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Inventor(s)	Hupkes; Ernst

Aerosol Generating Device Comprising a Supporting Structure Receiving Heating Plates

Abstract

The present invention concerns an aerosol generating device configured to operate with a flat-shaped tobacco article including a substrate portion. The device includes: a heating chamber extending according to a chamber axis and configured to receive the substrate portion of the tobacco article, the heating chamber having a heating plate defining two opposite edges extending according to the chamber; a supporting structure extending along the chamber axis and comprising two recess portions facing one another, each recess portion being adapted to receive at least a part of one of said edges of the heating plate and delimited by two opposite retention sides designed to retain the corresponding edge; and at least one retention side of each recess portion being inclined in respect with a transversal axis parallel to the heating plate and perpendicular to the chamber axis.

Inventors: **Hupkes; Ernst (Kampen, NL)**

Applicant: **JT International SA** (Geneva, CH)

Family ID: **1000008614202**

Assignee: **JT International SA (Geneva, CH)**

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Background/Summary

FIELD OF THE INVENTION

[0001] The present invention concerns an aerosol generating device comprising a supporting structure receiving a heating plate heating the substrate of a tobacco article in order to generate an aerosol.

[0002] The aerosol generating device according to the invention is configured to operate with an aerosol generating 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.

BACKGROUND OF THE INVENTION

[0003] The popularity and use of reduced-risk or modified-risk devices (also known as vaporisers or aerosol generating devices) 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.

[0004] A commonly available reduced-risk or modified-risk device is the heated substrate aerosol generation 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.

[0005] An aerosol generating device generally encloses at least one heating plate intended to heat an aerosol substrate. During operation, a heat transfer occurs between the heating plate and the aerosol substrate, but also with other internal components of the aerosol generating device as for example means supporting the heating plate. Hence, heat is dissipated in the aerosol generating device through said supporting means. Energy is lost and autonomy is limited. As a consequence, a user needs to reload or to replace the power batteries of the device oftenly. The supporting means notably fulfil the function of positioning the heating plate at an accurate position. They also ensure a steady assembly which prevents the heating plate from sliding when the user moves the aerosol generating device.

SUMMARY OF THE INVENTION

[0006] One of the aims of the invention is to solve at least one of the drawbacks of the prior art and notably, to improve the thermal efficiency of an aerosol generating device.

[0007] For this purpose, the invention relates to an aerosol generating device configured to operate with a flat-shaped tobacco article comprising a substrate portion, the device comprising: [0008] 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 heating plate defining two

opposite edges extending according to the chamber axis; [0009] a supporting structure extending along the chamber axis and comprising two recess portions facing one another, each recess portion being adapted to receive at least a part of one of said edges of the heating plate and delimited by two opposite retention sides designed to retain the corresponding edge; [0010] at least one retention side of each recess portion being inclined in respect with a transversal axis parallel to the heating plate and perpendicular to the chamber axis.

[0011] By inclining at least one retention side of at least one recess portion, heat transfer within the aerosol generating device is limited. The contact interfaces formed in the recess portions prevent parasitic thermal conduction. Then energy used to heat the substrate portion is more dedicated to this function. The supporting structure receives and dissipates less energy. The device becomes more energy efficient. Its need in primary energy decreases. As apparent from the above, this result is achieved while keeping the positioning accuracy and the overall stiffness. Then, the invention offer a compromise between at least: energy savings, an accurate positioning of the heating plate, the stiffness.

[0012] In particular, the tobacco article may be a flat-shaped cuboid, for example extending along a substrate axis X.

[0013] According to some embodiments, both retention sides of each recess portion are inclined in respect with the transversal axis.

[0014] Thanks to these features, the heat transfer is prevented further. Each retention side is optimised in order to reduce heat transfer, and each recess portion as well.

[0015] According to some embodiments, each of the retention sides of each recess portion is designed to be in contact with the corresponding edge of the heating plate.

[0016] According to some embodiments, one of the retention sides presents a greater area of contact with the corresponding edge of the heating plate than the other retention side of a same recess portion.

[0017] Thanks to these features, the retention side with the greater area of contact improves the positioning accuracy, and contributes to the stability.

[0018] According to some embodiments, at least one retention side of each recess portion presents a rounded edge.

[0019] Thanks to these features, heat transfer is reduced at this retention side because a rounded edge implies more space between the heating plate and the recess portion. The air gap at the rounded edge is thicker, and more efficient for avoiding heat transfer.

[0020] According to some embodiments, each recess portion presents a groove extending along the chamber axis.

[0021] According to some embodiments, each groove extends substantially along the whole length of the heating chamber.

[0022] Thanks to these features, the heating plate is maintained in a stable manner.

[0023] According to some embodiments, the heating plate is designed to be in contact with the substrate portion of the tobacco article.

[0024] Thanks to these features, the substrate portion is heated more efficiently because a direct thermal contact occurs.

[0025] According to some embodiments, the heating plate is made from a ceramic substrate.

[0026] According to some embodiments, the supporting structure comprises two symmetric parts, each symmetric part comprising one of said recess portions.

[0027] Thanks to these features, providing two parts eases assembly. It is easier to mount therein the heating plate, an optional insulating body and the substrate portion.

[0028] According to some embodiments, the aerosol generating device further comprising a holding structure designed to clump said symmetric parts together according to the transversal axis.

[0029] Thanks to these features, the symmetric parts are maintained together in an accurate and stiff architecture. Hence, these benefits are also obtained with respect to the heating plate.

[0030] According to some embodiments, the holding structure is a part of a housing of the device.
[0031] According to some embodiments, the heating chamber comprises two heating plates facing each other.
[0032] Thanks to these features, the substrate portion heats more quickly. Temperature is more homogeneous as his both main faces are heated.
[0033] According to some embodiments, the supporting structure comprises a recess portion for each edge of each heating plate.
[0034] Thanks to these features, each recess portion optimises heat insulation and a steady fixing interface.
[0035] According to some embodiments, the heating chamber is delimited according to the transversal axis by a pair of lateral walls formed by the supporting structure.
[0036] According to some embodiments, each lateral wall extends between a pair of recess portions.
[0037] According to some embodiments, the at least one retention side which is inclined comprises a chamfer facing the heating plate.
[0038] According to some embodiments, each recess portion comprises a bottom joining the two opposite retention sides of said recess portion, and a width reduction toward said bottom.
[0039] Thanks to these features, the contact between the heating plate and the supporting structure essentially occurs at the ends of the heating plate; where less heat is generated.
[0040] According to some embodiments, each recess portion comprises an air gap between the associated heating plate and the at least one retention side which is inclined in respect with the transversal axis parallel to the heating plate and perpendicular to the chamber axis.
[0041] According to some embodiments, the supporting structure comprises an insulation body which is adjacent to the heating plate and which faces the at least one retention side which is inclined in respect with the transversal axis parallel to the heating plate and perpendicular to the chamber axis.
[0042] Thanks to these features, heat transfer with the supporting structure is reduced. The heating chamber keeps heat produced. The ratio of produced aerosol/spent energy increases.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0043] 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:
[0044] FIG. **1** is a perspective view of an aerosol generating device according to a first embodiment of the invention;
[0045] FIG. **2** is a perspective view of a flat-shaped tobacco article usable with the aerosol generating device of FIG. **1**;
[0046] FIG. **3** is a perspective view of a mouthpiece of the aerosol generating device of FIG. **1**;
[0047] FIG. **4** is a perspective view of the mouthpiece of FIG. **3** mounted on a housing of the aerosol generating device of FIG. **1**;
[0048] FIG. **5** is a partial cross-sectional view of FIG. **1** according to plane V;
[0049] FIG. **6** is an enlarged view of a part of FIG. **5**;
[0050] FIG. **7** is a view similar to the view of FIG. **6** where the aerosol generating device is according to a second embodiment of the invention; and
[0051] FIG. **8** is a cross-sectional view of an aerosol generating device according to a third embodiment of the invention.
DETAILED DESCRIPTION OF THE INVENTION

[0052] 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.
[0053] 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.
[0054] 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.
[0055] 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.
[0056] As used herein, the term “transversally” may refer to an orientation along the transversal axis T as represented in the figures.
First Embodiment of the Invention
[0057] FIG. **1** shows an aerosol generating device **10** according to the first embodiment of the invention. The aerosol generating device **10** is intended to operate with an aerosol generating substrate **12**, also designated as tobacco article **12** or flat-shaped tobacco article **12**, shown with more detail on FIG. **2**.
[0058] With reference to FIG. **2**, the aerosol generating substrate **12** is for example a flat-shaped cuboid extending along a substrate axis X and having external dimensions L×W×D. In a typical example, the length L of the substrate according to the substrate 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. The depth D, also considered as a thickness, of the substrate **12** is formed by a pair of parallel walls **13**A, **13**B, called hereinafter substrate side walls **13**A, **13**B, and the width W of the substrate is formed by a pair of parallel walls **14**A, **14**B, called hereinafter substrate contact walls **14**A, **14**B. According to other embodiments of the invention, the aerosol generating substrate **12** can have any other suitable shape(s) and/or external dimensions.
[0059] The tobacco article **12** comprises a substrate portion **15**, also designated as heater part **15**, and a mouthpiece part **16** arranged along the substrate axis X. In some embodiments, the aerosol

generating substrate **12** may comprise only the substrate portion **15**. The substrate portion **15** may for example be slightly longer than the mouthpiece part **16**. For example, the length L**2** of the substrate portion **15** according to the substrate axis X may be substantially equal to 18 mm and the length L**1** of the mouthpiece part **16** according to the substrate axis X may be substantially equal to 15 mm. The substrate portion **15** defines an abutting end **18** of the substrate **12** and the mouthpiece part **16** defines a mouth end **20** of the substrate **12**. The substrate portion **15** and the mouthpiece part **16** may be fixed one to the other by a unique wrapper extending around the substrate axis X. In other embodiments, the parts **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 substrate **12** between the abutting end **18** and the mouth end **20**.

[0060] The substrate portion **15** is intended to be heated by a heater (using a heating chamber in the present example) and comprises vaporizable material as defined above. According to the first and the second embodiments of the invention, the mouthpiece part **16** is intended to be received inside a mouthpiece as it will be explained in further detail below. According to other embodiments of the invention, the mouthpiece part **16** forms itself a mouthpiece intended to be in contact with the user's mouth and/or lips. The mouthpiece part **16** comprises 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 substrate portion **15** may be shaped to provide one or more airflow channels. Additionally, in the particular example of FIG. **2**, the mouthpiece part **16** defines a plurality of venting holes **22** arranged for example according to the whole perimeter of the mouthpiece part **16** along two axes perpendicular to the substrate axis X. In other words, according to this example, the venting holes **22** are arranged on each wall of the substrate among the substrate side walls **13**A, **13**B and the substrate contact walls **14**A, **14**B. According to another example, the venting holes **22** are arranged only on the substrate contact walls **14**A, **14**B or preferably, only on one of the substrate contact walls **14**A, **14**B. In both examples, the venting holes **22** may be aligned perpendicularly to the substrate axis on the or each corresponding wall of the substrate **12**, and can be spaced by a same distance. The venting holes **22** allow fresh air entering inside the substrate **12** to achieve particular vaping/tasting effects.

[0061] Referring again to FIG. **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 first embodiment of the invention, the mouthpiece **32** and the housing **34** form two different pieces. Particularly, according to this embodiment, 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.

[0062] 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 FIG. **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 law state, an error state, etc.

[0063] The housing **34** delimits an internal space **45** of the device **10** receiving various elements designed to carry out different functionalities of the device **10**. This internal space **45** can for example receive a battery for powering the device **10**, a controller for controlling the operation of the device **10**, a supporting structure (not represented), a heating chamber for heating the tobacco article **12** and at least two heating elements (not represented), such as heating plates, for heating the heating chamber. The heating chamber defines a chamber axis which may correspond to the device axis Y and/or the substrate 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 least one heating plates and/or of the aerosol generating substrate **12** and/or of the aerosol generated by the aerosol generating substrate. The heating plates and the tobacco article **12** may be maintained in the heating chamber by the supporting structure which will be described further through FIGS. **5** to **8**.
[0064] FIG. **3** shows in more detail the mouthpiece **32**. In reference to this FIG. **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 FIG. **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 FIG. **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**.
[0065] 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 FIG. **2**) of the aerosol generating substrate **12** such that the substrate axis X coincides with, is aligned on, the device axis Y. Thus, the through-hole **60** has the same cross-sectional shape as the aerosol generating substrate **12**, respectively the tobacco article **12**; and defines internal dimensions slightly greater than the external dimensions of the mouthpiece part **16** of the aerosol generating substrate **12**. Particularly, in the example of the figures, the through-hole **60** defines a rectangular cross-section to be able to receive the mouthpiece part **16** of the tobacco article **12** shown on FIG. **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 substrate axis X. According to another embodiment, the length of the mouthpiece part **16** of the aerosol generating substrate **12** can be shorter than the length of the through-hole **60** so as the mouth end **20** of the aerosol generating substrate **12** can be flushed at the flow outlet **64**.
[0066] 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 FIG. **4**. In other words, the flow inlet **66** is formed on a outer wall **40** of the device **10** in a transition zone between the mouthpiece **32** and the housing **34**.
[0067] 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**.
[0068] 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**.
[0069] FIG. **5** shows in more detail the supporting structure **50** of the aerosol generating device **10** in accordance with a first embodiment of the invention. The aerosol generating device **10** is in accordance with the previous figures. FIG. **5** is a through cut across the plane V as illustrated in FIG. **1**.
[0070] As mentioned above, the internal space **45** in the housing (not represented in FIG. **5**) of the device **10** may enclose the heating chamber **46** for heating the tobacco article **12** and the supporting structure **50**. The heating chamber **46** may comprise at least two heating plates **47**A and **47**B, also designated as heating elements, for heating the heating chamber **46**. At least one or each heating plate **47**A, **47**B is made for example from a ceramic substrate. The heating chamber **46** spans along the chamber axis Z and receives the substrate portion **15** of the tobacco article **12**. The substrate portion **15** is sandwiched between the heating plates **47**A and **47**B in order to be maintained in a predefined position inside the heating chamber **46**. In the example of FIG. **5**, each heating plate **47**A, **47**B is designed in order to be in contact with the substrate portion **15**.
[0071] Each heating plate **47**A and **47**B exhibits two opposite edges **49**, for instance transversally opposite. The opposite edges **49** extends along the chamber axis Z. The chamber axis Z is perpendicular to the current through cut. With respect to at least one, preferably to each of the heating plates **47**A and **47**B, the supporting structure **50** comprises two recess portions **51**. Particularly, the supporting structure **50** comprises a recess portion **51** for each edge **49** of each heating plate **47**A, **47**B. The recess portions **51** associated with one heating plates **47**A, **47**B face each other. They are open toward one another. The shape of the surface of the recess portions **51** are adapted to receive the edges **49** of the heating plates **47**A and **47**B in order to support the latter. Each recess portion **51** comprises opposite retention sides. The retention sides are designed in order to retain the opposite edge **49** inserted there between. The retention sides are opposite with respect to the thickness of the heating plates **47**A, **47**B. At least one retention side of each recess portion **51** is inclined with respect to a transversal axis T, which is parallel to the heating plate and perpendicular to the chamber axis Z. Preferably, both retention sides of each recess portion are inclined in respect with the transversal axis T. The retention sides, which are inclined with respect to the transversal axis T, are more generally heat transfer reduction means or contact surface reduction means. These reduction means are configured for reducing the heat transfer from the heating plates to the elements which support them. These reduction means are configured for reducing heat conduction across the supporting structure **50**. Consequently, heat transfer to the housing is limited. Generated heat remains in the heating chamber for heating more efficiently the substrate portion **15**.
[0072] As an option, the supporting structure **50** comprises two symmetric parts **50**S, each symmetric part comprising one of said recess portions **51**. The symmetric parts **50**S are transversally opposite. They are arranged at opposite edges **49** of one heating plate **47**A, **47**B. Each symmetric part **50**S supports the two heating plates **47**A, **47**B, the latter being inserted in the recess portions **51**. Then, the heating plate **47**A, **47**B are maintained at a predefined distance from one another, said predefined distance being set in accordance of the depth D of the substrate portion **15** (as defined in connection with FIG. **2**). Each symmetric part **50**S generally comprises a central plate, and two branches which project from the central plate; along the transversal axis T. The branches may be parallel. Each central plate exhibits a thicker portion in which the recess portions **51** are arranged.
[0073] As a further option, the supporting structure **50** comprises a holding structure **50**H. The holding structure **50**H is structurally and functionally designed in order to clump the symmetric parts **50**S together according to the transversal axis T. The holding structure **50**H may be

configured in order to press and/or push the symmetric parts **50**S toward one another; thereby maintaining the heating plate **47**A, **47**B inside. The holding structure **50**H may comprise two parallel plates, which are parallel to the heating plates **47**A, **47**B, and two retaining parts protruding from these plates at each side. Particularly, in the example of FIG. **5**, the retaining parts are designed to be engaged with the symmetric parts **50**S of the supporting structure **50**.
[0074] The supporting structure **50** may further comprise at least one insulating body **52**, preferably at least two insulating bodies **52**. These insulating bodies are heat-insulating bodies **52**. Each heating plate **47**A, **47**B is associated with one of the insulating bodies **52**. The insulating bodies **52** may be arranged in the symmetric parts **50**S, for instance in the holding structure **50**H. The insulating bodies **52** may be arranged between the branches of the symmetric parts **50**S. Then, heat from the heating plates **47**A, **47**B toward the symmetric parts **50**S is reduced. The heating chamber **46** is delimited with respect to the transversal axis T by two lateral walls **70** formed by the supporting structure **50**. Each lateral wall **70** extends between a pair of recess portions **51**.
[0075] When the supporting structure **50** receives two heating plates **47**A, **47**B, it forms spacing means. The supporting structure is configured to maintain the heating plates **47**A, **47**B at a predefined distance with respect to each other. It maintains a specific space, between the heating plates **47**A, **47**B, notably in order to receive the substrate portion **15**.
[0076] FIG. **6** is an enlarged view of the device **10** as represented in FIG. **5**. The enlarged view is centred on the recess portion **51** of the supporting structure **50** at one transversal side of the heating plates **47**A, **47**B. FIG. **6** shows in more detail the supporting structure **50** of the aerosol generating device **10** in accordance with the first embodiment of the invention.
[0077] At least one retention side **51**A, **51**B of each recess portion **51** is inclined with respect to the transversal axis T, which is parallel to the associated heating plate **47**A, **47**B and perpendicular to the chamber axis Z. Preferably, both retention sides **51**A, **51**B of each recess portion **51** are inclined with respect to the transversal axis T. The retention sides **51**A, **51**B may be inclined retention sides **51**A, **51**B when they are inclined with respect to the transversal axis T. The retention sides **51**A, **51**B may form opposite walls of the associated recess portion **51**. There the bottom **55** connects the opposite walls. The bottom **55** may face, and/or transversally engage the edges **49** of the heating plate **47**A, **47**B. The retention sides **51**A, **51**B may be inclined of at least: 5°, or 15°, or 30°, with respect to the transversal axis T. The retention sides **51**A, **51**B face the heating plates **47**A, **47**B. Within each recess portion **51**, the retention sides **51**A, **51**B define a width, perpendicularly to the transversal direction. Each recess portion **51** exhibits a width reduction toward the bottom **55**. The width reduction may be defined by the surfaces of the retention sides **51**A, **51**B. At the transversal opposite of the bottom **55**, each recess portion **51** comprises an opening, and a width increase toward said opening; along the transversal axis T.
[0078] Within each recess portion **51**, at least one retention side **51**A extends from the optional insulating body **52**, and faces it. Accordingly, at least one or each recess portion **51** comprises an air gap **68** between the associated heating plate **47**A, **47**B and the at least one retention side **51**A, **51**B which is inclined with respect to the transversal axis T parallel to the heating plate and perpendicular to the chamber axis Z. Each air gap **68** may exhibit a wedge shape. Each air gap **68** may be a free space. It may be empty. At each recess portion **51**, it may be arranged between the heating plate **47**A, **47**B, one of the retention sides **51**A, and the optional insulating body **52**.
[0079] In the current illustration, each retention side **51**A, **51**B is inclined with respect to the transversal direction T and/or the associated heating plate **47**A, **47**B. Accordingly, each recess portion **51** may comprise two air gaps **68**; one on each main face of the heating plates **47**A, **47**B.
[0080] As apparent from the current view, one of the retention sides **51**A, **51**B presents a greater area of contact with the corresponding edge of the heating plate than the other retention side of a same recess portion **51**. In other words; within the, or each recess portion **51**, the retention sides **51**A, **51**B have different contact surfaces; said contact surfaces actually engaging, or touching, the heating plates **47**A, **47**B.

[0081] As an option, at least one retention side **51**A, **51**B of each recess portion comprises a rounded edge **51**A. Still as an option, at least one retention side of each recess portion comprises a planar edge **51**B. As a further option, each recess portion **51** combines a rounded edge **51**A and a planar edge **51**B.

[0082] At least one or each recess portion **51** presents, or is formed by, a groove **53** extending along the chamber axis Z. The groove **53** may form a notch with a depth along the transversal axis T. The groove **53** forms a slot in which the edges **49** are mounted in a cantilevered fashion. Each groove **53** is defined by its retention sides **51**A, **51**B which are inclined with respect to each other. At least one or each groove **53** extends substantially along the whole length of the heating chamber **46**, along the chamber axis Z.

Second Embodiment of the Invention

[0083] FIG. **7** shows a supporting structure **50** of an aerosol generating device **10** in accordance with a second embodiment of the invention. The aerosol generating device **10** may be similar or identical those described in FIGS. **1** to **4**. The aerosol generating device **10** is notably configured to operate with a flat-shaped tobacco article **12** comprising a substrate portion **15**. The optional heat insulating bodies are not illustrated for the sake of clarity.

[0084] The aerosol generating device **10** (partially represented) comprises a heating chamber **46** extending according to a chamber axis Z and configured to receive the substrate portion of the tobacco article. The heating chamber **46** comprises at least one heating plate with two opposite edges **49** with respect to the transversal axis T. The opposite edges **49** extend along the chamber axis Z. In the current illustration, the device **10** is provided with two heating plates **47**A, **47**B, for instance identical.

[0085] The supporting structure **50** spans along the chamber axis Z. With respect to the or each heating plate **47**A, **47**B, the supporting structure **50** comprises at least two recess portions **51** facing one another (only one side of each heating plate is illustrated for the sake of clarity. Each recess portion **51** is adapted to receive at least a part of one of said edges **49**, and delimited by two opposite retention sides **51**A, **51**B. These retention sides **51**A, **51**B are substantially spaced by a distance which is at least the depth of the heating plates **47**A, **47**B. Then, they are adapted in order to retain the associated edge **49**.

[0086] In the current embodiment, within at least one or each recess portion **51**, only one of the two retention sides **51**A, **51**B is inclined with respect to the transversal axis T, the other of the two being parallel to said transversal axis T. The air gap **68** exhibits a triangle cross section along the chamber axis Z. The inclined retention sides **51**A deviate from the heating plate **47**A, **47**B. The inclined retention sides **51**A are biased with respect to the transversal direction T. They create a gap variation along the transversal axis T. At least one or each inclined retention side **51**A may be, or may comprise a chamfer **72**. Along the transversal axis T, the chamfer(s) **72** may extend along the whole recess portion(s) **51**. As an alternative, the chamfer **72** may be replaced by a rounded edge, similarly as in FIG. **6**.

[0087] In the current illustration, it may be observed that within each recess portion **51**, one of the retention sides, for instance the planar retention side **51**B, presents a greater area of contact with the corresponding edge **49** of the heating plate than the other retention side, for instance the inclined retention side **51**A. Then the inclined retention sides **51**A maintain the heating plates **47**A, **47**B but with a limited contact surface. Hence, heat conduction from the heating plates **47**A, **47**B toward the supporting structure **50** is reduced. This technical effect is achieved with a single inclined retention side **51**A.

Third Embodiment of the Invention

[0088] FIG. **8** shows a supporting structure **50** of an aerosol generating device **10** in accordance with a third embodiment of the invention. The aerosol generating device **10** may be similar or identical to those described in the FIGS. **1** to **4**. The aerosol generating device **10** is notably configured to operate with a flat-shaped tobacco article comprising a substrate portion which is not

illustrated for the sake of clarity. The same applies to the optional heat insulating bodies.
[0089] The aerosol generating device **10** (partially represented) comprises a heating chamber **46** extending according to a chamber axis Z and configured to receive the substrate portion **15** of the tobacco article. The heating chamber **46** comprises at least one heating plate, optionally two heating plates **47**A, **47**B. Each heating plate **47**A, **47**B comprises two opposite edges **49** with respect to the transversal axis T. Each opposite edge **49** extends along, and is parallel to the chamber axis Z.
[0090] The supporting structure **50** spans along the chamber axis Z. With respect to the, or each heating plate **47**A, **47**B, the supporting structure **50** comprises at least two recess portions **51** facing each another. In the current embodiment, four recess portions **51** are provided. The recess portions **51** receiving one of the heating plates **47**A, **47**B, face each other.
[0091] Each recess portion **51** is adapted to receive at least a part of one of said edges **49**, and is delimited by two opposite retention sides **51**A, **51**B. The retention sides **51**A, **51**B are inclined with respect to each other. The inclination angle between the retention sides **51**A, **51**B may be of at least: 45°, 60° or 90°. These inclination angles allow a heat transfer reduction due to a greater empty space. The retention sides **51**A, **51**B may be inclined with respect to the transversal axis T, and notably to the heating plate **47**A, **47**B. The retention sides **51**A, **51**B may be symmetric. They may be joined at a bottom **55** of the recess portion **51** which may have a “V” shape. There, the bottom **55** forms a line. The retention sides **51**A, **51**B are adapted in order to retain the associated edge **49**. They may be symmetric. Under this configuration, the contact between each retention side **51**A, **51**B and an edge **49** is a line. Then, the physical contact is reduced. This is also fostered by the fact that the bottom **55** is at distance from the edge **49**.
[0092] A general concept of the invention is to define an inclination between at least one, or each, retention side **51**A, **51**B and the transversal axis T. As an alternative, the inclination may be defined with respect to the, or least one, heating plate. More precisely, the inclination may be defined with respect to a main surface of the heating plate. The main surface may be the surface with the greatest area.
[0093] In the description, features are defined in connection with each edge, each recess portion, each retention side. However, the invention considers configuration wherein edges are different, wherein the recess portions are different, and/or retention sides are different. Features defined with one of these entities may apply to all the corresponding entities.
[0094] The invention considers combining the features of one embodiment with the other embodiments, notably in order to reduce heat transfer.
[0095] The scope of protection is defined by the following claims.

Claims

1. An aerosol generating device configured to operate with a flat-shaped tobacco article comprising a substrate portion, the device comprising: a heating chamber extending along a chamber axis and being configured to receive the substrate portion of the tobacco article, the heating chamber comprising a heating plate defining two opposite edges extending according to the chamber axis; a supporting structure extending along the chamber axis and comprising two recess portions facing one another, each recess portion being adapted to receive at least a part of one of said edges of the heating plate and delimited by two opposite retention sides designed to retain a corresponding edge; at least one retention side of each recess portion being inclined in respect with a transversal axis parallel to the heating plate and perpendicular to the chamber axis.
2. The aerosol generating device according to claim 1, wherein both retention sides of each recess portion are inclined in respect with the transversal axis.
3. The aerosol generating device according to claim 1, wherein each of the retention sides of each recess portion is designed to be in contact with the corresponding edge of the heating plate.

4. The aerosol generating device according to claim 1, wherein at least one retention side of each recess portion has a rounded edge.
5. The aerosol generating device according to claim 1, wherein each recess portion has a groove extending along the chamber axis.
6. The aerosol generating device according to claim 5, wherein each groove extends substantially along an entire length of the heating chamber.
7. The aerosol generating device according to claim 1, wherein the heating plate is arranged to be in contact with the substrate portion of the tobacco article.
8. The aerosol generating device according to claim 1, wherein the heating plate is made from a ceramic substrate.
9. The aerosol generating device according to claim 1, wherein the supporting structure comprises two symmetric parts, each symmetric part comprising one of said recess portions.
10. The aerosol generating device according to claim 9, further comprising a holding structure designed to clump said symmetric parts together according to the transversal axis.
11. The aerosol generating device according to claim 10, wherein the holding structure is a part of a housing of the device.
12. The aerosol generating device according to claim 1, wherein the heating chamber comprises two heating plates facing each other.
13. The aerosol generating device according to claim 12, wherein the supporting structure comprises a recess portion for each edge of each heating plate.
14. The aerosol generating device according to claim 1, wherein the heating chamber is delimited according to the transversal axis by a pair of lateral walls formed by the supporting structure.
15. The aerosol generating device according to claim 13, wherein each lateral wall extends between a pair of recess portions.
16. The aerosol generating device according to claim 3, wherein one of the retention sides presents a greater area of contact with the corresponding edge of the heating plate than the other retention side of a same recess portion.
17. The aerosol generating device according to claim 8, wherein the at least one retention side which is inclined comprises a chamfer facing the heating plate.
18. The aerosol generating device according to claim 12, wherein each recess portion comprises an air gap between the heating plate and the at least one retention side which is inclined in respect with the transversal axis parallel to the heating plate and perpendicular to the chamber axis.