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(71) Applicant: JT INTERNATIONAL S.A. [CH/CH]; 8, rue
Kazem Radjavi, 1202 GENEVE (CH).

(72) Inventors: VOERMAN, Dick Paul; Cantatestraat 16,
7323 KL Apeldoorn (NL). HUPKES, Ernst; Geerstraat 31,
8261 HL Kampen (NL).

(74) Agent: HABASQUE, Etienne et al.; LAVOIX 2 place
d'Estienne d'Orves, 75441 Paris Cedex 09 (FR).

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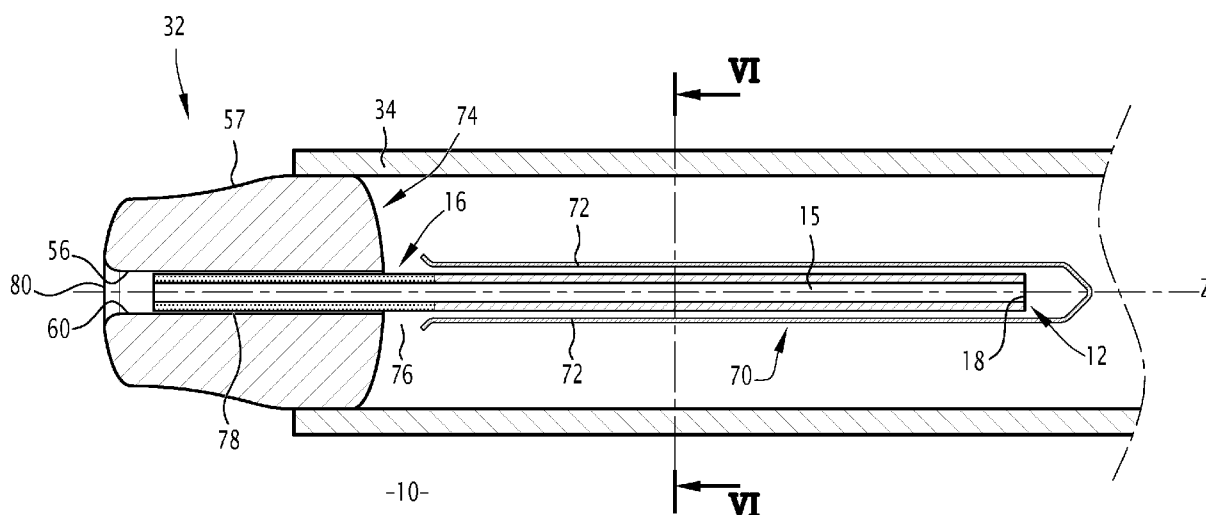


FIG. 5

(57) Abstract: The present invention provides an aerosol generating device (10) configured to operate with a tobacco article (12) comprising a substrate portion (15) and a gripping portion (16) arranged successively along an article axis, the device comprising: - a heating chamber (70) extending according to a chamber axis (Z) and configured to receive the substrate portion of the tobacco article, the heating chamber comprising a heater extending along the chamber axis (Z); - a maintaining structure (74) configured to be engaged with the gripping portion (16) of the tobacco article to maintain the substrate portion (15) of the tobacco article inside the heating chamber (70) at a distance (G) from the heater.

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AEROSOL GENERATING DEVICE WITH A HEATING CHAMBER ADAPTED FOR CONVECTION HEATING

FIELD OF THE INVENTION

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The present invention concerns an aerosol generating device comprising a heating chamber receiving a tobacco article.

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The aerosol generating device according to the invention is configured to operate with a tobacco article, also designated as aerosol generating substrate or aerosol substrate, which presents for example a solid substrate able to form aerosol when being heated. Thus, such type of aerosol generating devices, also known as heat-not-burn devices, is adapted to heat, rather than burn, the substrate by conduction, convection and/or radiation, to generate aerosol for inhalation.

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BACKGROUND OF THE INVENTION

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The popularity and use of reduced-risk or modified-risk devices (also known as vaporisers) has grown rapidly in the past few years as an aid to assist habitual smokers wishing to quit smoking traditional tobacco products such as cigarettes, cigars, cigarillos, and rolling tobacco. Various devices and systems are available that heat or warm vaporizable substances as opposed to burning tobacco in conventional tobacco products.

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A commonly available reduced-risk or modified-risk device is the heated substrate aerosol generating device or heat-not-burn device. Devices of this type generate aerosol or vapour by heating an aerosol substrate that typically comprises moist leaf tobacco or other suitable vaporizable material to a temperature typically in the range 150°C to 350°C. Heating an aerosol substrate, but not combusting or burning it, releases aerosol that comprises the components sought by the user but not the toxic and carcinogenic by-products of combustion and burning. Furthermore, the aerosol produced by heating the tobacco or other vaporizable material does not typically comprise the burnt or bitter taste resulting from combustion and burning that can be unpleasant for the user and so the substrate does not therefore require the sugars and other additives that are typically added to such materials to make the smoke and/or vapour more palatable for the user.

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The aerosol substrate presents a consumable part of the aerosol generating device. Thus, the user has to replace it by another one when it is no longer able to produce aerosol or/and a desired taste. In some aerosol generating devices, replacing an aerosol generating substrate by a new one can be laborious for the user. Additionally, some aerosol generating substrates may leave residues inside the device that can deteriorate the operation of the device.

The aerosol generating device typically includes a heating element heating the aerosol substrate. During operations, the heating element generates localized heat peaks. Areas of the aerosol substrate are too hot, whereas others not enough. Accordingly, the aerosol substrate does not generate the desired aerosols. The aerosol substrate experiences an unsuitable heating.

SUMMARY OF THE INVENTION

One of the aims of the invention is to improve the heating conditions of an aerosol substrate in an aerosol generating device.

For this purpose, the invention relates to an aerosol generating device configured to operate with a tobacco article comprising a substrate portion and a gripping portion arranged successively along an article axis, the device comprising:

- a heating chamber extending according to a chamber axis and configured to receive the substrate portion of the tobacco article, the heating chamber comprising a heater extending along the chamber axis;

- a maintaining structure configured to be engaged with the gripping portion of the tobacco article to maintain the substrate portion of the tobacco article inside the heating chamber at a distance from the heater.

Advantageously, the substrate portion is the unique tobacco-containing portion of the tobacco article. No further tobacco containing substance is provided within the device.

Thanks to these features, the heater and the substrate portion are contact free. Accordingly, the temperature of the substrate portion is homogeneous. Heat peaks are avoided and the heating conditions are kept in optimum conditions. Moreover, should a residue build-up appears in the heating chamber, risks of damaging the substrate portion are avoided.

According to some embodiments, said distance is adapted to ensure convection heat transfer from the heater to the substrate portion of the tobacco article.

5 Thanks to these features, essentially or only convection heating occurs between the heater and the aerosol substrate.

According to some embodiments, said distance is formed according to an axis perpendicular to the chamber axis.

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According to some embodiments, the maintaining structure is arranged exterior to the heating chamber.

15 Thanks to these features, heat transfer toward and through the maintaining structure reduces. It remains cold. Compactness is improved as well.

According to some embodiments, the heating chamber defines an open end usable for inserting the substrate portion of the tobacco article inside the heating chamber; the maintaining structure is arranged adjacent to the open end of the heating chamber or to face the open end of the heating chamber.

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Thanks to these features, the open end eases replacement of the tobacco article; the position of the maintaining structure as well.

25 According to some embodiments, the maintaining structure defines a reception cavity configured to extend along the chamber axis and being able to receive and retain the gripping portion of the tobacco article along the chamber axis.

30 Thanks to these features, the maintaining structure is thereby adapted to set the distance, and to keep the gap with the heater. In addition, the position along the chamber axis is fixed such that the substrate still faces the heater in order to be heated in the required condition.

35 According to some embodiments, the reception cavity defines an opening, a flow channel extending from the heating chamber through the reception cavity to said opening.

Thanks to these features, the reception cavity combines the function of providing an air passageway for aerosol formed by the substrate portion and of maintaining the tobacco product.

5 According to some embodiments, the maintaining structure is formed by a mouthpiece.

Thanks to these features, the mouthpieces fulfills at least two functions. The device architecture exhibits less elements. It becomes less expensive and easier to assemble.

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According to some embodiments, the maintaining structure is removable from a housing of the device.

15 Thanks to these features, opening the heating chamber is easier. This makes it possible to replace easily the tobacco article.

According to some embodiments, the maintaining structure is configured to be engaged with the gripping portion of the tobacco article when it is removed from the housing of the device.

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Thanks to these features, during replacement, grabbing the used tobacco article is more convenient as it automatically leaves the housing. It limits the risks of losing or breaking or bending the used tobacco article. The same benefits occur for mounting and placing a new tobacco article in the device.

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According to some embodiments, the tobacco article is a flat-shaped tobacco article and the heater comprises a heating plate, advantageously two heating plates facing each other.

30 A tobacco article having a flat shape can be simply handled by the user. Particularly, its insertion/extraction to/from the heating chamber may be easily performed. Its dimensions can also be reduced which makes it possible to reduce the dimensions of the heating chamber and consequently, of the whole device. The heater comprising at least one heating plate can extend along the whole area of the substrate portion of the tobacco article to
35 optimize heat transfer. Additionally, by using two heating plates, both faces of the tobacco article are heated. Heating is thus homogeneous.

According to some embodiments, the maintaining structure is configured to maintain the substrate portion of the tobacco article inside the heating chamber at a distance from each heating plate.

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Thanks to these features, heating becomes even more homogeneous.

According to some embodiments, the maintaining structure is configured to maintain the substrate portion of the tobacco article inside the heating chamber at a same distance from each heating plate.

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Thanks to these features, each of the upper face and lower face of the tobacco article reach a same temperature. The homogeneous heating is more accurate.

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According to some embodiments, the heating chamber encloses a loop shaped free space configured to surround the substrate portion of the tobacco article.

Thanks to these features, the substrate portion is essentially wrapped by hot air, and avoids contacts with hot surfaces.

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According to some embodiments, the heating chamber is configured for being contactless with a free end of the substrate portion.

Thanks to these features, the substrate portion is not exposed to excessively hot surfaces of the heating chamber.

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BRIEF DESCRIPTION OF THE DRAWINGS

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:

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- Figure 1 is a perspective view of an aerosol generating device according to the invention;

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- Figure 2 is a perspective view of an aerosol generating substrate usable with the aerosol generating device of Figure 1;

- Figure 3 is a perspective view of a tobacco article usable with the aerosol generating device of Figure 1;

- Figure 4 is a perspective view of the mouthpiece of Figure 3 mounted on the housing of the aerosol generating device of Figure 1;

- Figure 5 is a cross-sectional view of Figure 1 according to plane V;

- Figure 6 is a cross-sectional view of Figure 5 according to plane VI;

- Figure 7 is a cross-sectional view similar to the view of Figure 6 showing a preferred example of a heater part of the aerosol generating substrate.

DETAILED DESCRIPTION OF THE INVENTION

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.

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 a heater element explained in further detail below. 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 the heater element 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 vapour 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 pre-cursor) to a

specified target temperature and thereafter to maintain the temperature at the target temperature that enables efficient generation of aerosol.

As used herein, the term “**aerosol**” may include a suspension of vaporizable material 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 vapour. Aerosol may include one or more components of the vaporizable material.

As used herein, the term “**vaporizable material**” or “**precursor**” may refer to a smokable material which may for example comprise nicotine or tobacco and an aerosol former. Tobacco may take the form of various materials such as shredded tobacco, granulated tobacco, tobacco leaf and/or reconstituted tobacco. Suitable aerosol formers include: a polyol such as sorbitol, glycerol, and glycols like propylene glycol or triethylene glycol; a non-polyol such as monohydric alcohols, acids such as lactic acid, glycerol derivatives, esters such as triacetin, triethylene glycol diacetate, triethyl citrate, glycerin or vegetable glycerin. In some embodiments, the aerosol generating agent may be glycerol, propylene glycol, or a mixture of glycerol and propylene glycol. The substrate may also comprise at least one of a gelling agent, a binding agent, a stabilizing agent, and a humectant.

In the following description, a “**vertical direction**” and/or a “**horizontal direction**” may be defined in connection with the orientation of the device in normal use; in the mouth of a user. For instance, the horizontal direction may be detected due to a specific shape of a mouth piece; mating typical lips of a user. The upper face of the device may be detected by means of a light thereon, a shape of the mouth piece, an opening forming a flow inlet.

Figure 1 shows an aerosol generating device 10 according to the invention. The aerosol generating device 10 is intended to operate with an aerosol generating substrate 12 also designated tobacco article 12, shown in more detail on Figure 2.

With reference to Figure 2, the tobacco article 12 is for example a flat-shaped cuboid extending along an article axis X. The tobacco article 12 defines external dimensions $L \times W \times D$. In a typical example, the length L of the tobacco article 12 according to the article axis X equals substantially to 33 mm while its width W and depth D are substantially equal respectively to 12 mm and 1,2 mm. According to different examples, the values L, W and D

can be selected within a range of +/- 40%, for example. Due to its depth D, the tobacco article 12 is generally flat-shaped. The depth D, also considered as a thickness, of the tobacco article 12 is formed by a pair of parallel walls 13A, 13B, called hereinafter substrate side walls 13A, 13B, and the width W of the substrate is formed by a pair of parallel walls 14A, 14B, called hereinafter substrate wide walls 14A, 14B. According to other embodiments of the invention, the tobacco article 12 can have any other suitable shape(s) and/or external dimensions. For example, the tobacco article 12 can have a circular, oval, square or rectangular cross-section. The tobacco article 12 can for example present a stick having a shape similar to the shape of a conventional cigarette.

The tobacco article 12 comprises a heater part 15, also designated as substrate portion 15, and a gripping portion 16, also designated as mouthpiece part 16, arranged along the article axis X. The article axis X may be considered as a substrate axis X. The substrate portion 15 may for example be slightly longer than the gripping portion 16. For example, the length L2 of the substrate portion 15 according to the article axis X may be substantially equal to 18 mm and the length L1 of the gripping portion 16 according to the article axis X may be substantially equal to 15 mm. The substrate portion 15 defines an abutting end 18, or free end 18, of the tobacco article 12. The gripping portion 16 defines a mouth end 20 of the substrate 12. The substrate portion 15 and the gripping portion 16 may be fixed one to the other by a unique wrapper extending around the article axis X. In other embodiments, the portions 15, 16 may be wrapped by different wrappers and fixed one to the other by any other suitable mean. The or each wrapper may, for example, comprise paper and/or non-woven fabric and/or aluminium. The or each wrapper may be porous or air impermeable. The or each wrapper forms a plurality of airflow channels extending inside the tobacco article 12 between the free end 18 and the mouth end 20.

The substrate portion 15 is intended to be heated by a heater (using a heating chamber in the present example) and comprises solid vaporizable material as defined above. The gripping portion 16 is intended to be received entirely inside a mouthpiece as it will be explained in further detail below. According to other embodiments of the invention, a part of the gripping portion 16 forms itself a mouthpiece intended to be in contact with the user's mouth and/or lips. The gripping portion 16 may comprise a core 17 acting for example like a filter. The core 17 may for example be a foam, or packed strands or fibres. The core 17 may be formed through an extrusion and/or rolling process into a stable shape. The tobacco article 12 may be shaped to provide one or more airflow channels. In the particular example of Figure 2, the gripping portion 16 defines a plurality of venting holes 22 arranged

for example according to the whole perimeter of the gripping portion 16 along two axes perpendicular to the article axis X. In other words, according to this example, the venting holes 22 are arranged on each wall of the tobacco article 12 among the substrate side walls 13A, 13B and the substrate wide walls 14A, 14B. According to another example, the venting holes 22 are arranged only on the substrate wide walls 14A, 14B or preferably, only on one of the substrate wide walls 14A, 14B. In both examples, the venting holes 22 may be aligned perpendicularly to the substrate axis on the or each corresponding wall of the tobacco article 12, and can be spaced by a same distance. The venting holes 22 allow fresh air entering inside the tobacco article 12 to achieve particular vaping/tasting effects.

Referring again to Figure 1, the aerosol generating device 10 comprises a device body 30 extending along a device axis Y and forming at least one outer wall 40 of the device 10. The device body 30 comprises a mouthpiece 32 and a housing 34 arranged successively according to the device axis Y. According to the example of Figure 1, the mouthpiece 32 and the housing 34 form two different pieces. Particularly, according to this example, the mouthpiece 32 is designed in order to be fixed on, or be received in, an insertion opening 36 formed at one of the ends of the housing 34. This opening 36 extends perpendicularly to the device axis Y.

In each cross section, the housing 34 may for example form a substantially rectangular shape with rounded edges. In this case, the housing 34 with the mouthpiece 32 form at least four outer walls 40. According to other embodiments, the housing 34 can have a round cross-sectional shape. In this case, it can form with the mouthpiece 32 only one outer wall 40. The housing 34 can be sealed at the end opposite to the insertion opening 36 receiving the mouthpiece 32. The housing 34 can be formed from a single piece or several assembled pieces made of any suitable material like aluminium or plastic. In some embodiments, the material of the housing 34 can be a thermally conductive material. In some other embodiments, it can be a thermally insulating material. In some embodiments, the housing 34 can form on the corresponding part of the device outer wall 40 one or several openings suitable for arranging control and/or visual elements. For example, such element may comprise control buttons, touch panels, screens, LEDs, etc. Particularly, in the example of Figure 1, the housing 34 forms a slot opening 42 receiving for example a LED indicating at least an ON state of the device 10. It can also indicate for example a battery low state, an error state, etc.

The housing 34 delimits an internal space of the device 10 receiving various elements designed to carry out different functionalities of the device 10. This internal space can for example receive a battery for powering the device 10, a maintaining structure (not represented) , a heating chamber for heating the tobacco article 12 and a heater comprising for example at least two heating elements (not represented), such as heating plates, for heating the heating chamber . The internal space can also receive a controller for controlling the operation of the heater. The heating chamber defines a chamber axis which may correspond to the device axis Y and/or the article axis X. The heating chamber extends along the chamber axis. In some embodiments, the housing 34 may further comprise at least one temperature sensor. This temperature sensor can for example generate temperature measurements relative to the temperature of the heater and/or of the tobacco article 12 and/or of the aerosol generated by the tobacco article 12. The tobacco article 12, notably the gripping portion 16, may be maintained outside the heating chamber by the maintaining structure as will be described further through the Figures 5 to 6.

Figure 3 shows in more detail the mouthpiece 32. In reference to this Figure 3, the mouthpiece 32 is delimited by an internal surface 56 intended to face the insertion opening 36 while assembling the mouthpiece 32 with the housing 34, and an external surface 57 intended to form with the housing 34 at least one outer wall 40 of the device 10 (as illustrated in Figure 1). An external border 59 of the internal surface 56 is designed to be in a tight contact with a part of an internal border of the insertion opening 36 (as illustrated in Figure 1) to fix the mouthpiece 32 inside the insertion opening 36. The external surface 57 has an appropriate shape to be in contact with the user's mouth and/or lips. Each side of the external surface 57 can be formed as an extension of the corresponding side of the housing to form an almost continuous outer wall 40 of the device 10. Particularly, in this case, a discontinuity can be formed in the transition zone between the mouthpiece 32 and the housing 34.

The mouthpiece 32 is crossed by a through-hole 60 extending along the device axis Y, between a notch 62 and a flow outlet 64. Particularly, the through-hole 60 is designed to receive the mouthpiece part 16 (as illustrated in Figure 2) of the aerosol generating substrate 12 such that the article axis X coincides with, is aligned on, the device axis Y. Thus, the through-hole 60 has the same cross-sectional shape as the tobacco article 12 and defines internal dimensions slightly greater than the external dimensions of the gripping portion 16 of the tobacco article 12. Particularly, in the example of the figures, the through-hole 60 defines a rectangular cross-section to be able to receive the gripping portion 16 of

the tobacco article 12 shown on Figure 2. In some embodiments, the through-hole 60 may have variable cross-sectional dimensions. For example, the through-hole 60 can have gradually decreasing cross-sectional dimensions (notably the width) from the notch 62 to the flow outlet 64. Additionally, the through-hole 60 and the mouthpiece part 16 of the aerosol generating substrate 12 can have the same length measured respectfully according to the device axis Y and the article axis X. According to another embodiment, the length of the gripping portion 16 of the tobacco article 12 can be shorter than the length of the through-hole 60 so as the mouth end 20 of the tobacco article 12 can be flushed at the flow outlet 64.

The notch 62 corresponds to a cavity, or a channel, formed in both internal and external surfaces 56, 57 of the mouthpiece 32. This cavity can be formed by a first opening extending on the internal surface 56 on one side of the through-hole 60 from the border 59 to this through-hole 60 and a second opening extending on the external surface 57 from the border following a percentage, d%, of the length of the mouthpiece 32 measured along the device axis Y. The value d% can be less than 25%, advantageously less than 10% and more advantageously less than 5%. Thus, when the mouthpiece 32 is inserted in the insertion opening 36, the notch 62 forms an opening 66 forming a flow inlet 66 as shown on Figure 4. In other words, the flow inlet 66 is formed on an outer wall 40 of the device 10 in a transition zone between the mouthpiece 32 and the housing 34.

In the embodiment where the tobacco article 12 comprises the venting holes 22, at least some of these venting holes 22 are arranged in order to face the flow inlet 66.

According to another embodiment of the invention (not shown), a flow inlet is formed at any other wall of the device 10. It can for example be formed at the wall opposite to the mouthpiece 32.

Figure 5 shows in more detail a portion of the aerosol generating device 10 in accordance with the invention. The aerosol generating device 10 is similar or identical to the previous figures. The housing 34 is partially represented. The through cut plane V is distant and parallel to the device axis Y as illustrated in Figure 1.

The aerosol generating device device 10 exhibits a chamber axis Z, and a heating chamber 70 extending according to a chamber axis Z and configured to receive the substrate portion 15 of the tobacco article 12. In different embodiments of the invention, the

heating chamber 70 can define a circular, oval, square or rectangular cross-sectional shape. Particularly, this cross-sectional shape of the heating chamber 70 can be adapted to the cross-sectional shape of the tobacco article 12. In the example of the Figures, the heating chamber 70 has a flat shape adapted to receive the flat-shaped tobacco article 12.

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The heating chamber 70 comprises a heater comprising at least one heating plate 72. As it will be explained in further detail below, the device 10 allows the substrate portion 15 to be held within the heating chamber 70 in a contactless manner in respect with the heater. In the examples of Figure 5 and 6, the heater of the heating chamber 70 comprises two heating plates 72 which are parallel to the substrate portion 15 and the chamber axis Z. The heating plates 72 may for example be at a same distance from the substrate portion 15, said distance being measured perpendicularly to the chamber axis Z. Along the substrate portion 15 and/or the chamber axis Z, said distance may be constant. In the following description, features will be defined in relation with one heating plate. Yet, these features may apply to each heating plate. According to other embodiments of the invention, the heater can take any other suitable form or shape. For example, when the tobacco article 12 has a circular or oval cross-sectional shape, the heater can comprise a cylindrical element extending in a contactless manner around the substrate portion 15 of the tobacco article 12. In this case, this cylindrical element is designed to be spaced from the substrate portion 15 for example by a same distance.

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The aerosol generating device 10 includes a maintaining structure 74 configured to be engaged with the gripping portion 16 of the tobacco article 12 to maintain the substrate portion 15 of the tobacco article 12 inside the heating chamber 70 at a distance from the heater and in the example of Figures, at a distance from the heating plate 72. The maintaining structure 74 acts as a sole gripping member. The distance is adapted to ensure convection heat transfer from the heater to the substrate portion 15. Air at the separation interface between the heater and the substrate portion 15 transfers calories. It may be observed that the maintaining structure 74, also considered as a holding structure, is arranged exterior the heating chamber 70. They may be separated and distinct. They are at distance from each other along the chamber axis Z.

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The heating chamber 70 defines an open end 76 usable for inserting the substrate portion 15 of the tobacco article 12 within the heating chamber 70. The open end 76 forms an inlet, with a cross section that is larger than the substrate portion 15. At the opposite, the heating chamber 70 may exhibit a closed end. Then, the heating chamber 70 may form a

blind pocket. The heating chamber 70 may comprise a closed bottom at the opposite of the open end 76. The free end 18 of the substrate portion 15 may face the closed bottom with respect to the chamber axis Z.

5 The distance is may be measured with respect to an/any axis perpendicular to the chamber axis. The distance may be measured perpendicularly to the inner face of the heating plate 72, and/or perpendicularly to the substrate portion 15.

10 The maintaining structure 74 is arranged adjacent to the open end 76 of the heating chamber 70 and/or arranged to face the open end 76 of the heating chamber 70. Along the chamber axis Z, the maintaining structure 74 may be in physical abutment with the open end 76, or may be spaced apart therefrom.

15 The maintaining structure 74 defines a reception cavity 78 configured to extend along the chamber axis Z. The reception cavity 78 is intended to receive and retain the gripping portion 16 of the tobacco article along the chamber axis Z. In the example of Figure 5, the maintaining structure 74 is formed by the mouthpiece 32 and the reception cavity 78 corresponds to the through-hole 60 of the mouthpiece 32. The inner surface 56 may be in physical contact with the gripping portion 16. The inner surface 56 may generally be
20 orientation means and/or gripping means. The means are configured for setting the orientation and or the location of the tobacco article 12. The inner surface 56 comprises a complementary surface to the gripping portion 16, for instance in order to form a nesting interface. Then during operations, the substrate portion 15 keeps a predefined position in the heating chamber 70. The reception cavity 78 defines an opening 80, a flow channel 60
25 extending from the heating chamber 70 through the reception cavity 78 and said opening.

30 As a further option, the maintaining structure 74 may be distinct from the mouthpiece 32 and is removable from a housing 34 of the device. For example, the maintaining structure 74 can be designed to be arranged between the mouthpiece 32 and the heating chamber 70. The maintaining structure 74 may comprise fixation means collaborating with the housing 34. These fixation means may be reversible fixation means. By way of illustration, the outer surface 57 forms the fixation means. The outer surface 57 may match the inner surface of the housing 34. The outer surface 57 may fit snugly with the inner space of the housing 34; thereby achieving a firm assembly.

The maintaining structure 74 is configured to be engaged with the gripping portion 16 when it is removed from the housing 34 of the device 10. The gripping portion 16 is intended to be inserted in the maintaining structure 74. The gripping portion 16 comprises an outer surface which mates, which is complementary to the inner surface 56. The inner surface
5 may form sealing means. The interface between the gripping portion 16 and the inner surface 56 may be airtight.

In an assembled state, the maintaining structure 74 is configured to maintain the substrate portion 16 of the tobacco article inside the heating chamber 70 at a same distance
10 from the heater and notably, in the example of the Figures, from each heating plate 72. The heating chamber 70 is preferably free of physical contact with the substrate portion, and notably the free end 18 of the substrate portion 15. The heating chamber is configured such that the tobacco article 12 is mounted in a cantilever fashion. In the disassembled state, the maintaining structure 74 is configured to keep the substrate portion of the tobacco article
15 inside the heating chamber at a distance from each heating plate.

Figure 6 is a through cut across the plane VI as illustrated in Figure 5. The through cut is perpendicular to the chamber axis Z. The through cut plane VI crosses the heating chamber 70, thus the heating plates 72 and the chamber axis Z as well. In addition, the
20 through cut plane VI meets the substrate portion 15 of the tobacco product 12; thereby exposing inner features of the aerosol generating device 10. The maintaining structure 78 is in the background of the current figure.

In the example of Figure 6, the tobacco article 12 exhibits a rectangular cross-section.
25 It is generally flat-shaped. It comprises two main faces which are parallel. The main faces may comprise or may correspond to the substrate wide walls 14A and 14B. The substrate wide walls 14A and 14B are in the heating chamber 70. Each of the substrate wide walls 14A and 14B face one of the heating plates 72. Each of the heating plate 72 may comprise an inner face 84, or inward surface, facing one of the substrate wide walls 14A and 14B.
30 Hence, each inner face 84 is associated with one of the substrate wide walls 14A, 14B. The heating plates 72 are identical. They may be symmetrical.

The maintaining structure 74 of the aerosol generating device 10 is configured in order to maintain at least one distance G, also designated as air gap G, between an inner face
35 84 and the associated wall 14A, 14B. The maintaining structure 74 is configured to maintain the substrate portion 15 within the heating chamber 70 at the distance G from each heating

plate 72. Preferably, the maintaining structure 74 maintains the substrate portion 15 within the heating chamber 70 at a same distance G from each heating plate 72. The following description will focus on one distance G between one of the substrate walls 14A, 14B and the associated inner face 84 of the device 10. However the following features may apply to each distance G of the device 10. One side, such as the upper or lower side with respect to a vertical direction (not illustrated), will be described. Accordingly, the heating chamber 70 includes a convection space 82. The convection space 82 defines a separation between the substrate portion 15 and the heating plate 72. The convection space 82 may be a free space. It is configured in order to ensure convection heat transfer from the heating plate 72 to the substrate portion 15 of the tobacco article 12.

The thickness of the convection space 82 may correspond to the distance G. The distance G may be formed according to an axis perpendicular to the chamber axis Z, for instance an axis perpendicular to the inner face 84 and/or to the substrate wide wall 14A, 14B.

With respect to a transversal direction T, the heating plate 72 is broader than the substrate portion 15. The transversal direction T may correspond to a horizontal direction. The heating chamber 70 comprises two heating plates 72 facing each other, at least when the tobacco article 12 is removed. The heating plates 72 are generally toward one another. With respect to the transversal direction T, the distance G may be constant along the aerosol substrate 12. The distance G may be equal on both walls 14A, 14B.

The heating chamber 70 includes a loop 86, such as inner loop 86. The loop may be a ring, such as a rectangular ring. The loop 86 may encircle the chamber axis Z. The loop may be a loop shaped free space 86. The substrate portion 15 is within the free loop 86 and may be surrounded by the latter. The loop 86 may be a free space, or empty space, through which convection heating occurs, for instance toward its center. This empty space allows a thermal transfer from the heating plate(s) 72 to the substrate portion 15. Then, heating is more homogeneous.

Of course, when the tobacco article 12 has a cross-sectional shape different from the cross-sectional shape shown in Figure 6, the convection space 82 and the loop 86 can be defined in a similar manner.

As visible in Figure 7, the heater part 15 of the aerosol generating substrate 12 may have for example a flat-plate shape with slotted grooves on both opposite surfaces.

The scope of protection is defined by the following claims.

CLAIMS

1. An aerosol generating device (10) configured to operate with a tobacco article (12) comprising a substrate portion (15) and a gripping portion (16) arranged successively along an article axis (X), the device (10) comprising:

- a heating chamber (70) extending according to a chamber axis (Z) and configured to receive the substrate portion (15) of the tobacco article (12), the heating chamber (70) comprising a heater extending along the chamber axis (Z);

- a maintaining structure (74) configured to be engaged with the gripping portion (16) of the tobacco article (12) to maintain the substrate portion (15) of the tobacco article (12) inside the heating chamber (70) at a distance (G) from the heater,

wherein the maintaining structure (74) defines a reception cavity (78) configured to extend along the chamber axis (Z) and being able to receive and retain the gripping portion (16) of the tobacco article (12) along the chamber axis (Z), the reception cavity (78) defining an opening (80), a flow channel extending from the heating chamber (70) through the reception cavity (78) to said opening (80).

2. The aerosol generating device (10) according to claim 1, wherein said distance (G) is adapted to ensure convection heat transfer from the heater to the substrate portion (15) of the tobacco article (12).

3. The aerosol generating device (10) according to claim 1 or 2, wherein said distance (G) is formed according to an axis perpendicular to the chamber axis (Z).

4. The aerosol generating device (10) according to any one of the preceding claims, wherein the maintaining structure (74) is arranged exterior to the heating chamber (70).

5. The aerosol generating device (10) according to any one of the preceding claims, wherein:

- the heating chamber (70) defines an open end (76) usable for inserting the substrate portion (15) of the tobacco article (12) inside the heating chamber (70);

- the maintaining structure (74) is arranged adjacent to the open end (76) of the heating chamber (70) or to face the open end (76) of the heating chamber (70).

6. The aerosol generating device (10) according to any one of the preceding claims, wherein the maintaining structure (74) is formed by a mouthpiece (32).

7. The aerosol generating device (10) according to any one of the preceding claims, wherein the maintaining structure (74) is removable from a housing (34) of the device (10).

5 8. The aerosol generating device (10) according to claim 7, wherein the maintaining structure (74) is configured to be engaged with the gripping portion (16) of the tobacco article (12) when it is removed from the housing (34) of the device (10).

10 9. The aerosol generating device (10) according to any one of the preceding claims, wherein the tobacco article (12) is a flat-shaped tobacco article (12) and wherein the heater comprises a heating plate (72), advantageously two heating plates (72) facing each other.

15 10. The aerosol generating device (10) according to claim 9, wherein the maintaining structure (74) is configured to maintain the substrate portion (15) of the tobacco article (12) inside the heating chamber (70) at a distance (G) from each heating plate (72).

20 11. The aerosol generating device (10) according to claim 10, wherein the maintaining structure (74) is configured to maintain the substrate portion (15) of the tobacco article (12) inside the heating chamber (70) at a same distance (G) from each heating plate (72).

 12. The aerosol generating device (10) according to any one of the preceding claims, wherein the heating chamber (70) encloses a loop shaped free space (86) configured to surround the substrate portion (15) of the tobacco article (12).

25 13. The aerosol generating device (10) according to any one of the preceding claims, wherein the heating chamber (70) is configured for being contactless with a free end (18) of the substrate portion (15).

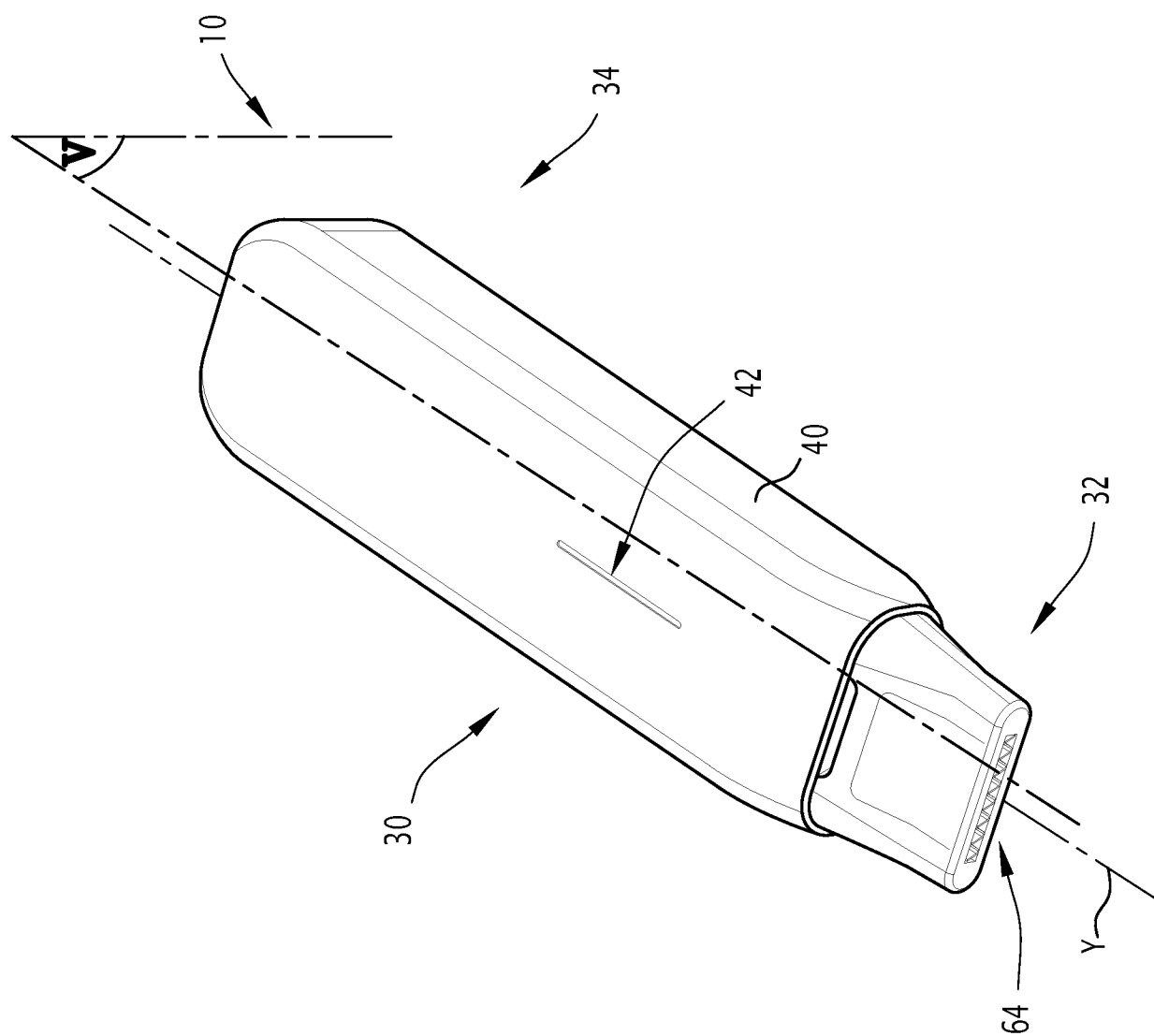


FIG. 1

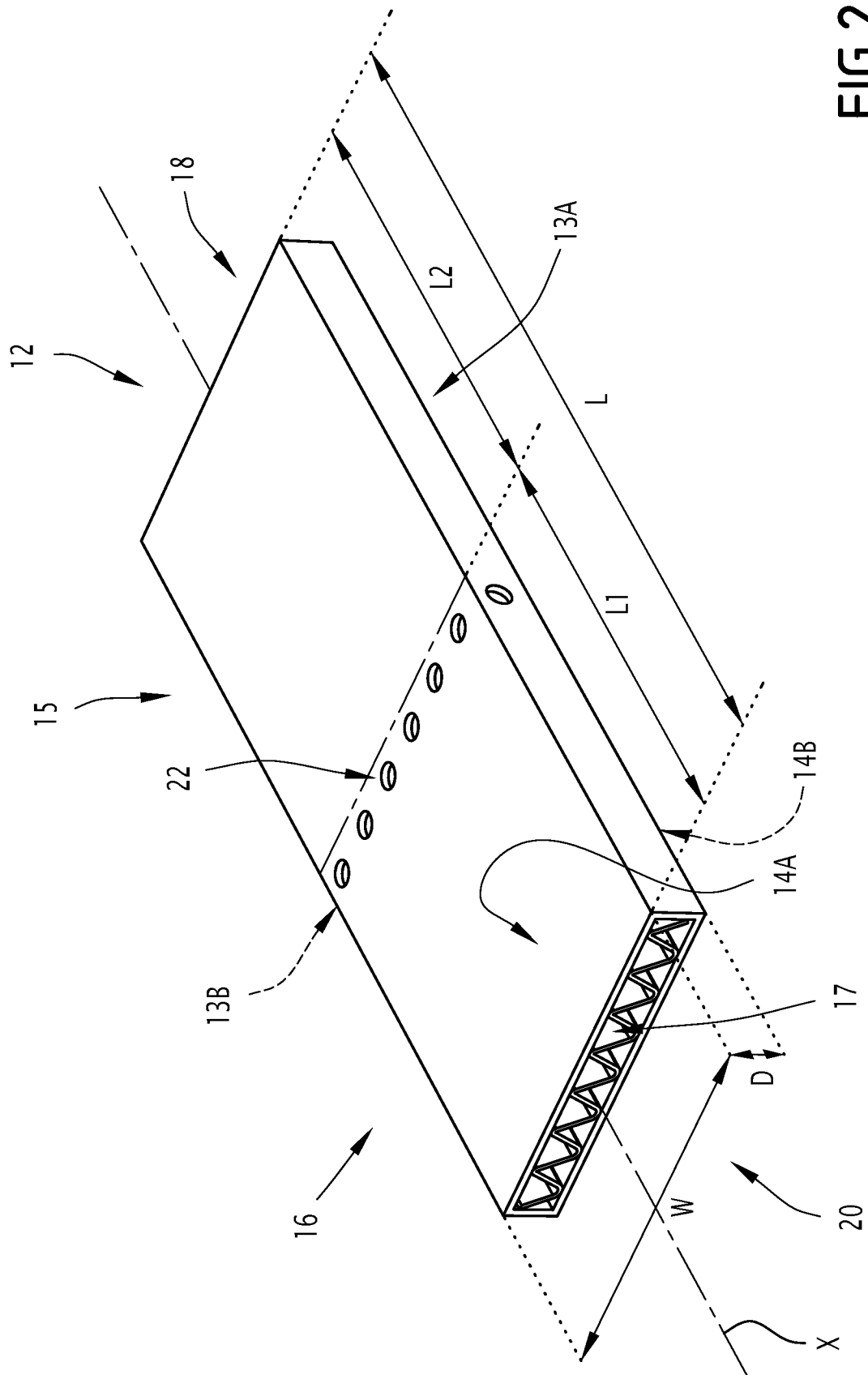


FIG. 2

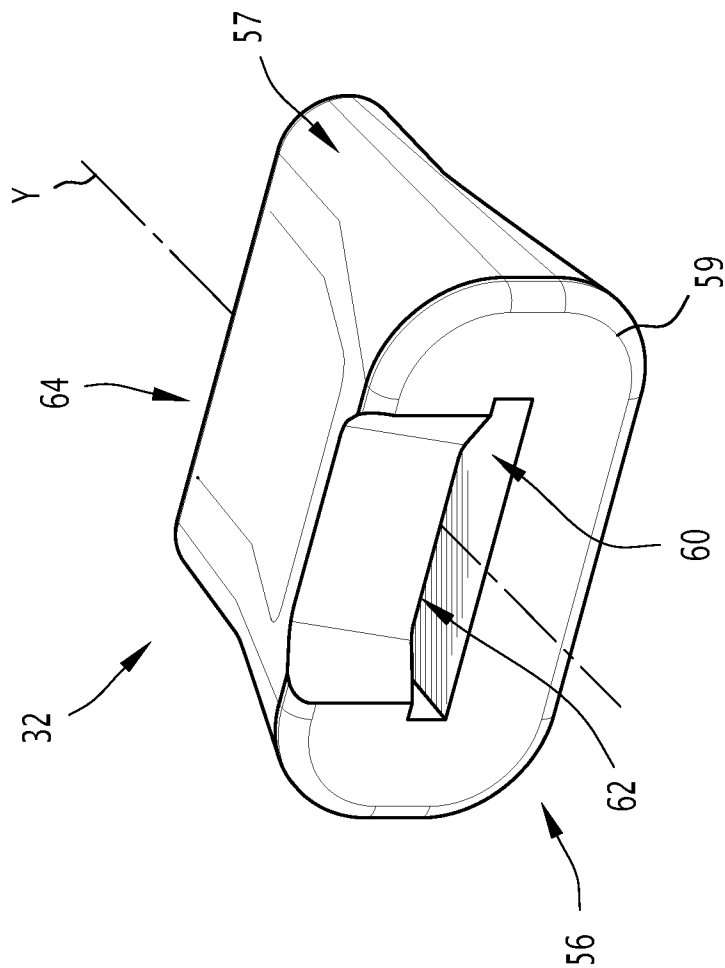
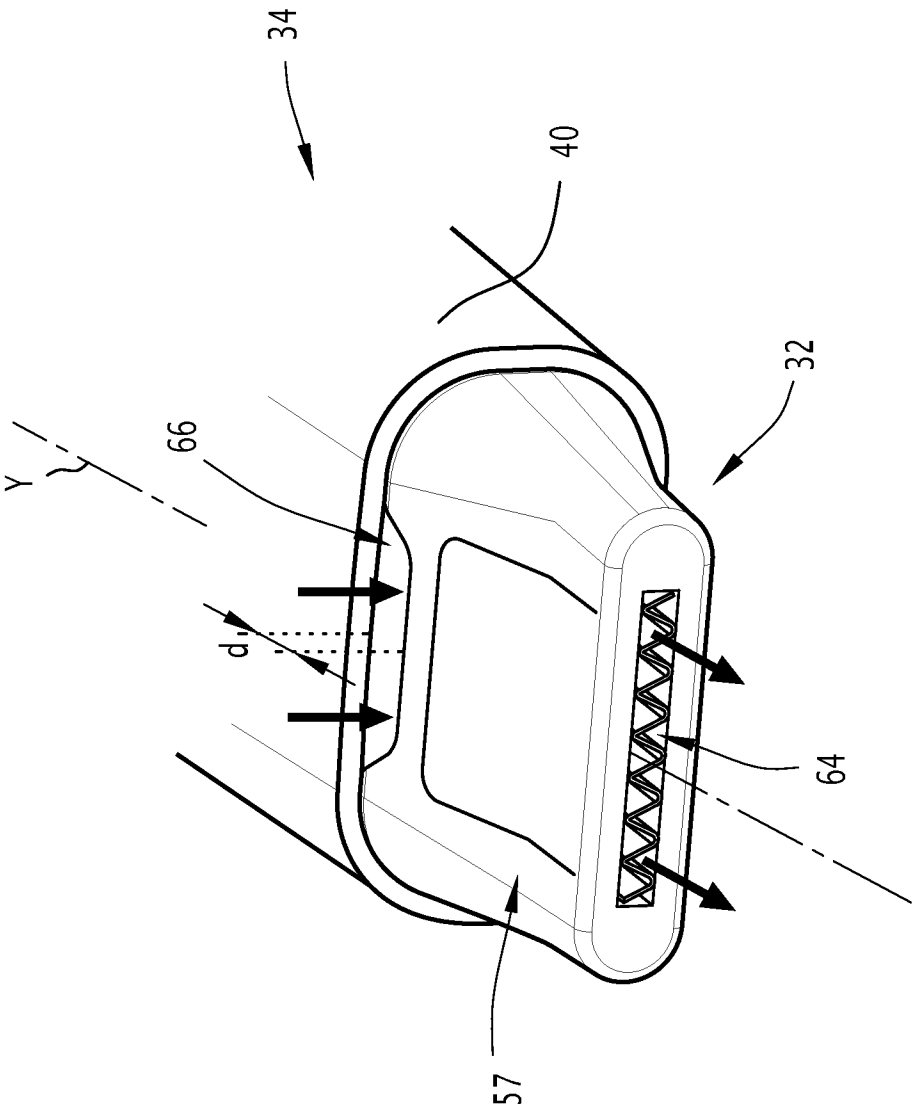


FIG. 3

FIG. 4



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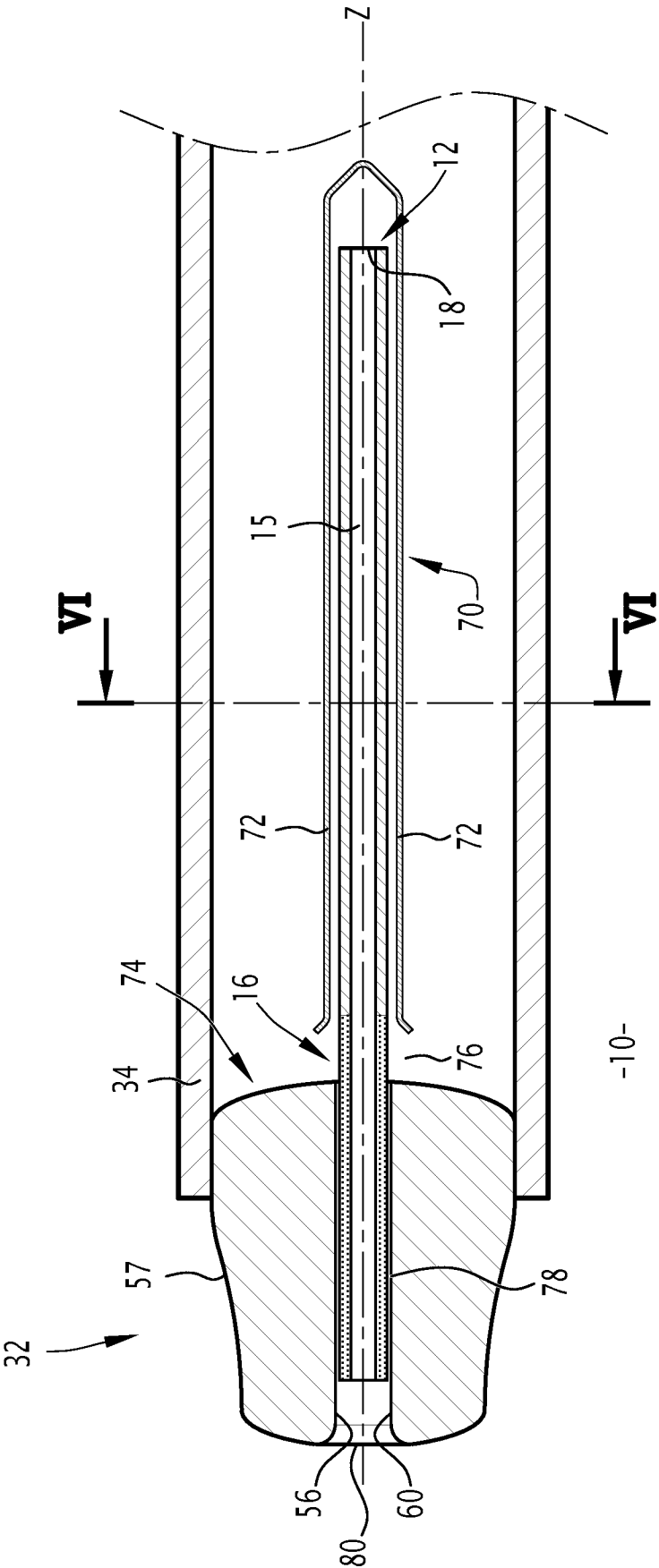


FIG.5

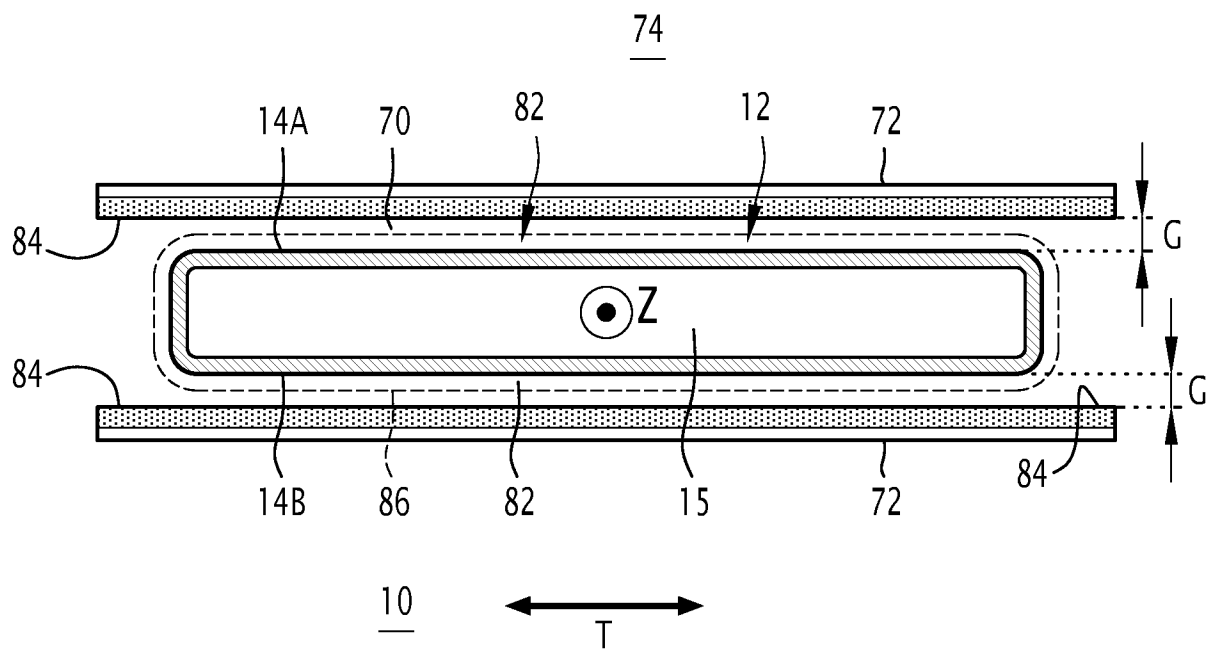


FIG.6

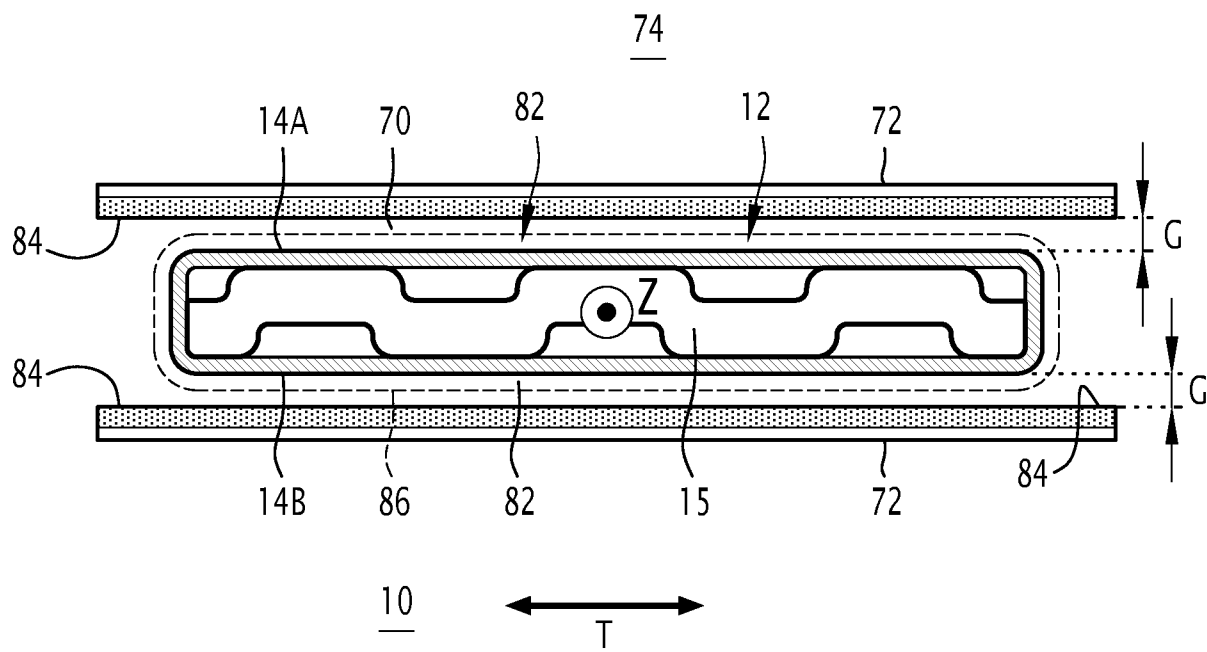


FIG.7

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2022/079866

A. CLASSIFICATION OF SUBJECT MATTER**INV. A24F40/46****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)

A24F

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**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 10 2019 105937 A1 (HAUNI MASCHINENBAU GMBH [DE]) 10 September 2020 (2020-09-10) abstract paragraphs [0033], [0037], [0038] paragraph [0047] - paragraph [0070] figures 1-3 -----	1-13
A	US 2020/375253 A1 (BATISTA RUI NUNO [CH] ET AL) 3 December 2020 (2020-12-03) abstract figures 3, 4, 5, 6, 9, 10 paragraph [0149] - paragraph [0167] -----	1-13
A	WO 2016/023173 A1 (LIU SHUIGEN [CN]) 18 February 2016 (2016-02-18) abstract paragraph [0035] - paragraph [0057] figures 1-6 -----	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

31 October 2022

Date of mailing of the international search report

23/11/2022

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2

NL - 2280 HV Rijswijk

Tel. (+31-70) 340-2040,

Fax: (+31-70) 340-3016

Authorized officer

Payr, Matthias

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2022/079866

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