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(54) **SMOKING ARTICLE WITH DOWNSTREAM FLAVOR ADDITION**

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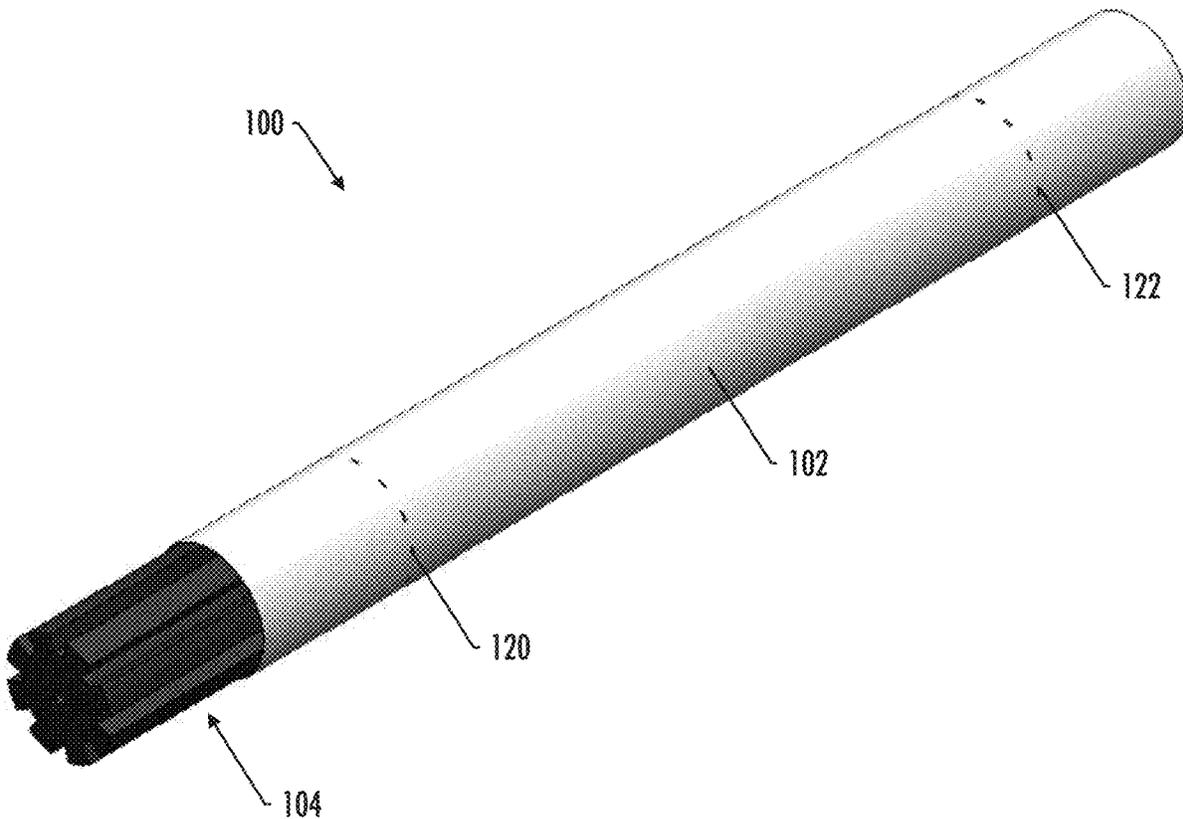
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(57) **ABSTRACT**

A smoking article that comprises at least one substrate material section having an aerosol precursor composition associated therewith, a flavor addition component, and a mouthpiece disposed downstream from the at least one substrate material section, the mouthpiece including a filter. In one implementation, the mouthpiece may include the flavor addition component, and the flavor addition component may comprise a plurality of flavor beads proximate a hollow flow tube, the flow tube including a plurality of peripheral openings defined therethrough. In another implementation, the mouthpiece may include the flavor addition component, the filter may define a cavity therein, the flavor addition component may comprise a plurality of flavor beads, and the plurality of flavor beads may be located in the cavity.



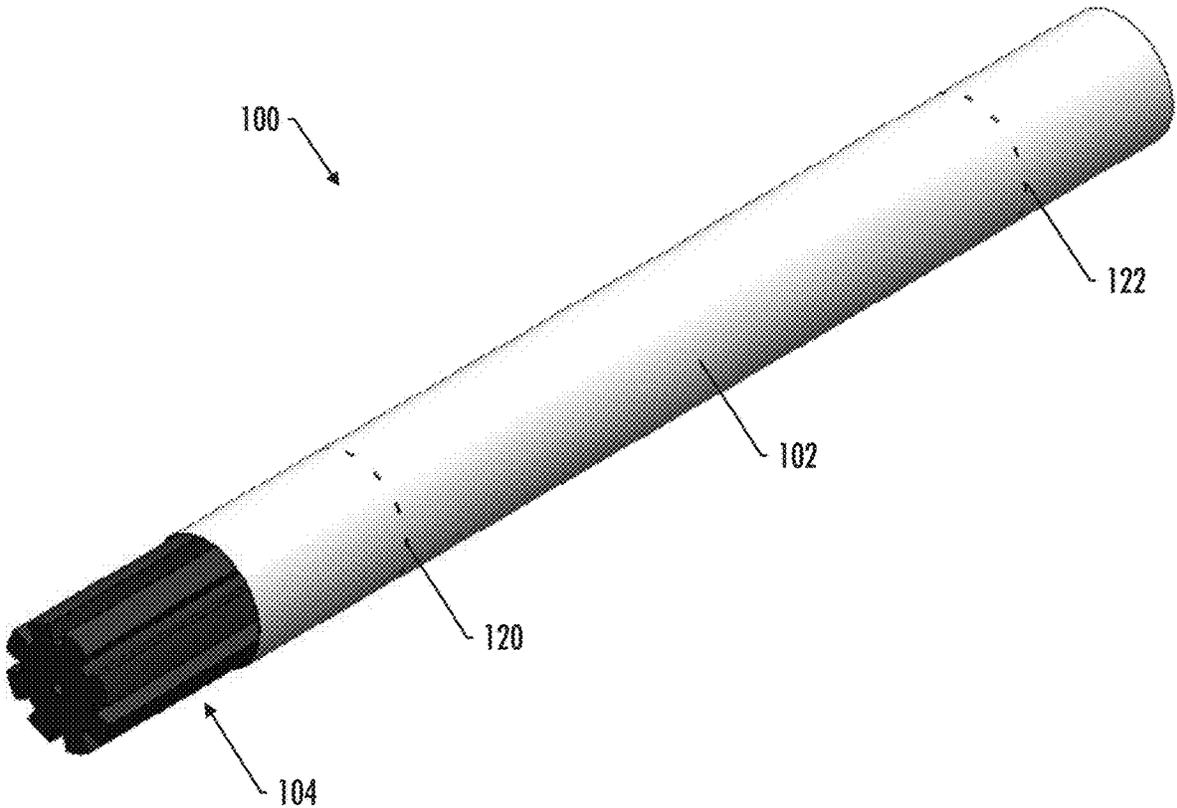


FIG. 1

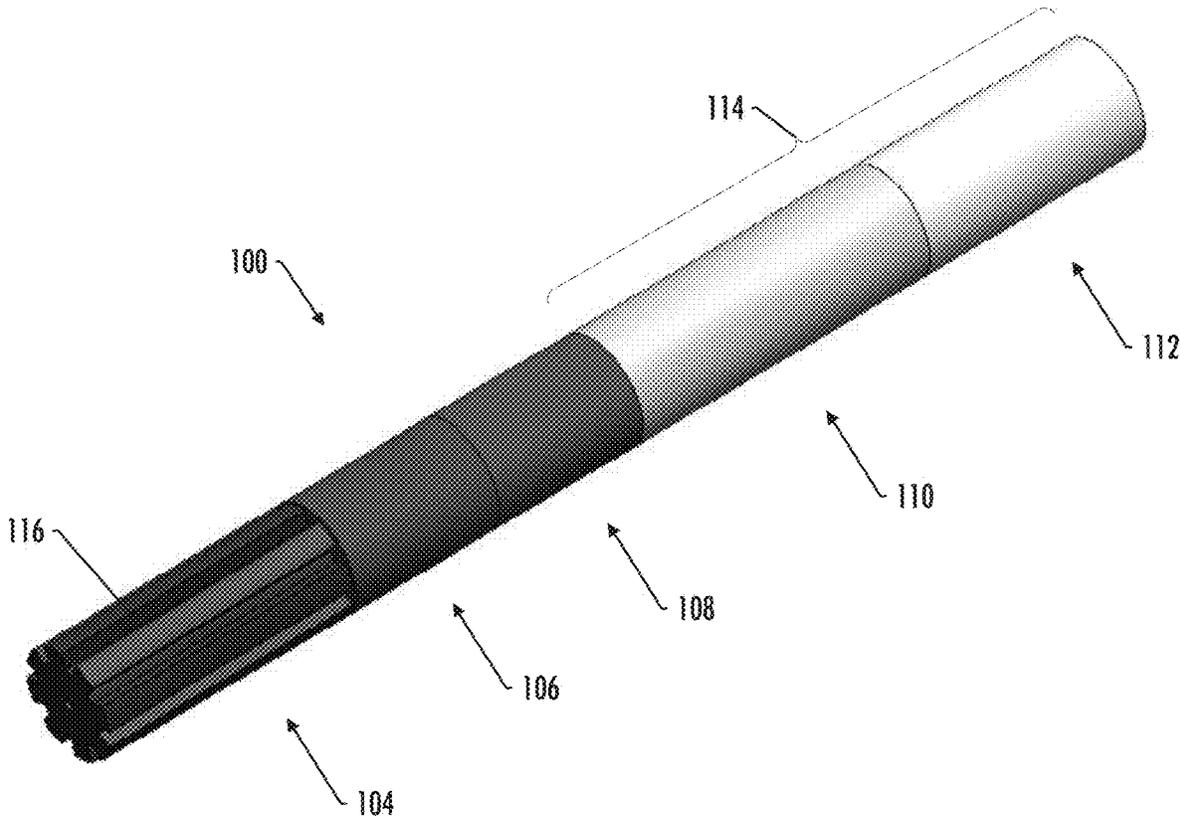


FIG. 2

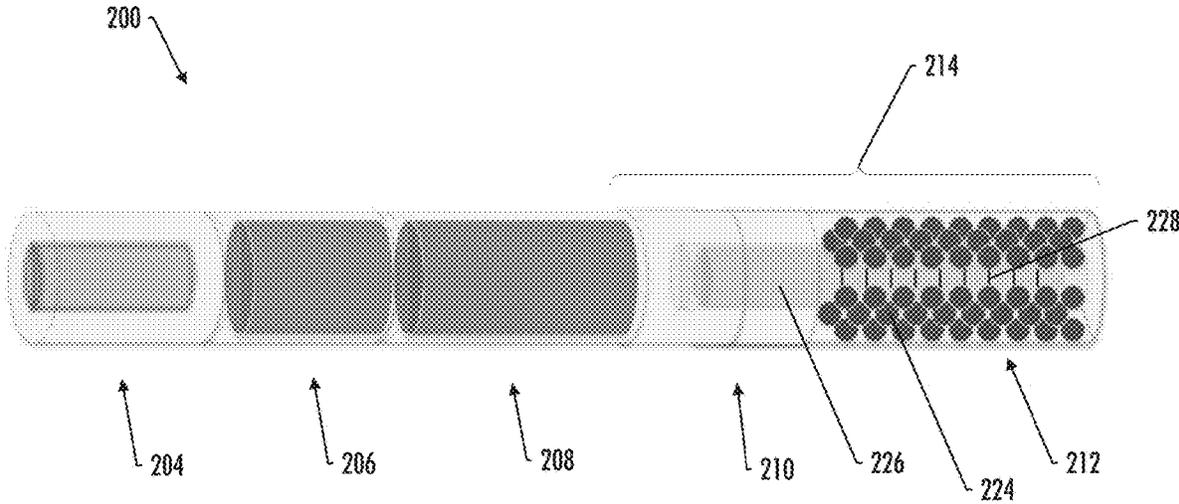


FIG. 3

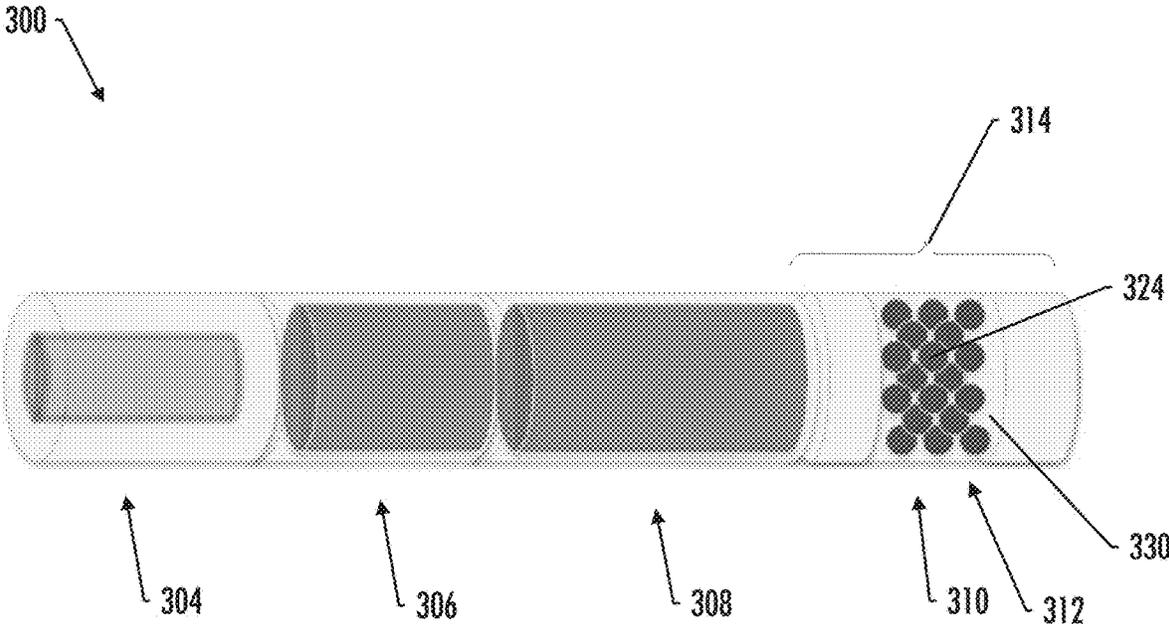


FIG. 4

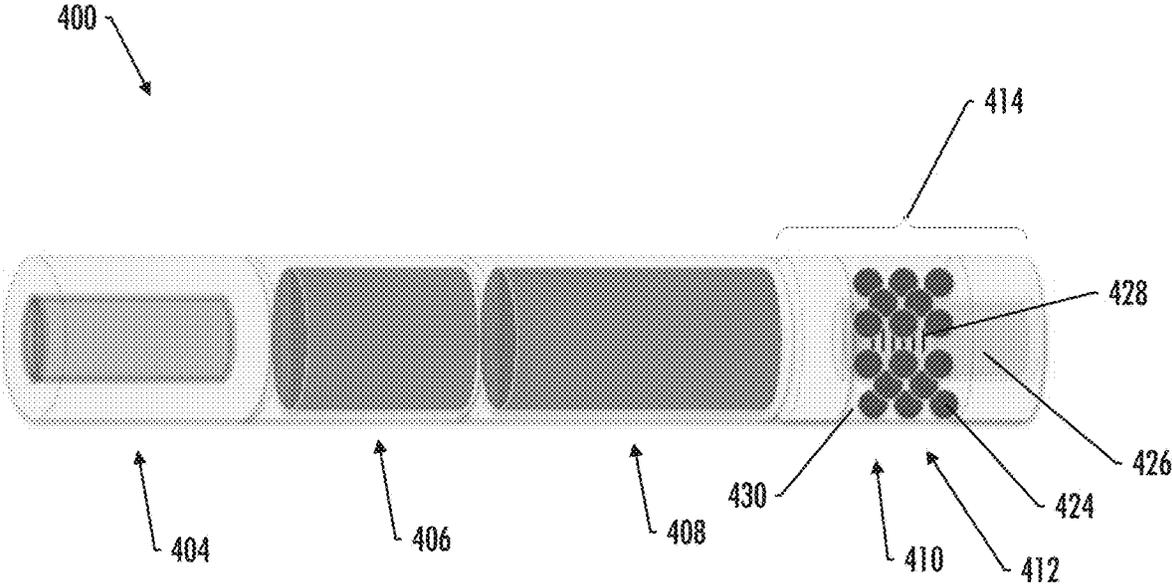


FIG. 5

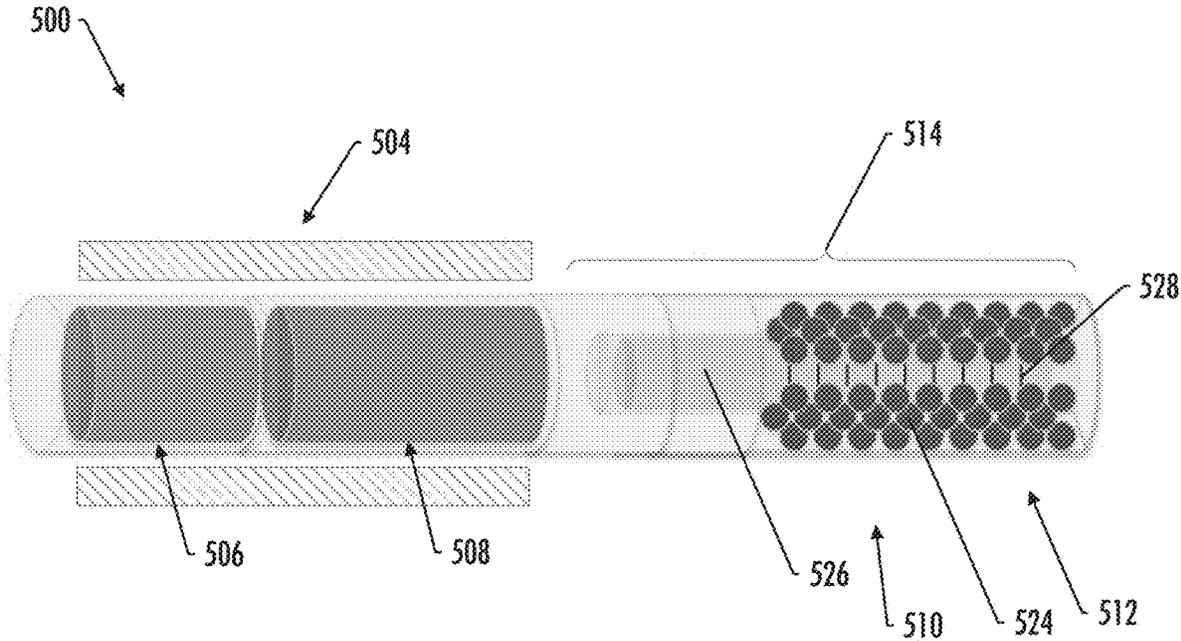


FIG. 6

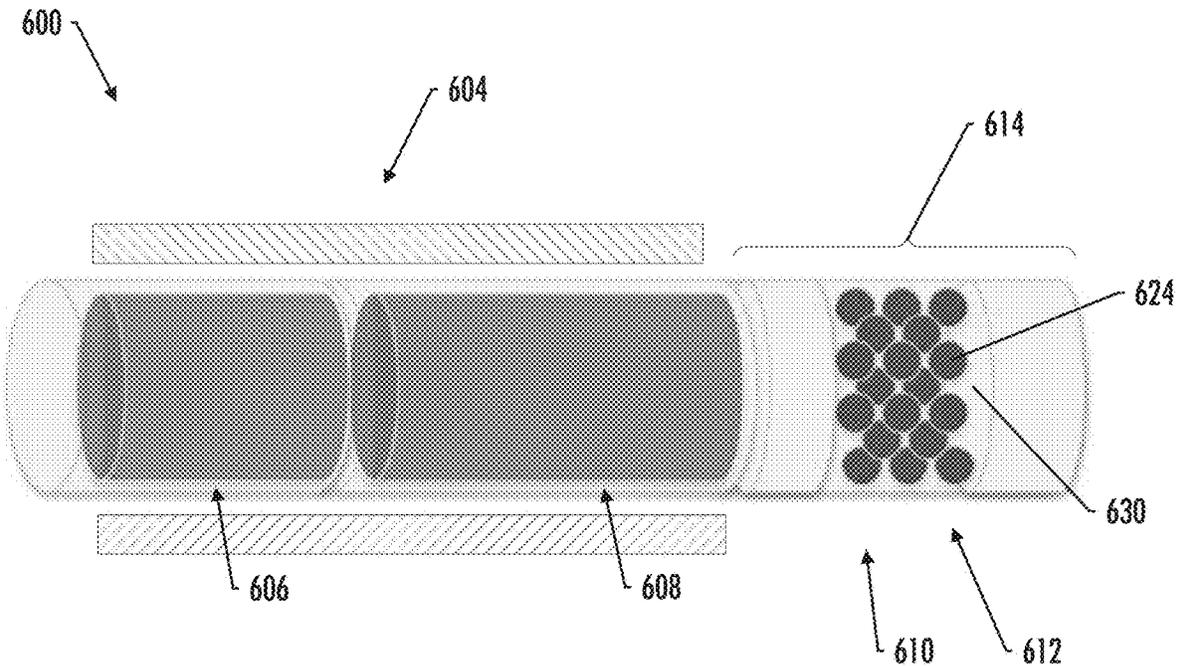


FIG. 7

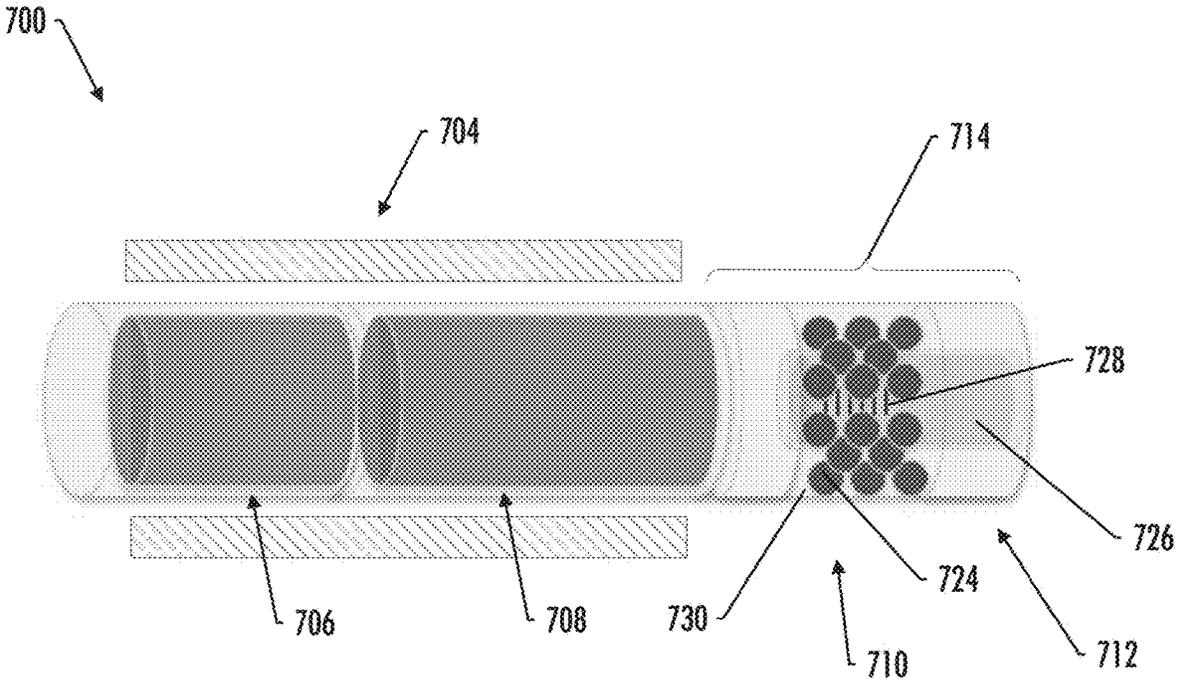


FIG. 8

SMOKING ARTICLE WITH DOWNSTREAM FLAVOR ADDITION

FIELD OF THE DISCLOSURE

[0001] The present disclosure relates to aerosol delivery devices and systems, such as smoking articles; and more particularly, to aerosol delivery devices and systems that utilize a heat source configured to generate heat, such as, for example, a combustible carbon-based ignition source, for the production of aerosol (e.g., smoking articles for purposes of yielding components of tobacco and other materials in an inhalable form, commonly referred to as heat-not-burn systems or electronic cigarettes). Components of such articles may be made or derived from tobacco, or those articles may be characterized as otherwise incorporating tobacco for human consumption, and which may be capable of vaporizing components of tobacco and/or other tobacco related materials to form an inhalable aerosol for human consumption.

BACKGROUND

[0002] Many smoking articles have been proposed through the years as improvements upon, or alternatives to, smoking products based upon combusting tobacco. Example alternatives have included devices wherein a solid or liquid fuel is combusted to transfer heat to tobacco or wherein a chemical reaction is used to provide such heat source. Examples include the smoking articles described in U.S. Pat. No. 9,078,473 to Worm et al., which is incorporated herein by reference.

[0003] The point of the improvements or alternatives to smoking articles typically has been to provide the sensations associated with cigarette, cigar, or pipe smoking, without delivering considerable quantities of incomplete combustion and pyrolysis products. To this end, there have been proposed numerous smoking products, flavor generators, and medicinal inhalers which utilize electrical energy to vaporize or heat a volatile material, or attempt to provide the sensations of cigarette, cigar, or pipe smoking without burning tobacco to a significant degree. See, for example, the various alternative smoking articles, aerosol delivery devices and heat generating sources set forth in the background art described in U.S. Pat. No. 7,726,320 to Robinson et al.; and U.S. Pat. App. Pub. Nos. 2013/0255702 to Griffith, Jr. et al.; and 2014/0096781 to Sears et al., which are incorporated herein by reference. See also, for example, the various types of smoking articles, aerosol delivery devices and electrically powered heat generating sources referenced by brand name and commercial source in U.S. Pat. App. Pub. No. 2015/0220232 to Bless et al., which is incorporated herein by reference. Additional types of smoking articles, aerosol delivery devices and electrically powered heat generating sources referenced by brand name and commercial source are listed in U.S. Pat. App. Pub. No. 2015/0245659 to DePiano et al., which is also incorporated herein by reference in its entirety. Other representative cigarettes or smoking articles that have been described and, in some instances, been made commercially available include those described in U.S. Pat. No. 4,735,217 to Gerth et al.; U.S. Pat. Nos. 4,922,901, 4,947,874, and 4,947,875 to Brooks et al.; U.S. Pat. No. 5,060,671 to Counts et al.; U.S. Pat. No. 5,249,586 to Morgan et al.; U.S. Pat. No. 5,388,594 to Counts et al.; U.S. Pat. No. 5,666,977 to Higgins et al.;

U.S. Pat. No. 6,053,176 to Adams et al.; U.S. Pat. No. 6,164,287 to White; U.S. Pat. No. 6,196,218 to Voges; U.S. Pat. No. 6,810,883 to Felter et al.; U.S. Pat. No. 6,854,461 to Nichols; U.S. Pat. No. 7,832,410 to Hon; U.S. Pat. No. 7,513,253 to Kobayashi; U.S. Pat. No. 7,726,320 to Robinson et al.; U.S. Pat. No. 7,896,006 to Hamano; U.S. Pat. No. 6,772,756 to Shayan; U.S. Pat. App. Pub. No. 2009/0095311 to Hon; U.S. Pat. App. Pub. Nos. 2006/0196518, 2009/0126745, and 2009/0188490 to Hon; U.S. Pat. App. Pub. No. 2009/0272379 to Thorens et al.; U.S. Pat. App. Pub. Nos. 2009/0260641 and 2009/0260642 to Monsees et al.; U.S. Pat. App. Pub. Nos. 2008/0149118 and 2010/0024834 to Oglesby et al.; U.S. Pat. App. Pub. No. 2010/0307518 to Wang; and WO 2010/091593 to Hon, which are incorporated herein by reference.

[0004] Various manners and methods for assembling smoking articles that possess a plurality of sequentially arranged segmented components have been proposed. See, for example, the various types of assembly techniques and methodologies set forth in U.S. Pat. No. 5,469,871 to Barnes et al. and U.S. Pat. No. 7,647,932 to Crooks et al.; and U.S. Pat. App. Pub. Nos. 2010/0186757 to Crooks et al.; 2012/0042885 to Stone et al., and 2012/00673620 to Conner et al.; each of which is incorporated by reference herein in its entirety.

[0005] Representative products that resemble many of the attributes of traditional types of cigarettes, cigars or pipes have been marketed as ACCORD® by Philip Morris Incorporated; ALPHA™, JOYE 510™ and M4™ by InnoVapor LLC; CIRRUSt™ and FLING™ by White Cloud Cigarettes; BLU™ by Fontem Ventures B.V.; COHITA™, COLIBRI™, ELITE CLASSIC™, MAGNUM™, PHANTOM™ and SENSE™ by EPUFFER® International Inc.; DUOPRO™, STORM™ and VAPORKING® by Electronic Cigarettes, Inc.; EGAR™ by Egar Australia; eGo-C™ and eGo-T™ by Joyetech; ELUSION™ by Elusion UK Ltd; EONSMOKE® by Eonsmoke LLC; FIN™ by FIN Branding Group, LLC; SMOKE® by Green Smoke Inc. USA; GREENARETTE™ by Greenarette LLC; HALLIGAN™, HENDU™ JET™, MAXXQ™ PINK™ and PITBULL™ by SMOKE STIK®; HEATBAR™ by Philip Morris International, Inc.; HYDRO IMPERIAL™ and LXETM from Crown7; LOGIC™ and THE CUBAN™ by LOGIC Technology; LUCI® by Luciano Smokes Inc.; METRO® by Nicotek, LLC; NJOY® and ONEJOY™ by Sottera, Inc.; NO. 7™ by SS Choice LLC; PREMIUM ELECTRONIC CIGARETTE™ by PremiumEstore LLC; RAPP E-MYSTICK™ by Ruyan America, Inc.; RED DRAGON™ by Red Dragon Products, LLC; RUYAN® by Ruyan Group (Holdings) Ltd.; SF® by Smoker Friendly International, LLC; GREEN SMART SMOKER® by The Smart Smoking Electronic Cigarette Company Ltd.; SMOKE ASSIST® by Coastline Products LLC; SMOKING EVERYWHERE® by Smoking Everywhere, Inc.; V2CIGS™ by VMR Products LLC; VAPOR NINE™ by VaporNine LLC; VAPOR4LIFE® by Vapor 4 Life, Inc.; VEPPOTM by E-CigaretteDirect, LLC; VUSE® by R. J. Reynolds Vapor Company; Mystic Menthol product by Mystic Ecigs; and the Vype product by CN Creative Ltd.; IQOS™ by Philip Morris International; and GLO™ by British American Tobacco. Yet other electrically powered aerosol delivery devices, and in particular those devices that have been characterized as so-called electronic cigarettes, have been marketed under the tradenames COOLER VISIONS™, DIRECT E-CIG™, DRAGONFLY™;

EMIST™; EVERSMOKE™; GAMUCCI®; HYBRID FLAME™; KNIGHT STICKS™; ROYAL BLUES™; SMOKETIP®; and SOUTH BEACH SMOKE™.

[0006] In some instances, traditional types of smoking articles, such as those referenced above, are difficult to assemble as a result of multiple components that must be disassembled and reassembled upon consumption of aerosol delivery components provided therein. In still further instances, traditional types of smoking articles may suffer from poor performance with respect to aerosolizing the aerosol forming component(s). It would be desirable to provide a smoking article with enhanced functionality. In this regard, it is desirable to provide a smoking article with advantageous features.

BRIEF SUMMARY

[0007] In various implementations, the present disclosure provides a smoking article. The present disclosure includes, without limitation, the following example implementations:

[0008] A smoking article comprising at least one substrate material section having an aerosol precursor composition associated therewith, a flavor addition component, and a mouthpiece disposed downstream from the heat source and the at least one substrate material section, the mouthpiece including a filter, wherein the mouthpiece includes the flavor addition component, and wherein the flavor addition component comprises a plurality of flavor beads proximate a hollow flow tube, the flow tube including a plurality of peripheral openings defined therethrough.

[0009] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, further comprising a combustible heat source, wherein the combustible heat source is disposed proximate at least a portion of the at least one substrate material section.

[0010] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, further comprising a device separate from the smoking article, wherein the separate device includes an electric heat source configured to heat at least a portion of the at least one substrate material section.

[0011] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the flavor addition component is disposed downstream from the filter.

[0012] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the plurality of peripheral openings of the flow tube comprises a plurality of holes extending through a peripheral wall of the flow tube.

[0013] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the plurality of peripheral openings of the flow tube comprises a plurality of slots extending through a peripheral wall of the flow tube.

[0014] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the flow tube extends through at least a portion of the filter.

[0015] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the plurality of flavor beads comprises at least one of tobacco flavor beads, non-

tobacco flavor beads, gel flavor beads, capsules containing flavor beads, or any combination thereof.

[0016] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the filter defines a cavity, wherein plurality of flavor beads are located in the cavity, and wherein the flow tube extends through at least a portion of the filter.

[0017] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, further comprising a second substrate material disposed between the first substrate material and the mouthpiece.

[0018] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the substrate material comprises at least one of tobacco-containing beads, tobacco shreds, tobacco strips, pieces of a reconstituted tobacco material, or tobacco rods.

[0019] A smoking article comprising at least one substrate material section having an aerosol precursor composition associated therewith, a flavor addition component, and a mouthpiece disposed downstream from heat source and the at least one substrate material section, the mouthpiece including a filter, wherein the mouthpiece includes the flavor addition component, wherein the filter defines a cavity therein, wherein the flavor addition component comprises a plurality of flavor beads, and wherein the plurality of flavor beads are located in the cavity.

[0020] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, further comprising a heat source, and wherein the heat source is disposed proximate at least a portion of the at least one substrate material section.

[0021] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, further comprising a device separate from the smoking article, wherein the separate device includes an electric heat source configured to heat at least a portion of the at least one substrate material section.

[0022] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, further comprising a hollow flow tube, the flow tube extending through at least a portion of the filter.

[0023] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the plurality of flavor beads substantially surround the flow tube.

[0024] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the flow tube includes a plurality of peripheral openings defined therethrough.

[0025] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the plurality of peripheral openings of the flow tube comprises a plurality of holes extending through a peripheral wall of the flow tube.

[0026] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the plurality of peripheral openings of the flow tube comprises a plurality of slots extending through a peripheral wall of the flow tube.

[0027] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the plurality of flavor beads comprises at least one of tobacco flavor beads, non-tobacco flavor beads, gel flavor beads, capsules containing flavor beads, or any combination thereof.

[0028] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, further comprising a second substrate material disposed between the first substrate material and the mouthpiece.

[0029] The smoking article of any preceding example implementation, or any combination of any preceding example implementations, wherein the substrate material comprises at least one of tobacco-containing beads, tobacco shreds, tobacco strips, pieces of a reconstituted tobacco material, or tobacco rods.

[0030] These and other features, aspects, and advantages of the disclosure will be apparent from a reading of the following detailed description together with the accompanying drawings, which are briefly described below. The invention includes any combination of two, three, four, or more of the above-noted embodiments as well as combinations of any two, three, four, or more features or elements set forth in this disclosure, regardless of whether such features or elements are expressly combined in a specific embodiment description herein. This disclosure is intended to be read holistically such that any separable features or elements of the disclosed invention, in any of its various aspects and embodiments, should be viewed as intended to be combinable unless the context clearly dictates otherwise.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] Having thus described the disclosure in the foregoing general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

[0032] FIG. 1 illustrates a perspective view of a smoking article, according to one implementation of the present disclosure;

[0033] FIG. 2 illustrates a perspective view of the smoking article of FIG. 1 with an outer wrap removed, according to one implementation of the present disclosure;

[0034] FIG. 3 illustrates a longitudinal schematic view of a smoking article, according to one implementation of the present disclosure;

[0035] FIG. 4 illustrates a longitudinal schematic view of a smoking article, according to one implementation of the present disclosure;

[0036] FIG. 5 illustrates a longitudinal schematic view of a smoking article, according to one implementation of the present disclosure;

[0037] FIG. 6 illustrates a longitudinal schematic view of a smoking article, according to one implementation of the present disclosure;

[0038] FIG. 7 illustrates a longitudinal schematic view of a smoking article, according to one implementation of the present disclosure; and

[0039] FIG. 8 illustrates a longitudinal schematic view of a smoking article, according to one implementation of the present disclosure.

DETAILED DESCRIPTION

[0040] The present disclosure will now be described more fully hereinafter with reference to example embodiments thereof. These example embodiments are described so that this disclosure will be thorough and complete, and will fully convey the scope of the disclosure to those skilled in the art. Indeed, the disclosure is embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. As used in the specification, and in the appended claims, the singular forms “a”, “an”, “the”, include plural referents unless the context clearly dictates otherwise.

[0041] The present disclosure provides descriptions of articles (and the assembly and/or manufacture thereof) in which a material is heated (preferably without combusting the material to any significant degree) to form an aerosol and/or an inhalable substance; such articles most preferably being sufficiently compact to be considered “hand-held” devices. In some aspects, the articles are characterized as smoking articles. As used herein, the term “smoking article” is intended to mean an article and/or device that provides many of the sensations (e.g., inhalation and exhalation rituals, types of tastes or flavors, organoleptic effects, physical feel, use rituals, visual cues such as those provided by visible aerosol, and the like) of smoking a cigarette, cigar, or pipe, without any substantial degree of combustion of any component of that article and/or device. As used herein, the term “smoking article” does not necessarily mean that, in operation, the article or device produces smoke in the sense of an aerosol resulting from by-products of combustion or pyrolysis of tobacco, but rather, that the article or device yields vapors (including vapors within aerosols that are considered to be visible aerosols that might be considered to be described as smoke-like) resulting from volatilization or vaporization of certain components, elements, and/or the like of the article and/or device. In some aspects, articles or devices characterized as smoking articles incorporate tobacco and/or components derived from tobacco.

[0042] As noted, aerosol generating components of certain aerosol delivery devices may provide many of the sensations (e.g., inhalation and exhalation rituals, types of tastes or flavors, organoleptic effects, physical feel, use rituals, visual cues such as those provided by visible aerosol, and the like) of smoking a cigarette, cigar or pipe that is employed by lighting and burning tobacco (and hence inhaling tobacco smoke), without any substantial degree of combustion of any component thereof. For example, the user of an aerosol delivery device in accordance with some example implementations of the present disclosure can hold and use that component much like a smoker employs a traditional type of smoking article, draw on one end of that piece for inhalation of aerosol produced by that piece, take or draw puffs at selected intervals of time, and the like.

[0043] Articles or devices of the present disclosure are also characterized as being vapor-producing articles, aerosol delivery articles, or medicament delivery articles. Thus, such articles or devices are adaptable so as to provide one or more substances in an inhalable form or state. For example, inhalable substances are substantially in the form of a vapor (e.g., a substance that is in the gas phase at a temperature lower than its critical point). Alternatively, inhalable substances are in the form of an aerosol (e.g., a suspension of fine solid particles or liquid droplets in a gas). For purposes

of simplicity, the term “aerosol” as used herein is meant to include vapors, gases, and aerosols of a form or type suitable for human inhalation, whether or not visible, and whether or not of a form that might be considered to be smoke-like. In some implementations, the terms “vapor” and “aerosol” may be interchangeable. Thus, for simplicity, the terms “vapor” and “aerosol” as used to describe the disclosure are understood to be interchangeable unless stated otherwise.

[0044] In use, smoking articles of the present disclosure are subjected to many of the physical actions of an individual in using a traditional type of smoking article (e.g., a cigarette, cigar, or pipe that is employed by lighting with a flame and used by inhaling tobacco that is subsequently burned and/or combusted). For example, the user of a smoking article of the present disclosure holds that article much like a traditional type of smoking article, draws on one end of that article for inhalation of an aerosol produced by that article, and takes puffs at selected intervals of time.

[0045] While the systems are generally described herein in terms of implementations associated with smoking articles such as so-called “tobacco heating products,” it should be understood that the mechanisms, components, features, and methods may be embodied in many different forms and associated with a variety of articles. For example, the description provided herein may be employed in conjunction with implementations of traditional smoking articles (e.g., cigarettes, cigars, pipes, etc.), heat-not-burn cigarettes, and related packaging for any of the products disclosed herein. Accordingly, it should be understood that the description of the mechanisms, components, features, and methods disclosed herein are discussed in terms of implementations relating to aerosol delivery devices by way of example only, and may be embodied and used in various other products and methods.

[0046] Smoking articles of the present disclosure generally include a number of elements provided or contained within an enclosure of some sort, such as a housing, an outer wrap, or wrapping, a casing, a component, a module, a member, or the like. The overall design of the enclosure is variable, and the format or configuration of the enclosure that defines the overall size and shape of the smoking article is also variable. In some, but not all implementations, the overall design, size, and/or shape of the enclosure resembles that of a conventional cigarette or cigar. In various aspects, the heat source may be capable of generating heat to aerosolize a substrate material that comprises, for example, an extruded structure and/or substrate, a substrate material associated with an aerosol precursor composition, tobacco and/or a tobacco related material, such as a material that is found naturally in tobacco that is isolated directly from the tobacco or synthetically prepared, in a solid or liquid form (e.g., beads, sheets, shreds, a wrap), or the like. In some implementations, an extruded structure may comprise tobacco products or a composite of tobacco with other materials such as, for example, ceramic powder. In other implementations, a tobacco extract/slurry may be loaded into porous ceramic beads. Other implementations may use non-tobacco products. In some implementations aerosol precursor composition-loaded porous beads/powders (ceramics) may be used. In other implementations, rods/cylinders made of extruded slurry of ceramic powder and aerosol precursor composition may be used.

[0047] Although a smoking article according to the disclosure may take on a variety of implementations, as dis-

cussed in detail below, the use of the smoking article by a consumer will be similar in scope. The foregoing description of use of the smoking article is applicable to the various implementations described through minor modifications, which are apparent to the person of skill in the art in light of the further disclosure provided herein. The description of use, however, is not intended to limit the use of the inventive article but is provided to comply with all necessary requirements of disclosure herein.

[0048] According to certain aspects of the present disclosure, it may be advantageous to provide a smoking article that provides downstream flavor addition. FIGS. 1-5 illustrate example implementations of such a smoking article. In particular, FIG. 1 illustrates a perspective view of a smoking article **100** that includes an outer wrap **102**, and FIG. 2 illustrates the smoking article **100** wherein the outer wrap **102** is removed to reveal the other components of the smoking article **100**. Referring to FIG. 2, the smoking article of the depicted implementation includes a heat source **104**, a first substrate material **106**, a second substrate material **108**, a filter **110**, and a downstream flavor addition component **112**. As will be described in more detail with respect to other example implementations, the downstream flavor addition component may have a variety of different configurations. In the depicted implementation, the filter **110** and the flavor addition component **112** together comprise a mouthpiece **114**.

[0049] In various implementations, the filter may comprise a disc or other device radially and/or longitudinally disposed proximate the downstream end of the smoking device. In this manner, upon a draw on the mouthpiece, the filter may receive the aerosol flowing through device. In some implementations, the filter may comprise discrete segments. In some implementations, the filter may be constructed of a packed rod or cylindrical disc constructed of a gas permeable material (such as, for example, cellulose acetate or fibers such as paper or rayon, or polyester fibers). In some implementations, the filter may comprise cellulose acetate tow, a gathered polypropylene web, a cellulose acetate tube, polylactic acid (PLA) filter material, etc. In some implementations, the filter may additionally or alternatively contain strands of tobacco containing material, such as described in U.S. Pat. No. 5,025,814 to Raker et al., which is incorporated herein by reference in its entirety. In some implementation, the filter may include a segment providing filtering, a segment providing draw resistance, a hollow segment providing a space for the aerosol to cool, other filter segments, and any one or any combination of the above. In some implementations, a filter may include one or more filter segments that may be replaceable.

[0050] In the depicted implementation, the first and second substrate materials **106**, **108** may comprise centrally defined longitudinally extending axes between each of the respective opposed first and second ends, and a cross-section of the first and second substrate materials **106**, **108** may be, in some implementations, symmetrical about the axis. For example, in some implementations cross-sections of the first substrate material **106** and the second substrate material **108** may be substantially circular such that the first and second substrate materials **106**, **108** define substantially cylindrical shapes extending between the opposed first and second ends thereof. However, in other implementations, the first and second substrate materials **106**, **108** may define substantially non-circular cross-sections such that one or both of the first

substrate material **106** or the second substrate material **108** may define a substantially non-cylindrical shape between the opposed first and second ends thereof. Otherwise, in other examples, one or both of the first substrate material **106** or the second substrate material **108** may comprise an asymmetric cross-section about the axis. In various implementations, each end of the first and second substrate materials, **106**, **108** may be in axial alignment with adjacent elements. For example, the first end of the second substrate material **108** may be configured to be in coaxial alignment with the second end of the first substrate material **106** upon engagement therebetween.

[0051] Although various other implementations may employ a variety of different heat sources, including, for example, resistive heat sources, inductive heat sources, etc., in the depicted implementation the heat source **104** is configured to generate heat upon ignition thereof. In the depicted implementation, for example, the heat source **104** comprises a combustible fuel element that has a generally cylindrical shape and that incorporates a combustible carbonaceous material. In other implementations, the heat source **104** may have a different shape, for example, a prism shape having a cubic or hexagonal cross-section. Carbonaceous materials generally have a high carbon content. Some example carbonaceous materials may be composed predominately of carbon, and/or typically have carbon contents of greater than about 60 percent, generally greater than about 70 percent, often greater than about 80 percent, and frequently greater than about 90 percent, on a dry weight basis.

[0052] In some instances, the heat source may incorporate elements other than combustible carbonaceous materials (e.g., tobacco components, such as powdered tobaccos or tobacco extracts; flavoring agents; salts, such as sodium chloride, potassium chloride and sodium carbonate; heat stable graphite a hollow cylindrical (e.g., tube) fibers; iron oxide powder; glass filaments; powdered calcium carbonate; alumina granules; ammonia sources, such as ammonia salts; and/or binding agents, such as guar gum, ammonium alginate and sodium alginate). In other implementations, the heat source may comprise a plurality of ignitable objects, such as, for example, a plurality of ignitable beads. It should be noted that in other implementations, the heat source may differ in composition or relative content amounts from those listed above. For example, in some implementations different forms of carbon could be used as a heat source, such as graphite or graphene. In other implementations, the heat source may have increased levels of activated carbon, different porosities of carbon, different amounts of carbon, blends of any above mentioned components, etc. In still other implementations, the heat source may comprise a non-carbon heat source, such as, for example, a combustible liquefied gas configured to generate heat upon ignition thereof. For example, in some implementations, the liquefied gas may comprise one or more of petroleum gas (LPG or LP-gas), propane, propylene, butylenes, butane, isobutene, methyl propane, or n-butane. In still other implementations, the heat source may comprise a chemical reaction based heat source, wherein ignition of the heat source comprises the interaction of two or more individual components. For example, a chemical reaction based heat source may comprise metallic agents and an activating solution, wherein the heat source is activated when the metallic agents and the activating solution come in contact. Some examples of chemical based heat sources can be found in U.S. Pat. No.

7,290,549 to Banerjee et al., which is incorporated herein by reference in its entirety. Combinations of heat sources are also possible.

[0053] In some instances, the heat source may incorporate elements other than combustible carbonaceous materials (e.g., tobacco components, such as powdered tobaccos or tobacco extracts; flavoring agents; salts, such as sodium chloride, potassium chloride and sodium carbonate; heat stable graphite a hollow cylindrical (e.g., tube) fibers; iron oxide powder; glass filaments; powdered calcium carbonate; alumina granules; ammonia sources, such as ammonia salts; and/or binding agents, such as guar gum, ammonium alginate and sodium alginate). In other implementations, the heat source may comprise a plurality of ignitable objects, such as, for example, a plurality of ignitable beads. It should be noted that in other implementations, the heat source may differ in composition or relative content amounts from those listed above. For example, in some implementations different forms of carbon could be used as a heat source, such as graphite or graphene. In other implementations, the heat source may have increased levels of activated carbon, different porosities of carbon, different amounts of carbon, blends of any above mentioned components, etc. In still other implementations, the heat source may comprise a non-carbon heat source, such as, for example, a combustible liquefied gas configured to generate heat upon ignition thereof. For example, in some implementations, the liquefied gas may comprise one or more of petroleum gas (LPG or LP-gas), propane, propylene, butylenes, butane, isobutene, methyl propane, or n-butane. In still other implementations, the heat source may comprise a chemical reaction based heat source, wherein ignition of the heat source comprises the interaction of two or more individual components. For example, a chemical reaction based heat source may comprise metallic agents and an activating solution, wherein the heat source is activated when the metallic agents and the activating solution come in contact. Some examples of chemical based heat sources can be found in U.S. Pat. No. 7,290,549 to Banerjee et al., which is incorporated herein by reference in its entirety. Combinations of heat sources are also possible.

[0054] Although in other implementations, the heat source may be constructed in a variety of ways, in some implementations the heat source may comprise an extruded or compounded using a ground or powdered carbonaceous material, and has a density that is greater than about 0.5 g/cm³, often greater than about 0.7 g/cm³, and frequently greater than about 1 g/cm³, on a dry weight basis. See, for example, the types of fuel source components, formulations and designs set forth in U.S. Pat. No. 5,551,451 to Riggs et al. and U.S. Pat. No. 7,836,897 to Borschke et al., which are incorporated herein by reference in their entireties.

[0055] Although in various implementations the heat source may have a variety of forms, including, for example, a substantially solid cylindrical shape or a hollow cylindrical (e.g., tube) shape, the heat source **104** of the depicted implementation comprises an extruded monolithic carbonaceous material. In some implementations, the heat source may include a plurality of internal passages extending longitudinally from a first end of the heat source to an opposing second end of the heat source. It should be noted that in other implementations, there need not be a plurality of internal passages and/or the plurality of internal passages may take a variety of forms and/or sizes, including substan-

tially cylindrical and non-cylindrical shapes. For example, in some implementations, there may be as few as a single internal passage. Still other implementations may include no internal passages at all. Additional implementations may include multiple internal passages that may be of unequal diameter and/or shape and which may be unequally spaced and/or located within the heat source.

[0056] The depicted implementation includes a plurality of peripheral grooves **116** that extend longitudinally from a first end of the heat source to an opposing second end. In other implementations, the grooves need not extend the full length of the heat source. In the depicted implementation, the grooves are substantially equal in width and depth and are substantially equally distributed about a circumference of the heat source. Other implementations, however, may differ. For example, in some implementations there may be as few as two grooves, and still other implementations may include as few as a single groove. Still other implementations may include no grooves at all. Additional implementations may include multiple grooves that may be of unequal width and/or depth, and which may be unequally spaced around a circumference of the heat source. In still other implementations, the heat source may include flutes and/or slits extending longitudinally from a first end of the extruded monolithic carbonaceous material to an opposing second end thereof. In some implementations, the heat source may comprise a foamed carbon monolith formed in a foam process of the type disclosed in U.S. Pat. No. 7,615,184 to Lobovsky, which is incorporated herein by reference in its entirety. As such, some implementations may provide advantages with regard to reduced time taken to ignite the heat source. In some other implementations, the heat source may be co-extruded with a layer of insulation (not shown), thereby reducing manufacturing time and expense. Other implementations of fuel elements include carbon fibers of the type described in U.S. Pat. No. 4,922,901 to Brooks et al. or other heat source implementations such as is disclosed in U.S. Pat. App. Pub. No. 2009/0044818 to Takeuchi et al., each of which is incorporated herein by reference in its entirety. Further examples of heat sources including debossed heat source systems, methods, and smoking articles that include such heat sources are disclosed in U.S. patent application Ser. No. 15/902,665, filed on Feb. 22, 2018, and titled System for Debossing a Heat Generation Member, a Smoking Article Including the Debossed Heat Generation Member, and a Related Method, which is incorporated herein by reference in its entirety.

[0057] Generally, the heat source is positioned sufficiently near an aerosol delivery component (e.g., a substrate material) having one or more aerosolizable components so that the aerosol formed/volatilized by the application of heat from the heat source to the aerosolizable components (as well as any flavorants, medicaments, and/or the like that are likewise provided for delivery to a user) is deliverable to the user by way of the mouthpiece. That is, when the heat source heats the substrate material, an aerosol is formed, released, or generated in a physical form suitable for inhalation by a consumer. It should be noted that the foregoing terms are meant to be interchangeable such that reference to release, releasing, releases, or released includes form or generate, forming or generating, forms or generates, and formed or generated. Specifically, an inhalable substance is released in the form of a vapor or aerosol or mixture thereof. Additionally, the selection of various smoking article elements are

appreciated upon consideration of commercially available electronic smoking articles, such as those representative products listed in the background art section of the present disclosure.

[0058] Although other implementations may include a single substrate material, as noted, the depicted implementation includes a first substrate material **106** and a second substrate material **108**. Still other implementations may include additional substrate materials. In some implementations, one or more of the substrate materials may comprise a blend of flavorful and aromatic tobaccos in cut filler form. In another implementation, one or more of the substrate materials may comprise a reconstituted tobacco material, such as described in U.S. Pat. No. 4,807,809 to Pryor et al.; U.S. Pat. No. 4,889,143 to Pryor et al. and U.S. Pat. No. 5,025,814 to Raker, the disclosures of which are incorporated herein by reference in their entirety. Additionally, a reconstituted tobacco material may include a reconstituted tobacco paper for the type of cigarettes described in Chemical and Biological Studies on New Cigarette Prototypes that Heat Instead of Burn Tobacco, R. J. Reynolds Tobacco Company Monograph (1988), the contents of which are incorporated herein by reference in its entirety. For example, a reconstituted tobacco material may include a sheet-like material containing tobacco and/or tobacco-related materials. As such, in some implementations, one or more of the substrate materials may be formed from a wound roll of a reconstituted tobacco material. In another implementation, one or more of the substrate materials may be formed from shreds, strips, and/or the like of a reconstituted tobacco material. In another implementation, the tobacco sheet may comprise overlapping layers (e.g., a gathered web), which may, or may not, include heat conducting constituents. Examples of substrate materials that include a series of overlapping layers (e.g., gathered webs) of an initial substrate sheet formed by the fibrous filler material, aerosol forming material, and plurality of heat conducting constituents are described in U.S. patent application Ser. No. 15/905,320, filed on Feb. 26, 2018, and titled Heat Conducting Substrate For Electrically Heated Aerosol Delivery Device, which is incorporated herein by reference in its entirety.

[0059] In some implementations, one or more of the substrate materials may include a plurality of microcapsules, beads, granules, and/or the like having a tobacco-related material. For example, a representative microcapsule may be generally spherical in shape, and may have an outer cover or shell that contains a liquid center region of a tobacco-derived extract and/or the like. In some implementations, one or more of the substrate materials may include a plurality of microcapsules each formed into a hollow cylindrical shape. In some implementations, one or more of the substrate materials may include a binder material configured to maintain the structural shape and/or integrity of the plurality of microcapsules formed into the hollow cylindrical shape.

[0060] Tobacco employed in one or more of the substrate materials may include, or may be derived from, tobaccos such as flue-cured tobacco, burley tobacco, Oriental tobacco, Maryland tobacco, dark tobacco, dark-fired tobacco and *Rustica* tobacco, as well as other rare or specialty tobaccos, or blends thereof. Various representative tobacco types, processed types of tobaccos, and types of tobacco blends are set forth in U.S. Pat. No. 4,836,224 to Lawson et al.; U.S. Pat. No. 4,924,888 to Perfetti et al.; U.S. Pat. No.

5,056,537 to Brown et al.; U.S. Pat. No. 5,159,942 to Brinkley et al.; U.S. Pat. No. 5,220,930 to Gentry; U.S. Pat. No. 5,360,023 to Blakley et al.; U.S. Pat. No. 6,701,936 to Shafer et al.; U.S. Pat. No. 6,730,832 to Dominguez et al.; U.S. Pat. No. 7,011,096 to Li et al.; U.S. Pat. No. 7,017,585 to Li et al.; U.S. Pat. No. 7,025,066 to Lawson et al.; U.S. Pat. App. Pub. No. 2004/0255965 to Perfetti et al.; PCT Pub. No. WO 02/37990 to Bereman; and Bombick et al., *Fund. Appl. Toxicol.*, 39, p. 11-17 (1997); the disclosures of which are incorporated herein by reference in their entireties.

[0061] In still other implementations of the present disclosure, one or more of the substrate materials may be configured as an extruded structure that includes, or is essentially comprised of a tobacco, a tobacco related material, glycerin, water, and/or a binder material, although certain formulations may exclude the binder material. In various implementations, suitable binder materials may include alginates, such as ammonium alginate, propylene glycol alginate, potassium alginate, and sodium alginate. Alginates, and particularly high viscosity alginates, may be employed in conjunction with controlled levels of free calcium ions. Other suitable binder materials include hydroxypropylcellulose such as Klucel H from Aqualon Co.; hydroxypropylmethylcellulose such as Methocel K4MS from The Dow Chemical Co.; hydroxyethylcellulose such as Natrosol 250 MRCS from Aqualon Co.; microcrystalline cellulose such as Avicel from FMC; methylcellulose such as Methocel A4M from The Dow Chemical Co.; and sodium carboxymethylcellulose such as CMC 7HF and CMC 7H4F from Hercules Inc. Still other possible binder materials include starches (e.g., corn starch), guar gum, carrageenan, locust bean gum, pectins and xanthan gum. In some implementations, combinations or blends of two or more binder materials may be employed. Other examples of binder materials are described, for example, in U.S. Pat. No. 5,101,839 to Jakob et al.; and U.S. Pat. No. 4,924,887 to Raker et al., each of which is incorporated herein by reference in its entirety. In some implementations, the aerosol forming material may be provided as a portion of the binder material (e.g., propylene glycol alginate). In addition, in some implementations, the binder material may comprise nanocellulose derived from a tobacco or other biomass.

[0062] In some implementations, one or more of the substrate materials may be configured as an extruded material, as described in U.S. Pat. App. Pub. No. 2012/0042885 to Stone et al., which is incorporated herein by reference in its entirety. In yet another implementation, one or more of the substrate materials may include an extruded structure and/or substrate formed from marumarized and/or non-marumarized tobacco. Marumarized tobacco is known, for example, from U.S. Pat. No. 5,105,831 to Banerjee, et al., which is incorporated by reference herein in its entirety. Marumarized tobacco includes about 20 to about 50 percent (by weight) tobacco blend in powder form, with glycerol (at about 20 to about 30 percent weight), calcium carbonate (generally at about 10 to about 60 percent by weight, often at about 40 to about 60 percent by weight), along with binder agents, as described herein, and/or flavoring agents. In various implementations, the extruded material may have one or more longitudinal openings.

[0063] In various implementations, one or more of the substrate materials may take on a variety of conformations based upon the various amounts of materials utilized therein. For example, an example substrate material may comprise

up to approximately 98% by weight, up to approximately 95% by weight, or up to approximately 90% by weight of a tobacco and/or tobacco related material. An example substrate material may also comprise up to approximately 25% by weight, approximately 20% by weight, or approximately 15% by weight water—particularly approximately 2% to approximately 25%, approximately 5% to approximately 20%, or approximately 7% to approximately 15% by weight water. Flavors and the like (which include, for example, medicaments, such as nicotine) may comprise up to approximately 10%, up to about 8%, or up to about 5% by weight of the aerosol delivery component.

[0064] Additionally or alternatively, one or more of the substrate materials may be configured as an extruded structure and/or a substrate that includes or essentially is comprised of tobacco, glycerin, water, and/or binder material, and is further configured to substantially maintain its structure throughout the aerosol-generating process. That is, one or more of the substrate materials may be configured to substantially maintain its shape (e.g., the substrate material does not continually deform under an applied shear stress) throughout the aerosol-generating process. Although such an example substrate material may include liquids and/or some moisture content, the substrate may remain substantially solid throughout the aerosol-generating process and may substantially maintain structural integrity throughout the aerosol-generating process. Example tobacco and/or tobacco related materials suitable for a substantially solid substrate material are described in U.S. Pat. App. Pub. No. 2015/0157052 to Ademe et al.; U.S. Pat. App. Pub. No. 2015/0335070 to Sears et al.; U.S. Pat. No. 6,204,287 to White; and U.S. Pat. No. 5,060,676 to Hearn et al., which are incorporated herein by reference in their entirety.

[0065] In some implementations, the amount of substrate material(s) used within the smoking article may be such that the article exhibits acceptable sensory and organoleptic properties, and desirable performance characteristics. For example, in some implementations an aerosol precursor composition such as, for example, glycerin and/or propylene glycol, may be employed within the substrate material in order to provide for the generation of a visible mainstream aerosol that in many regards resembles the appearance of tobacco smoke. For example, the amount of aerosol precursor composition incorporated into the substrate material of the smoking article may be in the range of about 3.5 grams or less, about 3 grams or less, about 2.5 grams or less, about 2 grams or less, about 1.5 grams or less, about 1 gram or less, or about 0.5 gram or less.

[0066] According to another implementation, a smoking article according to the present disclosure may include one or more substrate materials comprising a porous, inert material such as, for example, a ceramic material. For example, in some implementations ceramics of various shapes and geometries (e.g., beads, rods, tubes, etc.) may be used, which have various pore morphology. In addition, in some implementations non-tobacco materials, such as e-liquids, may be loaded into the ceramics. In another implementation, one or more of the substrate materials may include a porous, inert material that does not substantially react, chemically and/or physically, with a tobacco-related material such as, for example, a tobacco-derived extract. In addition, an extruded tobacco, such as those described above, may be porous. For example, in some implementa-

tions an extruded tobacco material may have an inert gas, such as, for example, nitrogen, that acts as a blowing agent during the extrusion process.

[0067] As noted above, in various implementations one or more of the substrate materials may include a tobacco, a tobacco component, and/or a tobacco-derived material that has been treated, manufactured, produced, and/or processed to incorporate an aerosol precursor composition (e.g., humectants such as, for example, propylene glycol, glycerin, and/or the like) and/or at least one flavoring agent, as well as a flame/burn retardant (e.g., diammonium phosphate and/or another salt) configured to help prevent ignition, pyrolysis, combustion, and/or scorching of the substrate material by the heat source. Various manners and methods for incorporating tobacco into smoking articles, and particularly smoking articles that are designed so as to not purposefully burn virtually all of the tobacco within those smoking articles are set forth in U.S. Pat. No. 4,947,874 to Brooks et al.; U.S. Pat. No. 7,647,932 to Cantrell et al.; U.S. Pat. No. 8,079,371 to Robinson et al.; U.S. Pat. No. 7,290,549 to Banerjee et al.; and U.S. Pat. App. Pub. No. 2007/0215167 to Crooks et al.; the disclosures of which are incorporated herein by reference in their entireties.

[0068] As noted, in some implementations, flame/burn retardant materials and other additives that may be included within one or more of the substrate materials and may include organo-phosphorus compounds, borax, hydrated alumina, graphite, potassium tripolyphosphate, dipentaerythritol, pentaerythritol, and polyols. Others such as nitrogenous phosphonic acid salts, mono-ammonium phosphate, ammonium polyphosphate, ammonium bromide, ammonium borate, ethanolammonium borate, ammonium sulphamate, halogenated organic compounds, thiourea, and antimony oxides are suitable but are not preferred agents. In each aspect of flame-retardant, burn-retardant, and/or scorch-retardant materials used in the substrate material and/or other components (whether alone or in combination with each other and/or other materials), the desirable properties most preferably are provided without undesirable off-gassing or melting-type behavior.

[0069] According other implementations of the present disclosure, one or more of the substrate materials may also incorporate tobacco additives of the type that are traditionally used for the manufacture of tobacco products. Those additives may include the types of materials used to enhance the flavor and aroma of tobaccos used for the production of cigars, cigarettes, pipes, and the like. For example, those additives may include various cigarette casing and/or top dressing components. See, for example, U.S. Pat. No. 3,419,015 to Wochnowski; U.S. Pat. No. 4,054,145 to Berndt et al.; U.S. Pat. No. 4,887,619 to Burcham, Jr. et al.; U.S. Pat. No. 5,022,416 to Watson; U.S. Pat. No. 5,103,842 to Strang et al.; and U.S. Pat. No. 5,711,320 to Martin; the disclosures of which are incorporated herein by reference in their entireties. Some casing materials may include water, sugars and syrups (e.g., sucrose, glucose and high fructose corn syrup), humectants (e.g. glycerin or propylene glycol), and flavoring agents (e.g., cocoa and licorice). Those added components may also include top dressing materials (e.g., flavoring materials, such as menthol). See, for example, U.S. Pat. No. 4,449,541 to Mays et al., the disclosure of which is incorporated herein by reference in its entirety. Further materials that may be added include those disclosed in U.S. Pat. No. 4,830,028 to Lawson et al. and U.S. Pat. No. 8,186,360 to

Marshall et al., the disclosures of which are incorporated herein by reference in their entireties.

[0070] As noted above, in various implementations, one or more of the substrate materials may have an aerosol precursor composition associated therewith. For example, in some implementations the aerosol precursor composition may comprise one or more different components, such as polyhydric alcohol (e.g., glycerin, propylene glycol, or a mixture thereof). Representative types of further aerosol precursor compositions are set forth in U.S. Pat. No. 4,793,365 to Sensabaugh, Jr. et al.; U.S. Pat. No. 5,101,839 to Jakob et al.; PCT WO 98/57556 to Biggs et al.; and Chemical and Biological Studies on New Cigarette Prototypes that Heat Instead of Burn Tobacco, R. J. Reynolds Tobacco Company Monograph (1988); the disclosures of which are incorporated herein by reference. In some aspects, a substrate material may produce a visible aerosol upon the application of sufficient heat thereto (and cooling with air, if necessary), and the substrate material may produce an aerosol that is “smoke-like.” In other aspects, the substrate material may produce an aerosol that is substantially non-visible but is recognized as present by other characteristics, such as flavor or texture. Thus, the nature of the produced aerosol may be variable depending upon the specific components of the aerosol delivery component. The substrate material may be chemically simple relative to the chemical nature of the smoke produced by burning tobacco.

[0071] In some implementations, the aerosol precursor composition may incorporate nicotine, which may be present in various concentrations. The source of nicotine may vary, and the nicotine incorporated in the aerosol precursor composition may derive from a single source or a combination of two or more sources. For example, in some implementations the aerosol precursor composition may include nicotine derived from tobacco. In other implementations, the aerosol precursor composition may include nicotine derived from other organic plant sources, such as, for example, non-tobacco plant sources including plants in the Solanaceae family. In other implementations, the aerosol precursor composition may include synthetic nicotine. In some implementations, nicotine incorporated in the aerosol precursor composition may be derived from non-tobacco plant sources, such as other members of the Solanaceae family. The aerosol precursor composition may additionally include one or more active ingredients including, but not limited to, a nicotine component, botanical ingredients (e.g., lavender, peppermint, chamomile, basil, rosemary, ginger, *cannabis*, *ginseng*, maca, hemp, *eucalyptus*, rooibos, fennel, citrus, cloves, and tisanes), stimulants (e.g., caffeine and guarana), amino acids (e.g., taurine, theanine, phenylalanine, tyrosine, and tryptophan) and/or pharmaceutical, nutraceutical, and medicinal ingredients (e.g., vitamins, such as B6, B12, and C, and/or cannabinoids, such as tetrahydrocannabinol (THC) and cannabidiol (CBD)). The particular percentages and choice of ingredients will vary depending upon the desired flavor, texture, and other characteristics. Example active ingredients would include any ingredient known to impact one or more biological functions within the body, such as ingredients that furnish pharmacological activity or other direct effect in the diagnosis, cure, mitigation, treatment, or prevention of disease, or which affect the structure or any function of the body of humans or other animals (e.g., provide a stimulating action

on the central nervous system, have an energizing effect, an antipyretic or analgesic action, or an otherwise useful effect on the body).

[0072] A wide variety of types of flavoring agents, or materials that alter the sensory or organoleptic character or nature of the mainstream aerosol of the smoking article may be suitable to be employed. In some implementations, such flavoring agents may be provided from sources other than tobacco and may be natural or artificial in nature. For example, some flavoring agents may be applied to, or incorporated within, the substrate material and/or those regions of the smoking article where an aerosol is generated. In some implementations, such agents may be supplied directly to a heating cavity or region proximate to the heat source or are provided with the substrate material. Example flavoring agents may include, for example, vanillin, ethyl vanillin, cream, tea, coffee, fruit (e.g., apple, cherry, strawberry, peach and citrus flavors, including lime and lemon), maple, menthol, mint, peppermint, spearmint, wintergreen, nutmeg, clove, lavender, cardamom, ginger, honey, anise, sage, cinnamon, sandalwood, jasmine, cascarilla, cocoa, licorice, and flavorings and flavor packages of the type and character traditionally used for the flavoring of cigarette, cigar, and pipe tobaccos. Syrups, such as high fructose corn syrup, may also be suitable to be employed.

[0073] Flavoring agents may also include acidic or basic characteristics (e.g., organic acids, such as levulinic acid, succinic acid, and pyruvic acid). In some implementations, flavoring agents may be combinable with the elements of the substrate material if desired. Example plant-derived compositions that may be suitable are disclosed in U.S. Pat. No. 9,107,453 and U.S. Pat. App. Pub. No. 2012/0152265 both to Dube et al., the disclosures of which are incorporated herein by reference in their entireties. Any of the materials, such as flavorings, casings, and the like that may be useful in combination with a tobacco material to affect sensory properties thereof, including organoleptic properties, such as described herein, may be combined with the substrate material. Organic acids particularly may be able to be incorporated into the substrate material to affect the flavor, sensation, or organoleptic properties of medicaments, such as nicotine, that may be able to be combined with the substrate material. For example, organic acids, such as levulinic acid, lactic acid, and pyruvic acid, may be included in the substrate material with nicotine in amounts up to being equimolar (based on total organic acid content) with the nicotine. Any combination of organic acids may be suitable. For example, in some implementations, the substrate material may include approximately 0.1 to about 0.5 moles of levulinic acid per one mole of nicotine, approximately 0.1 to about 0.5 moles of pyruvic acid per one mole of nicotine, approximately 0.1 to about 0.5 moles of lactic acid per one mole of nicotine, or combinations thereof, up to a concentration wherein the total amount of organic acid present is equimolar to the total amount of nicotine present in the substrate material. Various additional examples of organic acids employed to produce a substrate material are described in U.S. Pat. App. Pub. No. 2015/0344456 to Dull et al., which is incorporated herein by reference in its entirety.

[0074] The selection of such further components may be variable based upon factors such as the sensory characteristics that are desired for the smoking article, and the present disclosure is intended to encompass any such further components that are readily apparent to those skilled in the art of

tobacco and tobacco-related or tobacco-derived products. See, Gutcho, Tobacco Flavoring Substances and Methods, Noyes Data Corp. (1972) and Leffingwell et al., Tobacco Flavoring for Smoking Products (1972), the disclosures of which are incorporated herein by reference in their entireties.

[0075] In other implementations, one or more of the substrate materials may include other materials having a variety of inherent characteristics or properties. For example, one or more of the substrate materials may include a plasticized material or regenerated cellulose in the form of rayon. As another example, viscose (commercially available as VISIL®), which is a regenerated cellulose product incorporating silica, may be suitable. Some carbon fibers may include at least 95 percent carbon or more. Similarly, natural cellulose fibers such as cotton may be suitable, and may be infused or otherwise treated with silica, carbon, or metallic particles to enhance flame-retardant properties and minimize off-gassing, particularly of any undesirable off-gassing components that would have a negative impact on flavor (and especially minimizing the likelihood of any toxic off-gassing products). Cotton may be treatable with, for example, boric acid or various organophosphate compounds to provide desirable flame-retardant properties by dipping, spraying or other techniques known in the art. These fibers may also be treatable (coated, infused, or both by, e.g., dipping, spraying, or vapor-deposition) with organic or metallic nanoparticles to confer the desired property of flame-retardancy without undesirable off-gassing or melting-type behavior.

[0076] Although other implementations may differ, in the depicted implementation the outer wrap **102** (shown most clearly in FIG. 1) is provided to engage or otherwise join together at least a portion of the heat source **104** with the first substrate material **106**, the second substrate material **108**, and at least a portion of the mouthpiece **114**. As such, the outer wrap material **102** is configured, in some aspects, to circumscribe, e.g., coaxially encircle, at least a portion of the heat source **104**, the first substrate material **106** engaged about the first end thereof with the heat source **104**, the second substrate material **108** engaged with the second end of the first substrate material **106**, and at least a portion of the mouthpiece **114**. The outer wrap **102** is configured to be retained in a wrapped position in any manner of ways including via an adhesive, or a fastener, and the like, to allow the outer wrap **102** to remain in the wrapped position. Otherwise, in some other aspects, the outer wrap **102** may be configured to be removable as desired. For example, upon retaining the outer wrap **102** in a wrapped position, the outer wrap **102** may be able to be removed from the heat source **104**, the first substrate material **106** engaged with the heat source **104** about the first end thereof, the second substrate material **108** engaged with the second end of the first substrate material **106**, and/or the mouthpiece **114**.

[0077] In the depicted implementation, the outer wrap **102** also includes one or more openings **120** formed therethrough that allow the entry of air upon a draw on the mouthpiece **114**. In various implementations, the size and number of these openings may be tuned such that a larger fraction of the drawn airflow occurs through these openings (and, in some implementations, a higher air flowrate) and a smaller fraction of the airflow occurs through the hollow structure (and, in some implementations, a lower air flowrate) described below. In such a manner, the airflow through the hollow structure may be only, or mostly, for promoting the heat

transfer. In the depicted implementation, a plurality of substantially evenly spaced openings **120** are formed in the outer wrap **102** in an area proximate the first substrate material **106**, and a plurality of substantially evenly spaced separate openings **122** are formed in the outer wrap **102** in an area proximate the mouthpiece **114**. Although in various implementations the plurality of openings may be formed through the outer wrap **102** in a variety of ways, in the depicted implementation, the plurality of openings are formed via laser perforation.

[**0078**] In various implementations of the present invention, a downstream flavor addition component provides one or more flavors to the aerosol generated by heating the substrate material(s). FIG. 3 illustrates a longitudinal schematic view of a smoking article in accordance with one implementation of the present invention. In particular, FIG. 3 illustrates a smoking article **200** that includes a heat source **204**, a first substrate material **206**, a second substrate material **208**, a filter **210**, and a downstream flavor addition component **212**. In the depicted implementation, the filter **210** and the flavor addition component **212** together comprise a mouthpiece **214**. In the depicted implementation, the heat source **204** comprises a combustible fuel element. In alternative implementations (e.g., consumables for use with ETHP devices), however, the heat source may be removed and the smoking article may be engaged with an electrically powered device capable of heating a consumable or portion thereof (e.g., through resistive and/or inductive heating—see for example, FIG. 6). Further reference is made to the description above regarding possible heat sources and variations thereof. In the depicted implementation, the first substrate material **206** and the second substrate material **208** may comprise the same or different materials. Reference is made to the description above regarding possible substrate materials and variations thereof. Reference is also made to the description above regarding possible filters and variations thereof.

[**0079**] In the depicted implementation, the flavor addition component **212** comprises a plurality of flavor beads **224** and a substantially hollow flow tube **226**. In various implementations, the flow tube may be made of a variety of different materials, including, for example, metal materials (such as, for example, stainless steel), plastic materials, or other materials, such as cellulose acetate. Although other configurations are possible, in the depicted implementation flow tube **226** includes a plurality of openings **228** disposed about a periphery of the flow tube **226**. The plurality of openings **228** of the depicted implementation are positioned in an area proximate the plurality of flavor beads **224**. In other implementations, however, the plurality of openings may have another location and/or may extend beyond the area of the flavor beads. In the depicted implementation, the plurality of openings **228** comprises a plurality of slots, although in other implementations the plurality of openings may have other configurations. For example, in some implementations the plurality of openings comprises a plurality of holes.

[**0080**] In various implementations, the flavor beads may comprise one or more of tobacco flavor beads (such as, for example, marumerized tobacco beads), non-tobacco flavor beads, gel flavor beads, capsules containing flavor beads, or any combination thereof. In various implementations, the flavor beads may include or more flavors, which may alter the sensory or organoleptic character or nature of the main-

stream aerosol of the smoking article may be suitable to be employed. In some implementations, such flavors may be provided from tobacco sources or sources other than tobacco and may be natural or artificial in nature. Example flavors may include, for example, vanillin, ethyl vanillin, cream, tea, coffee, fruit (e.g., apple, cherry, strawberry, peach and citrus flavors, including lime and lemon), maple, menthol, mint, peppermint, spearmint, wintergreen, nutmeg, clove, lavender, cardamom, ginger, honey, anise, sage, cinnamon, sandalwood, jasmine, cascarilla, cocoa, licorice, and flavorings and flavor packages of the type and character traditionally used for the flavoring of cigarette, cigar, and pipe tobaccos. Syrups, such as high fructose corn syrup, may also be suitable to be employed. In some implementations, the flavor(s) of the plurality of flavor beads may be the only flavor(s) added to the aerosol. In other implementations, the flavor(s) of the plurality of flavor beads may be in addition to flavor(s) included in the substrate material(s).

[**0081**] In the depicted implementation, the flow tube **226** extends from a distal end of the mouthpiece **214**, along a longitudinal axis thereof, and through at least a portion of the filter **210**. It should be noted that in other implementations, the flow tube need not extend into the filter. In various implementations, the plurality of flavor beads may be proximate at least a portion of the flow tube. In some implementations, the plurality of flavor beads may substantially surround at least a portion of the flow tube. In the depicted implementation, the plurality flavor beads **224** substantially surround more than half of the longitudinal length of the flow tube **226**. In other implementations, however, the plurality of flavor beads may substantially surround less than half the longitudinal length of the flow tube. In some implementations, the plurality of flavor beads may be positioned proximate the substrate material section.

[**0082**] As noted above, various other types of heat sources are possible. For example, FIG. 6 illustrates a longitudinal schematic view of a smoking article, according to another implementation of the present disclosure. In various respects, the depicted smoking article **500** is similar to that depicted in FIG. 3 (and further reference is made to that description). For example, the smoking article **500** includes a first substrate material **506**, a second substrate material **508**, and a filter **510** and a downstream flavor addition component **512** that together comprise a mouthpiece **514**. In the depicted implementation, the flavor addition component **512** comprises a plurality of flavor beads **524** and a substantially hollow flow tube **526** that includes a plurality of openings **528** disposed about a periphery of the flow tube **526**. The plurality of openings **528** of the depicted implementation are positioned in an area proximate the plurality of flavor beads **524**. In the depicted implementation, however, the heat source **504** represents an electric heat source, such as a resistive or inductive heat source, which may be part of a device that is separate from the smoking article **500**. It should be noted that in various implementations, the heat source may or may not make physical contact with a substrate material, and the heat source may have any configuration, including, for example, configurations that are proximate (or, in some implementations, contact) a periphery of at least a portion of a substrate material, and/or configurations that are proximate (or, in some implementations, contact) an end of a substrate material.

[**0083**] FIG. 4 illustrates a longitudinal schematic view of a smoking article in accordance with another implementa-

tion of the present invention. In particular, FIG. 4 illustrates a smoking article 300 that includes a heat source 304, a first substrate material 306, a second substrate material 308, a filter 310, and a downstream flavor addition component 312. In the depicted implementation, the filter 310 and the flavor addition component 312 together comprise a mouthpiece 314. In the depicted implementation, the heat source 304 comprises a combustible fuel element. In alternative implementations (e.g., consumables for use with EHP devices), however, the heat source may be removed and the smoking article may be engaged with an electrically powered device capable of heating a consumable or portion thereof (e.g., through resistive and/or inductive heating—see for example, FIG. 7). Further reference is made to the description above regarding possible heat sources and variations thereof. In the depicted implementation, the first substrate material 306 and the second substrate material 308 may comprise the same or different materials. Reference is made to the description above regarding possible substrate materials and variations thereof. Reference is also made to the description above regarding possible filters and variations thereof.

[0084] In the depicted implementation, the flavor addition component 312 comprises a plurality of flavor beads 324. In various implementations, the flavor beads may comprise one or more of tobacco flavor beads, non-tobacco flavor beads, gel flavor beads, capsules containing flavor beads, or any combination thereof. In various implementations, the flavor beads may include one or more flavors, which may alter the sensory or organoleptic character or nature of the mainstream aerosol of the smoking article may be suitable to be employed. In some implementations, such flavors may be provided from tobacco sources or sources other than tobacco and may be natural or artificial in nature. Example flavors may include, for example, vanillin, ethyl vanillin, cream, tea, coffee, fruit (e.g., apple, cherry, strawberry, peach and citrus flavors, including lime and lemon), maple, menthol, mint, peppermint, spearmint, wintergreen, nutmeg, clove, lavender, cardamom, ginger, honey, anise, sage, cinnamon, sandalwood, jasmine, cascarilla, cocoa, licorice, and flavorings and flavor packages of the type and character traditionally used for the flavoring of cigarette, cigar, and pipe tobaccos. Syrups, such as high fructose corn syrup, may also be suitable to be employed. In some implementations, the flavor(s) of the plurality of flavor beads may be the only flavor(s) added to the aerosol. In other implementations, the flavor(s) of the plurality of flavor beads may be in addition to flavor(s) included in the substrate material(s).

[0085] In the depicted implementation, the filter 310 includes a cavity 330, wherein the plurality of flavor beads 324 are located in the cavity 330. Although in the depicted implementation the cavity 330 is approximately centrally located along the longitudinal length of the filter 310, in other implementations the cavity may be located proximate either end of the filter or any other location along the length of the filter. In addition, although in the depicted implementation there is a single cavity 330, in other implementations there may be multiple cavities, wherein the same or different flavor beads may be located in one or more of the cavities.

[0086] As noted above, various other types of heat sources are possible. For example, FIG. 7 illustrates a longitudinal schematic view of a smoking article, according to another implementation of the present disclosure. In various respects, the depicted smoking article 600 is similar to that depicted in FIG. 4 (and further reference is made to that

description). For example, the smoking article 600 includes a first substrate material 606, a second substrate material 608, and a filter 610 and a downstream flavor addition component 612 that together comprise a mouthpiece 614. The filter 610 includes a cavity 630, and the plurality of flavor beads 624 are located in the cavity 630. In the depicted implementation, however, the heat source 504 represents an electric heat source, such as a resistive or inductive heat source, which may be part of a device that is separate from the smoking article 500. It should be noted that in various implementations, the heat source may or may not make physical contact with a substrate material, and the heat source may have any configuration, including, for example, configurations that are proximate (or, in some implementations, contact) a periphery of at least a portion of a substrate material, and/or configurations that are proximate (or, in some implementations, contact) an end of a substrate material. FIG. 5 illustrates a longitudinal schematic view of a smoking article in accordance with another implementation of the present invention. In particular, FIG. 5 illustrates a smoking article 400 that includes a heat source 404, a first substrate material 406, a second substrate material 408, a filter 410, and a downstream flavor addition component 412. In the depicted implementation, the filter 410 and the flavor addition component 412 together comprise a mouthpiece 414. In the depicted implementation, the heat source 404 comprises a combustible fuel element. In alternative implementations (e.g., consumables for use with EHP devices), however, the heat source may be removed and the smoking article may be engaged with an electrically powered device capable of heating a consumable or portion thereof (e.g., through resistive and/or inductive heating—see for example, FIG. 8). Reference is made to the description above regarding possible heat sources and variations thereof. In the depicted implementation, the first substrate material 406 and the second substrate material 408 may comprise the same or different materials. Reference is made to the description above regarding possible substrate materials and variations thereof. Reference is also made to the description above regarding possible filters and variations thereof.

[0087] In the depicted implementation, the flavor addition component 412 comprises a plurality of flavor beads 424 and a substantially hollow flow tube 426. Although other configurations are possible, in the depicted implementation the flow tube 426 includes a plurality of openings 428 disposed about a periphery of the flow tube 426. The plurality of openings 428 of the depicted implementation are positioned in an area proximate the plurality of flavor beads 424. In other implementations, however, the plurality of openings may have another location and/or may extend beyond the area of the flavor beads. In the depicted implementation, the plurality of openings 428 comprises a plurality of slots, although in other implementations the plurality of openings may have other configurations. For example, in some implementations the plurality of openings comprises a plurality of holes.

[0088] In various implementations, the flavor beads may comprise one or more of tobacco flavor beads, non-tobacco flavor beads, gel flavor beads, capsules containing flavor beads, or any combination thereof. In various implementations, the flavor beads may include one or more flavors, which may alter the sensory or organoleptic character or nature of the mainstream aerosol of the smoking article may be suitable to be employed. In some implementations, such

flavors may be provided from tobacco sources or sources other than tobacco and may be natural or artificial in nature. Example flavors may include, for example, vanillin, ethyl vanillin, cream, tea, coffee, fruit (e.g., apple, cherry, strawberry, peach and citrus flavors, including lime and lemon), maple, menthol, mint, peppermint, spearmint, wintergreen, nutmeg, clove, lavender, cardamom, ginger, honey, anise, sage, cinnamon, sandalwood, jasmine, cascarilla, cocoa, licorice, and flavorings and flavor packages of the type and character traditionally used for the flavoring of cigarette, cigar, and pipe tobaccos. Syrups, such as high fructose corn syrup, may also be suitable to be employed. In some implementations, the flavor(s) of the plurality of flavor beads may be the only flavor(s) added to the aerosol. In other implementations, the flavor(s) of the plurality of flavor beads may be in addition to flavor(s) included in the substrate material(s).

[0089] In the depicted implementation, the filter includes a cavity **430**, wherein the plurality of flavor beads **424** are located in the cavity **430**. Although in the depicted implementation the cavity **430** is approximately centrally located along the longitudinal length of the filter **410**, in other implementations the cavity may be located proximate either end of the filter or any other location along the length of the filter. In addition, although in the depicted implementation there is a single cavity **430**, in other implementations there may be multiple cavities, wherein the same or different flavor beads may be located in one or more of the cavities. In the depicted implementation, the flow tube **426** extends from a distal end of the mouthpiece **414**, along a longitudinal axis thereof, and through at least a portion of the filter **410**. It should be noted that in other implementations, the flow tube need not extend into the filter. In various implementations, the plurality of flavor beads may be proximate at least a portion of the flow tube. In some implementations, the plurality of flavor beads may substantially surround at least a portion of the flow tube. In the depicted implementation, the plurality of flavor beads **424** substantially surround more than half of the longitudinal length of the flow tube. In other implementations, however, the plurality of flavor beads may substantially surround less than half the longitudinal length of the flow tube.

[0090] As noted above, various other types of heat sources are possible. For example, FIG. **8** illustrates a longitudinal schematic view of a smoking article, according to another implementation of the present disclosure. In various respects, the depicted smoking article **700** is similar to that depicted in FIG. **5** (further reference is made to that description). For example, the smoking article **700** includes a first substrate material **706**, a second substrate material **708**, and a filter **710** and a downstream flavor addition component **712** that together comprise a mouthpiece **714**. In the depicted implementation, the flavor addition component **712** comprises a plurality of flavor beads **724** and a substantially hollow flow tube **726**. Although other configurations are possible, in the depicted implementation the flow tube **726** includes a plurality of openings **728** disposed about a periphery of the flow tube **726**. The plurality of openings **728** of the depicted implementation are positioned in an area proximate the plurality of flavor beads **724**. The filter includes a cavity **730**, wherein the plurality of flavor beads **724** are located in the cavity **730**. In the depicted implementation, however, the heat source **704** represents an electric heat source, such as a resistive or inductive heat

source, which may be part of a device that is separate from the smoking article **700**. It should be noted that in various implementations, the heat source may or may not make physical contact with a substrate material, and the heat source may have any configuration, including, for example, configurations that are proximate (or, in some implementations, contact) a periphery of at least a portion of a substrate material, and/or configurations that are proximate (or, in some implementations, contact) an end of a substrate material.

[0091] Although a smoking article according to the disclosure may take on a variety of implementations, as discussed in detail herein, the use of the smoking article by a consumer will be similar in scope. The foregoing description of use of the smoking article is applicable to the various implementations described through minor modifications, which are apparent to the person of skill in the art in light of the further disclosure provided herein. The description of use, however, is not intended to limit the use of the inventive article but is provided to comply with all necessary requirements of disclosure herein.

[0092] Many modifications and other embodiments of the disclosure will come to mind to one skilled in the art to which this disclosure pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the disclosure is not to be limited to the specific embodiments disclosed herein and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

1. A smoking article comprising:

- at least one substrate material section having an aerosol precursor composition associated therewith;
- a flavor addition component; and
- a mouthpiece disposed downstream from the heat source and the at least one substrate material section, the mouthpiece including a filter,

wherein the mouthpiece includes the flavor addition component, and wherein the flavor addition component comprises a plurality of flavor beads proximate a hollow flow tube, the flow tube including a plurality of peripheral openings defined therethrough.

2. The smoking article of claim **1** further comprising a combustible heat source, wherein the combustible heat source is disposed proximate at least a portion of the at least one substrate material section.

3. The smoking article of claim **1** further comprising a device separate from the smoking article, wherein the separate device includes an electric heat source configured to heat at least a portion of the at least one substrate material section.

4. The smoking article of claim **1**, wherein the flavor addition component is disposed downstream from the filter.

5. The smoking article of claim **1**, wherein the plurality of peripheral openings of the flow tube comprises a plurality of holes extending through a peripheral wall of the flow tube.

6. The smoking article of claim **1**, wherein the plurality of peripheral openings of the flow tube comprises a plurality of slots extending through a peripheral wall of the flow tube.

7. The smoking article of claim **1**, wherein the flow tube extends through at least a portion of the filter.

8. The smoking article of claim **1**, wherein the plurality of flavor beads comprises at least one of tobacco flavor beads, non-tobacco flavor beads, gel flavor beads, capsules containing flavor beads, or any combination thereof.

9. The smoking article of claim **1**, wherein the filter defines a cavity, wherein plurality of flavor beads are located in the cavity, and wherein the flow tube extends through at least a portion of the filter.

10. The smoking article of claim **1** further comprising a second substrate material disposed between the first substrate material and the mouthpiece.

11. The smoking article of claim **1**, wherein the substrate material comprises at least one of tobacco-containing beads, tobacco shreds, tobacco strips, pieces of a reconstituted tobacco material, or tobacco rods.

12. A smoking article comprising:

at least one substrate material section having an aerosol precursor composition associated therewith;

a flavor addition component; and

a mouthpiece disposed downstream from heat source and the at least one substrate material section, the mouthpiece including a filter,

wherein the mouthpiece includes the flavor addition component, wherein the filter defines a cavity therein, wherein the flavor addition component comprises a plurality of flavor beads, and wherein the plurality of flavor beads are located in the cavity.

13. The smoking article of claim **12** further comprising a heat source, and wherein the heat source is disposed proximate at least a portion of the at least one substrate material section.

14. The smoking article of claim **12** further comprising a device separate from the smoking article, wherein the separate device includes an electric heat source configured to heat at least a portion of the at least one substrate material section.

15. The smoking article of claim **12** further comprising a hollow flow tube, the flow tube extending through at least a portion of the filter.

16. The smoking article of claim **15**, wherein the plurality of flavor beads substantially surround the flow tube.

17. The smoking article of claim **15**, wherein the flow tube includes a plurality of peripheral openings defined there-through.

18. The smoking article of claim **17**, wherein the plurality of peripheral openings of the flow tube comprises a plurality of holes extending through a peripheral wall of the flow tube.

19. The smoking article of claim **17**, wherein the plurality of peripheral openings of the flow tube comprises a plurality of slots extending through a peripheral wall of the flow tube.

20. The smoking article of claim **12**, wherein the plurality of flavor beads comprises at least one of tobacco flavor beads, non-tobacco flavor beads, gel flavor beads, capsules containing flavor beads, or any combination thereof.

21. The smoking article of claim **12** further comprising a second substrate material disposed between the first substrate material and the mouthpiece.

22. The smoking article of claim **12**, wherein the substrate material comprises at least one of tobacco-containing beads, tobacco shreds, tobacco strips, pieces of a reconstituted tobacco material, or tobacco rods.

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