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(54) **Title:** AN ARTICLE, AN AEROSOL PROVISION SYSTEM AND A METHOD FOR FORMING AN ARTICLE

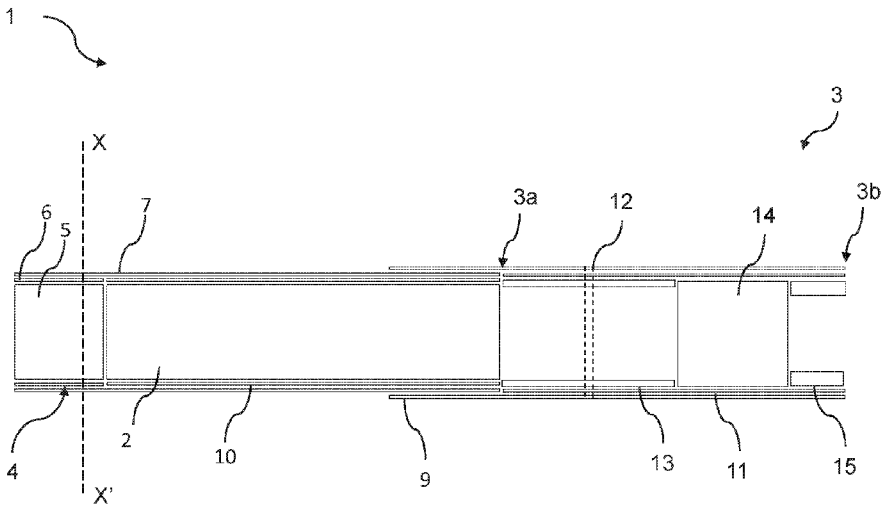

Figure 1

(57) **Abstract:** An article (1) for use in an aerosol provision system includes an aerosol-generating portion and a body of material (5) upstream of the aerosol-generating portion. A resistance to draw through the length of the body of material can be between 5% and 25% of the resistance to draw through the length of the article. The body of material can alternatively or additionally have a resistance to draw through the length of the body of material of between 4 mmH_2O and 20 mmH_2O. Alternatively or additionally, the body of material can be circumscribed by first and second sheets of wrapping material, where at least one of said sheets is non-combustible. A system including the article and methods of forming the article are also provided.

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An article, an Aerosol Provision System and a Method for Forming an Article

Technical Field

The present invention relates to an article for use in an aerosol provision system, an aerosol provision system, and a method for forming an article.

Background

Certain tobacco industry products produce an aerosol during use, which is inhaled by a user. For example, tobacco heating devices heat an aerosol generating substrate such as tobacco to form an aerosol by heating, but not burning, the substrate. Such tobacco industry products commonly include mouthpieces through which the aerosol passes to reach the user's mouth.

Summary

In accordance with embodiments of the invention, in a first aspect there is provided an article for use in an aerosol provision system, the article comprising an aerosol-generating portion and a body of material upstream of the aerosol-generating portion, wherein a resistance to draw through the length of the body of material is between 5% and 25% of the resistance to draw through the length of the article.

The resistance to draw through the length of the body of material can be between 10% and 20%, or between 15% and 20% of the resistance to draw through the length of the article.

In accordance with embodiments of the invention, in a second aspect there is provided an article for use in an aerosol provision system, the article comprising an aerosol-generating portion and a body of material upstream of the aerosol-generating portion, wherein a resistance to draw through the length of the body of material is between 4 mmH_2O and 20 mmH_2O.

In accordance with embodiments of the invention, in a third aspect there is provided an article for use in an aerosol-provision system, the article comprising an aerosol-generating portion and a body of material upstream of the aerosol-generating portion,

wherein the body of material is circumscribed by first and second sheets of wrapping material, and wherein at least one of said sheets is non-combustible.

At least one of the first or second sheets of wrapping material can extend over the full length of the aerosol-generating portion. The at least one non-combustible sheet can comprise a metal foil, optionally wherein the metal is aluminium.

The body of material of any of the aspects above can be formed from cotton.

The body of material of any of the aspects above can comprise a sheet material. The sheet material can be gathered into the body of material. Alternatively or additionally the sheet material can be in the form of strips of sheet material. The strips of sheet material can be shredded and/or cut strips of sheet material.

The sheet material can comprise a heat conductive material. Optionally, the sheet material can comprise a metal foil, optionally wherein the metal is aluminium.

The sheet material can have a porosity of less than 100 CU.

The sheet material can comprise an aerosol-generating film. Optionally, the aerosol-generating film can be laminated on a supporting material.

The sheet material can comprise paper. The sheet material can comprise paper reconstituted tobacco or bandcast reconstituted tobacco.

The sheet material can be crimped. The crimping pattern can be defined by a crimp amplitude of between 0.1 mm and 0.7 mm, and/or a spacing of between 0.5 mm and 1.5 mm between adjacent peaks in the crimp pattern.

The crimp amplitude can be between 0.2 mm and 0.5 mm. Alternatively or additionally, the spacing between adjacent peaks in the crimp pattern can be about 1 mm.

The body of material according to any of the aspects above can include an additive selected from a flavour carrier, an aerosol-former, a salt gel, or an acid, optionally wherein the aerosol former is glycerol, optionally wherein the acid is selected from the

group consisting of lactic acid, levulinic acid, benzoic acid, citric acid, 2-methylbutyric acid, or 2-methylvaleric acid, or wherein the acid is lactic acid..

The body of material can comprise aerosol former in an amount less than 5% by weight or in an amount between 5% and 25% by weight on a dry weight basis.

Ventilation can be provided into the article. The level of ventilation can be between 40% and 75%.

The aerosol-generating portion of any of the aspects above can comprise aerosol former in an amount from 8% to 25%, or 12 to 20% by weight on a dry weight basis.

The aerosol-generating portion can comprise tobacco material or non-tobacco botanical material.

In accordance with embodiments of the invention, in a fourth aspect there is provided a system comprising an article according to any of the aspects above, and a heating device configured to receive the aerosol-generating portion, wherein the heating device is configured to externally heat the aerosol-generating portion, and/or inductively heat the aerosol-generating portion, and/or resistively heat the aerosol-generating portion.

In accordance with embodiments of the invention, in a fifth aspect there is provided a method for forming an article according to any one of the first to third aspects above, comprising the steps:

providing a body of material, an aerosol generating portion, and a wrapping material;

combining the body of material and the aerosol generating portion with the wrapping material to form a component;

further providing a mouthpiece and a further wrapping material; and

combining the mouthpiece and the component to form an article, such that the body is upstream of the aerosol-generating portion.

In accordance with embodiments of the invention, in a sixth aspect there is provided a method for forming an article according to any one of the first to third aspects above, comprising the steps:

providing a cooling section, a mouthpiece body, a hollow tubular element, and a wrapping material;

combining the cooling section, the mouthpiece body, and the hollow tubular element with the wrapping material to form a mouthpiece;

further providing an aerosol generating portion, a body of material, and a further wrapping material; and

combining the mouthpiece, the aerosol generating portion and the body of material with the further wrapping material to form an article.

Brief Description of the Drawings

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a side-on cross sectional view of an article for use in an aerosol provision system, comprising an aerosol generating portion and a component positioned at an upstream end of the article;

Figure 2 is a side-on cross-sectional view of a further article for use in an aerosol provision system, having an alternative configuration of wrappers;

Figure 3A is a cross-sectional view of the component of Figure 1, along the line X-X' of Figure 1;

Figure 3B is a side-on view of the sheet material forming the component of Figure 1;

Figure 4 is a side-on cross sectional view of a further article for use in an aerosol provision system;

Figure 5 is a side-on cross sectional view of a further article for use in an aerosol provision system comprising a further component upstream of the aerosol-generating portion;

Figure 6 schematically illustrates a method of forming an article according to the present disclosure; and

Figure 7 schematically illustrates an alternative method of forming an article according to the present disclosure.

Detailed Description

In the figures described herein, like reference numerals are used to illustrate equivalent features, articles or components.

Figure 1 is a side-on cross sectional view of an article 1 for use in an aerosol provision system. In the present case, the article comprises a consumable for a non-combustible aerosol provision system.

The article comprises an aerosol generating portion, in the present case a cylindrical rod of aerosol generating material 2, and a mouthpiece 3 downstream from and connected to the rod of aerosol generating material 2. In the present case, the aerosol generating material is tobacco. In other examples, the aerosol generating material may be a non-tobacco botanical material comprising an active material or substance as defined herein. The article 1 may be used within a non-combustible aerosol provision device to form a non-combustible aerosol provision system. In other examples, the article 1 can include its own heat source, forming an aerosol provision system without requiring a separate aerosol provision device.

In some examples, the aerosol-generating material comprises an aerosol-former in an amount from 10% to 30% by weight on a dry weight basis. The article further comprises a component 4 at an upstream end of the article. The component 4 includes a body of material 5 wrapped in a component wrapper 6.

In the present case, the component wrapper 6 is a foil backed paper. In other examples, the component wrapper 6 can be a metal foil, or a paper plug wrap. The construction of component 4 is described in more detail below, with reference to Figure 3A and 3B.

As set out in greater detail below, providing the component 4 at an upstream end of the article 1 can provide several advantages. For instance, the stability of the article 1, in use, may be improved, by preventing fall-out of aerosol-generating material from the upstream end of the article 1. Where the component 4 comprises a body of material having a resistance to draw between about 5% and 25% of the resistance to draw of the article 1 this can also result in greater consistency of resistance to draw between articles, since the contribution of the rod of aerosol generating material 2 to the overall resistance to draw of the article 1 is relatively less. Advantageously, the relatively high resistance to draw of the component 4 can make the overall resistance to draw of the article 1 less sensitive to variations in the resistance to draw of the rod of aerosol-generating material 2.

The component 4 is connected to the rod of aerosol generating material 2 by a connecting wrapper 7. In the present case, the connecting wrapper 7 is a paper wrapper. In other examples, the connecting wrapper 7 may be a paper backed foil wrapper, or a metal foil. Preferably, at least one of the wrapping material 6 and the connecting wrapper 7 comprises a non-combustible material, suitably a layer or coating of a non-combustible material or a metal foil. In some examples, at least one of the wrapping material 6 and the connecting wrapper 7 is non-combustible. For instance, the wrapping material 6 or the connecting wrapper 7 may be aluminium foil, or a paper backed aluminium foil, or otherwise comprise paper and a layer or coating of a non-combustible material. Advantageously, providing an article where the component 4 at the upstream end of the article is circumscribed by a non-combustible material, such as a metal foil, may prevent a user of the article from lighting the article in the manner of a conventional cigarette, where the article is not intended for such use. In the present example, the connecting wrapper 7 circumscribes substantially the entire length of the component 4 and the rod of aerosol generating material 2.

Advantageously, connecting the component 4 to the rod of aerosol generating material 2 with a connecting wrapper 7 which extends over substantially the entire length of the rod of aerosol generating material 2 can provide additional strength and rigidity to the rod of aerosol generating material. This can be particularly advantageous where the aerosol generating material is less densely packed, or provided in a form having an inherently lower level of structural stability, such as granular tobacco.

The connecting wrapper 7 is adhered to both the component 4 and the rod of aerosol-generating material 2. At least part of the inner surface of the connecting wrapper 7 is covered by a layer of adhesive. It has been surprisingly found that applying a reduced amount of adhesive to the connecting wrapper 7 can result in the formation of an improved aerosol. This may be achieved by reducing the thickness of the layer of adhesive, or preferably by providing gaps in the layer of adhesive. Preferably, the layer of adhesive is discontinuous. For example, prior to combining the component 4 and the tobacco rod 2, adhesive may be applied to the connecting wrapper 7 in bands, such that the remaining portions of the connecting wrapper 7 are entirely free of adhesive. When the connecting wrapper 7 with bands of adhesive is wound around the component 4 and the rod of aerosol-generating material 2, portions of the component 4 and the rod of aerosol-generating material 2 may be free of adhesive. The bands of adhesive may extend in the same direction as the longitudinal axis of the article,

perpendicular to the longitudinal axis of the article, or at another angle, such as diagonal to the longitudinal axis. Providing a discontinuous layer of adhesive on the inner surface of the connecting wrapper 7 may advantageously improve the ease of manufacture of the article 1, since less of the connecting wrapper 7 is wetted by the adhesive which can result in a higher tensile strength of the connecting wrapper 7 during manufacture.

Other means of varying or reducing the amount of adhesive applied to the connecting wrapper 7 may be employed. For instance, the adhesive layer may be applied in a different pattern, for instance a dot matrix.

Preferably, at least a portion of the area of the inner surface of the connecting wrapper 7 is free of adhesive. Suitably, at least 30%, at least 40%, or at least 50% of the area of the inner surface of the connecting wrapper 7 is free of adhesive.

Suitably, the connecting wrapper 7 has a tensile strength of at least 2.5 kgf/15mm, for instance at least 3 kgf/15mm, or at least 3.5 kgf/15mm. The tensile strength of the connecting wrapper 7 may be determined in accordance with the test method T 494.

In some examples, the connecting wrapper 7 has a permeability of at least 3 Coresta Units. In some examples, the connecting wrapper 7 has a permeability of at least 5 Coresta Units, at least 10 Coresta Units, or at least 20 Coresta Units. In some examples, this permeability is an inherent property of the connecting wrapper 7. In other examples, the connecting wrapper 7 may be provided with perforations to increase the material permeability. In some examples, the combined permeability of the rod wrapper 10 and the connecting wrapper 7, together with any intermediate layer of adhesive, is at least 25 Coresta Units, or at least 30 Coresta Units, or at least 50 Coresta Units. The combined permeability of the rod wrapper 10 and the connecting wrapper 7 together with any intermediate layer of adhesive may be determined by breaking down the article 1 to separate the wrapping materials from the rod of aerosol-generating material, and measuring the total permeability through the wrapping materials surrounding the rod of aerosol-generating material, i.e., the rod wrapper 10, the connecting wrapper 7, and any intermediate layer of adhesive, in accordance with ISO 2965:2019.

In some examples, connecting wrapper 7 has a basis weight between about 27 gsm and about 70 gsm, for instance between about 36 gsm and about 50 gsm, or about 36 gsm, about 41 gsm, about 44 gsm or about 48 gsm. Using a basis weight in these ranges provides a configuration having improved firmness and resilience of the article, for instance during and after use of the article with a heating device as described herein.

In the present case, the component 4 is adjacent to an upstream end of the rod of aerosol generating material 2. In other examples, more than one component may be provided upstream of the rod of aerosol-generating material. For example, a first component 4 may be provided at the upstream end of the article, and a second component may be provided in between the first component 4 and the rod of aerosol generating material 2.

In the present example, the article 1 has an outer circumference of about 21 mm (i.e. the article is in the demi-slim format). Preferably, the article 1 has a rod of aerosol generating material having a circumference greater than 19 mm. This has been found to provide a sufficient circumference to generate an improved and sustained aerosol over a usual aerosol generation session preferred by consumers. As the article is heated, heat transfers through the rod of aerosol generating material 2 to volatise components of the aerosol generating material, and circumferences greater than 19 mm have been found to be particularly effective at producing an aerosol in this way. Since the article is to be heated to release an aerosol, improved heating efficiency can be achieved using articles having circumferences of less than about 23 mm. To achieve improved aerosol via heating, while maintaining a suitable product length, rod circumferences of greater than 19 mm and less than 23 mm are preferable. In some examples, the rod circumference can be between 20 mm and 22 mm, which has been found to provide a good balance between providing effective aerosol delivery while allowing for efficient heating.

The outer circumference of the mouthpiece 2 is substantially the same as the outer circumference of the rod of aerosol generating material 3, such that there is a smooth transition between these components. In the present example, the outer circumference of the mouthpiece 2 is about 20.8 mm.

In the present example, the mouthpiece includes a cooling section 13, positioned downstream of the rod of aerosol-generating material 2. In the present example, the cooling section 13 is in an abutting relationship with the rod of aerosol-generating material 2. In other examples, additional components may be provided between the rod of aerosol generating material 2 and the cooling section 13.

The mouthpiece 3 also includes, in the present example, a mouthpiece body 14 downstream of the cooling section 13, and a hollow tubular element 15 downstream of the mouthpiece body 14, at the mouth end of the article 1. In other examples, the hollow tubular element 15 may be omitted, and the mouthpiece body 14 may form the mouth end of the article. In some examples where the hollow tubular element 15 is omitted, the length of the mouthpiece body 14 may be increased, or a further body of material may be provided at the mouth end.

In the present example, the cooling section 13 defines an air gap within the mouthpiece. The air gap provides a chamber through which heated volatilised components generated by the rod of aerosol generating material 2 flow. The cooling section 13 is hollow to provide a chamber for aerosol accumulation yet rigid enough to withstand axial compressive forces and bending moments that might arise during manufacture and whilst the article 1 is in use. The cooling section 13 provides a physical displacement between the rod of aerosol generating material 2 and downstream portions of the mouthpiece 3.

Preferably, the internal volume of the cooling section 13 is greater than 130 mm^3. Providing a cavity of at least this volume has been found to enable the formation of an improved aerosol. Such a cavity size provides sufficient space within the mouthpiece 2 to allow heated volatilised components to cool, therefore allowing the exposure of the aerosol generating material 2 to higher temperatures than would otherwise be possible, since they may result in an aerosol which is too warm. More preferably, the mouthpiece 3 comprises a cavity having an internal volume greater than 170 mm^3, and still more preferably greater than 200 mm^3, allowing further improvement of the aerosol. In some examples, the internal cavity comprises a volume of between about 130 mm^3 and about 700 mm^3 and, preferably, between about 160 mm^3 and about 700 mm^3. For example, the internal cavity may have a volume between about 170 mm^3 and about 300 mm^3.

The cavity can be configured to provide a temperature differential of at least 40 degrees Celsius between a heated volatilised component entering a first, upstream end of the cavity and a heated volatilised component exiting a second, downstream end of the cavity. The cavity is preferably configured to provide a temperature differential of at least 60 degrees Celsius, preferably at least 80 degrees Celsius and more preferably at least 100 degrees Celsius between a heated volatilised component entering a first, upstream end of the cavity and a heated volatilised component exiting a second, downstream end of the cavity. This temperature differential across the length of the cavity can protect temperature sensitive elements of the mouthpiece downstream of the cavity from the high temperatures of the aerosol generating material 2 when it is heated.

Preferably, the length of the cooling section 13 is less than about 50 mm. More preferably, the length of the cooling section 13 is less than about 40 mm. Still more preferably, the length of the cooling section 13 is less than about 35 mm. In addition, or as an alternative, the length of the cooling section 13 is preferably at least about 10 mm. Preferably, the length of the cooling section 13 is at least about 15 mm.

In some preferred embodiments, the length of the cooling section 13 is from about 15 mm to about 35 mm, more preferably from about 20 mm to about 30 mm, even more preferably from about 23 to about 27 mm, most preferably about 25 mm. In the present example, the length of the cooling section 13 is 25 mm.

In the present example, the cooling section 13 is formed from a plurality of layers of paper which are parallel wound, with butted seams, to form a hollow tube. In the present example, first and second paper layers are provided in a two-ply tube, although in other examples 3, 4 or more paper layers can be used forming 3, 4 or more ply tubes. Other constructions can be used, such as spirally wound layers of paper, cardboard tubes, tubes formed using a papier-mâché type process, moulded or extruded plastic tubes or similar.

In some embodiments, the cooling section 13 preferably has a wall thickness of at least about 50 μm and up to about 1 mm, preferably between 100 μm and 500 μm and more preferably between 100 μm and 150 μm. In the present example, the cooling section 13 has a wall thickness of about 150 μm. The "wall thickness" of the cooling section corresponds to the thickness of the wall of the hollow tube in a radial direction, not

including any surrounding material in which the hollow tube may be embedded. The wall thickness of the cooling section 13 may be measured, for example, using a caliper.

In some embodiments, the thickness of the wall of the cooling section 13 is at least 50 microns and, preferably, at least 75, 80, 85, 90, 95, 100, or 105 microns. In some embodiments, the thickness of the wall of the cooling section is at least 100 or 110 microns.

In some embodiments, the thickness of the wall of the cooling section 13 is less than 1000 microns and, preferably, less than 500 microns.

The cooling section 13, mouthpiece body 14 and hollow tubular element 15 are connected by a combining wrapping material 11.

In the present example, the article 1 is provided with first and second parallel rows of perforations 12 through the tipping material 9, combining wrapping material 11 and cooling section 13, providing ventilation into the mouthpiece 3 at the cooling section 13. In the present case, the perforations 12 are formed as laser perforations, at positions about 18 mm and about 19 mm respectively from the downstream, mouth-end 3b of the mouthpiece 3. In other examples, the ventilation can be provided into the mouthpiece 3 at other locations.

In the present embodiment, the mouthpiece body 14 is a filter. However, it should be recognised that in other examples the mouthpiece body 14 may be provided without substantially filtering the aerosol generated by the article 1.

The mouthpiece body 14 is formed from fibrous material. In the present example, the mouthpiece body 14 is formed from a sheet material. In the present example, the sheet material is paper. The sheet material may be folded to form the mouthpiece body 14. The mouthpiece body 14 may be formed from a continuous web of sheet material. In the present example, the sheet material is gathered to form the body 14 in a similar manner to a 'crepe filter'.

The hollow tubular element 15 is positioned at the mouth end of the article 1. In the present example, the hollow tubular element 15 is formed from a plurality of layers of paper which are parallel wound, with butted seams, to form a hollow tube, as described

in relation to the cooling section 13. The hollow tubular element 15 may be formed according to any of the means described for the cooling section 13 and may have any wall thickness as described in relation to the cooling section 13.

Preferably, the length of the hollow tubular element 15 is less than about 20 mm. More preferably, the length of the hollow tubular element 15 is less than about 15 mm. Still more preferably, the length of the hollow tubular element 15 is less than about 10 mm. In addition, or as an alternative, the length of the hollow tubular element 15 is at least about 5 mm. Preferably, the length of the hollow tubular element 15 is at least about 6 mm. In some preferred embodiments, the length of the hollow tubular element 15 is from about 5 mm to about 20 mm, more preferably from about 6 mm to about 10 mm, even more preferably from about 6 mm to about 8 mm, most preferably about 6 mm, 7 mm or about 8 mm. In the present example the hollow tubular element 15 has a length of 6 mm.

In the present example, a tipping paper 9 is wrapped around the full length of the mouthpiece 3 and over part of the rod of aerosol generating material 2, and has an adhesive on its inner surface to connect the mouthpiece 3 and rod 2. In the present example, the tipping paper 9 extends 5 mm over the rod of aerosol generating material 2 but it can alternatively extend between 3 mm and 15 mm over the rod 2, or between 4 mm and 6 mm, to provide a secure attachment between the mouthpiece 3 and rod 2.

In the present example, the rod of aerosol generating material 2 is wrapped in a rod wrapper 10. The rod wrapper 10 can, for instance, be a paper or paper-backed foil wrapper. As described above, the connecting wrapper 7 circumscribes substantially the entire length of the rod of aerosol generating material 7, such that the rod of aerosol generating material is circumscribed by two wrappers along substantially its entire length. Such a double wrapped rod of aerosol generating material may have improved stiffness and/or rigidity. Advantageously, this can allow a lower density rod of aerosol generating material to be provided, whilst maintaining the desired level of stiffness.

In some examples, the rod wrapper 10 may comprise a flavourant, an aerosol modifying additive, an aerosol former, or an aerosol generating material.

Figure 2 is a side-on cross-sectional view of a further article 1' for use in an aerosol provision system. Article 1' is substantially the same as article 1, except for the

configuration of wrappers surrounding the component 4 and the rod of aerosol-generating material 2. In article 1', the connecting wrapper 7 is replaced by a connecting wrapper 7', which circumscribes the component 4 and a portion of the rod of aerosol-generating material 2. The connecting wrapper 7' extends over only a portion of the rod of aerosol-generating material 2. For example, the connecting wrapper 7' may extend over the rod of aerosol generating material by about 3 mm to about 10 mm, for instance by about 5 mm.

The connecting wrapper 7' may be the same as the connecting wrapper 7, except for the length of the connecting wrapper 7'. The connecting wrapper 7' has a length such that the connecting wrapper 7' does not extend over the entire length of the rod of aerosol-generating material 2.

Figure 3A is a cross sectional view of the component 4 of Figures 1 and 2 through the line X-X' thereof. The component 4 is illustrated in isolation of the remaining parts of the article 1, and includes the body of material 5 and wrapping material 6. As illustrated, the body of material 5 is formed from a crimped and gathered sheet of material 8. The sheet 8 is gathered laterally to form the body 5, which has a generally cylindrical outer shape.

In some examples, the sheet 8 has a permeability of between about 1,000 and about 50,000 Coresta Units, in some examples between about 5,000 and about 50,000 Coresta Units. Such levels of permeability have been advantageously found to result in a component 4 in which the material forming the body 5 is more evenly distributed within the body 5, and less likely to form channels extending longitudinally through the body 5. For a given weight of sheet material 8, the increased permeability therefore results in a higher resistance to draw through the length of the body 5. This means that a lower average density of sheet material 8 can be used in the body 5 to achieve a desired resistance to draw, thus saving on material.

In addition, a sheet material 8 having a higher permeability also has a more open structure, and therefore for degradable materials this can result in an improvement in the time for the component 4 to degrade. Where additives are to be applied in liquid form to the sheet material 8, the increased permeability can also result in a sheet material 8 which is more absorbent, meaning that a larger volume of additive can be applied for a given weight of material.

The permeability of the sheet of material 7 can be measured according to the international standard ISO 2965:2019, as known to those skilled in the art.

Biodegradability can be measured according to the procedure set out under ISO 14855-2:2018. Components as described herein can achieve a biodegradation of greater than 50% in
30 days when exposed to either fresh or marine water.

In other examples, the sheet material may be non-porous, having for example, a porosity of less than 100 Coresta Units, for instance less than 50 Coresta Units. In some examples, the sheet material 8 may comprise a metal foil. For instance, the sheet material 8 may be a metal foil, or a paper backed metal foil.

In the present example, the body 5 has a resistance to draw of between 1 mmH_2O and 30 mmH_2O, for instance between 5 mmH_2O and 25 mmH_2O, or between 10 mmH_2O and 20 mmH_2O. Preferably, the body 5 has a resistance to draw of between 0 mmH_2O and 20 mmH_2O.In some examples, the resistance to draw through the length of the body 5 is between 4mmH_2O and 20 mmH_2O. This resistance to draw can be between 1% and 30% of the resistance to draw through the length of the article, for instance between 5% and 25%, or between 10% and 20%. Advantageously, providing a component 4 having a resistance to draw between 5% and 25% of the resistance to draw through the length of the article at a position upstream of the rod of aerosol generating material 2 reduces the relative contribution of the rod of aerosol generating material to the overall resistance to draw of the article. As a consequence, the overall resistance to draw of the article 1 is less sensitive to variations in the resistance to draw of the rod of aerosol generating material, which may occur due to the organic nature of the tobacco material, and it is also possible to provide a higher level of ventilation into the rod of aerosol generating material whilst keeping the overall resistance to draw through the length of the article 1 at an acceptable level. Ventilation may be provided into the rod of aerosol generating material 2 such that the overall level of ventilation of the article 1 is between 10% and 60%, or between 25% and 80%, for instance up to 70%, up to 65%, up to 60%, up to 55%, or up to 50%.

The resistance to draw of the body 5 is measured according to the ISO standard method (ISO6565:2015). The resistance to draw refers to the 'closed resistance to draw', in which any ventilation zones into the article or body under measurement are closed.

In some examples, the resistance to draw of the body 5 is at least 5 mmH_2O, or at least 7 mmH_2O, or at least 8 mm H_2O.

In some examples, the resistance to draw of the body 5 is at least 1.1 mmH_2O per mm length of the body, or at least 1.5 mm H_2O per mm length of the body, or at least 2 mmH_2O per mm length of the body.

The article 1 in the present example has a ventilation level of about 70% of the aerosol drawn through the article 1.

In the present example the body 5 is formed by a single gathered sheet of material 8. However, in alternative examples, the body 5 may be formed from a plurality of sheets of material 8, which are gathered together to form the body 5. Each of the plurality of sheets of material may have the same or different properties, for instance their dimensions, permeability, thickness, basis weight, and composition.

The one or more sheets 8 forming the body of material 5 can have a combined width, prior to any crimping, of between 100mm and 240mm, for instance between 140mm and 200mm. Such widths can provide a good balance between the pressure drop through the length of the body of material 5 and the firmness of the body of material 5.

The one or more sheets 8 forming the body 5 can be formed from a cellulosic material. For instance, the one or more sheets can be paper sheets, sheets of tobacco material, sheets of non-tobacco botanical material or combinations thereof. The one or more sheets 8 forming the body 5 can have a basis weight of between about 20 and about 80 gsm, or between about 30 and about 50 gsm, or between about 36 and about 45 gsm, or between about 55 and about 75 gsm. Alternatively or in addition, the one or more sheets can have an uncrimped thickness of between about 50 μm and about 500 μm, between about 50 μm and about 350 μm, between about 60 μm and about 300 μm, or between about 60 μm and about 160 μm.

In some examples, the sheet material 8 can comprise a metal foil, for instance aluminium foil, optionally a paper-backed aluminium foil. In other examples, the sheet material may comprise an aerosol generating material, for example, a paper reconstituted tobacco material, or an aerosol generating film. Optionally, the aerosol generating film may be laminated on a supporting material, such as paper.

The body of material 5 can have a weight of from about 5 mg to about 15 mg per mm of length of said body, or between about 8 mg and about 12 mg per mm of length of said body, or about 10 mg per mm of length of said body.

The one or more sheets 8 can be crimped to increase the amount of sheet material that can be included in the body 5. At least one of the one of more sheets 8 extending through the body 5 can include a crimped sheet material formed having a crimp pattern including a series of substantially parallel ridges and grooves.

In the present example, the sheet material 8 is crimped prior to being formed into the body 5. For instance, the sheet material 8 may be passed through a pair of crimping rollers. In the present example, the first body 5 comprises crimped sheet material 8 formed having a crimp pattern comprising a series of substantially parallel ridges and grooves. The crimping may make it easier to gather the sheet material 8 to form the body 5. The crimping may also increase the width of sheet material 8 that can be used to form a body 5 of a particular volume. Increasing the width of sheet material 8 in the body 5 may increase the available surface area of the sheet material in the body 5, which can increase the amount of moisture that may be absorbed by the body 5. Thus, increased amounts of condensate can be absorbed by the body 5, resulting in a more hygienic user experience when the article 1 is used in a non-combustible aerosol provision device.

In the present example, the average spacing between adjacent ridges of the sheet material 8 is greater than about 0.3 mm. In addition, in the present example, the crimp amplitude is less than about 0.7 mm.

The crimp amplitude (also known as “crimping factor”) refers to the depth of the grooves the crimping forms in the sheet material 8 forming the body. That is, crimping the sheet material 8 produces a plurality of peaks and troughs in the sheet material 8 when viewed from a first side of the sheet material 8, as shown in Figure 3B, wherein

the crimp amplitude 'A' is the depth of the troughs, measured from their peak. The crimping may form a 'Zig-Zag' formation or another shape. In some examples, adjacent grooves of the crimped sheet material 8 are spaced by a distance, or have a pitch 'P', in the range of 0.3 to 2 mm and, preferably, in the range of 0.4 to 1 mm. In some embodiments, adjacent grooves of the crimped sheet material are spaced by a distance in the range of 0.1 to 3 mm and, preferably, in the range of 0.2 to 2 mm. In some embodiments, adjacent grooves of the crimped sheet material 10 are spaced by a distance of at least 0.1 mm and, preferably, at least, 0.2, 0.5, 0.7, 1, 1.5, 2, 2.5 or 3 mm. In some embodiments, adjacent grooves of the crimped sheet material are spaced by a distance of at most 3 mm, for instance, at most, 2.5, 2, 1, 1.5, 0.7, 0.5, 0.2 or 0.1 mm.

For instance, the sheet material 8 can have a crimp with a crimp amplitude of less than 500 μm and spacing between peaks (or troughs) of at least 300 μm, at least 400 μm or at least 500 μm.

In some embodiments, the sheet material 8 is heated as it is crimped. For example, the sheet material 8 may be passed between crimping rollers, wherein one or both of the crimping rollers is heated. For example, one or both of the rollers may be heated to a temperature of up to 100 degrees Celsius, for example 50 degrees Celsius or 60 degrees Celsius. The amount of pressure applied to the sheet material passing between the rollers may also be varied. Heating the roller/s or applying a higher level of pressure to the sheet material can result in a higher level of crimping. For example, the crimp can be applied using a roller surface with a temperature of greater than 30°C, greater than 40°C or greater than 50°C.

The average density of the body 5 can be between about 0.1 and about 0.25 mg/mm^3. In the present example, the density of the body of material 5 is about 0.19 mg/mm^3. In some embodiments, the body 5 has a density of at least 0.1 mg/mm^3, 0.12 mg/mm^3 or 0.15 mg/mm^3. The density of a body of material can be measured by separating said body from an article and surrounding plug wraps and/or tipping paper, and removing any embedded objects, but including any additives added to the sheet material 8. The density may be calculated as a bulk density based on the weight of the sheet material 8 and any additives added to the sheet material 8, and the overall volume occupied by the sheet material 8. For instance, the overall volume of the body of material 5 measured inside the plug wrap 6.

In some examples, the body of material is not formed from a sheet material, but from another fibrous material, such as cotton.

In some examples, aerosol-modifying agent or aerosol former may be added to the material forming the body of material. For example, a flavour carrier or glycerol may be applied to the sheet material 8 before forming the body of material 5. In some examples, the body of material 5 includes an aerosol-generating film comprising lactic acid, for instance as described in WO 2021/105449. In some examples, the body of material comprises an acid, for instance an acid selected from the group consisting of lactic acid, levulinic acid, benzoic acid, citric acid, 2-methylbutyric acid, or 2-methylvaleric acid. In some embodiments, the acid is lactic acid. In some embodiments, the acid is levulinic acid. The term lactic acid is synonymous with the term 2-hydroxypropanoic acid and covers both D and L enantiomers separately or a mixture thereof. For example, the lactic acid can be a mixture (for example a racemic mixture) of D-2-hydroxypropanoic acid and L-2-hydroxypropanoic acid. The term levulinic acid is synonymous with the term 4-oxopentanoic acid.

The use of an acid in the body of material 5 can be particularly advantageous when the aerosol generating material comprises nicotine, as the acid can allow for optimal protonation of the nicotine in the resulting aerosol, for example, by altering the ratio of free-base nicotine to protonated nicotine. It is understood that protonation of the nicotine in the aerosol-generating material changes the ratio of nicotine (gas):nicotine (particulate/liquid) by increasing the amount of nicotine present in the particulate/liquid phase. The aerosols produced by the aerosol-generating materials described herein deliver an appropriate amount of nicotine to the user.

In some examples, the body 5 comprises aerosol-former in an amount from 10% to 30% by weight on a dry weight basis.

In other examples,, the body of material 5 comprises aerosol former in an amount less than 5% by weight on a dry weight basis.

In other examples, the body of material 5 comprises a combustion retarding material, for instance a combustion retarding salt and an aerosol-generating film, as described in WO 2020/183163 A1, or a salt gel. In some embodiments, the combustion retarding salt is incorporated into an amorphous solid material, to form a salt gel as referred to

herein. This means that the combustion retarding salt is included within the amorphous solid composition. For example, during the preparation of the amorphous solid material, a liquid precursor of the amorphous solid material is mixed with combustion retarding salt. This distributes the combustion retarding salt throughout the resultant amorphous solid material. In some embodiments, the distribution of the combustion retarding salt is even throughout the amorphous solid and this may be advantageous as the combustion retarding effect is effective across all of the material. The combustion retarding salt may be added in the form of a solution or suspension. Alternatively, the combustion retarding salt may be added to the liquid precursor in solid form, for example in particulate form, such as a powder.

In other embodiments, the combustion retarding salt is added or applied to an amorphous solid material. For example, once the amorphous solid material has been prepared, a solution or suspension comprising the combustion retarding salt is applied to the surface of the amorphous solid material, to deposit the combustion retarding salt on the surface of the amorphous solid material.

In the present example, the component 4 has a length of about 6 mm. In alternative embodiments the component 4 may have any length in the range of about 3 mm to about 15 mm, preferably about 4 mm to about 6 mm.

The outer circumference of the component 4 is substantially the same as the outer circumference of the rod of aerosol generating material 2, such that there is a smooth transition between these components.

Although only a single body of material 5 has been described with reference to the drawings, in alternative embodiments, the article 1 of Figures 1 and 2A/2B may include additional sections, such as additional bodies of material or other sections such as tubular sections. The additional sections may be immediately upstream, immediately downstream of the component 4, or both, and may be formed from any materials suitable for use in the article described herein.

In some examples, the component wrapper 6 has a basis weight between about 27 gsm and about 70 gsm, for instance about 36 gsm, about 41 gsm, or about 44 gsm.

Figure 4 is a side-on cross sectional view of a further article 1" for use in a non-combustible aerosol provision system. The article 1" is substantially the same as the article 1, except for the arrangement of wrappers connecting the components of the article. In the present case the mouthpiece 3, comprising cooling section 13, mouthpiece body 14 and hollow tubular element 15 connected by wrapping material 11, is joined to the rod of aerosol generating material 2 and the component 4 by a further wrapper 17, which extends along substantially the entire length of the article 1". In the present example, the further wrapper 17 comprises paper, such as a tipping paper.

Figure 5 is a side-on cross-sectional view of a further article 1"', comprising an additional component 41 at the upstream end of the article. The article 1"' is substantially the same as the article 1, except that the length of the component 4 is reduced in the present example, and the additional component 41 is provided upstream of the component 4. The additional component 41 can be formed in the same manner as the component 4 of Figure 1. In the present example, each of the components 4, 41 have a length of 3 mm, such that the combined length of the components 4, 41 is the same as the component 4 of Figure 1. In other examples, components 4, 41 may have any suitable length as described above in relation to component 4.

In the present example, the body of material 5 of the downstream component 4 may preferably comprise an aerosol former, or an aerosol-modifying additive. The provision of an aerosol former or an aerosol-modifying additive in the body 4 may result in the generation of an improved aerosol.

The provision of adjacent components 4, 41 at the upstream end of the article 1"' may advantageously provide a displacement of the rod of aerosol generating material 2 from the distal end of a heating arrangement into which the article 1"' is inserted, in use, towards an area where the aerosol-generating material may be heated more effectively. Such effect may be further enhanced by the provision of a component 41 at the upstream end of the article 1"' which is arranged to act as a heat exchanger, and may advantageously improve the transfer of heat into the air flowing into the article 1"'. This may be achieved, for instance, by providing a component 41 comprising a body 51 formed from strips comprising a metal foil, for instance aluminium foil.

In examples where the upstream component 41 comprises strips of a metal foil, and the downstream component 4 comprises an aerosol former or an aerosol-modifying

additive, the aerosol generated by the article in use may be particularly improved. The combined effect of the upstream component 41 improving the heating of air passing into the article 1''' and the downstream component 4 providing additional aerosol former or aerosol-modifying additive may advantageously result in an improved experience for the consumer of the article 1''', in use.

In the present example, the additional component 41 comprises a body of material 51. The body of material 51 may be formed in any suitable way and from any material as described in relation to body of material 5. In the present example, the body of material 51 comprises strands or strips of material, which are gathered to form the body 51. In the present example, the strands or strips are aluminium foil.

The components 4, 41 are each circumscribed by component wrapper 6, 61, and combined by connecting wrapper 7, as described above in relation to Figure 1. In alternative examples, the components 4, 41 may be combined by a further wrapping material, prior to being combined with the rod of aerosol generating material by wrapper 7.

In some examples, an article 1 according to the present disclosure may be formed by the method illustrated in Figure 6. The method comprises the steps: providing a body of material, an aerosol generating portion, and a wrapping material (S101); combining the body of material and the aerosol generating portion with the wrapping material to form a component (S102); further providing a mouthpiece and a further wrapping material (S103); and combining the mouthpiece and the component to form an article (S104).

In alternative examples, an article 1'' according to the present disclosure may be formed by the method illustrated in Figure 7, comprising the steps: providing a cooling section, a mouthpiece body, a hollow tubular element, and a wrapping material (S101); combining the cooling section, the mouthpiece body, and the hollow tubular element with the wrapping material to form a mouthpiece (S102); further providing an aerosol generating portion, a body of material, and a further wrapping material (S103); and combining the mouthpiece, the aerosol generating portion and the body of material with the further wrapping material to form an article (S104).

The ignition propensity of a paper wrapping material for use in an article may be determined according to ISO 5729:2021.

Articles, for instance those in the shape of rods, are often named according to the product length: "regular" (typically in the range 68 – 75 mm, e.g. from about 68 mm to about 72 mm), "short" or "mini" (68 mm or less), "king size" (typically in the range 75 – 91 mm, e.g. from about 79 mm to about 88 mm), "long" or "super-king" (typically in the range 91 – 105 mm, e.g. from about 94 mm to about 101 mm) and "ultra-long" (typically in the range from about 110 mm to about 121 mm).

They are also named according to the product circumference: "regular" (about 23 – 25 mm), "wide" (greater than 25 mm), "slim" (about 22 – 23 mm), "demi-slim" (about 19 – 22 mm), "super-slim" (about 16 – 19 mm), and "micro-slim" (less than about 16 mm).

Accordingly, an article in a king-size, super-slim format will, for example, have a length of about 83 mm and a circumference of about 17 mm.

Each format may be produced with mouthpieces of different lengths. The mouthpiece length will be from about 10mm to 50 mm, for instance from 15mm to 35mm. A tipping paper connects the mouthpiece to the aerosol generating material and will usually have a greater length than the mouthpiece, for example from 3 to 15 mm longer or 3 to 12mm longer, such that the tipping paper covers the mouthpiece and overlaps the aerosol generating material, for instance in the form of a rod of aerosol generating material, to connect the mouthpiece to the rod.

Articles and their aerosol generating materials and components described herein can be made in, but are not limited to, any of the above formats.

The terms 'upstream' and 'downstream' used herein are relative terms defined in relation to the direction of mainstream aerosol drawn though an article or device in use.

The various embodiments described herein are presented only to assist in understanding and teaching the claimed features. These embodiments are provided as a representative sample of embodiments only, and are not exhaustive and/or exclusive. It is to be understood that advantages, embodiments, examples, functions, features, structures, and/or other aspects described herein are not to be considered limitations on the scope of the invention as defined by the claims or limitations on equivalents to

the claims, and that other embodiments may be utilised and modifications may be made without departing from the scope of the claimed invention. Various embodiments of the invention may suitably comprise, consist of, or consist essentially of, appropriate combinations of the disclosed elements, components, features, parts, steps, means, etc, other than those specifically described herein. In addition, this disclosure may include other inventions not presently claimed, but which may be claimed in future.

As used herein, the term "delivery system" is intended to encompass systems that deliver at least one substance to a user, and includes:

combustible aerosol provision systems, such as cigarettes, cigarillos, cigars, and tobacco for pipes or for roll-your-own or for make-your-own cigarettes (whether based on tobacco, tobacco derivatives, expanded tobacco, reconstituted tobacco, tobacco substitutes or other smokable material);

non-combustible aerosol provision systems that release compounds from an aerosol-generating material without combusting the aerosol-generating material, such as electronic cigarettes, tobacco heating products, and hybrid systems to generate aerosol using a combination of aerosol-generating materials; and

aerosol-free delivery systems that deliver the at least one substance to a user orally, nasally, transdermally or in another way without forming an aerosol, including but not limited to, lozenges, gums, patches, articles comprising inhalable powders, and oral products such as oral tobacco which includes snus or moist snuff, wherein the at least one substance may or may not comprise nicotine.

According to the present disclosure, a "non-combustible" aerosol provision system is one where a constituent aerosol-generating material of the aerosol provision system (or component thereof) is not combusted or burned in order to facilitate delivery of at least one substance to a user.

In some embodiments, the delivery system is a non-combustible aerosol provision system, such as a powered non-combustible aerosol provision system.

In some embodiments, the non-combustible aerosol provision system is an electronic cigarette, also known as a vaping device or electronic nicotine delivery system (END), although it is noted that the presence of nicotine in the aerosol-generating material is not a requirement.

In some embodiments, the non-combustible aerosol provision system is an aerosol-generating material heating system, also known as a heat-not-burn system. An example of such a system is a tobacco heating system.

In some embodiments, the non-combustible aerosol provision system is a hybrid system to generate aerosol using a combination of aerosol-generating materials, one or a plurality of which may be heated. Each of the aerosol-generating materials may be, for example, in the form of a solid, liquid or gel and may or may not contain nicotine. In some embodiments, the hybrid system comprises a liquid or gel aerosol-generating material and a solid aerosol-generating material. The solid aerosol-generating material may comprise, for example, tobacco or a non-tobacco product.

Typically, the non-combustible aerosol provision system may comprise a non-combustible aerosol provision device, also referred to as a heating device, and a consumable or article for use with the non-combustible aerosol provision device.

In some embodiments, the disclosure relates to consumables comprising aerosol-generating material and configured to be used with non-combustible aerosol provision devices. These consumables are sometimes referred to as articles throughout the disclosure.

In some embodiments, the non-combustible aerosol provision system, such as a non-combustible aerosol provision device thereof, may comprise a power source and a controller. The power source may, for example, be an electric power source or an exothermic power source. In some embodiments, the exothermic power source comprises a carbon substrate which may be energised so as to distribute power in the form of heat to an aerosol-generating material or to a heat transfer material in proximity to the exothermic power source.

In some embodiments, the non-combustible aerosol provision system may comprise an area for receiving the consumable, an aerosol generator, an aerosol generation area, a housing, a mouthpiece, a filter and/or an aerosol-modifying agent.

In some embodiments, the consumable for use with the non-combustible aerosol provision device may comprise aerosol-generating material, an aerosol-generating material storage area, an aerosol-generating material transfer component, an aerosol

generator, an aerosol generation area, a housing, a wrapper, a filter, a mouthpiece, and/or an aerosol-modifying agent.

In some embodiments, the substance to be delivered comprises an active substance, also referred to as an active material.

The active substance or material as used herein may be a physiologically active material, which is a material intended to achieve or enhance a physiological response. The active substance may for example be selected from nutraceuticals, nootropics, psychoactives. The active substance may be naturally occurring or synthetically obtained. The active substance may comprise for example nicotine, caffeine, taurine, theine, vitamins such as B6 or B12 or C, melatonin, cannabinoids, or constituents, derivatives, or combinations thereof. The active substance may comprise one or more constituents, derivatives or extracts of tobacco, cannabis or another botanical.

In some embodiments, the active substance comprises nicotine. In some embodiments, the active substance comprises caffeine, melatonin or vitamin B12.

As noted herein, the active substance may comprise one or more constituents, derivatives or extracts of cannabis, such as one or more cannabinoids or terpenes.

As noted herein, the active substance may comprise or be derived from one or more botanicals or constituents, derivatives or extracts thereof. As used herein, the term "botanical" includes any material derived from plants including, but not limited to, extracts, leaves, bark, fibres, stems, roots, seeds, flowers, fruits, pollen, husk, shells or the like. Alternatively, the material may comprise an active compound naturally existing in a botanical, obtained synthetically. The material may be in the form of liquid, gas, solid, powder, dust, crushed particles, granules, pellets, shreds, strips, sheets, or the like. Example botanicals are tobacco, eucalyptus, star anise, hemp, cocoa, cannabis, fennel, lemongrass, peppermint, spearmint, rooibos, chamomile, flax, ginger, ginkgo biloba, hazel, hibiscus, laurel, licorice (liquorice), matcha, mate, orange skin, papaya, rose, sage, tea such as green tea or black tea, thyme, clove, cinnamon, coffee, aniseed (anise), basil, bay leaves, cardamom, coriander, cumin, nutmeg, oregano, paprika, rosemary, saffron, lavender, lemon peel, mint, juniper, elderflower, vanilla, wintergreen, beefsteak plant, curcuma, turmeric, sandalwood, cilantro, bergamot, orange blossom, myrtle, cassis, valerian, pimento, mace, damien, marjoram, olive,

lemon balm, lemon basil, chive, carvi, verbena, tarragon, geranium, mulberry, ginseng, theanine, theacrine, maca, ashwagandha, damiana, guarana, chlorophyll, baobab or any combination thereof. The mint may be chosen from the following mint varieties: Mentha Arventis, Mentha c.v.,Mentha niliaca, Mentha piperita, Mentha piperita citrata c.v.,Mentha piperita c.v, Mentha spicata crispa, Mentha cardifolia, Memtha longifolia, Mentha suaveolens variegata, Mentha pulegium, Mentha spicata c.v. and Mentha suaveolens

In some embodiments, the active substance comprises or is derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is tobacco.

In some embodiments, the active substance comprises or derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is selected from eucalyptus, star anise, cocoa and hemp.

In some embodiments, the active substance comprises or derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is selected from rooibos and fennel.

In some embodiments, the substance to be delivered comprises a flavour.

As used herein, the terms "flavour" and "flavourant" refer to materials which, where local regulations permit, may be used to create a desired taste, aroma or other somatosensorial sensation in a product for adult consumers. They may include naturally occurring flavour materials, botanicals, extracts of botanicals, synthetically obtained materials, or combinations thereof (e.g., tobacco, cannabis, licorice (liquorice), hydrangea, eugenol, Japanese white bark magnolia leaf, chamomile, fenugreek, clove, maple, matcha, menthol, Japanese mint, aniseed (anise), cinnamon, turmeric, Indian spices, Asian spices, herb, wintergreen, cherry, berry, red berry, cranberry, peach, apple, orange, mango, clementine, lemon, lime, tropical fruit, papaya, rhubarb, grape, durian, dragon fruit, cucumber, blueberry, mulberry, citrus fruits, Drambuie, bourbon, scotch, whiskey, gin, tequila, rum, spearmint, peppermint, lavender, aloe vera, cardamom, celery, cascarilla, nutmeg, sandalwood, bergamot, geranium, khat, naswar, betel, shisha, pine, honey essence, rose oil, vanilla, lemon oil, orange oil, orange blossom, cherry blossom, cassia, caraway, cognac, jasmine, ylang-ylang, sage, fennel, wasabi, piment, ginger, coriander, coffee, hemp, a mint oil from any

species of the genus Mentha, eucalyptus, star anise, cocoa, lemongrass, rooibos, flax, ginkgo biloba, hazel, hibiscus, laurel, mate, orange skin, rose, tea such as green tea or black tea, thyme, juniper, elderflower, basil, bay leaves, cumin, oregano, paprika, rosemary, saffron, lemon peel, mint, beefsteak plant, curcuma, cilantro, myrtle, cassis, valerian, pimento, mace, damien, marjoram, olive, lemon balm, lemon basil, chive, carvi, verbena, tarragon, limonene, thymol, camphene), flavour enhancers, bitterness receptor site blockers, sensorial receptor site activators or stimulators, sugars and/or sugar substitutes (e.g., sucralose, acesulfame potassium, aspartame, saccharine, cyclamates, lactose, sucrose, glucose, fructose, sorbitol, or mannitol), and other additives such as charcoal, chlorophyll, minerals, botanicals, or breath freshening agents. They may be imitation, synthetic or natural ingredients or blends thereof. They may be in any suitable form, for example, liquid such as an oil, solid such as a powder, or gas.

In some embodiments, the flavour comprises menthol, spearmint and/or peppermint. In some embodiments, the flavour comprises flavour components of cucumber, blueberry, citrus fruits and/or redberry. In some embodiments, the flavour comprises eugenol. In some embodiments, the flavour comprises flavour components extracted from tobacco. In some embodiments, the flavour comprises flavour components extracted from cannabis.

In some embodiments, the flavour may comprise a sensate, which is intended to achieve a somatosensorial sensation which are usually chemically induced and perceived by the stimulation of the fifth cranial nerve (trigeminal nerve), in addition to or in place of aroma or taste nerves, and these may include agents providing heating, cooling, tingling, numbing effect. A suitable heat effect agent may be, but is not limited to, vanillyl ethyl ether and a suitable cooling agent may be, but not alimited to eucolyptol, WS-3.

Aerosol-generating material is a material that is capable of generating aerosol, for example when heated, irradiated or energized in any other way. Aerosol-generating material may, for example, be in the form of a solid, liquid or semi-solid (such as a gel) which may or may not contain an active substance and/or flavourants.

The aerosol-generating material may comprise one or more active substances and/or flavours, one or more aerosol-former materials, and optionally one or more other functional material.

The aerosol-generating material may comprise a binder, such as a gelling agent, and an aerosol former. Optionally, a substance to be delivered and/or filler may also be present. Optionally, a solvent, such as water, is also present and one or more other components of the aerosol-generating material may or may not be soluble in the solvent. In some embodiments, the aerosol-generating material is substantially free from botanical material. In particular, in some embodiments, the aerosol-generating material is substantially tobacco free.

The aerosol-generating material may comprise or be in the form of an aerosol-generating film. The aerosol-generating film may comprise a binder, such as a gelling agent, and an aerosol former. Optionally, a substance to be delivered and/or filler may also be present. The aerosol-generating film may be substantially free from botanical material. In particular, in some embodiments, the aerosol-generating material is substantially tobacco free.

The aerosol-generating film may have a thickness of about 0.015 mm to about 1 mm. For example, the thickness may be in the range of about 0.05 mm, 0.1 mm or 0.15 mm to about 0.5 mm or 0.3 mm.

The aerosol-generating material may comprise more than one film, and the thickness described herein may refer to the aggregate thickness of those films.

The aerosol-generating film may be continuous. For example, the film may comprise or be a continuous sheet of material. The sheet may be in the form of a wrapper, it may be gathered to form a gathered sheet or it may be shredded to form a shredded sheet. The shredded sheet may comprise one or more strands or strips of aerosol-generating material.

The aerosol-generating film may be discontinuous. For example, the aerosol-generating film may comprise one or more discrete portions or regions of aerosol-generating material, such as dots, stripes or lines, which may be supported on a support. In such embodiments, the support may be planar or non-planar.

The aerosol-generating film may be formed by combining a binder, such as a gelling agent, with a solvent, such as water, an aerosol-former and one or more other components, such as one or more substances to be delivered, to form a slurry and then heating the slurry to volatilise at least some of the solvent to form the aerosol-generating film.

The slurry may be heated to remove at least about 60 wt%, 70 wt%, 80 wt%, 85 wt% or 90 wt% of the solvent.

The aerosol-generating material may comprise or be an "amorphous solid". In some embodiments, the aerosol-generating materiel comprises an aerosol-generating film that is an amorphous solid. The amorphous solid may be a "monolithic solid". The amorphous solid may be substantially non-fibrous. In some embodiments, the amorphous solid may be a dried gel. The amorphous solid is a solid material that may retain some fluid, such as liquid, within it. In some embodiments, the amorphous solid may, for example, comprise from about 50wt%, 60wt% or 70wt% of amorphous solid, to about 90wt%, 95wt% or 100wt% of amorphous solid.

The amorphous solid may be substantially free from botanical material. The amorphous solid may be substantially tobacco free.

The aerosol-former material may comprise one or more constituents capable of forming an aerosol. In some embodiments, the aerosol-former material may comprise one or more of glycerol, propylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, 1,3-butylene glycol, erythritol, meso-Erythritol, ethyl vanillate, ethyl laurate, a diethyl suberate, triethyl citrate, triacetin, a diacetin mixture, benzyl benzoate, benzyl phenyl acetate, tributyrin, lauryl acetate, lauric acid, myristic acid, and propylene carbonate.

The one or more other functional materials may comprise one or more of apH regulators, colouring agents, preservatives, binders, fillers, stabilizers, and/or antioxidants.

The material may be present on or in a support, to form a substrate. The support may, for example, be or comprise paper, card, paperboard, cardboard, reconstituted

material, a plastics material, a ceramic material, a composite material, glass, a metal, or a metal alloy. In some embodiments, the support comprises a susceptor. In some embodiments, the susceptor is embedded within the material. In some alternative embodiments, the susceptor is on one or either side of the material.

A consumable is an article comprising or consisting of aerosol-generating material, part or all of which is intended to be consumed during use by a user. A consumable may comprise one or more other components, such as an aerosol-generating material storage area, an aerosol-generating material transfer component, an aerosol generation area, a housing, a wrapper, a mouthpiece, a filter and/or an aerosol-modifying agent. A consumable may also comprise an aerosol generator, such as a heater, that emits heat to cause the aerosol-generating material to generate aerosol in use. The heater may, for example, comprise combustible material, a material heatable by electrical conduction, or a susceptor.

An aerosol-modifying agent (also referred to herein as an aerosol-modifying additive) is a substance, typically located downstream of the aerosol generation area, that is configured to modify the aerosol generated, for example by changing the taste, flavour, acidity or another characteristic of the aerosol. The aerosol-modifying agent may be provided in an aerosol-modifying agent release component, that is operable to selectively release the aerosol-modifying agent

The aerosol-modifying agent may, for example, be an additive or a sorbent. The aerosol-modifying agent may, for example, comprise one or more of a flavourant, a colourant, water, and a carbon adsorbent. The aerosol-modifying agent may, for example, be a solid, a liquid, or a gel. The aerosol-modifying agent may be in powder, thread or granule form. The aerosol-modifying agent may be free from filtration material.

Claims

1. An article for use in an aerosol provision system, the article comprising an aerosol-generating portion and a body of material upstream of the aerosol-generating portion, wherein a resistance to draw through the length of the body of material is between 5% and 25% of the resistance to draw through the length of the article.

2. An article according to claim 1, wherein the resistance to draw through the length of the body of material is between 10% and 20%, or between 15% and 20% of the resistance to draw through the length of the article.

3. An article for use in an aerosol provision system, the article comprising an aerosol-generating portion and a body of material upstream of the aerosol-generating portion, wherein a resistance to draw through the length of the body of material is between 4 mmH_2O and 20 mmH_2O.

4. An article for use in an aerosol-provision system, the article comprising an aerosol-generating portion and a body of material upstream of the aerosol-generating portion, wherein the body of material is circumscribed by first and second sheets of wrapping material, and wherein at least one of said sheets is non-combustible.

5. An article according to claim 4, wherein at least one of the first or second sheets of wrapping material extends over the full length of the aerosol-generating portion.

6. An article according to claim 4 or 5, wherein the at least one non-combustible sheet comprises a metal foil, optionally wherein the metal is aluminium.

7. An article according to claim 4, further comprising a layer of adhesive between the aerosol-generating portion and the at least one of the first or second sheets of wrapping material.

8. An article according to claim 7, wherein the layer of adhesive is discontinuous, optionally wherein the layer of adhesive comprises bands of adhesive.

9. An article according to any one of claims 1 to 8, wherein the body of material is formed from cotton.

10. An article according to any one of claims 1 to 9, wherein the body of material comprises a sheet material, optionally wherein the sheet material is gathered into the body of material, and/or wherein the sheet material is in the form of strips of sheet material.

11. An article according to claim 10, wherein the strips of sheet material are shredded and/or cut strips of sheet material.

12. An article according to claim 10 or 11, wherein the sheet material comprises a heat conductive material, optionally wherein the sheet material comprises a metal foil, optionally wherein the metal is aluminium.

13. An article according to claim 10, wherein the sheet material has a porosity less than 100 CU.

14. An article according to any one of claims 10 to 12, wherein the sheet material comprises an aerosol-generating film, optionally wherein the aerosol-generating film is laminated on a supporting material.

15. An article according to claim 10, 11, 13 or 14, wherein the sheet material comprises paper.

16. An article according to claim 10, wherein the sheet material comprises paper reconstituted tobacco or bandcast reconstituted tobacco.

17. An article according to any one of claims 10 to 16, wherein the sheet material is crimped.

18. An article according to claim 17, wherein the crimping pattern is defined by a crimp amplitude of between 0.1 mm and 0.7 mm, and/or a spacing of between 0.5 mm and 1.5 mm between adjacent peaks in the crimp pattern.

19. An article according to claim 18, wherein the crimp amplitude is between 0.2 mm and 0.5 mm and the spacing between adjacent peaks in the crimp pattern is about 1 mm.

20. An article according to any one of claims 1 to 19, wherein the body of material includes an additive selected from a flavour carrier, an aerosol-former, a salt gel, or an acid, optionally wherein the aerosol former is glycerol, optionally wherein the acid is selected from the group consisting of lactic acid, levulinic acid, benzoic acid, citric acid, 2-methylbutyric acid, or 2-methylvaleric acid, or wherein the acid is lactic acid.

21. An article according to any one of claims 1 to 20, wherein the body of material comprises aerosol former in an amount less than 5% by weight or in an amount between 5% and 25% by weight on a dry weight basis.

22. An article according to any one of claims 1 to 21, wherein ventilation is provided into the article, and the level of ventilation is between 40% and 75%.

23. An article according to any one of claims 1 to 22, wherein the aerosol-generating portion comprises aerosol former in an amount from 8% to 25%, or 12 to 20% by weight on a dry weight basis.

24. An article according to any one of claims 1 to 23, wherein the aerosol-generating portion comprises tobacco material or non-tobacco botanical material.

25. A system comprising:

an article according to any one of claims 1 to 24, and

a heating device configured to receive the aerosol-generating portion, wherein the heating device is configured to externally heat the aerosol-generating portion, and/or inductively heat the aerosol-generating portion, and/or resistively heat the aerosol-generating portion.

26. A method for forming an article according to any one of claims 1 to 24, comprising the steps:

providing a body of material, an aerosol generating portion, and a wrapping material;

combining the body of material and the aerosol generating portion with the wrapping material to form a component;

further providing a mouthpiece and a further wrapping material; and

combining the mouthpiece and the component to form an article, such that the body is upstream of the aerosol-generating portion.

27. A method for forming an article according to any one of claims 1 to 24, comprising the steps:

providing a cooling section, a mouthpiece body, a hollow tubular element, and a wrapping material;

combining the cooling section, the mouthpiece body, and the hollow tubular element with the wrapping material to form a mouthpiece;

further providing an aerosol generating portion, a body of material, and a further wrapping material; and

combining the mouthpiece, the aerosol generating portion and the body of material with the further wrapping material to form an article.

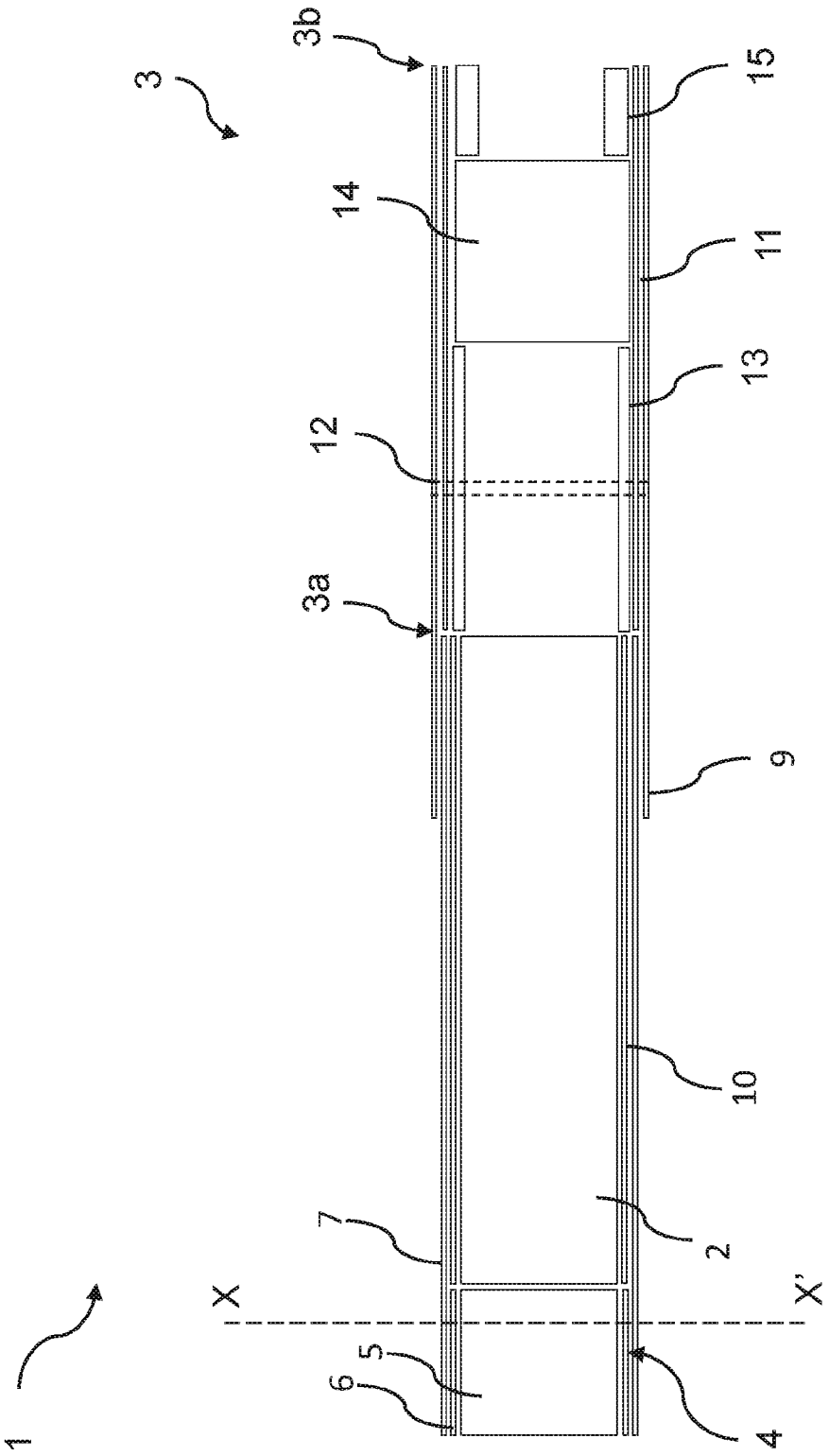

Figure 1

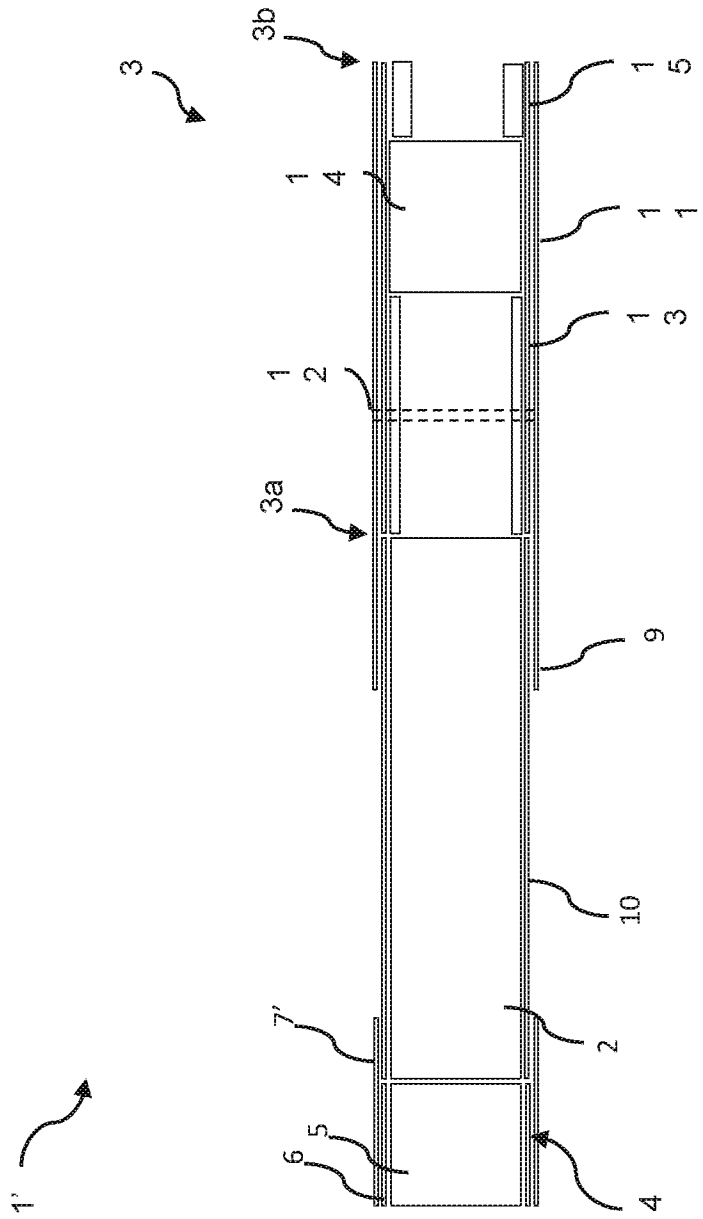

Figure 2

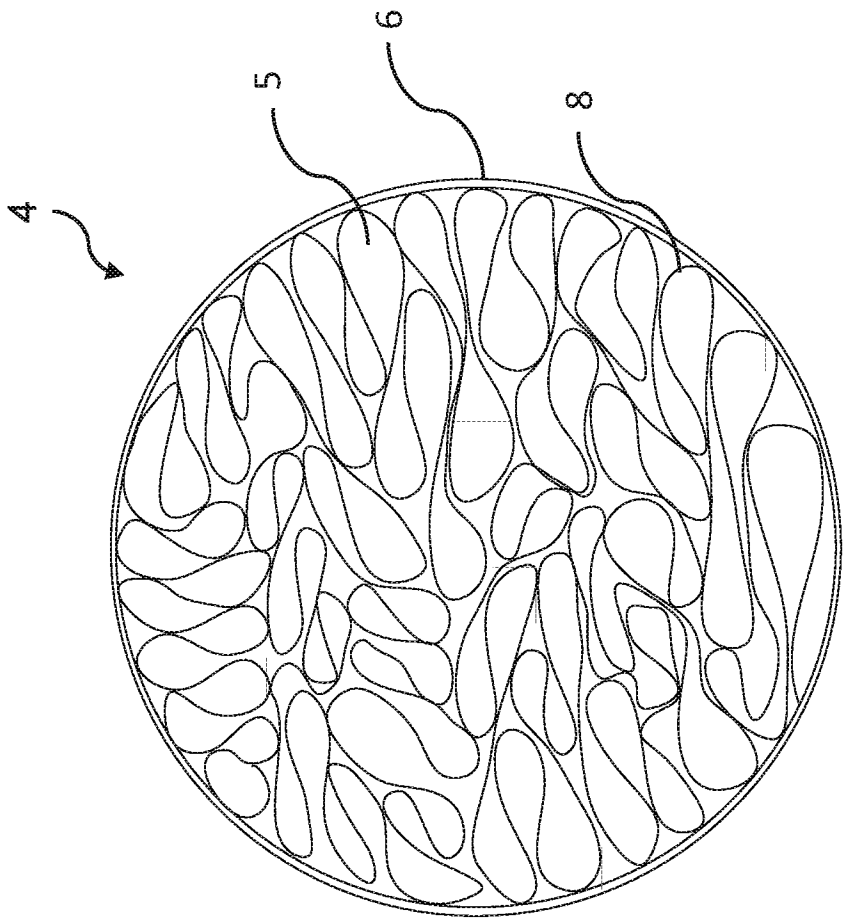

Figure 3A

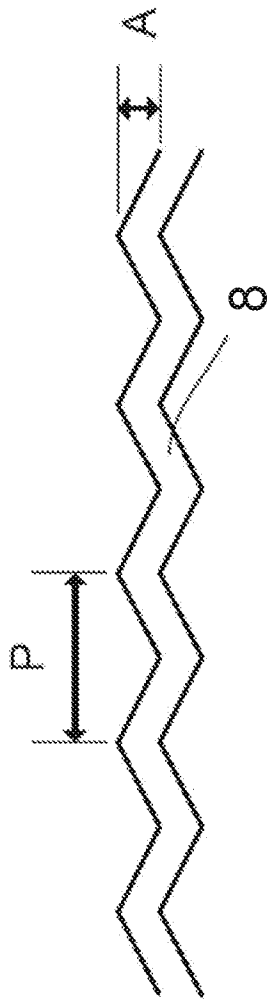

Figure 3B

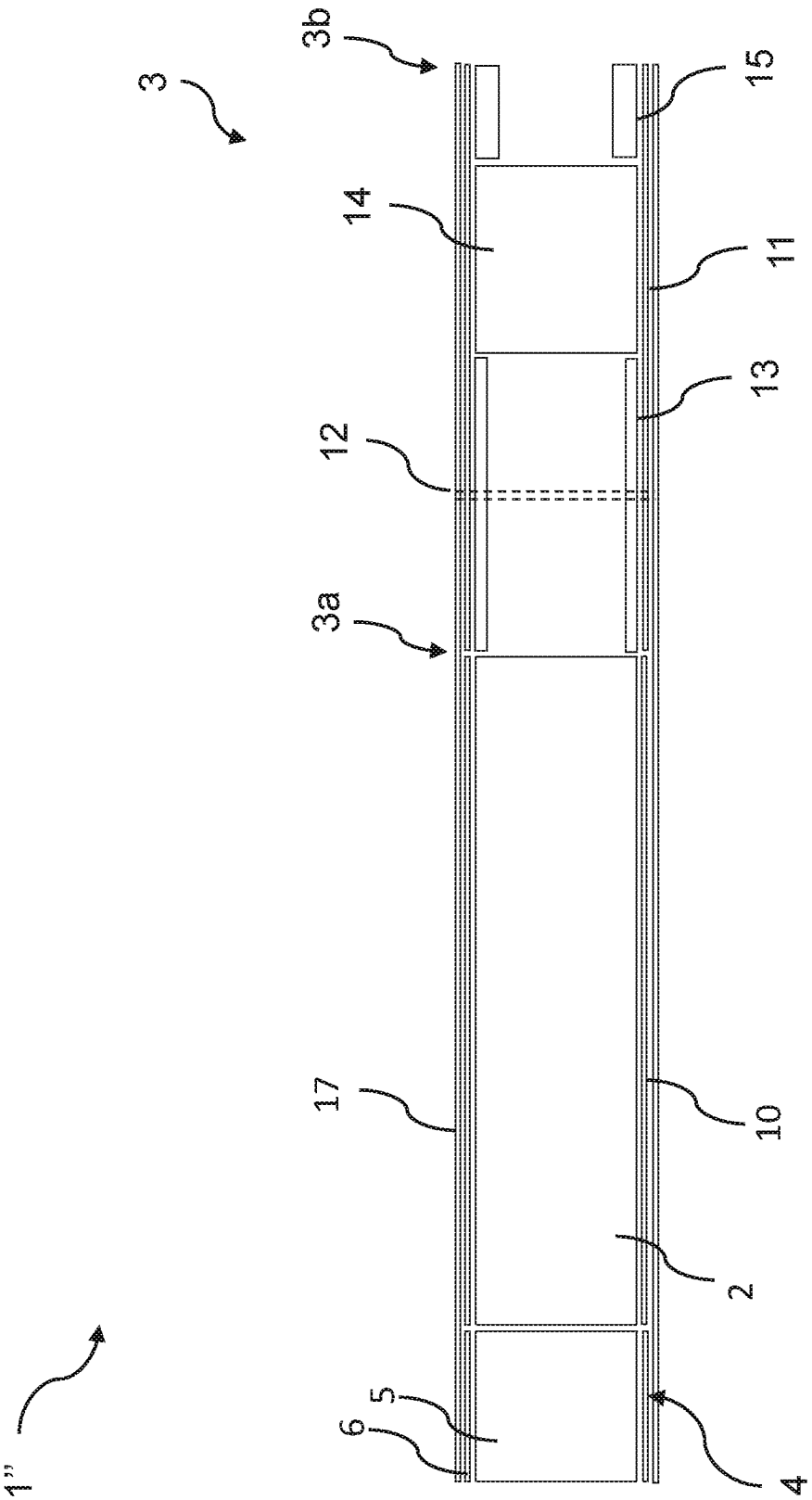

Figure 4

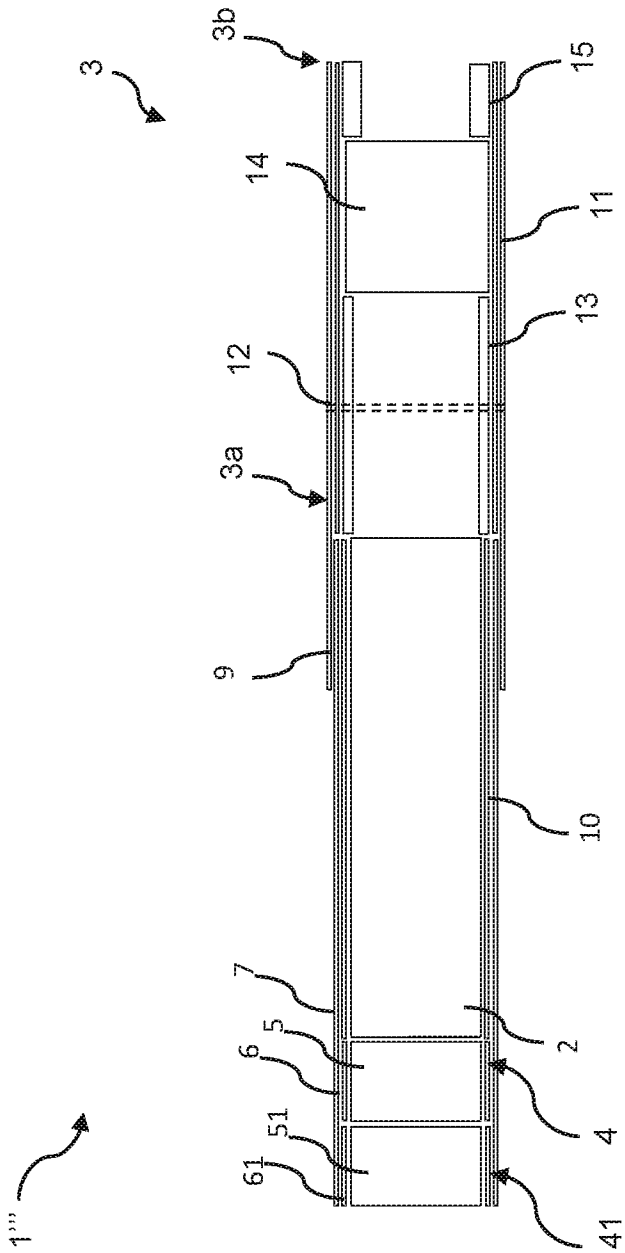

Figure 5

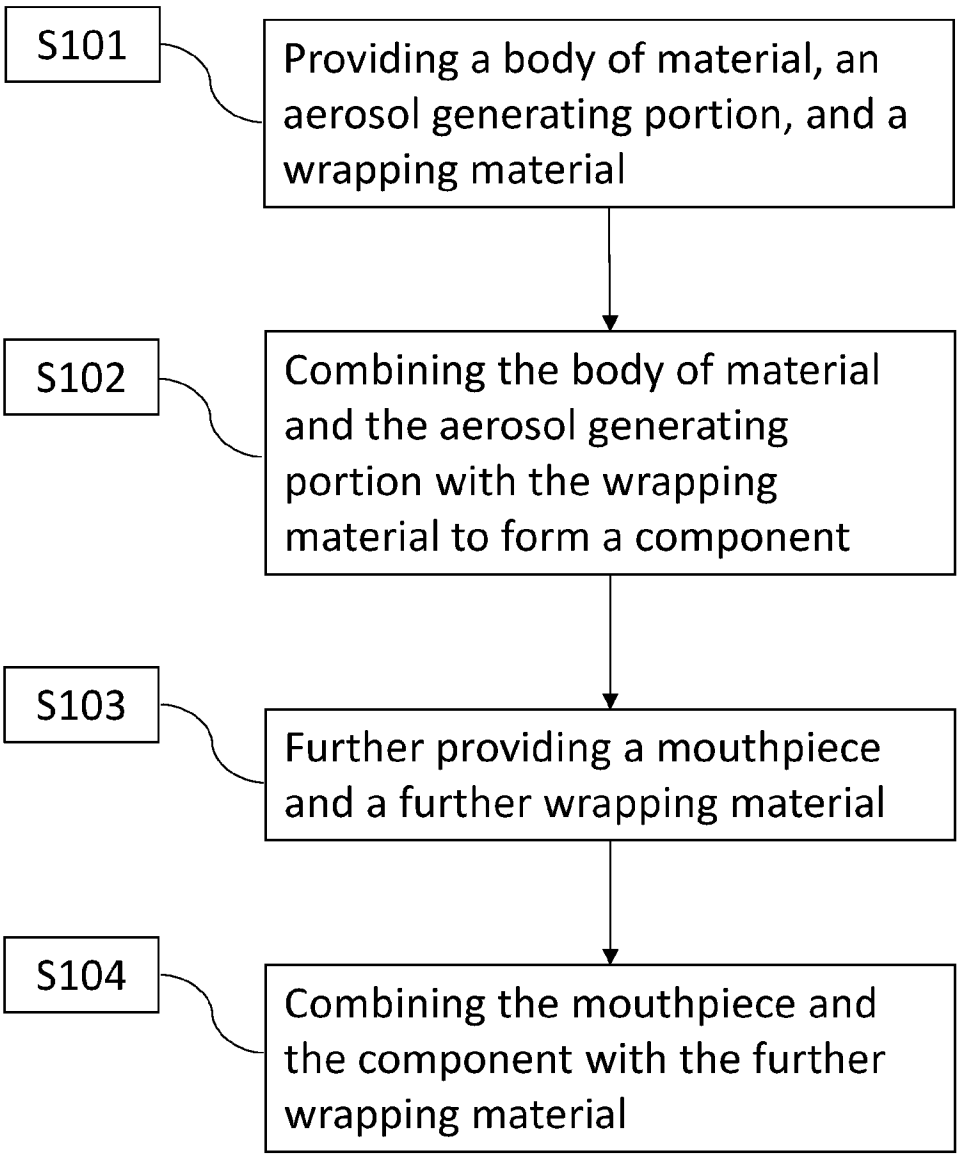
S101
Providing a body of material, an aerosol generating portion, and a wrapping material
S102
Combining the body of material and the aerosol generating portion with the wrapping material to form a component
S103
Further providing a mouthpiece and a further wrapping material
S104
Combining the mouthpiece and the component with the further wrapping material

Figure 6

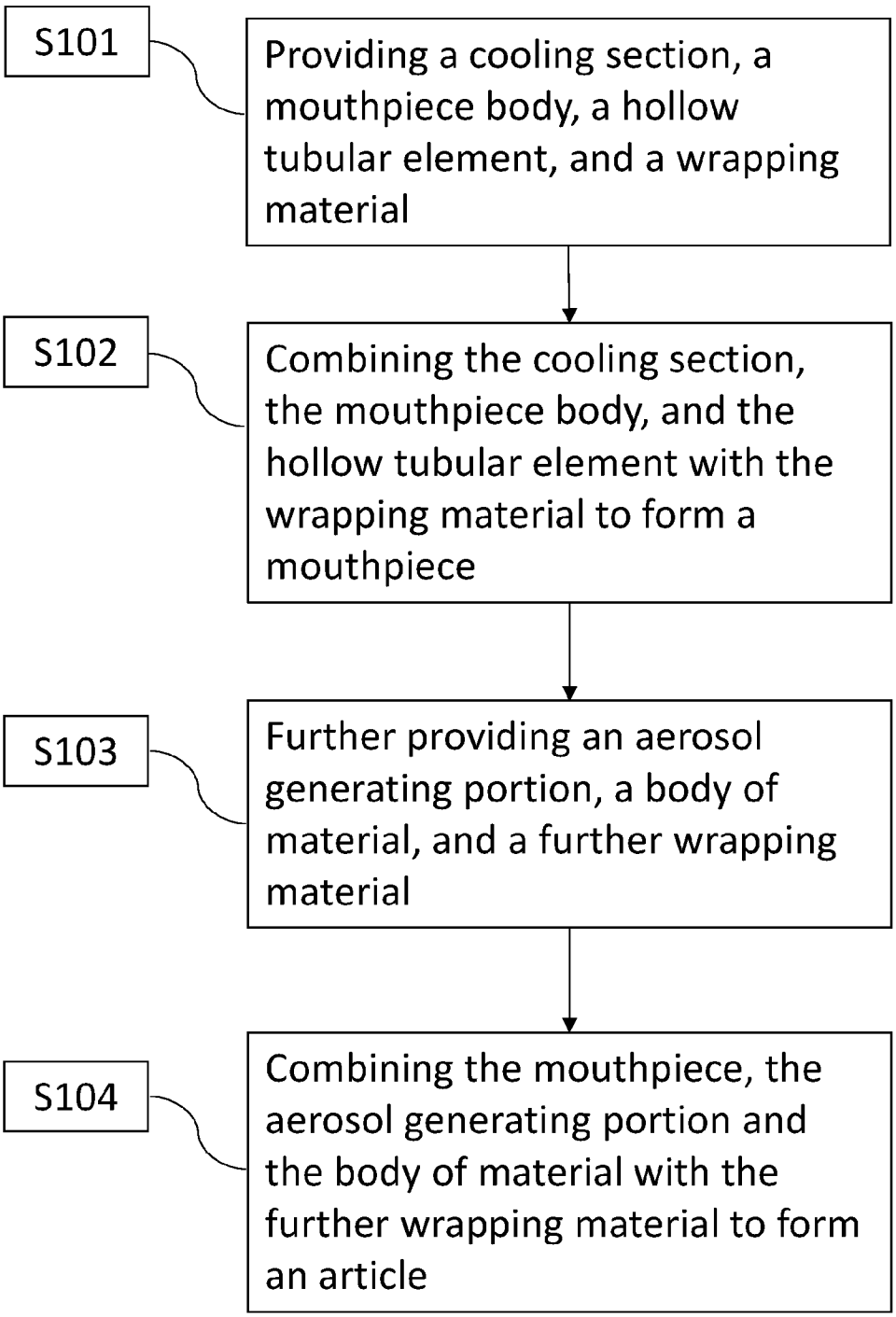
S101
Providing a cooling section, a mouthpiece body, a hollow tubular element, and a wrapping material
S102
Combining the cooling section, the mouthpiece body, and the hollow tubular element with the wrapping material to form a mouthpiece
S103
Further providing an aerosol generating portion, a body of material, and a further wrapping material
S104
Combining the mouthpiece, the aerosol generating portion and the body of material with the further wrapping material to form an article

Figure 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2024/050874

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24C5/01 A24D1/02 A24D1/20
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24C A24D

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2022/073687 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 14 April 2022 (2022-04-14) page 20, line 17 - page 23, line 32; claims 1-15; figures 1-3; examples 1-33	1-3,9-25
X	WO 2022/208832 A1 (JAPAN TOBACCO INC [JP]) 6 October 2022 (2022-10-06) paragraph [0094] - paragraph [0096]; claims 17,35; figures 1-18	1-3,9-25
X,P	WO 2024/013342 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 18 January 2024 (2024-01-18) page 20, line 2 - page 21, line 18; figures 1-2	1,3,10, 15,17, 18,23-25

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

☒ See patent family annex.

* Special categories of cited documents :

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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 June 2024	02/09/2024

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

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2024/050874

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims;; it is covered by claims Nos.:
1-3(completely); 9-25(partially)

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2024/050874

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2024/050874

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		WO 2022208832 A1	06-10-2022
WO 2024013342 A1	18-01-2024	NONE	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-3(completely); 9-25(partially)

   Article with front plug having a specific resistance to draw (in absolute or relative value), wherein the material of the front plug is further defined

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2. claims: 4-8(completely); 9-25(partially)

   Article with front plug circumscribed by two wrappers, wherein at least one wrapper is non-combustible

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3. claims: 26, 27

   Methods of manufacturing an article with front plug according to any of claims 1-24, wherein sub-groups of segments are formed with a sub-wrapper (front plug + aerosol generating portion in claim 26, cooling section + mouthpiece + tubular element in claim 27) before to be combined with the rest of the segments to form the article

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