



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.09.2024 Bulletin 2024/39

(51) International Patent Classification (IPC):
A24D 3/04 (2006.01)

(21) Application number: **24193189.8**

(52) Cooperative Patent Classification (CPC):
A24D 3/048; A24D 3/061

(22) Date of filing: **27.11.2018**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **30.11.2017 EP 17204767**

(62) Document number(s) of the earlier application(s) in
accordance with Art. 76 EPC:
**21215982.6 / 4 005 406
18807089.0 / 3 675 660**

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Remarks:

This application was filed on 06.08.2024 as a
divisional application to the application mentioned
under INID code 62.

(54) **AEROSOL-GENERATING ARTICLE HAVING MOUTHPIECE WITH UPSTREAM CAVITY**

(57) An aerosol-generating article (10) comprises: an aerosol-generating substrate (12); and a mouthpiece (14) in axial alignment with the aerosol-generating substrate (12), the mouthpiece comprising an additive segment (18) of filtration material comprising one or more breakable capsules (22), each breakable capsule (22) comprising an outer shell and an inner core containing an additive. The additive segment (18) of filtration mate-

rial is spaced downstream from the aerosol-generating substrate (12) to define an upstream cavity (24) between the aerosol-generating substrate (12) and the additive segment (18) of filtration material, wherein the upstream cavity is substantially unfilled. A wrapper (26) circumscribes the additive segment (18) of filtration material and the upstream cavity (24).

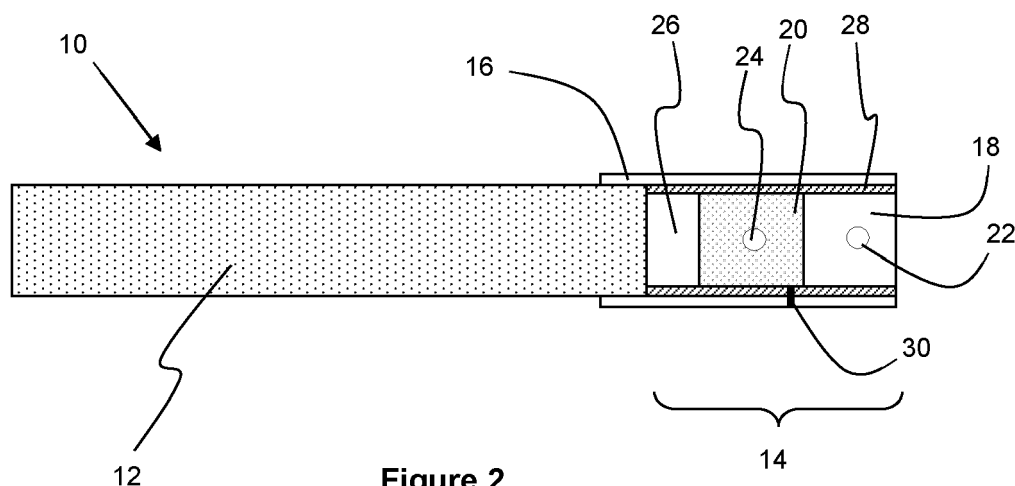


Figure 2

Description

[0001] The present invention relates to an aerosol-generating article having a mouthpiece with an upstream cavity.

[0002] Filter cigarettes typically comprise a cylindrical rod of tobacco cut filler surrounded by a paper wrapper and a cylindrical filter axially aligned in an abutting end-to-end relationship with the wrapped tobacco rod. The cylindrical filter typically comprises a filtration material circumscribed by a paper plug wrap. Conventionally, the wrapped tobacco rod and the filter are joined by a band of tipping wrapper, normally formed of an opaque paper material that circumscribes the entire length of the filter and an adjacent portion of the wrapped tobacco rod. Smoking articles having a cavity at the mouth end of their filter section have also been proposed.

[0003] A number of smoking articles in which tobacco is heated rather than combusted have also been proposed in the art. In heated smoking articles, an aerosol is generated by heating an aerosol generating substrate, such as tobacco. Known heated smoking articles include, for example, smoking articles in which an aerosol is generated by electrical heating or by the transfer of heat from a combustible fuel element or heat source to an aerosol forming substrate. During smoking, volatile compounds are released from the aerosol forming substrate by heat transfer from the heat source and entrained in air drawn through the smoking article. As the released compounds cool they condense to form an aerosol that is inhaled by the consumer. Also known are smoking articles in which a nicotine-containing aerosol is generated from a tobacco material, tobacco extract or other nicotine source, without combustion and in some cases without heating, for example through a chemical reaction.

[0004] It is known to incorporate one or more breakable capsules containing an additive into the mouthpiece of an aerosol-generating article, wherein the one or more breakable capsules are intended to be broken by the consumer through the application of a compressive force to the mouthpiece. The breakage of the one or more capsules releases the additive contained within the capsules into the mouthpiece so that it can be entrained in the smoke or aerosol passing through the mouthpiece. The consumer may choose to break the one or more capsules to release the additive into the mouthpiece before, during or after smoking. For example, it has been previously proposed to incorporate one or more breakable capsules containing an additional flavourant into the mouthpiece of a smoking article, so that the flavourant can be released into the mainstream smoke to provide a modified sensory experience to the consumer.

[0005] Breakable capsules are commonly formed with an inner core including the additive and a frangible outer shell. Upon the application of a force by the consumer, the outer shell cracks and breaks apart so that the inner core is released from the capsule. The breakage of the outer shell typically generates an audible sound, which

indicates to the consumer that the capsule has been broken and the additive released.

[0006] During smoking of a smoking article incorporating a breakable capsule, the smoke drawn through the mouthpiece from the aerosol-generating substrate will typically contact the capsule within the mouthpiece. It has been found that the capsule can be adversely affected by the heat and moisture of the smoke. In particular, it has been found that the outer shell of the capsule can become softened as a result of contact with the smoke, which can make it more difficult for the consumer to break the capsule in order to release the additive. It may also become difficult for the consumer to tell whether the capsule has been broken at all, since the outer shell becomes too soft to produce an audible sound upon breakage. The same problem can arise in a heated aerosol-generating article as a result of the aerosol passing through the mouthpiece in contact with the capsule.

[0007] It would be desirable to provide an aerosol-generating article incorporating a novel mouthpiece arrangement that provides a more reliable and stable means for releasing an additive, such as a flavourant, into the mouthpiece during smoking. In particular, it would be desirable to provide such an aerosol-generating article having a mouthpiece arrangement that reduces the deterioration of a capsule within the mouthpiece as a result of contact with the mainstream smoke or aerosol generated during use. It would be further desirable to provide such an aerosol-generating article that can be manufactured at high speed using existing apparatus and methods without the need for significant modification.

[0008] According to the invention there is provided an aerosol-generating article comprising: an aerosol-generating substrate; and a mouthpiece in axial alignment with the aerosol-generating substrate, the mouthpiece comprising an additive segment of filtration material comprising one or more breakable capsules, each breakable capsule comprising an outer shell and an inner core containing an additive. The additive segment of filtration material is spaced downstream from the aerosol-generating substrate to define an upstream cavity between the aerosol-generating substrate and the additive segment of filtration material, wherein the upstream cavity is substantially unfilled. The aerosol-generating article further comprises a wrapper circumscribing the additive segment of filtration material and the upstream cavity.

[0009] As used herein, the term "aerosol-generating substrate" describes a substrate capable of releasing, upon heating (including combustion), volatile compounds, which can form an aerosol. The aerosol generated from aerosol-generating substrates may be visible or invisible and may include vapours (for example, fine particles of substances, which are in a gaseous state, that are ordinarily liquid or solid at room temperature) as well as gases and liquid droplets of condensed vapours. As used herein, the term "aerosol" encompasses the aerosol produced upon heating of a substrate in a heated aerosol-generating article and the smoke produced upon

combustion of a substrate in a combustible smoking article.

[0010] As used herein, the terms "upstream" and "downstream" describe the relative positions of elements or portions of elements of an aerosol-generating article in relation to the direction in which a user draws on the aerosol-generating article during use. Aerosol-generating articles described herein comprise a downstream end and an opposed upstream end. In use, the consumer draws on the downstream end of the aerosol-generating article. The downstream end, which is also described as the mouth end, is downstream of the upstream end, which may also be described as the distal end.

[0011] As used herein, the term "substantially unfilled" describes a cavity which is substantially free from solid or liquid materials. Preferably, less than 5 percent of the upstream cavity contains solid or liquid material. More preferably, less than 2 percent of the upstream cavity contains solid or liquid material. Most preferably, the upstream cavity is completely unfilled so that the upstream cavity contains no solid or liquid material. The aerosol therefore passes through the upstream cavity in a substantially unrestricted manner.

[0012] Aerosol-generating articles according to the present invention comprise a mouthpiece incorporating an upstream cavity between the aerosol-generating substrate and the additive segment including the one or more capsules. The provision of this upstream cavity advantageously improves the stability of the one or more capsules by significantly reducing the adverse effects of the aerosol on the capsules, as described above. This is due to the fact that the aerosol has to pass through the upstream cavity before it reaches the additive segment, which means that the aerosol is cooler when it comes into contact with the one or more capsules. There will also typically be some condensation of the aerosol within the upstream cavity, which means that the moisture content of the aerosol is reduced before it reaches the additive segment.

[0013] As a result of the upstream cavity, the aerosol is therefore significantly cooler and has a lower moisture content by the time it reaches the one or more capsules within the additive segment than if the aerosol had passed directly from the aerosol-generating substrate into the additive segment. The aerosol therefore has a lesser effect on the outer shell of the one or more capsules. In particular, the softening of the outer shell during use of the aerosol-generating article is reduced and preferably minimised so that the one or more capsules within the additive segment are found to more reliably break upon the application of a compressive force by the consumer. In addition, the one or more capsules retain the ability to generate an audible sound upon breakage so that the consumer can more reliably detect the breakage of the one or more capsules during use.

[0014] The novel mouthpiece arrangement of the present invention can be readily incorporated into an aerosol-generating article without significantly impacting the

manufacturing apparatus and techniques. The mouthpiece components themselves need not be significantly modified and the apparatus for assembling the mouthpiece components can be readily adjusted to provide the novel arrangement with the upstream cavity, without significantly impacting the speed of the assembly process.

[0015] The upstream cavity preferably has a length of at least about 3 millimetres, more preferably at least about 4 millimetres, most preferably at least about 5 millimetres. This ensures that the upstream cavity provides sufficient space for the aerosol to cool and dry to the desired extent before reaching the additive segment. Preferably, the upstream cavity has a length of less than about 30 millimetres, more preferably less than about 25 millimetres. However, in certain embodiments, for example, embodiments in which the upstream cavity is defined by a plug wrap as described below, the upstream cavity preferably has a length of less than about 10 millimetres, more preferably less than about 7 millimetres. The "length" of the upstream cavity refers to the dimension of the upstream cavity in the longitudinal direction of the aerosol-generating article.

[0016] The length of the upstream cavity preferably corresponds to at least about 15 percent of the total length of the mouthpiece, more preferably at least about 20 percent of the total length of the mouthpiece.

[0017] The cross-sectional area of the upstream cavity preferably corresponds to at least about 30 percent of the cross-sectional area of the mouthpiece, more preferably at least about 50 percent of the cross-sectional area of the mouthpiece.

[0018] In some embodiments of the present invention, the upstream cavity extends from the downstream end of the aerosol-generating substrate to the upstream end of the additive segment. In such embodiments, there is no intervening material required between the downstream end of the aerosol-generating substrate and the upstream end of the additive segment.

[0019] In alternative embodiments, the mouthpiece comprises one or more intermediate segments of filtration material between the aerosol-generating substrate and the additive filter segment. For example, an intermediate segment of filtration material may be provided adjacent the aerosol-generating substrate so that the upstream cavity is provided between the intermediate segment of filtration material and the additive segment. Alternatively or in addition, an intermediate segment of filtration material may be provided adjacent the additive segment. Preferably the wrapper of the aerosol-generating articles according to the invention circumscribes any intermediate segments of filtration material that are provided between the aerosol-generating substrate and the additive segment.

[0020] The provision of one or more intermediate segments of filtration material may advantageously provide further cooling and drying of the aerosol before it reaches the additive segment, so that the effect of the aerosol on the one or more capsules can be further reduced.

[0021] The upstream cavity of the mouthpiece of aerosol-generating articles according to the invention may be defined by any suitable means.

[0022] In certain preferred embodiments of the present invention, the wrapper circumscribing the additive segment and the upstream cavity is a plug wrap and the plug wrap defines the upstream cavity. The plug wrap therefore extends upstream of the additive segment to define the upstream cavity. In such embodiments, the plug wrap preferably has a basis weight of at least about 50 grams per square metre, more preferably at least about 70 grams per square metre. This provides a relatively stiff plug wrap that maintains the structural rigidity of the upstream cavity and helps to prevent collapse of the upstream cavity during manufacture, or during use. For example, the plug wrap may have a basis weight of between about 50 grams per square metre and about 120 grams per square metre, or between about 70 grams per square metre and about 110 grams per square metre.

[0023] The use of the plug wrap to define the upstream cavity may simplify the manufacturing process, since no additional components are required to be incorporated into the mouthpiece.

[0024] In embodiments in which the plug wrap defines the upstream cavity, the length of the upstream cavity is typically limited in order to retain the structural integrity of the mouthpiece. Furthermore, in such embodiments, the upstream cavity will not significantly contribute to the RTD of the mouthpiece. The desired level of RTD must therefore be provided by the additive segment and any other mouthpiece components downstream of the upstream cavity. In such embodiments, the upstream cavity therefore preferably has a length of no more than 7 millimetres, for example a length of between about 5 millimetres and about 7 millimetres.

[0025] In such embodiments, the length of the upstream cavity preferably corresponds to less than about 25 percent of the overall length of the mouthpiece, more preferably less than about 20 percent of the overall length of the mouthpiece. The length of the upstream cavity in these embodiments is therefore preferably between about 15 percent and about 25 percent of the overall length of the mouthpiece.

[0026] In alternative preferred embodiments, the mouthpiece comprises a hollow tube segment between the substrate and the filter segment, wherein the hollow tube segment defines the upstream cavity. The use of a hollow tube segment to define the upstream cavity may advantageously make the upstream cavity more resistant to collapse or deformation during manufacture and subsequent use of the aerosol-generating article. In some cases, the hollow tube segment may additionally contribute to the overall RTD of the mouthpiece.

[0027] The hollow tube segment may be formed from any suitable material. For example, the hollow tube segment may be formed from an annular shaped segment of filtration material, such as cellulose acetate, having a hollow core extending from the upstream end of the an-

nular shaped segment of filtration material to the downstream end of the annular shaped segment of filtration material. Such segments may be referred to as a hollow acetate tube.

[0028] Preferably, the filtration material of the annular shaped segment comprises fibres of between approximately 2.1 denier per filament (dpf) and approximately 12 dpf, more preferably between approximately 3.0 denier per filament (dpf) and approximately 10 dpf. Preferably, the filtration material of the annular shaped segment comprises fibres of between approximately 30000 total denier (td) and approximately 50000 td, more preferably between 35000 total denier (td) and approximately 45000 td.

[0029] In a preferred embodiment, the filtration material of the annular shaped segment comprises fibres of approximately 40000 td. Preferably, the hollow tube segment comprises one or more plasticisers. Suitable plasticisers include triacetin, triethyl citrate and triethylenglycol di-acetate. Preferably, the plasticiser is present in the annular shaped segment in an amount of between about 8 and about 25 percentage weight, more preferably between about 10 and about 22 percentage weight. This can help the hollow tube segment to maintain its structural rigidity in the mouthpiece.

[0030] Preferably, where the hollow tube is an annular shaped segment of filtration material such as a hollow acetate tube, the wall thickness of the hollow tube segment is at least about 0.3 millimetres, more preferably at least about 0.5 millimetres. Alternatively or in addition, the wall thickness of the hollow tube segment in such embodiments is less than about 1.2 millimetres, more preferably less than about 1.1 millimetres. In some preferred embodiments, the wall thickness of the hollow tube segment is between about 0.5 millimetres and about 1.1 millimetres.

[0031] In some other preferred embodiments, the hollow tube segment is formed from a paper material. More preferably, the hollow tube segment is formed from a plurality of overlapping paper layers, such as a plurality of parallel wound paper layers or a plurality of spirally wound paper layers. Forming the hollow tube segment from a plurality of overlapping paper layers can help to improve resistance to collapse or deformation.

[0032] Preferably, each hollow tube segment comprises at least two paper layers. Alternatively, or in addition, each hollow tube segment preferably comprises fewer than eleven paper layers.

[0033] Preferably, at least one of the paper layers is made from a paper with a basis weight of at least about 100 grams per square metre.

[0034] Preferably, where the hollow tube segment is formed of paper layers, the wall thickness of the hollow tube segment is at least about 100 micrometres. More preferably, the wall thickness of the hollow tube segment is at least about 200 micrometres. Alternatively, or in addition, the wall thickness of the hollow tube segment in such embodiments is less than about 300 micrometres.

Preferably, the wall thickness of the hollow tube segment is less than about 270 micrometres. In some preferred embodiments, the wall thickness of the hollow tube segment is from about 100 micrometres to about 300 micrometres, preferably from 200 micrometres to 270 micrometres.

[0035] Where the upstream cavity is defined by a hollow tube segment, as described above, the length of the upstream cavity may be significantly greater than where the upstream cavity is defined by a plug wrap. For example, the upstream cavity may be up to 30 millimetres in length, or up to 25 millimetres in length. This is due to the structural rigidity provided by the hollow tube segment, which reduces the risk of collapse of the upstream cavity.

[0036] In such embodiments, the length of the upstream cavity may correspond to up to about 85 percent of the overall length of the mouthpiece, or up to about 70 percent of the overall length of the mouthpiece. The length of the upstream cavity in these embodiments is therefore preferably between about 15 percent and about 85 percent of the overall length of the mouthpiece.

[0037] The additive segment of the mouthpiece of aerosol-generating articles according to the present invention comprises a segment of filtration material containing one or more breakable capsules. The additive segment preferably has a length of at least about 8 millimetres, more preferably at least about 10 millimetres, most preferably about 12 millimetres long. Preferably, the additive segment has a length of less than about 16 millimetres, more preferably less than about 14 millimetres.

[0038] In some embodiments of the present invention, for example where the upstream cavity is defined by the plug wrap, the length of the additive segment may be greater than the length of the upstream cavity. For example, the length of the additive segment may be at least 1.5 times the length of the upstream cavity, more preferably at least 2 times the length of the upstream cavity.

[0039] In other embodiments of the present invention, for example where the upstream cavity is defined by a hollow tube segment, the length of the additive segment may be lower than or substantially the same as the length of the upstream cavity. For example, the length of the additive segment may be between about 0.25 times and about 1 times the length of the upstream cavity.

[0040] The length of the additive segment preferably corresponds to at least about 20 percent of the overall length of the mouthpiece, more preferably at least about 30 percent. Preferably, the length of the additive segment corresponds to less than about 85 percent of the overall length of the mouthpiece, more preferably less than about 60 percent.

[0041] The additive segment preferably comprises a plug of fibrous filtration material, such as cellulose acetate tow or paper. A filter plasticiser may be applied to the fibrous filtration material in a conventional manner, by spraying it onto the separated fibres.

[0042] The additive segment may include a single

breakable capsule. For example, in one preferred embodiment, the additive segment comprises a single breakable capsule within a plug of cellulose acetate tow. Where a single breakable capsule is provided, the breakable capsule is preferably substantially spherical with a diameter of between about 2 millimetres and about 5 millimetres. The single capsule is preferably provided approximately centrally along the length of the additive segment.

[0043] The additive segment may alternatively comprise a plurality of breakable capsules dispersed through the segment. The plurality of breakable capsules may all contain the same additive, or the breakable capsules may contain two or more different additives.

[0044] The additive contained in the one or more breakable capsules may include at least one flavourant comprising at least one of menthol, linalool, thymol, eucalyptol, methyl salicylate, and combinations thereof. Additionally, or alternatively, the at least one flavourant may comprise at least one of lemon oil, peppermint oil, parsley oil, champignon essence, green tea extract, oolong tea extract, mugwort drawing-extract, apple extract, kaki-fruit extract, ginger essence, and combinations thereof. Suitable flavourants are described in US-6426089-B1.

[0045] The at least one flavourant may comprise a diluent. The diluent may comprise at least one of palm oil and a medium-chain triglyceride.

[0046] Many naturally occurring flavourants can be obtained either by extraction from a natural source or by chemical synthesis if the structure of the compound is known. The flavourants can be extracted from a part of a plant or an animal by physical means, by enzymes, or by water or an organic solvent, and thus include any extractive, essence, hydrolysate, distillate, or absolute thereof. Plants that can be used to provide flavourants include, but are not limited to, those belonging to the families, *Lamiaceae* (for example, mints), *Apiaceae* (for example, anise, fennel), *Lauraceae* (for example, laurels, cinnamon, rosewood), *Rutaceae* (for example, citrus fruits), *Myrtaceae* (for example, anise myrtle), and *Fabaceae* (for example, liquorice). Non-limiting examples of sources of flavourants include mints such as peppermint and spearmint, coffee, tea, cinnamon, clove, ginger, cocoa, vanilla, chocolate, eucalyptus, geranium, agave, juniper, lemon balm, basil, cinnamon, lemon basil, chive, coriander, lavender, sage, tea, thyme and caraway. The term "mints" is used to refer to plants of the genus *Mentha*. Suitable types of mint leaf may be taken from plant varieties including but not limited to *Mentha piperita*, *Mentha arvensis*, *Mentha niliaca*, *Mentha citrata*, *Mentha spicata*, *Mentha spicata crispa*, *Mentha cordifolia*, *Mentha longifolia*, *Mentha pulegium*, *Mentha suaveolens*, and *Mentha suaveolens variegata*.

[0047] The additive contained in the one or more breakable capsules may provide one or more sensory effects other than a flavour sensation, such as a cooling or a warming sensation, a tingling sensation, a numbing sensation, effervescence, increased salivation, cough

suppression, and combinations thereof. These sensory effects may be provided by one or more flavourants, including the flavourants listed above. Additionally, or alternatively, the additive may comprise at least one non-flavourant material which provides one or more of these sensory effects without providing a flavour sensation. For example, suitable compounds that produce a cooling effect and can be used as an active material include, but are not limited to, the family of carboxamide compounds, such as the Wilkinson-Sword (WS) compounds WS-3 (N-Ethyl-p-menthane-3-carboxamide), WS-23 (2-Iso-propyl-N,2,3-trimethylbutyramide), WS-5 [Ethyl 3-(p-menthane-3-carboxamido)acetate], WS-27 (N-Ethyl-2,2-diisopropylbutanamide), WS-14 [N-([ethoxycarbonyl]methyl)-p-menthane-3-carboxamide], and WS-116 (N-(1,1-Dimethyl-2-hydroxyethyl)-2,2-diethylbutanamide). A suitable compound that provides a cough suppression effect is benzonatate.

[0048] The one or more breakable capsules are preferably provided at least about 2 millimetres from the upstream end of the additive segment, more preferably at least about 4 millimetres. This maximises the separation of the one or more capsules from the aerosol-generating substrate which in turn maximises the reduction in temperature and moisture content of the aerosol before it reaches the capsules. In addition, the positioning of the one or more capsules away from the upstream end of the additive segment ensures that the additive is effectively dispersed through the additive segment after it has been released from the one or more capsules and does not leak into the upstream cavity.

[0049] The one or more breakable capsules in the additive segment are preferably provided at least about 5 millimetres from the downstream end of the aerosol-generating substrate, more preferably at least about 8 millimetres from the downstream end of the aerosol-generating substrate and most preferably at least about 10 millimetres from the downstream end of the aerosol-generating substrate. For example, the one or more breakable capsules in the additive segment may be provided at a distance of between about 5 millimetres and about 12 millimetres from the downstream end of the aerosol-generating substrate.

[0050] The mouthpiece of aerosol-generating articles according to the invention may include only the additive segment downstream of the upstream cavity. Alternatively, the mouthpiece may further comprise a downstream segment of filtration material downstream of the additive segment. Preferably, the downstream segment of filtration material are in an abutting end-to-end relationship with the additive segment.

[0051] Where present, the downstream segment of filtration material preferably comprises one or more additional breakable capsules, which may be the same as the one or more breakable capsules in the additive segment, or different.

[0052] Alternatively or in addition to the provision of one or more additional breakable capsules within the

downstream segment of filtration material, the downstream segment of filter material may optionally incorporate a downstream recess. Preferably, the downstream recess provides a mouth end recess to the mouthpiece. Where present, the recess may have a length of between about 3 millimetres and about 8 millimetres, most preferably about 5 millimetres.

[0053] The downstream segment of filtration material preferably has a length of at least about 8 millimetres, more preferably at least about 9 millimetres, most preferably about 10 millimetres long. Preferably, the downstream segment has a length of less than about 14 millimetres, more preferably less than about 12 millimetres. The length of the downstream segment of filtration material may be approximately equal to the length of the additive segment. Alternatively, the additive segment may be at least about 1 millimetre longer than the downstream segment of filtration material, or at least about 2 millimetres longer. Alternatively, the additive segment may be at least 1 millimetre shorter than the downstream segment of filtration material, or at least 2 millimetres longer.

[0054] The downstream segment of filtration material may be formed of the same filtration material as the additive segment, or a different filtration material. In one preferred embodiment, both the additive segment and the downstream segment of filtration material are formed of plugs of cellulose acetate tow.

[0055] The downstream segment of filtration material may be selected to provide a required resistance to draw (RTD). Preferably, the downstream segment of filtration material has an RTD of at least about 5 mm WG (water gauge). Preferably, the downstream segment of filtration material has an RTD of less than about 120 mm WG, more preferably less than about 80 mm WG. RTD is measured in accordance with ISO 6565:2002.

[0056] Preferably, the mouthpiece of aerosol-generating articles according to the present invention further comprises one or more ventilation zones provided over the additive segment. Preferably, the one or more ventilation zones are provided upstream of the one or more capsules in the additive segment. The provision of an upstream ventilation zone introduces cooler air into the aerosol upstream of the one or more capsules. This advantageously provides an additional cooling effect on the aerosol to further minimise the impact of the aerosol on the breakability of the outer shell. In addition, the air introduced into the mouthpiece through the one or more ventilation zones dilutes the aerosol, thereby reducing the moisture content. This further minimises the impact of the aerosol on the outer shell.

[0057] The one or more ventilation zones are preferably provided at least about 1 millimetre upstream of the one or more capsules in the additive segment, more preferably at least about 2 millimetres upstream of the one or more capsules. This ensures that the cooling air is introduced into the mouthpiece sufficiently upstream of the one or more capsules that the cooling air can be mixed

into the aerosol.

[0058] The one or more ventilation zones are preferably provided at least about 2 millimetres from the upstream end of the additive segment, more preferably at least about 3 millimetres from the upstream end of the additive segment.

[0059] The ventilation level of the additive segment is preferably between about 20 percent and about 80 percent, as measured in accordance with ISO 9512:2002.

[0060] The one or more ventilation zones may be provided by one or more circumferential rows of perforations in the wrapper or wrappers circumscribing the additive segment. For example, an on-line laser perforation process may be used to form the required ventilation zones in the wrapper.

[0061] Alternatively or in addition to the one or more ventilation zones provided over the additive segment, as described above, the mouthpiece may comprise one or more ventilation zones provided over the upstream cavity. The provision of one or more ventilation zones over the upstream cavity introduces air into the upstream cavity during smoking. This advantageously increases the turbulence of the aerosol within the upstream cavity and increases the residence time of the aerosol within the cavity. As a result, the aerosol has more time to cool before reaching the one or more breakable capsules in the additive segment.

[0062] As described above, the mouthpiece of aerosol-generating articles according to the present invention comprises a wrapper circumscribing the upstream cavity and the additive segment. The wrapper is preferably a plug wrap that circumscribes the additive cavity and circumscribes or defines the upstream cavity. Where the plug wrap defines the upstream cavity, as described above, the plug wrap is preferably a stiff plug wrap with a relatively high basis weight, as described. Where a downstream segment of filtration material is provided downstream of the additive segment, the plug wrap preferably also circumscribes the downstream segment of filtration material to combine the mouthpiece components. Similarly, where one or more intermediate segments of filtration material are provided between the aerosol-generating substrate and the additive segment, the plug wrap preferably circumscribes the intermediate segments of filtration material to combine all of the mouthpiece components.

[0063] Preferably, the wrapper does not extend about any part of the aerosol-generating substrate. Preferably, the wrapper extends between the downstream end of the aerosol generating substrate and the downstream end of the mouthpiece. Utilising a wrapper which does not extend about any part of the aerosol-generating substrate advantageously simplifies the construction of the aerosol-generating article, since it allows the mouthpiece to be formed separately from the aerosol-generating substrate and then subsequently attached thereto later in the manufacturing process. Additionally, by utilising a wrapper which does not extend about any part of the

aerosol-generating substrate it is possible to construct the mouthpiece and the aerosol-generating substrate with the same external diameter, which facilitates connecting the mouthpiece and the aerosol-generating substrate together (for example, with a tipping wrapper).

[0064] To connect the mouthpiece to the aerosol-generating substrate, aerosol-generating articles according to the present invention may include a tipping wrapper circumscribing the mouthpiece and at least a portion of the aerosol-generating substrate. The tipping wrapper may comprise paper having a basis weight of less than about 70 grams per square metre, preferably less than about 40 grams per square metre. The tipping wrapper preferably has a basis weight of more than about 20 grams per square metre.

[0065] The mouthpiece of aerosol-generating articles according to the invention preferably has an overall length of between about 20 millimetres and about 35 millimetres, as measured between the downstream end of the aerosol-generating substrate and the mouth end of the aerosol-generating article. For example, the mouthpiece may have an overall length of about 27 millimetres.

[0066] Preferably, the aerosol-generating substrate of aerosol-generating articles according to the present invention comprises a wrapped rod of tobacco which can be combusted to form smoke. Alternatively, the aerosol-generating substrate may be a source of tobacco material, tobacco extract, or other nicotine source, which can be heated, without combustion, to generate an aerosol.

[0067] The aerosol-generating substrate may have a length of between about 45 millimetres and about 65 millimetres. For example, the aerosol-generating substrate may have a length of about 56 millimetres.

[0068] Aerosol generating articles according to the present invention may be filter cigarettes or other smoking articles in which the aerosol generating substrate comprises a tobacco material that is combusted to form smoke. Therefore, in any of the embodiments described above, the aerosol generating substrate may comprise a tobacco rod.

[0069] Alternatively, aerosol generating articles according to the present invention may be articles in which a tobacco material is heated to form an aerosol, rather than combusted. In one type of heated aerosol generating article, a tobacco material is heated by one or more electrical heating elements to produce an aerosol. In another type of heated aerosol-generating article, an aerosol is produced by the transfer of heat from a combustible or chemical heat source to a physically separate tobacco material, which may be located within, around or downstream of the heat source. The present invention further encompasses aerosol-generating articles in which a nicotine-containing aerosol is generated from a tobacco material, tobacco extract, or other nicotine source, without combustion, and in some cases without heating, for example through a chemical reaction.

[0070] The aerosol-generating article may have an overall length of between about 40 millimetres and about

90 millimetres, as measured between the upstream end of the aerosol-generating article and the mouth end of the aerosol-generating article. For example, the aerosol-generating article may have an overall length of about 83 millimetres.

[0071] The aerosol-generating article may have an external diameter (including any tipping wrapper that may be present) of between about 4 millimetres and about 9 millimetres. For example, the aerosol-generating article may have a diameter of about 7.8 millimetres. In other preferred embodiments, the aerosol-generating article may have a diameter of less than about 7.1 millimetres, or less than about 6 millimetres. The present invention finds particular application in mouthpieces for "thin" or "slim" aerosol-generating article having a diameter of less than about 7.1 millimetres. In such aerosol-generating articles the deterioration of capsules in the mouthpiece as a result of contact with the aerosol during use can be particularly problematic.

[0072] The invention will now be further described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a perspective view of an aerosol-generating article in accordance with the present invention; and

Figure 2 shows a longitudinal cross-sectional view of the aerosol-generating article of Figure 1.

[0073] Figures 1 and 2 illustrate an aerosol-generating article 10 in accordance with the present invention. The aerosol-generating article 10 comprises a wrapped tobacco rod 12 of tobacco cut filler which is attached at one end to an axially aligned mouthpiece 14. A band of tipping paper 16 circumscribes the mouthpiece 14 and a portion of the wrapped tobacco rod 12 to join together the two components of the aerosol-generating article 10.

[0074] As shown in Figure 2, the mouthpiece 14 comprises a first filter segment 18 and a second filter segment 20. The first filter segment 18 is provided at the mouth end of the mouthpiece 14 and comprises a wrapped plug of cellulose acetate tow containing a centrally positioned capsule 22. The first filter segment 18 has a length of 10 millimetres. The second filter segment 20 is provided upstream of the first filter segment 18 and the downstream end of the second filter segment 20 abuts the upstream end of the first filter segment 18. The second filter segment 20 comprises a wrapped plug of cellulose acetate tow containing a centrally positioned capsule 24.

[0075] Each of the capsules 22, 24 comprises an inner core of a flavourant additive and a frangible outer shell.

[0076] As shown in Figure 2, the second filter segment 20 is spaced apart from the wrapped tobacco rod 12 in the longitudinal direction and an upstream cavity 26 is provided between the second filter segment 20 and the wrapped tobacco rod 12. The upstream cavity 26 is unfilled and has a length of 5 millimetres.

[0077] The upstream cavity 26 is defined by a combin-

ing plug wrap 28 which circumscribes the first filter segment 18 and the second filter segment 20 and extends upstream of the second filter segment 20 by 5 millimetres. The combining plug wrap 28 therefore does not extend over the wrapped tobacco rod 12. The tipping wrapper 16 overlies the combining plug wrap 28 to connect the mouthpiece 14 and the wrapped tobacco rod 12, as shown in Figure 2.

[0078] The combining plug wrap 28 is formed of a sheet of a paper material having a basis weight of at least 70 grams per square metre such that the combining plug wrap 28 has a relatively high stiffness.

[0079] The aerosol-generating article 10 further comprises a ventilation zone 30 at a location along the second filter segment 20, upstream of the capsule 24. The ventilation zone 30 comprises a row of perforations extending through the tipping wrapper 16 and the combining plug wrap 28.

[0080] During smoking of the aerosol-generating article 10, the mainstream smoke generated from the tobacco in the wrapped rod 12 passes into the upstream cavity 26 before passing through the second filter segment 20 and coming into contact with the capsule 24. The smoke continues downstream and passes through the first filter segment 18 in contact with the capsule 22. The mainstream smoke cools down as it passes through the upstream cavity 26 and the effect of the mainstream smoke on the capsules 22, 24 is therefore minimised. The capsules 22, 24 retain their frangibility during smoking and can still be broken by the consumer after smoking to produce an audible sound.

[0081] Embodiments of the invention can be described with reference to the following numbered clauses, with preferred features laid out in the dependent clauses:

1. An aerosol-generating article comprising:

an aerosol-generating substrate; and
a mouthpiece in axial alignment with the aerosol-generating substrate, the mouthpiece comprising an additive segment of filtration material comprising one or more breakable capsules, each breakable capsule comprising an outer shell and an inner core containing an additive, wherein the additive segment of filtration material is spaced downstream from the aerosol-generating substrate to define an upstream cavity between the aerosol-generating substrate and the additive segment of filtration material, wherein the upstream cavity is substantially unfilled; and
a wrapper circumscribing the additive segment of filtration material and the upstream cavity.

2. An aerosol-generating article according to clause 1, wherein the upstream cavity has a length of at least 3 millimetres.

3. An aerosol-generating article according to clause 1 or 2, wherein the wrapper is a plug wrap and wherein the upstream cavity is defined by the plug wrap.

4. An aerosol-generating article according to clause 3, wherein the plug wrap is formed of a sheet material having a basis weight of at least 50 grams per square metre.

5. An aerosol-generating article according to clause 3 or 4, wherein the length of the upstream cavity corresponds to no more than 25 percent of the overall length of the mouthpiece.

6. An aerosol-generating article according to clause 1 or 2, wherein the mouthpiece comprises a hollow tube segment between the first segment of filtration material and the aerosol-generating substrate, the hollow tube segment defining the upstream cavity.

7. An aerosol-generating article according to clause 6, wherein the length of the upstream cavity defined by the hollow tube segment is up to 30 millimetres.

8. An aerosol-generating article according to any preceding clause, wherein the upstream cavity extends from a downstream end of the aerosol-generating substrate to an upstream end of the additive segment.

9. An aerosol-generating article according to any preceding clause, wherein the mouthpiece further comprises a downstream segment of filtration material, downstream of the additive segment.

10. An aerosol-generating article according to clause 9, wherein the downstream segment of filtration material comprises one or more additional breakable capsules, each additional breakable capsule comprising an outer shell and an inner core containing an additive.

11. An aerosol-generating article according to any preceding clause wherein the mouthpiece is provided with one or more ventilation zones around the additive segment of filtration material.

12. An aerosol-generating article according to clause 11, wherein the one or more ventilation zones are provided upstream of the one or more breakable capsules in the additive segment of filtration material.

13. An aerosol-generating article according to clause 12, wherein the one or more ventilation zones are provided at least 2 millimetres upstream of the one or more breakable capsules in the additive segment of filtration material.

14. An aerosol-generating article according to any preceding clause, wherein the additive segment of filtration material comprises a single breakable capsule having a maximum width of between 2 millimetres and 5 millimetres.

15. An aerosol-generating article according to any preceding clause, wherein the aerosol-generating substrate is a tobacco rod and wherein the aerosol-generating article further comprises a tipping wrapper securing the mouthpiece in axial alignment with the tobacco rod.

Claims

1. An aerosol-generating article comprising:

an aerosol-generating substrate; and
a mouthpiece in axial alignment with the aerosol-generating substrate, the mouthpiece comprising an additive segment of filtration material comprising one or more breakable capsules, each breakable capsule comprising an outer shell and an inner core containing an additive, wherein the additive segment of filtration material is spaced downstream from the aerosol-generating substrate to define an upstream cavity between the aerosol-generating substrate and the additive segment of filtration material, wherein the upstream cavity is substantially unfilled;
a wrapper circumscribing the additive segment of filtration material and the upstream cavity; and
wherein an intermediate segment of filtration material is provided adjacent the additive segment.

2. An aerosol-generating article according to claim 1, wherein the additive segment has a length of between about 8 millimetres and about 16 millimetres.

3. An aerosol-generating article according to claim 1 or claim 2, wherein the length of the additive segment is lower than or substantially the same as the length of the upstream cavity.

4. An aerosol-generating article according to claim 3, wherein the length of the additive segment may be between about 0.25 times and about 1 times the length of the upstream cavity.

5. An aerosol-generating article according to any preceding claim, wherein the mouthpiece comprises one or more ventilation zones provided over the upstream cavity.

6. An aerosol-generating article according to any pre-

ceding claim, wherein the length of the additive segment is lower than the length of the upstream cavity.

7. An aerosol-generating article according to any preceding claim, wherein the additive segment includes a single breakable capsule provided approximately centrally along the length of the additive segment. 5
8. An aerosol-generating article according to any preceding claim, wherein the upstream cavity has a length of at least 3 millimetres. 10
9. An aerosol-generating article according to any preceding claim, wherein the wrapper is a plug wrap and wherein the upstream cavity is defined by the plug wrap. 15
10. An aerosol-generating article according to claim 9, wherein the plug wrap is formed of a sheet material having a basis weight of at least 50 grams per square metre. 20
11. An aerosol-generating article according to any preceding claim, wherein the mouthpiece further comprises a downstream segment of filtration material, downstream of the additive segment. 25
12. An aerosol-generating article according to claim 11, wherein the downstream segment of filtration material comprises one or more additional breakable capsules, each additional breakable capsule comprising an outer shell and an inner core containing an additive. 30
13. An aerosol-generating article according to any preceding claim, wherein the additive segment of filtration material comprises a single breakable capsule having a maximum width of between 2 millimetres and 5 millimetres. 35
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14. An aerosol-generating article according to any preceding claim, wherein the aerosol-generating substrate is a tobacco rod and wherein the aerosol-generating article further comprises a tipping wrapper securing the mouthpiece in axial alignment with the tobacco rod. 45
15. An aerosol-generating substrate according to claim 14, wherein the tipping wrapper comprises paper having a basis weight of less than about 70 grams per square metre 50

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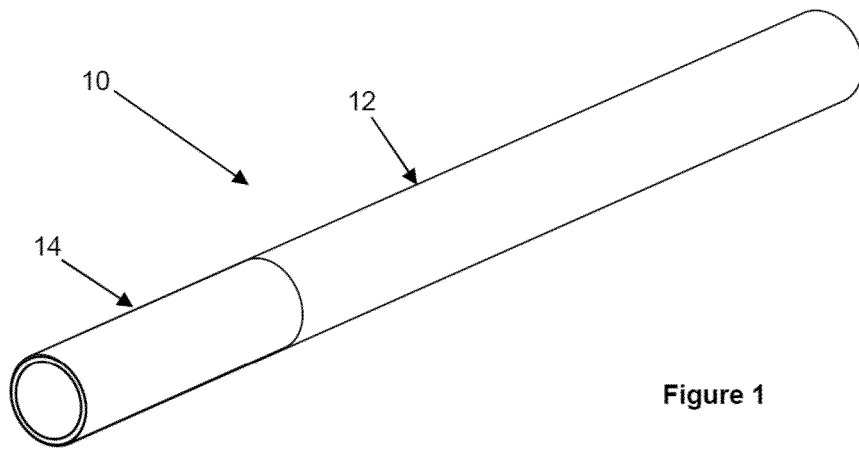


Figure 1

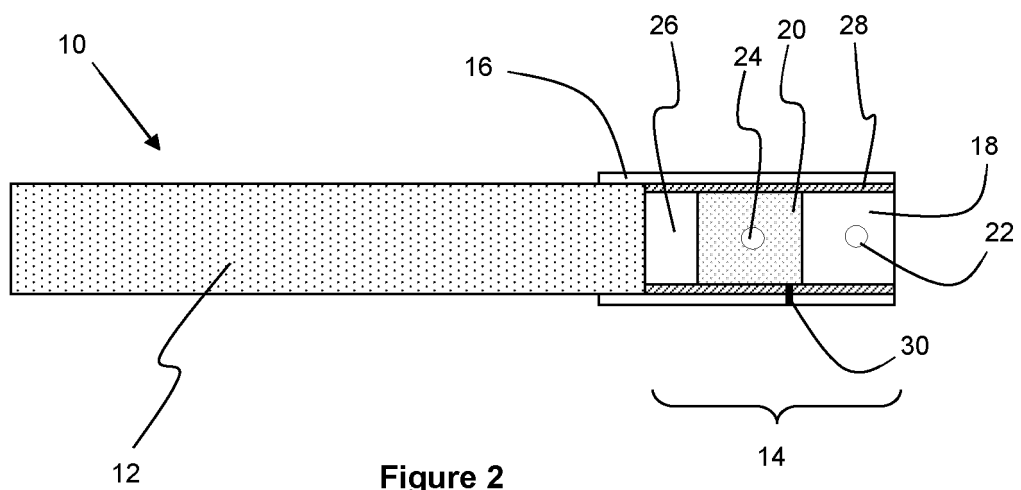


Figure 2

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 6426089 B1 **[0044]**