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(54) **FLAT-SHAPED TOBACCO ARTICLE AND ASSOCIATED AEROSOL GENERATING DEVICE WITH IMPROVED HEAT TRANSFER**

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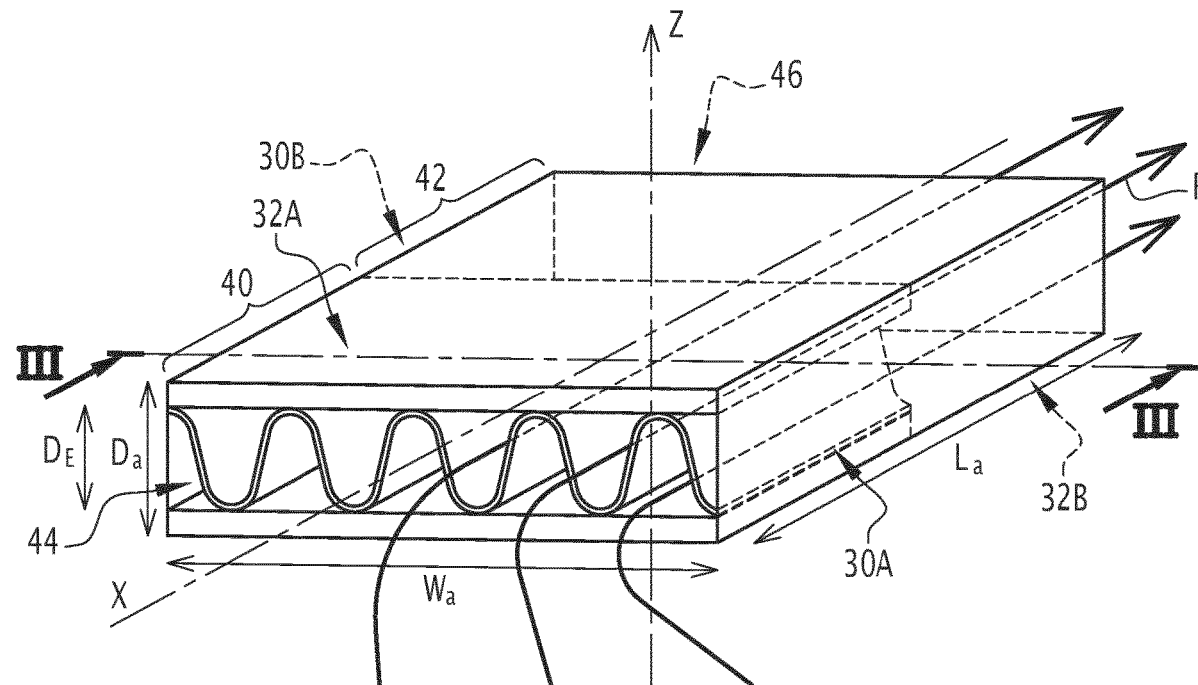
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(57) **ABSTRACT**

A flat-shaped tobacco article configured to operate with an aerosol generating device and extending along an article axis (X) includes:

- a first tobacco layer defining a first layer internal surface and a first layer external surface designed to be heated by a heater of the aerosol generating device; and
- a non-tobacco core element in contact with the first layer internal surface and designed to exert pressure on this internal surface to push the first layer external surface toward the heater.



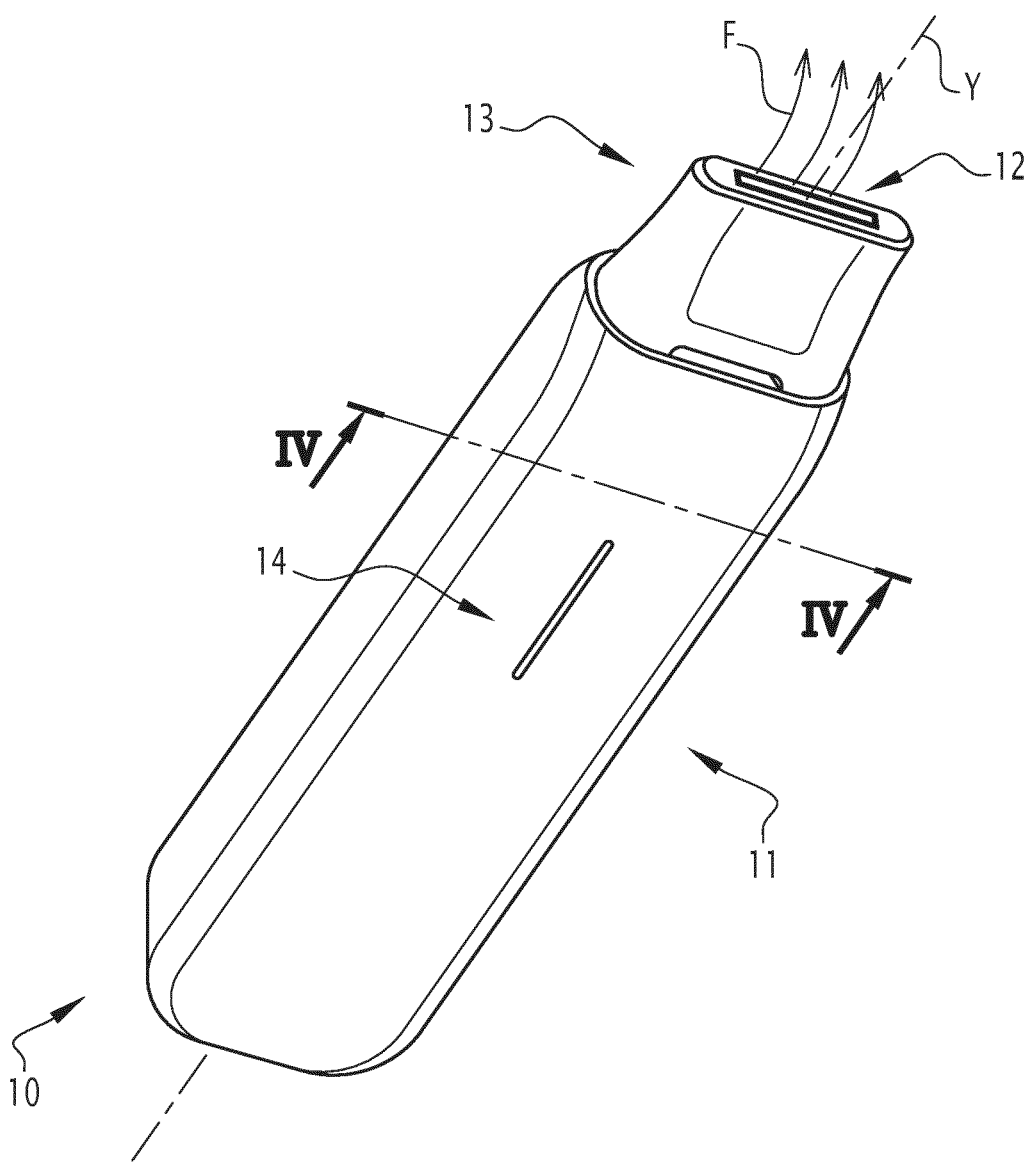


FIG.1

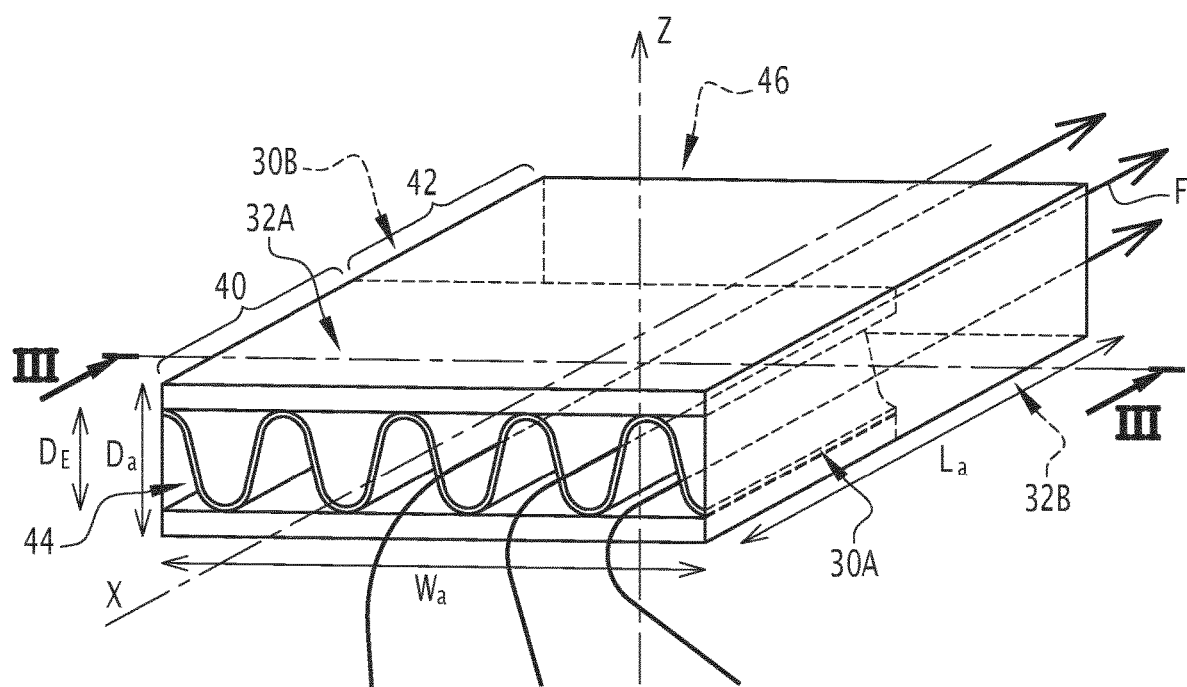


FIG. 2

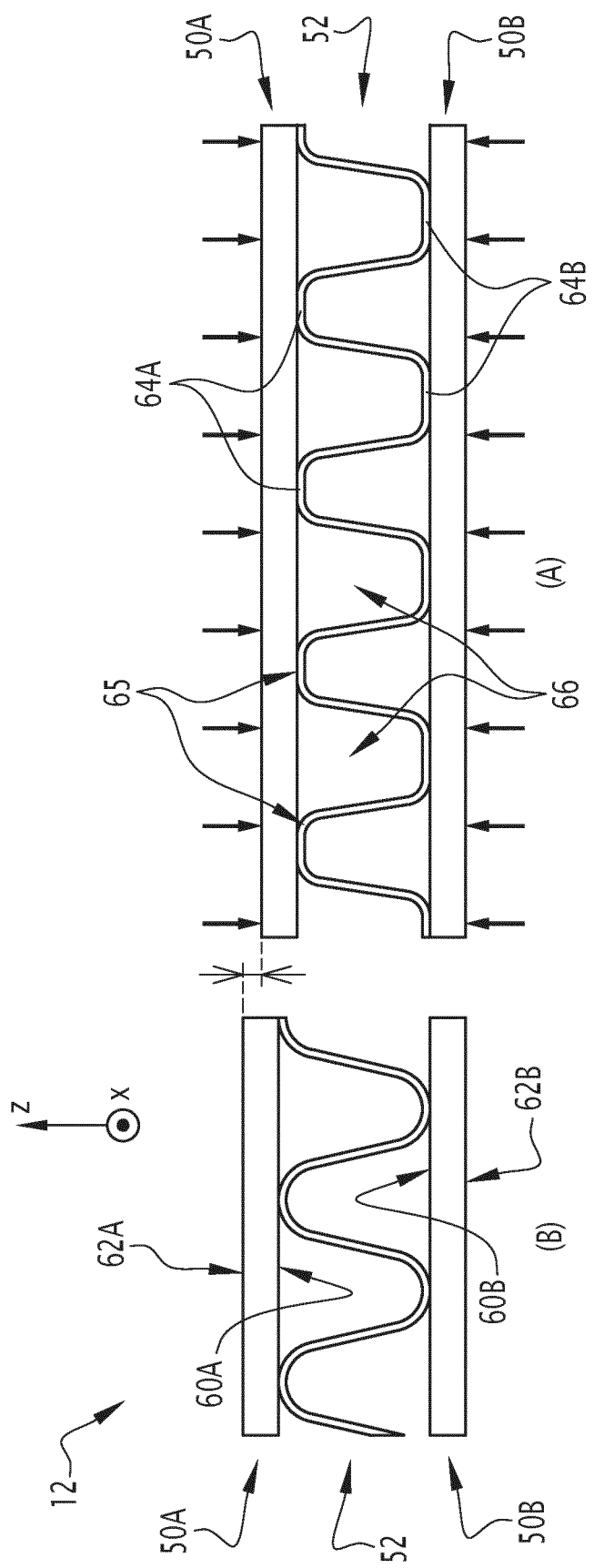


FIG. 3

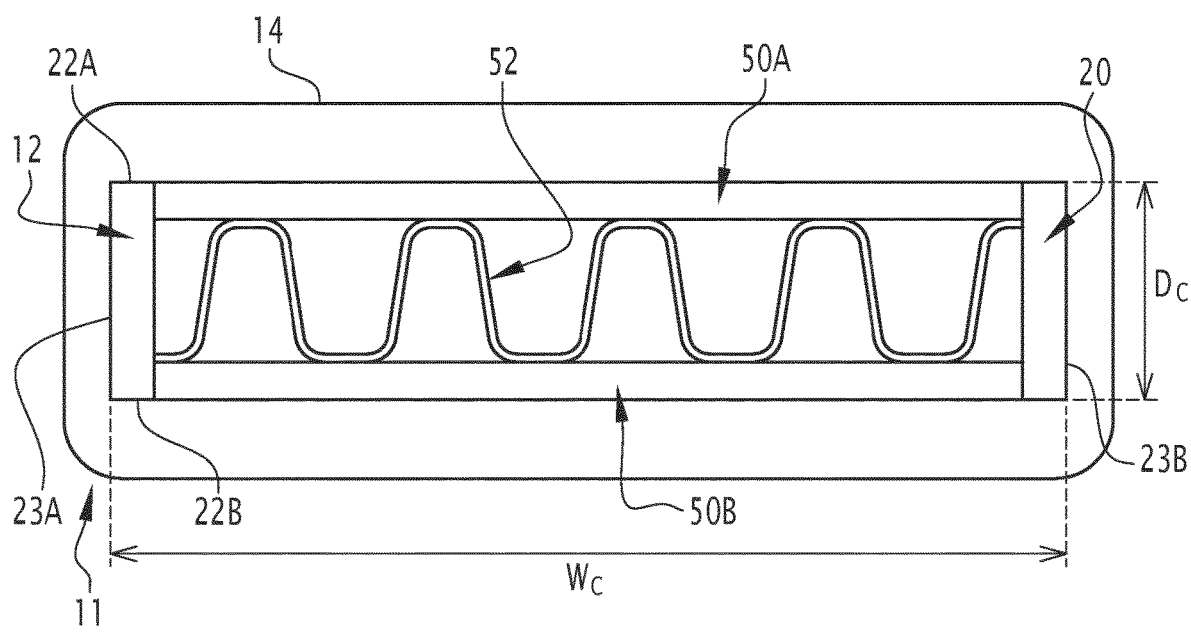


FIG. 4

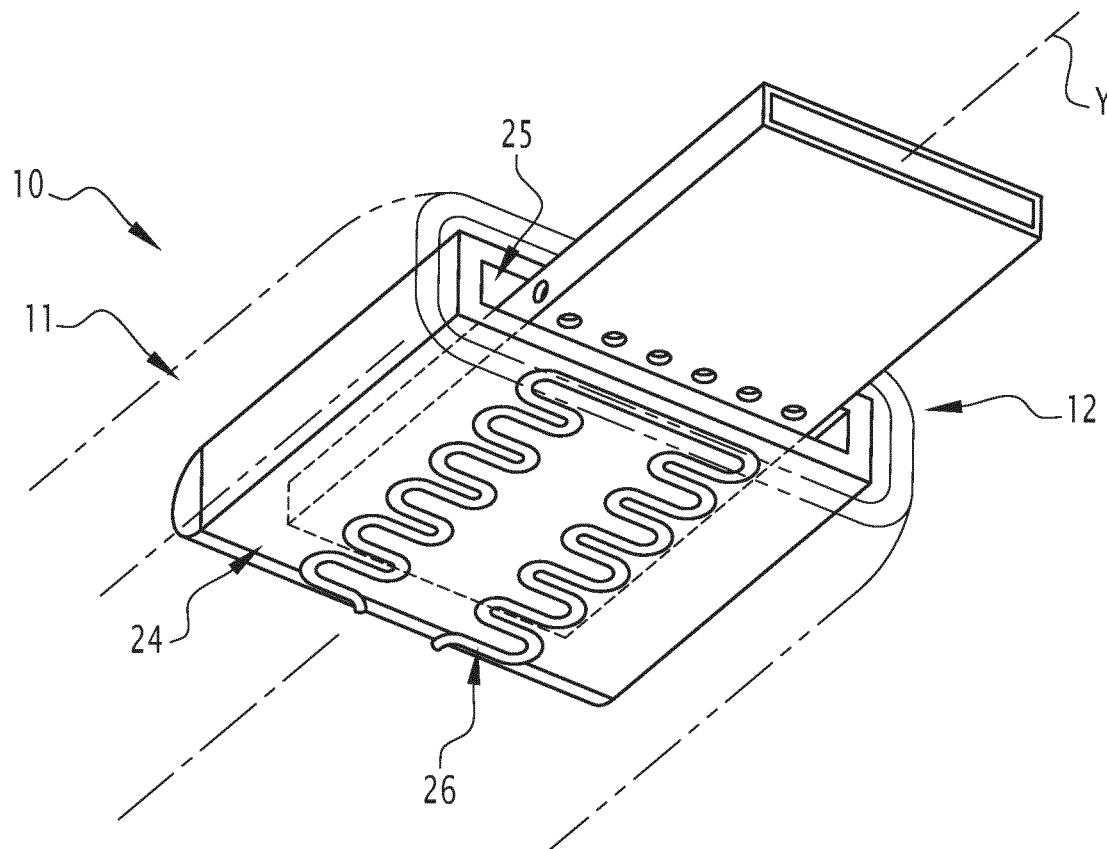


FIG. 5

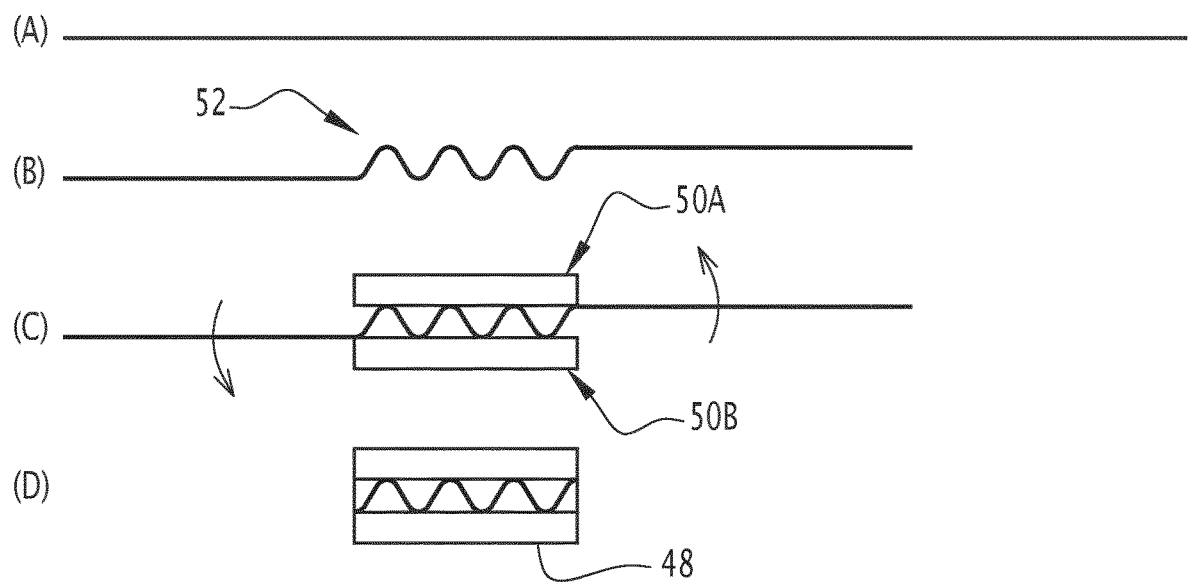


FIG. 6

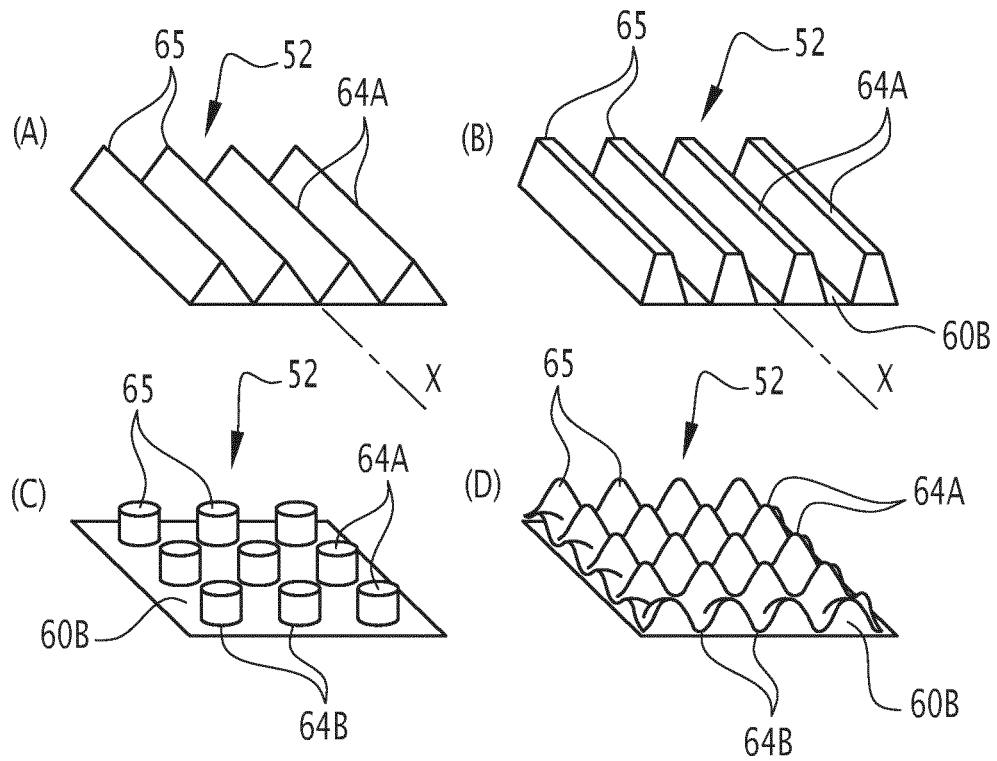


FIG. 7

**FLAT-SHAPED TOBACCO ARTICLE AND
ASSOCIATED AEROSOL GENERATING
DEVICE WITH IMPROVED HEAT
TRANSFER**

FIELD OF THE INVENTION

[0001] The present invention concerns a flat-shaped tobacco article.

[0002] The present invention also concerns an aerosol generating assembly associated to such a tobacco article.

[0003] The present invention also concerns a method of manufacturing such a tobacco article.

[0004] Particularly, the aerosol generating assembly comprises an aerosol generating device configured to operate with the flat-shaped tobacco article according to the invention which comprises a tobacco substrate able to form aerosol when being heated. Thus, such type of aerosol generating assemblies, 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

[0005] 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.

[0006] 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.

[0007] Tobacco articles, usable with such type of aerosol generating devices can take various forms. Some of them can present an elongated stick or any other suitable shape, like for example a flat shape. However, design of a tobacco article is often a trade-off between convenience, aesthetics and efficiency in heating.

[0008] Particularly, in the case of a flat-shaped tobacco article, it is generally necessary to wrap its tobacco portion in paper to allow convenient and hygienic handling of the article without directly having to touch the tobacco substance and further make the sample more attractive to the consumer. However, the paper acts as a thermal barrier when heated externally reducing thus the potential efficiency of the device. Additionally, since such a tobacco article is very thin (for example 1 mm), heating from inside of the tobacco

article, as it is used for example for tobacco sticks using internal susceptors or a heating blade, is also challenging.

SUMMARY OF THE INVENTION

[0009] One of the aims of the invention is to provide a flat-shaped tobacco article enabling an increased heating efficiency in a simple way.

[0010] For this purpose, the invention relates to a flat-shaped tobacco article configured to operate with an aerosol generating device and extending along an article axis, the flat-shaped tobacco article comprising:

[0011] a first tobacco layer defining a first layer internal surface and a first layer external surface designed to be heated by a heater of the aerosol generating device;

[0012] a non-tobacco core element in contact with the first layer internal surface and designed to exert pressure on this internal surface to push the first layer external surface toward the heater.

[0013] Thanks to these features, the tobacco article is designed to ensure that, when inserted in the device, a pressure is exerted between the tobacco article and the heater of the associated device. A firm and even contact with the heater is in this way ensured with the tobacco article. This contact leads to an improved heat transfer through the interface and results in a consistent aerosol generation from the tobacco layer, despite their variation in thickness due to the manufacturing process.

[0014] According to some embodiments, the non-tobacco core element comprises discontinuous surface portions in contact with the first layer internal surface and voids extending between the surface portions so as to make the core element resiliently deformable when a compression force is exerted on the layer in a direction orthogonal to the first layer external surface so that the non-tobacco core element is designed to exert pressure on this internal surface to push the first layer external surface outwardly.

[0015] Thanks to these features, the core element is able to be compressed and exert pressure on the tobacco layer to ensure a good contact with the heater, while enabling an airflow to cross the article through the voids.

[0016] According to some embodiments, the article further comprises a second tobacco layer defining a second layer internal surface and a second layer external surface designed to be heated by a heater of the aerosol generating device; the core element being arranged between the first tobacco layer and the second tobacco layer and comprising second discontinuous surface portions to be further in contact with the second layer internal surface and voids extending between the second surface portions so as to make the core element resiliently deformable when a compression force is exerted on the second layer in a direction orthogonal to the second layer external surface so that the non-tobacco core element is designed to exert pressure on the second layer internal surface to push the second layer external surface outwardly.

[0017] Thanks to these features, the aerosol generation is carried out between the two tobacco layers. The single core element enables to ensure a firm contact between each tobacco layer and the associated heater.

[0018] According to some embodiments, the core element comprises one or several airflow channels extending along the article axis.

[0019] Thanks to these features, an airflow may flow through the tobacco article in the airflow channels enabling

a mixing with the generated tobacco aerosol obtained through the heating of the tobacco layers by the respective heater. This vapour is sent through to the user for vaping.

[0020] According to some embodiments, the core element extends along the whole length of the or each tobacco layer.

[0021] Thanks to these features, the core element ensures a firm and even contact of all the tobacco layer with the associated heater.

[0022] According to some embodiments, the tobacco article extends between a mouth end and an abutting end along the article axis, the tobacco article comprising a mouthpiece portion adjacent to the mouth end and a tobacco portion adjacent to the abutting end, the tobacco layer(s) and the non-tobacco core element being arranged in the tobacco portion.

[0023] Thanks to these features, the article comprises a tobacco portion designed to be inserted in a heating chamber of the device and a mouthpiece portion designed to be inserted in a mouthpiece.

[0024] According to some embodiments, the core element comprises a plurality of, advantageously at least three, separated corrugations in contact with the or each layer internal surface, the corrugations extending advantageously longitudinally along the article axis.

[0025] Thanks to these features, the corrugations are able to be compressed and exert pressure on the tobacco layer to ensure a good contact with the heater, while enabling an airflow to cross the article. The corrugations enable a stable behavior of the article under compression.

[0026] According to some embodiments, the core element is an elastic element configured to exert pressure when compressed, the core element being advantageously made of paper.

[0027] According to some embodiments, the tobacco article further comprises a wrapper assembling together the or each tobacco layer with the core element, the core element and the wrapper being advantageously made from a single sheet.

[0028] Thanks to these features, the manufacturing of the article is simple as a single sheet of paper is necessary to obtain the core element and the wrapper.

[0029] According to some embodiments, the core element comprises a moisture-resistant coating.

[0030] Thanks to these features, the coating prevents an excessive softening of the core element and a loss of aerosol delivery due to a wicking of the paper composing the core element.

[0031] According to some embodiments, the flat-shaped tobacco presents an article thickness in an orthogonal section to the article axis and the core element presents a core thickness in the orthogonal section to the article axis, the ratio between the core thickness and the article thickness being comprised between 0.2 and 0.8.

[0032] According to some embodiments, the core element is a heat expanding element configured to expand while being heated.

[0033] In a possible mode, the invention relates to a flat-shaped tobacco article configured to operate with an aerosol generating device and extending along an article axis, the flat-shaped tobacco article comprising:

[0034] a first tobacco layer defining a first layer internal surface and a first layer external surface designed to be heated by a heater of the aerosol generating device;

[0035] a non-tobacco core element comprising a body in contact with the first layer internal surface and made of deformable and heat expandable material so that the non-tobacco core element is designed to exert pressure on this internal surface to push the first layer external surface outwardly when the core element is heated.

[0036] The tobacco article may further comprise a second tobacco layer defining a second layer internal surface and a second layer external surface designed to be heated by a heater of the aerosol generating device;

[0037] the core element being arranged between the first tobacco layer and the second tobacco layer and to be further in contact with the second layer internal surface;

[0038] the deformable and heat expandable body of the core element being designed to exert pressure on the second layer internal surface to push the second layer external surface outwardly when the core element is heated.

[0039] Thanks to these features, the core element may be formed by a foam or a metamaterial with lattice structure and/or with a positive coefficient of thermal expansion which upon heating increases the pressure between the tobacco layers and the associated heater.

[0040] The invention also concerns an aerosol generating assembly comprising:

[0041] a flat-shaped tobacco article as defined above,

[0042] an aerosol generating device extending along a device axis and comprising a heating chamber between a closed end and an opening, the heating chamber comprising at least one heater;

[0043] the heating chamber being configured to receive through its opening the flat-shaped tobacco article, the first layer external surface facing the or one of the heater(s).

[0044] According to some embodiments, the flat-shaped tobacco article is able to be deformed from a rest configuration to a compressed configuration in which the core is compressed and exert pressure on the internal surface, the flat-shaped tobacco article being in compressed configuration when inserted in the heating chamber.

[0045] According to some embodiments, the flat-shaped tobacco presents an orthogonal section to the article axis presenting an article width and an article thickness, the opening of the heating chamber presenting a chamber width and a chamber height, the chamber height being smaller than the article thickness in the rest configuration.

[0046] The invention also concerns a method of manufacturing such a flat-shaped tobacco article, the method comprising the following steps:

[0047] providing a layer of an elastic element, advantageously a layer of paper,

[0048] forming a compressible three-dimensional core element from the layer of elastic material; the core having a flat shape with a thickness and first and second larger sides opposed one another,

[0049] attaching a tobacco layer to the first side of the core element.

[0050] Preferably, the method further comprises attaching a second tobacco layer to the second side of the core element, e.g., to form a sandwiched structure.

[0051] In the method, the forming of the core element may comprise forming a corrugated layer. In particular, the layer can be bent to a corrugation form by roll forming.

[0052] The method may comprise placing at least a tobacco layer on top of the core element, and bending and gluing the rest of the layer around the tobacco layers.

[0053] The method may further comprise cutting the layers of the sandwiched structure into individual flat-shaped articles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0054] 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:

[0055] FIG. 1 is a perspective view of an aerosol generating assembly comprising an aerosol generating device and a flat-shaped tobacco article according to the invention, the flat-shaped tobacco being usable with the aerosol generating device;

[0056] FIG. 2 is a perspective view of the flat-shaped tobacco article of FIG. 1;

[0057] FIG. 3 is a cross-sectional view of the flat-shaped tobacco article of FIG. 2 in a rest configuration and in a compressed configuration;

[0058] FIG. 4 is a transversal cross-sectional view of the aerosol generating assembly of FIG. 1;

[0059] FIG. 5 is a perspective view of the aerosol generating assembly of FIG. 1, without the mouthpiece;

[0060] FIG. 6 is a sequential representation of a method of manufacturing the flat-shaped tobacco article of FIG. 2; and

[0061] FIG. 7 is a perspective view of different variants of the core element of the flat-shaped tobacco article.

[0062] 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.

[0063] 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.

[0064] 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/in-

clude a vapour. Aerosol may include one or more components of the vaporizable material.

[0065] 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.

DESCRIPTION OF A MAIN EMBODIMENT OF THE INVENTION

[0066] FIG. 1 shows an aerosol generating assembly 10 comprising an aerosol generating device 11 and a flat-shaped tobacco article 12, called hereinafter tobacco article 12. The flat-shaped article 12 is in particular planar shape, meaning that the effective thickness is much smaller than the other dimensions. The aerosol generating device 11 is intended to operate with the tobacco article 12 which is shown in more detail on FIG. 2.

[0067] The aerosol generating device 11 comprises a device body extending along a device axis Y. The device body comprises a mouthpiece 13 and a housing 14 arranged successively along the device axis Y. According to the example of FIG. 1, the mouthpiece 13 and the housing 14 form two different pieces. Particularly, the mouthpiece 13 is here designed to be fixed on or be received in an insertion opening formed at one of the ends of the housing 14. In this case, the tobacco article 12 can be inserted inside the device 11 when the mouthpiece 13 is removed from the housing 14. According to another example (not-shown), the mouthpiece 13 and the housing 14 form one unique piece. In this case, the tobacco article 12 can be inserted inside the device 11 through for example a flow outlet. According to both examples, the mouthpiece 13 defines a through hole adapted to receive at least partially the tobacco article 12.

[0068] The housing 14 delimits an internal space of the device 11 receiving various elements designed to carry out different functionalities of the device 11. This internal space can for example receive a battery for powering the device 11, a control module for controlling the operation of the device 11, a heating chamber 20 for heating the tobacco article 12, etc. The housing may further comprise an air flow path and/or inlet for introduction of air within the tobacco article. Among these elements, only the heating chamber 20 will be explained in further detail in reference to FIGS. 4 and 5.

[0069] As particularly shown on FIGS. 4 and 5, the heating chamber 20 can form a cup shape adapted to receive at least a portion of the tobacco article 12. The heating chamber 20 may form a cuboid shape extending along the device axis Y, complementary of the shape of the tobacco article 12.

[0070] The heating chamber 20 comprises a pair of parallel narrow walls 22A, 22B extending along the device axis Y, a pair of parallel wide walls 23A, 23B extending also

along the device axis Y and a bottom wall adjacent to each of said walls and extending perpendicularly to the device axis Y. The bottom wall forms thus a closed end 24 of the chamber 20. Opposite to the closed end 24, the heating chamber 20 defines an opening 25 configured to receive the tobacco article 12. The opening 25 of the heating chamber 20 presents a chamber width W_c and a chamber height D_c .

[0071] In reference to FIG. 5, the device 11 comprises at least a heater 26. Here, the device 11 comprises two heaters 26. Each heater 26 may be arranged in contact with one of the external surface of the narrow walls 22A, 22B of the heating chamber 20. Each heater 25 may comprise a polyimide film heater extending along substantially the total area of said outer surface of the chamber narrow walls 22A, 22B or only along a part of this surface. In this last case, said part may form a width substantially equal to the width W of the aerosol generating substrate 12. Each heater 26 is powered by the battery and controlled by the control module of the aerosol generating device 11. In some embodiments, the aerosol generating device 11 may comprise a single heater 26 attached on one of the outer surface of one of the chamber narrow walls 22A, 22B. The narrow walls are preferably made of thin conductive material, preferably metal, such as stainless steel.

[0072] In reference to FIG. 2, the tobacco article 12 is for example a flat-shaped cuboid extending along an article axis X and having external dimensions $L_a \times W_a \times D_a$. In a typical example, the length L_a of the article 12 according to the article axis X equals substantially to 33 mm while its width W_a and thickness D_a are substantially equal respectively to 12 mm and 4 mm. According to different examples, the values L_a , W_a and D_a can be selected within a range of $\pm 40\%$, for example. The thickness D_a of the tobacco article 12 is formed by a pair of parallel walls 30A, 30B, called hereinafter narrow walls 30A, 30B, and the width W of the substrate is formed by a pair of parallel walls 32A, 32B, called hereinafter wide walls 32A, 32B. In some embodiments, the edges between the wide and narrow walls 30A, 30B, 32A, 32B may be rounded. According to other embodiments of the invention, the tobacco article 12 may have any other suitable flat shape and/or external dimensions.

[0073] When inserted in the heating chamber 20, the tobacco article 12 remains flat-shaped.

[0074] The tobacco article 12 comprises a tobacco portion 40 and a mouthpiece portion 42 arranged along the article axis X. The tobacco portion 40 may for example be slightly longer than the mouthpiece portion 42. For example, the length of the tobacco portion 40 according to the article axis X may be substantially equal to 18 mm and the length of the mouthpiece portion 42 according to the article axis X may be substantially equal to 15 mm. The tobacco portion 40 defines an abutting end 44 of the article 12 and the mouthpiece portion 42 defines a mouth end 46 of the article 12. The tobacco portion 40 and the mouthpiece portion 42 may be fixed one to the other by a wrapper 48 extending around the article axis X.

[0075] The wrapper 48 forms the narrow and wide walls 30A, 30B, 32A, 32B of the tobacco article 12. The wrapper 48 may be formed from a same wrapping sheet. The wrapper 48 may, for example, comprise paper and/or non-woven fabric and/or aluminium foil. The wrapper 48 may be porous or air impermeable and forms a plurality of airflow channels extending inside the article 12 between the abutting end 44

and the mouth end 46. As it will be explained below, the wrapper 48 and the core element arranged in the tobacco portion 40 are advantageously made from a single sheet, particularly a single sheet of paper.

[0076] When the tobacco article 12 is inserted in the heating chamber 20, the corresponding wide walls 32A, 32B of the tobacco article 12 face the corresponding wide walls 23A, 23B of the heating chamber 20 and the corresponding narrow walls 30A, 30B of the tobacco article 12 face the corresponding narrow walls 22A, 22B of the heating chamber 20 and the abutting end 44 of the tobacco article 12 abuts against the bottom wall defining the closed end 24. Particularly, the heating chamber 20 is configured to receive the tobacco article 12 so that the narrow wall 30A (respectfully 30B) of the tobacco article 12 faces the narrow wall 22B (respectfully 22A) of the heating chamber 20, and the wide wall 23A (respectfully 23B) of the tobacco article 12 faces the wide wall 32B (respectfully 32A) of the heating chamber 20.

[0077] The mouthpiece portion 42 forms a cooling and/or filtering portion. The mouthpiece portion 42 is intended to act for example as a cooler and/or as a filter to cool slightly the vapour and/or to filter it, as represented by arrows F on FIGS. 1 and 2, before it is inhaled by the user. The mouthpiece portion may contain filtering material such as paper and/or cellulose acetate fibre.

[0078] The tobacco portion 40 is intended to be heated by the heater(s) 26, visible on FIG. 5, as it will be explained in further detail below. As it is shown on FIG. 2, the tobacco portion 40 comprises at least a tobacco layer 50 and a non-tobacco core element 52. In particular, the tobacco portion 40 comprises a first tobacco layer 50A and a second tobacco layer 50B. The core element 52 presents a core thickness D_e in the orthogonal section to the article axis X. The ratio between the core thickness D_e and the article thickness D_a is comprised between 0.2 and 0.8.

[0079] Each tobacco layer 50 comprises a vaporizable material as defined above. Each tobacco layer 50 extends inside the tobacco portion 40 along the article axis X. The first tobacco layer 50A and the second tobacco layer 50B forms two opposite sides of the tobacco portion 40. Each tobacco layer 50 is in contact with the wrapper 48. In particular, the first tobacco layer 50A is in contact with the wide wall 32A and the second tobacco layer 50B is in contact with the other wide wall 32B. The two tobacco layers 50 forms a gap between them, in which the core element 52 is arranged.

[0080] In reference to FIG. 3, the first tobacco layer 50A defines a first layer internal surface 60A and a first layer external surface 62A. The first layer internal surface 60A is designed to be in contact with the core element 52. The first layer external 62A surface is designed to be heated by the associated heater 26 of the device 11. The second tobacco layer 50B defines a second layer internal surface 60B and a second layer external surface 62B. The second layer internal surface 60B is designed to be in contact with the core element 52. The second layer external surface 60B designed to be heated by the associated heater 26, different from the heater 26 associated to the first layer 50A.

[0081] The non-tobacco core element 52 is in contact with the first layer internal surface 60A, and advantageously with the second layer internal surface 60B. It is understood that the core element 52 does not comprise any vaporizable material. In reference to FIG. 3, the tobacco article 12 is able

to switch from a rest configuration, represented on part A of FIG. 3, to a compressed configuration, represented on part B of FIG. 3. In the rest configuration, no external force is applied on the tobacco article 12. In the compressed configuration, the core element 52 is compressed. In particular, the core element 52 is compressed in a compression axis Z, orthogonal to the article axis X. In the compressed configuration, the core element 52 exerts pressure on the internal surfaces 60A, 60B of the tobacco layers 50A, 50B in response to this compression. The tobacco article 12 is in the compressed configuration when inserted in the heating chamber 20. In particular, the chamber height H_c is smaller than the article thickness H_a in the rest configuration. Therefore, the tobacco article 12 is compressed in order to be inserted in the heating chamber 20 through the opening 25. When inserted, the core element 52 exerts pressure on the internal surface 60A to push the first layer external surface 60A toward the associated heater 26. Likewise, the core element 52 is designed to exert pressure on the internal surface 60B to push the second layer external surface 60B toward the associated heater 26. Therefore, the core element 52 ensures an even and efficient heat transfer between each heater 26 and the associated tobacco layer 50A, 50B by increasing the contact pressure and thereby reducing associated contact losses. In particular, the core element 52 prevents the formation of any gaps between the heater 26 and the tobacco layer 50A, 50B which could penalize the heating performance.

[0082] In reference to FIG. 3, the core element 52 comprises first discontinuous surface portions 64A in contact with the first layer internal surface 60A. The core element 52 comprises advantageously second discontinuous surface portions 64B in contact with the second layer internal surface 60B. Here, each discontinuous surface portion 64 is a line extending along the article axis X.

[0083] The core element 52 further comprises voids 66 extending between the surface portions 64 so as to make the core element 52 resiliently deformable when a compression force is exerted on the layer 50A, 50B in a direction orthogonal to the associated layer external surface 62A, 62B so that the non-tobacco core element 52 is designed to exert pressure on this internal surface 60A, 60B to push the layer external surface 62A, 62B outwardly.

[0084] The core element 52 is an elastic element configured to exert pressure when compressed. The core element 52 is advantageously made of paper. The core element 52 extends along the whole length of each tobacco layer 50A, 50B along the article axis X. The core element 52 extends advantageously along the whole width of each tobacco layer 50A, 50B perpendicular to the article axis X. In reference to FIGS. 2 to 4, the core element 52 is here a corrugated sheet. The core element 52 comprises a plurality of separated corrugations 65 in contact with each layer internal surface 60A, 60B. Advantageously, the core element 52 comprises at least three corrugations 65 ensuring a stable behavior under compression. The corrugations 65 extend here longitudinally along the article axis X. The corrugations 65 form undulations able to be compressed under pressure. The corrugated sheet presents a thickness advantageously comprised between 80 μm and 300 μm .

[0085] The core element 52 may comprise a moisture-resistant coating. This coating prevents excessive softening of the core element 52 during the use of the assembly 10 by

the user and a loss of vapor delivery due to wicking of the paper composing the core element 52.

[0086] The core element 52 comprises one or several airflow channels extending along the article axis X. As visible on FIG. 2, the airflow channels are formed by the voids 66 arranged between the surface portions 64 and enable the vapour flow F to go through the article 12.

Operation of the Invention

[0087] The operation of the aerosol generating assembly 10 will now be described. Initially, it is considered that the tobacco article 12 is extracted from the device 11. In order to insert it, the user first takes off the mouthpiece 13 from the housing 14. The tobacco article 12 is then in the rest configuration.

[0088] Then, the user compresses the tobacco article 12 as represented in FIG. 3. When the tobacco article 12 is in the compressed configuration, the user inserts the tobacco part 40 of the article 12 into the heating chamber 20. In an advantageous variant, the tobacco article 12 is compressed at the insertion into the heating chamber 20 by a guiding channel piece. In another advantageous variant, a mechanism is arranged in the heating chamber 20, which compresses on the tobacco article 12 when the latter is fully inserted.

[0089] Then, the user fixes the mouthpiece 13 on the housing 14 by sliding the mouthpiece part 42 of the tobacco article 12 inside the mouthpiece 13.

[0090] Then, the user may activate the operation of the aerosol generating assembly 10 by actuating for example an ON button or by performing a puff. This creates an airflow in an airflow path formed inside the device 11 between a flow inlet and a flow outlet in the device 11.

[0091] The flow inlet may be arranged near the mouthpiece 13 and the airflow passes between the wide walls 23A, 23B of the heating chamber 20 and the article 12. A transition portion is arranged at the closed end 24 of the heating chamber 20 which forms a "U" turn inside the heating chamber 20. The transition portion forces the airflow F to flow inside the tobacco article 12, as shown on FIG. 2.

[0092] In a variant, the flow inlet may be arranged at the opposite of the mouthpiece 13 and the airflow F crosses directly the device 11 and the article 12 without U turn.

[0093] The airflow F flows through the tobacco article 12, in the airflow channels formed by the voids 66 between the corrugations 65. The air mixes with the tobacco aerosol obtained through the heating of the tobacco layers 50A, 50B by the respective heater 26. In the case when the article 12 comprises venting holes, the flow flowing towards the mouthpiece may further comprise fresh air entered through these holes.

[0094] Finally the vapour comprising the tobacco aerosol is sent through the mouthpiece 13 to the user, as shown in FIG. 1.

Manufacturing of the Tobacco Article

[0095] The manufacturing of the flat-shaped tobacco article 12 will now be described. The different steps of the method of manufacturing the tobacco article 12 are represented on FIG. 6.

[0096] In reference to this Figure, the method comprises in a first step (A) the providing of a layer of an elastic element, advantageously a layer of paper.

[0097] In a step (B), the method comprises a step of forming the compressible three-dimensional core element 52 from the layer of elastic material. The core element 52 has a flat shape with a thickness and first and second larger sides opposed one another.

[0098] In particular, the core element 52 is obtained by roll forming a part of the layer.

[0099] In a step (C), a tobacco layer 50A is attached to the first side of the core element 52 to form the discontinuous surface portions 64A.

[0100] The method further comprises advantageously a step of attaching a second tobacco layer 50B to the second side of the core element 52 to form the second discontinuous surface portions 64B. The attaching steps of the tobacco layers 50A, 50B to the core element may be performed simultaneously or successively.

[0101] In particular, the tobacco layers 50A, 50B are placed on both sides of the core element 52 to form a sandwiched structure.

[0102] In a step (D), the rest of the paper layer is wrapped around the tobacco layers 50A, 50B to form the wrapper 48. In particular, the rest of the paper layer is bended and glued around the tobacco layers 50A, 50B at the tobacco article sides 30A and 30B. The core element 52 and the wrapper 48 of the article 12 are here made from the same paper sheet folded around the tobacco layers 50A, 50B. In particular, a first portion of the paper layer is folded on the outer surface of the top tobacco layer 50A and a second, opposite, portion of the paper layer is folded on the outer surface of the bottom tobacco layer 50B. The outer surfaces of the tobacco layers are advantageously fully covered by their respective portion of paper layer.

[0103] The method may comprise an optional step of adding additional parts in the cooling section 42, such as filters or other structure which continue in the article axis X from the tobacco layers 50A, 50B with the same width and thickness.

[0104] The method comprises an optional final step of cutting the core element and the wrapper to single pieces to obtain several tobacco articles 12.

DESCRIPTION OF OTHER EMBODIMENTS OF THE INVENTION

[0105] FIG. 7 shows different variants of the core element 52.

[0106] In part (A), each corrugation 65 presents a triangular transversal section. Each corrugation 65 is then a right prism with triangular base extending along the article axis X. Voids are present between the corrugations.

[0107] The article 12 here comprises a first discontinuous surface portions 64A under the form of parallel lines extending along the article axis X. A second discontinuous portions also under the form of parallel lines extending along the article axis X can be formed at the junction between the prisms. Each first and second discontinuous surfaces portions can be attached to a tobacco layer to form channels between the tobacco layers and the voids.

[0108] In part (B), each corrugation 65 presents a trapezoid transversal section. Each corrugation 65 is then a right prism with trapezoid base extending along the article axis X. The voids are present in the form of parallel channels between the corrugations.

[0109] The article 12 here comprises only the first discontinuous surface portions 64A under the form of parallel stripe extending along the article axis X.

[0110] In part (C), each corrugation 65 is a cylinder arranged between the two tobacco layers 50A, 50B. The corrugations are spaced apart in both longitudinal and transversal directions to form voids between the corrugations.

[0111] The article 12 here comprises disk-shaped first discontinuous surface portions 64A and second discontinuous surface portions 64B.

[0112] In part (D), each corrugation 65 is a paraboloid. The core element 52 presents then an egg box form.

[0113] The article 12 here comprises dot-shaped first discontinuous surface portions 64A and second discontinuous surface portions 64B.

[0114] For example, the corrugations 65 may be obtained by additive manufacturing.

[0115] In another embodiment, the corrugations 65 extend transversally, perpendicular to the article axis X.

[0116] In another embodiment, the core element 52 is a heat expanding element configured to expand while being heated. In particular, the core element 52 is a foam or a metamaterial with high effective thermal expansion coefficient which upon heating increase the pressure between the tobacco article 12 and the respective heaters 26. In this case, no compression of the tobacco article 12 is necessary upon its insertion. Expanding is performed upon heating the heat expanding material.

[0117] It will be apparent to those skilled in the art that other embodiments may be carried out in various ways by combining the previous embodiments.

1. A flat-shaped tobacco article configured to operate with an aerosol generating device and extending along an article axis, the flat-shaped tobacco article comprising:

- a first tobacco layer defining a first layer internal surface and a first layer external surface configured to be heated by a heater of the aerosol generating device; and
- a non-tobacco core element in contact with the first layer internal surface, configured to exert pressure on the first layer internal surface to push the first layer external surface toward the heater,

the non-tobacco core element comprising first discontinuous surface portions in contact with the first layer internal surface and first voids extending between the first discontinuous surface portions so as to make the core element resiliently deformable when a compression force is exerted on the layer in a direction orthogonal to the first layer external surface so that the non-tobacco core element is configured to exert pressure on the first layer internal surface to push the first layer external surface outwardly.

2. The flat-shaped tobacco article according to claim 1, further comprising a second tobacco layer defining a second layer internal surface and a second layer external surface configured to be heated by the heater of the aerosol generating device;

wherein the core element being is arranged between the first tobacco layer and the second tobacco layer and comprises second discontinuous surface portions to be further in contact with the second layer internal surface and second voids extending between the second surface portions so as to make the core element resiliently deformable when a compression force is exerted on the second layer in a direction orthogonal to the second

layer external surface so that the non-tobacco core element is configured to exert pressure on the second layer internal surface to push the second layer external surface outwardly.

3. The flat-shaped tobacco article according to claim 1, wherein the first voids form one or several airflow channels extending along the article axis (X).

4. The flat-shaped tobacco article according to claim 1, wherein the core element extends along the whole length of the first tobacco layer.

5. The flat-shaped tobacco article according to claim 1, wherein the tobacco article extends between a mouth end and an abutting end along the article axis (X), the tobacco article comprising a mouthpiece portion adjacent to the mouth end and a tobacco portion adjacent to the abutting end, and

wherein the first tobacco layer and the non-tobacco core element are arranged in the tobacco portion.

6. The flat-shaped tobacco article according to claim 1, wherein the core element comprises a plurality of separated corrugations in contact with the first layer internal surface, and

wherein the plurality of separated corrugations extend longitudinally along the article axis (X).

7. The flat-shaped tobacco article according to claim 1, wherein the core element is an elastic element configured to exert pressure when compressed, and

wherein the core element is made of paper.

8. The flat-shaped tobacco article according to claim 1, further comprising a wrapper assembling together the first tobacco layer with the core element, and

wherein the core element and the wrapper are made from a single sheet.

9. The flat-shaped tobacco article according to claim 1, wherein the flat-shaped tobacco has an article thickness in an orthogonal section to the article axis and the core element has a core thickness in the orthogonal section to the article axis, and

wherein the ratio between the core thickness and the article thickness is between 0.2 and 0.8.

10. The flat-shaped tobacco article according to claim 1, wherein the core element is a heat expanding element configured to expand while being heated.

11. An aerosol generating assembly comprising:
a flat-shaped tobacco article according to claim 1;
an aerosol generating device extending along a device axis (Y) and comprising a heating chamber between a closed end and an opening, the heating chamber comprising at least one heater;

wherein the heating chamber is configured to receive through an opening thereof the flat-shaped tobacco article, the first layer external surface facing one of the at least one heater.

12. The aerosol generating assembly according to claim 11, wherein the flat-shaped tobacco article is configured to switch from a rest configuration to a compressed configuration in which the core element is compressed and exert pressure on the first layer internal surface, and

wherein the flat-shaped tobacco article is in compressed configuration when inserted in the heating chamber.

13. The aerosol generating assembly according to claim 12, wherein the flat-shaped tobacco article has an orthogonal section to the article axis (X) having an article width (Wa) and an article thickness (Da), the opening of the heating chamber having a chamber width (Wc) and a chamber height (Dc), and

wherein the chamber height (Wc) is smaller than the article thickness (Da) in the rest configuration.

14. A method of manufacturing a flat-shaped tobacco article according to claim 1, the method comprising the following steps:

providing a layer of an elastic element,

forming a compressible three-dimensional core element from the layer of elastic material; the core having a flat shape with a thickness and first and second larger sides opposed one another,

attaching a tobacco layer to the first side of the core element; and

attaching a second tobacco layer to the second side of the core element to form a sandwiched structure.

15. The flat-shaped tobacco article according to claim 2, wherein the core element extends along the whole length of at least one of the first tobacco layer or the second tobacco layer.

16. The flat-shaped tobacco article according to claim 5, wherein the second tobacco layer is arranged in the tobacco portion.

17. The method according to claim 14, wherein the layer of an elastic element is a layer of paper.

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