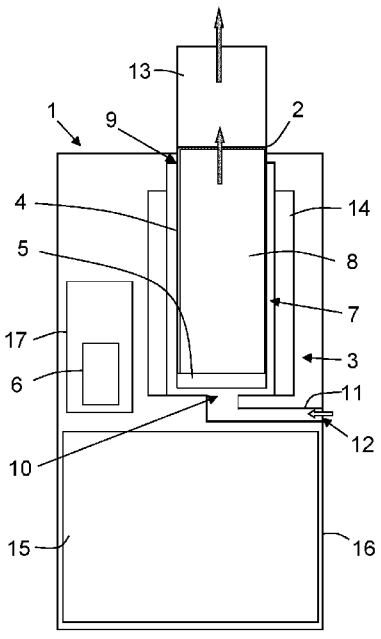


FIG.1

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NON-REINSERTABLE AEROSOL GENERATION ARTICLE AFTER USE IN AN AEROSOL GENERATION DEVICE

Field of the invention

[01] The present invention relates to aerosol generation articles intended to be used in aerosol generation devices.

Background

[02] Some aerosol generation devices comprise a heating chamber arranged for receiving an aerosol generation article (or consumable) comprising a wrapper containing a “solid” aerosol generation substrate. This heating chamber is arranged for heating the aerosol generation substrate to generate, in the presence of air, an aerosol that may be inhaled by a user during a vaping session.

[03] The invention concerns more particularly aerosol generation articles (or consumables) comprising a “solid” aerosol generation substrate (for instance a tobacco stick) and possibly similar to traditional cigarettes. So, in the following description the term “aerosol generation substrate” is used to designate any solid material that is aerosolizable in air to form an aerosol.

[04] The aerosol generation substrate may comprise one or more of nicotine, tobacco material, cannabinoid, polyol, caffeine or other active components. An active component may be carried by a carrier which may include propylene glycol or glycerin, for instance. A flavoring may also be present in the aerosol generation material and may include Ethylvanillin (vanilla), menthol, Isoamyl acetate (banana oil) or similar, for instance.

[05] Moreover, in the following description the term “aerosol” may include a suspension of substance as one or more of solid particles, liquid droplets and gas. Such a suspension may be in a gas including air. Aerosol herein may generally refer to, or include, a vapor, and may include one or more components of the aerosol generation material.

[06] The aerosol generation articles (or consumables) described above are intended to be used only once in aerosol generation devices called “T-vapor (or heat-not-burn (or “HnB”)) devices”. If such an aerosol generation article is reused, the flavor and vapor formation is poor but also there is a chance that it could break up in the heating chamber causing a device failure. As the aerosol generation article before and after use keeps the same shape and size, it is not always immediately obvious for its user if it has been used or not. Moreover, when the user has finished with an aerosol generation article (after a vaping session) he often removes it from the heating chamber and then puts it back in the package with unused aerosol generation articles until it can be responsibly disposed of. It is therefore the color of the aerosol generation article that allows the user to make the difference with unused aerosol generation articles, but such a differentiation may be tricky if this aerosol generation article has not been completely consumed or if the lighting is non-favorable.

[07] So, the present invention aims at preventing reinsertion of an aerosol generation article that has been previously used, even partially, in the heating chamber of an aerosol generation device defining a T-vapor device.

Summary

[08] The proposed invention provides an embodiment of an aerosol generation article, intended for being used in an aerosol generation device comprising a heating chamber, and comprising a wrapper containing an aerosol generation substrate.

[09] This aerosol generation article is characterized in that its wrapper comprises a deformable circumferential portion configured to be deformed from a first cross-sectional shape into a second cross-sectional shape after having been inserted and heated at a heating temperature in the heating chamber during aerosol generation, and more particularly after having been removed from the heating chamber.

[10] The invention also provides an aerosol generation system comprising an aerosol generation device including a heating chamber and an aerosol generation article comprising a wrapper containing an aerosol generation substrate. The wrapper comprises a deformable circumferential portion configured to be deformed from a first cross-sectional shape into a second cross-sectional shape after having been heated at a heating temperature in the heating chamber during aerosol generation, and more particularly after having been removed from the heating chamber.

[11] The first cross-sectional shape corresponds to a cross-sectional shape of the heating chamber. Thus, the aerosol generation article can be inserted into the heating chamber. The second cross-sectional shape does not correspond to the cross-sectional shape of the heating chamber. Thus, the aerosol generation article cannot be re-inserted into the heating chamber after its removal because the second cross-sectional shape is not compatible with the cross-sectional shape of the heating chamber.

[12] Thanks to the invention, once the aerosol generation article has been removed from the heating chamber, the first cross-sectional shape of its deformable circumferential portion can change into the second cross-sectional shape as allowed by its own characteristics, which was impossible inside the heating chamber. Therefore, the second cross-sectional shape taken by the deformable circumferential portion outside the heating chamber prevents the aerosol generation article from reinsertion into the heating chamber, in particular because the second cross-sectional shape of the circumferential portion no longer corresponds to (i.e., is no longer compatible with) the cross-sectional shape of the heating chamber.

[13] In the context of the invention, the term “circumferential portion” refers to a portion of the aerosol generation article which extends along the full circumference or a part of the circumference of a surface of the aerosol generation article.

[14] The embodiment of aerosol generation article may comprise other features, considered separately or combined, as defined hereafter.

- The deformable circumferential portion is preferably configured to expand in at least one direction perpendicular to a longitudinal direction of the aerosol generation article from said first cross-sectional shape into said second cross-sectional shape. Preferably, the deformable circumferential portion is configured to expand in a radial direction. Preferably, the deformable circumferential portion is configured to expand in a plurality of radial directions perpendicular to a longitudinal direction of the aerosol generation article. For example, if the first cross-sectional shape is substantially circular, the second cross-sectional shape may be non-circular, e.g., elliptic. As a result of this expansion, the aerosol generation article has a dimension in said at least one direction which is greater than a dimension, e.g., diameter, of the heating chamber of the aerosol generation device, thus preventing re-insertion of the aerosol generation article into the heating chamber because the second cross-sectional shape is no longer compatible with the cross-sectional shape of the heating chamber.
- In a first embodiment, the deformable circumferential portion may comprise a shape-memory material having a shape memory effect with a transition temperature above a predefined ambient temperature.
- The material may be a shape-memory material having a shape memory effect with a transition temperature between 50°C and 200°C (and preferably between 60°C and 200°C).
- The shape-memory material may comprise at least one metal.
- The shape-memory material may be arranged in the form of a sheet or at least one wire or a combination thereof. In the case of a sheet, the latter may have a flat or tubular configuration. In the case of a wire, the latter may have a ring or an open or closed loop configuration.
- In a second embodiment, the deformable circumferential portion may comprise a bimetallic element. In this second embodiment, the deformable circumferential portion may be arranged in the form of a sheet having a flat or tubular configuration, for instance.

- The deformable circumferential portion may extend along a part of an axial length of the wrapper.
- The deformable circumferential portion may extend from an end of the wrapper.
- The aerosol generation article may be in the form of a rod or a plate or else a card. The plate may be planar, corrugated, undulated or U-shaped.
- The aerosol generation substrate may comprise a tobacco material or at least one aerosol former. The aerosol former may be a polyol. The amount of aerosol former is preferably between 5 and 30 wt. % of the aerosol generation substrate. The aerosol generation substrate may further comprise a binder. The binder may comprise gum (e.g. guar gum) or polysaccharide, for instance. The aerosol generation substrate may further contain cellulose fiber or another filler.

[15] In other words, the invention relates to an aerosol generation article for use in an aerosol generation device, comprising a wrapper forming a cavity containing an aerosol generation substrate, wherein the wrapper comprises a deformable circumferential portion configured to be deformed from a first shape to a second shape when heated to a temperature of at least 50°C.

[16] In the first shape, the deformable circumferential portion can be circular or arcuated, for instance.

[17] In the second shape, the deformable circumferential portion can be at least partially linear or non-circular, in particular angular, for instance.

[18] The material of the deformable circumferential portion may be a shape-memory material having a shape memory effect with a transition temperature between 50°C and 200°C, preferably between 60°C and 200°C.

[19] The proposed invention provides also an embodiment of a method intended for using an aerosol generation device comprising a heating chamber.

[20] This method is characterized in that it comprises:

- inserting at least partly an aerosol generation article such as the one above introduced into the heating chamber,

- heating the aerosol generation article in the heating chamber at a heating temperature for generating aerosol, and
- removing the aerosol generation article from the aerosol generation device to allow the deformable circumferential portion to deform to a second shape. In particular, the second shape of the deformable circumferential portion of the aerosol generation article is such that the aerosol generation article can no longer be inserted in the heating chamber.

Brief description of the figures

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

- the figure 1 (FIG.1) schematically and functionally illustrates an example of embodiment of an aerosol generation device in which an example of embodiment of an aerosol generation article according to the invention has been inserted,
- the figure 2 (FIG.2) schematically illustrates, in a perspective view, an example of embodiment of an aerosol generation article according to the invention before use during a vaping session,
- the figure 3 (FIG.3) schematically illustrates, in a perspective view, the aerosol generation article of figure 2 after use during a vaping session and after removal from an aerosol generation device,
- the figure 4 (FIG.4) schematically illustrates, in a front view, the deformable circumferential portion of the aerosol generation article of figure 3,
- the figure 5 (FIG.5) schematically illustrates, in a front view, a deformable circumferential portion having a star cross-sectional shape after use during a vaping session and after removal from an aerosol generation device, and
- the figure 6 (FIG.6) schematically and functionally illustrates an example of algorithm implementing a method according to the invention.

Detailed description of embodiments

[22] The invention aims at offering an aerosol generation article 2 intended to be inserted into, and used in, an aerosol generation device 1 to allow a user to have a vaping session, but that is non-reinsertable into this aerosol generation device 1 after having been used and removed from the latter (1).

[23] In the following description it will be considered that the aerosol generation device 1 is (or constitutes) an electronic cigarette (or e-cigarette or else personal vaporizer). But the aerosol generation device 1 could be of another type, as soon as it allows to transform an aerosol generation substrate, in solid form and contained in an aerosol generation article, into an aerosol (possibly close to room temperature). More generally, the invention concerns any type of T-vapor (or heat-not-burn (or HnB)) device comprising a heater for heating an aerosol generation substrate in solid form and contained in an aerosol generation article.

[24] Moreover, in the following description it will be considered that the aerosol generation article (or consumable) 2 is a tobacco stick. So, the aerosol generation substrate comprises at least tobacco material (possibly shredded tobacco). But the invention is not limited to this type of aerosol generation article.

[25] It is recalled that an “aerosol generation substrate” is used to designate any solid material that is aerosolizable in air to form an aerosol. The aerosol generation substrate may comprise homogenized tobacco material. It may comprise aerosol former and nicotine, cannabinoid or caffeine, for instance. The aerosol former may comprise polyhydric alcohol(s) such as glycerine and/or polypropylene glycol or water. The tobacco material may be cast sheet, laminated tobacco or tobacco paper and/or flavoring (e.g. menthol). The aerosol generation substrate may comprise tobacco cut filler, other fillers such as cellulose pulp and other ingredients such as sugar, starch, gums, acids, cellulose derivates, etc.

[26] It is also recalled that the term “aerosol” may include a suspension of substance as one or more of solid particles, liquid droplets and gas, and that such a suspension may be in a gas including air.

[27] As illustrated in figure 1 an aerosol generation device 1, that can use an aerosol generation article 2 according to the invention, comprises at least a heating chamber 7 defined in a casing of an aerosol generation unit 3 controlled by a controller 6.

[28] The casing (and therefore its heating chamber 7) is arranged for receiving an aerosol generation article 2 (here a tobacco stick) comprising a wrapper 4 containing an aerosol generation substrate 8, through an opening 9 whose access is possibly controlled by an occluding element. So, the internal shape of the heating chamber 7 is, along at least a length of the heating chamber 7, similar or complementary to the shape of the aerosol generation article 2. For instance, this shape may be in the form of a rod or a plate or else a card. In the non-limiting example illustrated in figures 1 to 3, the shape of the aerosol generation article 2 (and therefore of the heating chamber 7) is in the form of a cylinder rod.

[29] The heating chamber 7 is arranged for heating (without burning) the aerosol generation substrate 8 mixed with air to cause its transformation into an aerosol that may be inhaled by a user through successive draws (or “puffs” or inhalation phases) during a vaping session.

[30] As illustrated in the non-limiting example of figure 1, the casing and its heating chamber 7 communicates with an air outlet 10 of an air flow channel 11 to be supplied with air originating from at least one air inlet 12 of this air flow channel 11. This allows mixing between the aerosol generation substrate 8 and the air. In a possible embodiment, the air inlet 12 may be formed as an enlargement of the opening 9 and the heating chamber 7 may comprise longitudinal grooves allowing air to travel from the opening to the end of the aerosol generation substrate 8 in the heating chamber 7.

[31] This heating is performed by a heater 14 supplied with electrical energy originating from a power source 15. This heater 14 may belong to the aerosol generation unit 3.

[32] In the non-limiting example illustrated in figure 1 the heater 14 surrounds the casing and its heating chamber 7, and therefore a part of the aerosol generation article 2 (and more precisely its aerosol generation substrate 8) to heat the latter (8). For instance, the heater 14 may be a thin film heater wrapped around the outer surface of the casing (of the heating chamber 7) to heat its side walls and at least a part of its internal volume. But in a variant (not illustrated) the heater 14 could be a coil associated with a susceptor or a resistive coil heater. In the first alternative, the coil is arranged for generating an electromagnetic field when it is supplied with an electrical current, and the susceptor is arranged for transforming this electromagnetic field into heat. This susceptor may be a foil of the wrapper 4 of the aerosol generation article 2 that surrounds the aerosol generation substrate 8, or a foil, strips and/or particles located inside the aerosol generation substrate 8. In other variants of embodiment (not illustrated) the heater 14 could be located inside the aerosol generation article 2 or inside the heating chamber 7.

[33] For instance, the heater 14 may heat the aerosol generation substrate 8 at an aerosol generation temperature comprised between 50°C and 350°C, and preferably between 200°C and 320°C.

[34] The power source 15 is housed in a body 16 of the aerosol generation device 1. In the non-limiting example illustrated in figure 1, this body 16 also comprises the aerosol generation unit 3.

[35] Also for instance, the power source 15 may be a rechargeable battery. In this case the body 16 may comprise an electrical connector to which a charger cable may be connected during a charging session of the rechargeable battery 15.

[36] The electrical energy supplied to the heater 14 during a vaping session is controlled by the controller 6. This controller (or control unit) 6 may

comprise at least a processor and a memory arranged for performing operations for controlling the aerosol generation unit 3 (and notably its heater 14) during a vaping session and also the power source 15 during a possible charging session.

[37] For instance, the processor may be a digital signal processor (or DSP), or an application specific integrated circuit (ASIC), or else a field programmable gate array (FPGA). More generally, the processor may comprise integrated (or printed) circuits, or several integrated (or printed) circuits connected therebetween through wired or wireless connections. The term “integrated (or printed) circuits” refers here to any type of device capable of carrying out at least one electric or electronic operation.

[38] Also for instance, the memory may be a random access memory (or RAM). But it may be any type of device arranged for storing program instructions for the processor.

[39] Generally speaking, the functions of the controller (or control unit) 6 may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or even manually (by the user). These functions may be provided through the use of dedicated hardware as well as hardware capable of executing software in association with appropriate software.

[40] As illustrated in the non-limiting example of figure 1, the controller (or control unit) 6 (and notably its processor and memory) may be fixed onto a printed circuit board (or PCB) 17 (here housed in the body 16).

[41] The controller (or control unit) 6 may also comprise, in addition to its processor and memory, an input interface, a mass memory (notably for storing intermediate data produced during its calculus and processing), and an output interface for delivering messages and instructions at least for controlling the aerosol generation unit 3 (and notably its heater 14) and the electronic component(s) (such as switch(es)) supplying the electrical power (stored in the power source 15) to the aerosol generation unit 3.

[42] Also as illustrated, the aerosol generation article 2 may comprise a filter 13 at the mouth end of the aerosol generation article 2 with at least part of it forming a mouthpiece of the aerosol generation article 2. The filter 13 may comprise several filter segments (for instance plain cellulose acetate fiber segment(s) and/or center hole segment(s)) and possibly a cavity adjacent to one or two filter segments and formed of paper wrapper. The aerosol generation article 2 may further comprise a cooling or spacer element positioned between the aerosol generation substrate 8 and the filter 13. The cooling or spacer element may be a hollow tubular element formed of paper or polymer or may be a cavity (e.g. rolled paper tube) filled with a cooling material, preferably fibrous material and/or sheet, such as a gathered polylactic acid sheet. The aerosol generation substrate 8, filter 13 and spacer or cooling element are typically combined with paper wrapper.

[43] According to the invention, the wrapper 4 of the aerosol generation article 2 comprises a deformable circumferential portion 5 configured to be deformed from a first shape (illustrated in figures 1 and 2) into a second shape (illustrated in figures 3 and 4) after having been inserted and heated at a heating temperature in the heating chamber 7 during aerosol generation, and subsequently cooled to a temperature that is lower than the heating temperature.

[44] It is important to notice that when heated in the heating chamber 7 the deformable circumferential portion 5 wants to change its first shape but such a change cannot occur as the shape of the heating chamber 7 holds it in place. But, once the aerosol generation article 2 has been removed from the heating chamber 7 the first shape of its deformable circumferential portion 5 can change into the second shape as allowed by the characteristics (possibly shape-memory characteristics) of the material constituting the deformable circumferential portion 5. Therefore, the second shape taken by the deformable circumferential portion 5 prevents the aerosol generation article 2 from being reinserted into the heating chamber 7. After cooling the second shape is maintained.

[45] For instance, the deformable circumferential portion 5 may be stuck to or embedded in the wrapper 4.

[46] Also for instance, the wrapper 4 may be made of paper or paper and aluminium laminate.

[47] Also for instance, in the non-limiting example of figures 1 and 2, the first shape of the deformable circumferential portion 5 is circular. But, it could be rectangular or square, for instance. Also for instance, in the non-limiting example of figures 3 and 4, the second shape of the deformable circumferential portion 5 (after use) is elliptic. But, it could be circular or roughly rectangular, for instance. More generally, the second shape is defined to not fit within the internal shape or cross-section of the heating chamber 7. In particular, the second shape is preferably non-circular. For instance, the second shape may be angular, fluted or undulated compared to a rounded or curved first shape. For example, the second shape may have a substantially star or polygonal cross-sectional shape. An example of a star cross-sectional shape is illustrated in figure 5.

[48] In a first example of embodiment, the deformable circumferential portion 5 may comprise a shape-memory material having a shape memory effect with a transition temperature above a predefined ambient temperature. In other words, when the temperature becomes higher than the transition temperature a shape memory effect of the shape-memory material causes a shape change thereof, and this shape change remains stable after cooling outside the heating chamber 7. The heating chamber 7 may restrain a change of shape of the deformable circumferential portion 5 or prevent the deformable circumferential portion 5 from deforming or changing shape, in particular when the surface of the heating chamber 7 snugly fits or even compresses the deformable circumferential portion 5. When the aerosol generation article 2 is removed from the heating chamber 7, the shape-memory material alloy is allowed to take a second shape, e.g. by expanding, relaxing, bending, stretching, etc., as a result of the material having attained a temperature above the transition temperature of the shape-memory

material. It is possible that the deformable circumferential portion 5 starts changing shape in the heating chamber 7 or during removal due to possible presence of a gap. However, such deformation should be kept minimal to prevent the aerosol generation article 2 from becoming stuck in the aerosol generation device 1.

[49] For instance, the predefined ambient temperature may be typically equal to 25°C.

[50] Also for instance, the material may be a shape-memory material having a shape memory effect with a transition temperature between 50°C and 200°C, and preferably between 60°C and 200°C.

[51] As an example, the shape-memory material may comprise at least one metal. For instance, it may be an alloy such as iron-based and copper-based shape-memory alloys (or SMAs), such as Ni-Ti, Fe-Mn-Si, Cu-Zn-Al and Cu-Al-Ni alloys. In particular, the material can be Ni-Ti-Cu with respective proportions equal to 45%, 50% and 5%.

[52] As illustrated in the non-limiting example of figures 2 and 3, the shape-memory material may be arranged in the form of a sheet. In this case the sheet may have a flat configuration or a tubular configuration, for instance.

[53] But in variants of embodiment the shape-memory material may be arranged in the form of at least one wire or a combination of a sheet and at least one wire. The sheet or wire can be arranged to extend at least a portion of the circumference of the aerosol generation article 2, preferably over at least 70%, most preferably 100% of its circumference.

[54] In a second example of embodiment, the deformable circumferential portion 5 may comprise a bimetallic element. The bimetallic materials usually deform under heating due to the difference in thermal expansion and temperature coefficient properties of the two metals constituting the circumferential portion. For instance, a bimetallic material may be constituted by of any two: of copper, steel, iron or brass. Preferably, the bimetallic materials can be steel and copper or steel and brass.

[55] In this second example of embodiment, the deformable circumferential portion 5 may be arranged in the form of a sheet having a flat or tubular configuration.

[56] Also as illustrated in the non-limiting example of figures 1 to 3, the deformable circumferential portion 5 may extend along a part of an axial length of the wrapper 4. For instance, and as illustrated the deformable circumferential portion 5 may extend from an end of the wrapper 4 which is opposite to the possible filter 13. But in a variant of embodiment the deformable circumferential portion 5 could extend along a part of the axial length of the wrapper 4, between the opposite ends of the aerosol generation substrate 8.

[57] The invention can be also considered as a method intended for using the aerosol generation device 1.

[58] As illustrated in the non-limiting example of algorithm of figure 5, this method comprises a step 100 in which an aerosol generation article 2 is inserted at least partly into the heating chamber 7. The method further comprises a step 110 in which the inserted aerosol generation article 2 is heated at the heating temperature (by the heater 14) for generating aerosol. The method further comprises a step 120 in which the aerosol generation article 2 is removed from the aerosol generation device 1 to allow the deformable circumferential portion 5 to deform to a second shape.

[59] It should be appreciated by those skilled in the art that some block diagrams of figures 1 to 5 herein represent conceptual views of illustrative elements or circuitry embodying the principles of the invention.

[60] The description and drawings merely illustrate the principles of the invention. It will thus be appreciated that those skilled in the art will be able to devise various arrangements that, although not explicitly described or shown herein, embody the principles of the invention and are included within its spirit and scope. Furthermore, all examples recited herein are principally intended expressly to be only for pedagogical purposes to aid the reader in understanding the principles of the invention and the concepts contributed

by the inventor(s) to furthering the art, and are to be construed as being without limitation to such specifically recited examples and conditions. Moreover, all statements herein reciting principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass equivalents thereof.

CLAIMS

1. Aerosol generation article (2) for use in an aerosol generation device (1) comprising a heating chamber (7), said article (2) comprising a wrapper (4) containing an aerosol generation substrate (8), wherein said wrapper (4) comprises a deformable circumferential portion (5) configured to be deformed from a first cross-sectional shape into a second cross-sectional shape after having been heated at a heating temperature in said heating chamber (7) during aerosol generation.

2. Aerosol generation article according to claim 1, wherein:

said first cross-sectional shape corresponds to a cross-sectional shape of the heating chamber (7); and

said second cross-sectional shape does not correspond to the cross-sectional shape of the heating chamber (7).

3. Aerosol generation article according to claim 1 or claim 2, wherein the deformable circumferential portion (5) is configured to expand from said first cross sectional shape into said second cross-sectional shape in at least one direction perpendicular to a longitudinal direction of the article (2).

4. Aerosol generation article according to claim 3, wherein the deformable circumferential portion (5) is configured to expand from said first cross-sectional shape into said second cross-sectional shape in a plurality of radial directions perpendicular to a longitudinal direction of the article (2).

5. Aerosol generation article according to any one of the preceding claims, wherein said deformable circumferential portion (5)

comprises a shape-memory material having a shape memory effect with a transition temperature above a predefined ambient temperature.

6. Aerosol generation article according to claim 5, wherein said material is a shape-memory material having a shape memory effect with a transition temperature between 50°C and 200°C.

7. Aerosol generation article according to claim 5 or 6, wherein said shape-memory material comprises at least one metal.

8. Aerosol generation article according to any one of claims 5 to 7, wherein said shape-memory material is arranged in the form of a sheet or at least one wire or a combination thereof.

9. Aerosol generation article according to claim 8, wherein said sheet has a flat or tubular configuration.

10. Aerosol generation article according to any one of claims 1 to 4, wherein said deformable circumferential portion (5) comprises a bimetallic element.

11. Aerosol generation article according to claim 10, wherein said deformable circumferential portion (5) is arranged in the form of a sheet having a flat or tubular configuration.

12. Aerosol generation article according to any one of the preceding claims, wherein said deformable circumferential portion (5) extends along a part of an axial length of said wrapper (4).

13. Aerosol generation article according to any one of the preceding claims, wherein said deformable circumferential portion (5) extends from an end of said wrapper (4).

14. Aerosol generation article according to any one of the preceding claims, wherein it is in the form of a rod or a flat plate.

15. Aerosol generation article according to any one of the preceding claims, wherein said aerosol generation substrate comprises a tobacco material or at least one polyol.

16. Method for using an aerosol generation device (1) comprising a heating chamber (7), wherein it comprises inserting at least partly an aerosol generation article (2) according to any one of the preceding claims into said heating chamber (7), heating said aerosol generation article (2) at a heating temperature for generating aerosol, and removing said aerosol generation article (2) from said aerosol generation device (1) to allow said deformable circumferential portion (5) to deform to said second cross-sectional shape.

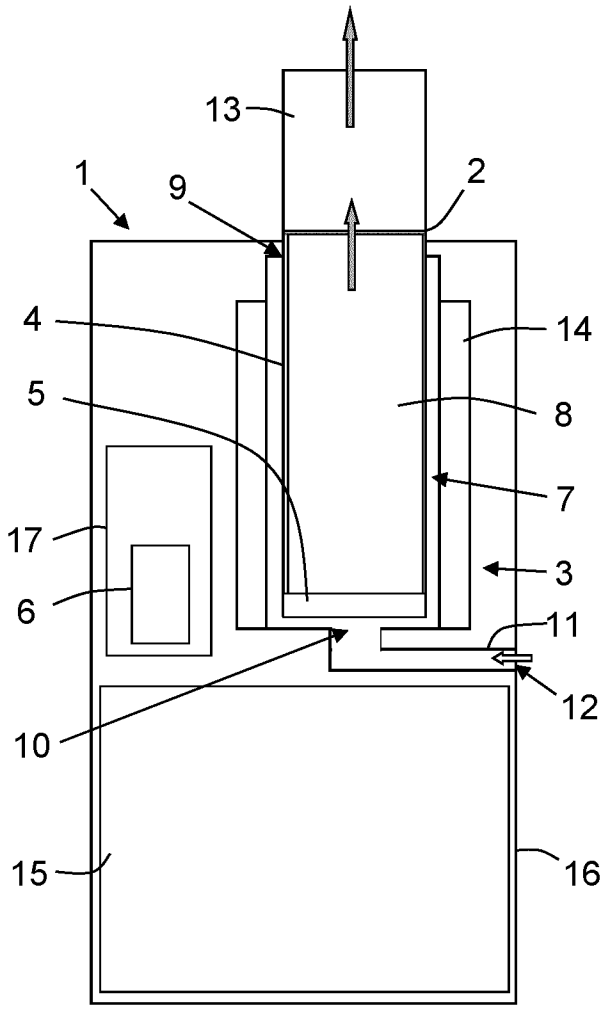


FIG.1

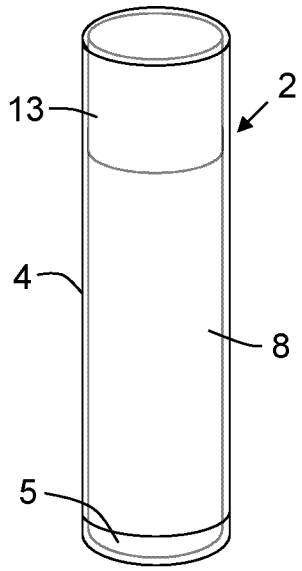


FIG.2

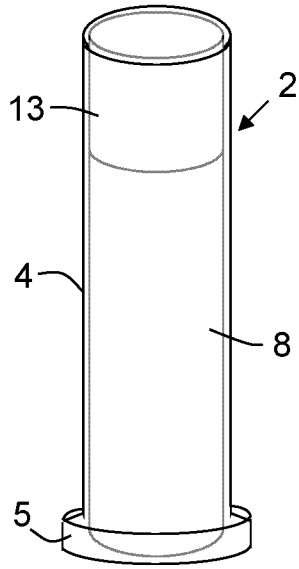


FIG.3

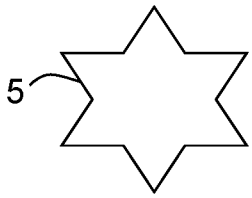


FIG.5

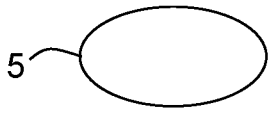


FIG.4

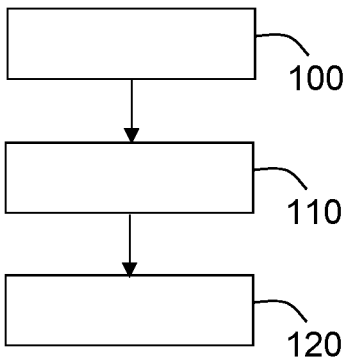


FIG.6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2022/070935

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24D1/02 A24D1/20
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2019/197417 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 17 October 2019 (2019-10-17)	1,2,5-15
A	page 15, line 34 - page 20, line 15; figures 1-8	3,4,16

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 October 2022	26/10/2022

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Klintebäck, Daniel

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2022/070935

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2019197417 A1	17-10-2019	BR 112020019013 A2	29-12-2020
		CN 111954471 A	17-11-2020
		EP 3772251 A1	10-02-2021
		JP 2021520791 A	26-08-2021
		KR 20200136440 A	07-12-2020
		US 2021145044 A1	20-05-2021
		WO 2019197417 A1	17-10-2019