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(54) **ELECTRONIC SMOKING ARTICLE HAVING A VAPOR-ENHANCING APPARATUS AND ASSOCIATED METHOD**

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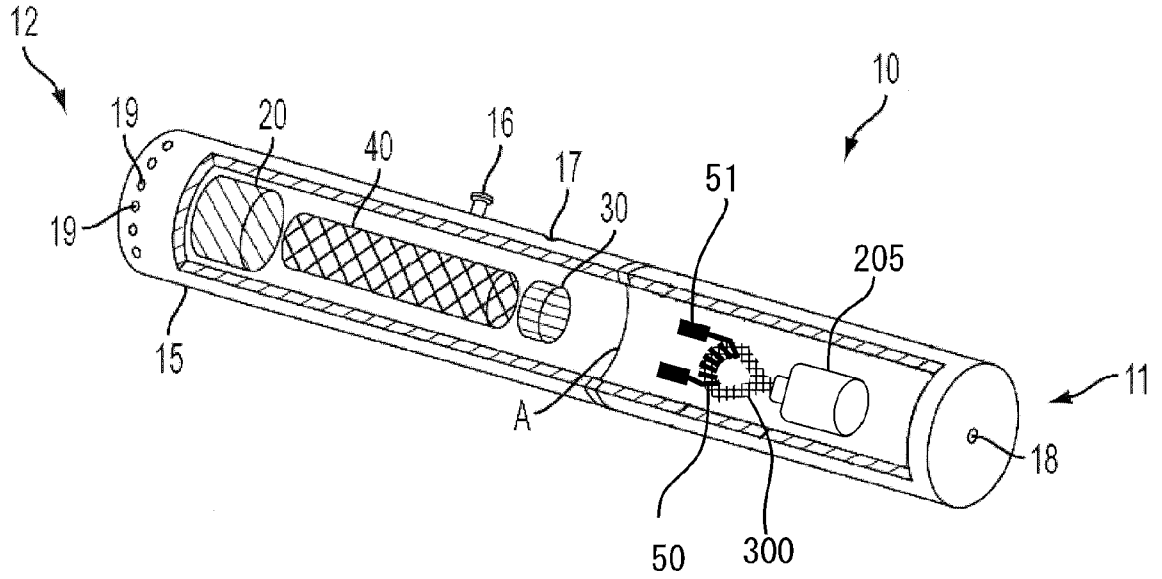
(57) **ABSTRACT**

A vapor-enhancing apparatus is provided for an electronic vapor smoking article. Such an apparatus includes a filter material and a tubular housing defining a lumen. The lumen has a mouth-engaging end and a longitudinally-opposed component-engaging end, and is configured to receive the filter material therein. The component-engaging end is adapted to operably engage a control body portion associated with the electronic vapor smoking article and to receive a vapor therethrough. A vapor-enhancing element is operably engaged with the filter material and is configured to enhance the vapor drawn through the filter material within the lumen, and through the mouth-engaging end, by application of suction to the mouth-engaging end of the housing. An associated method is also provided.



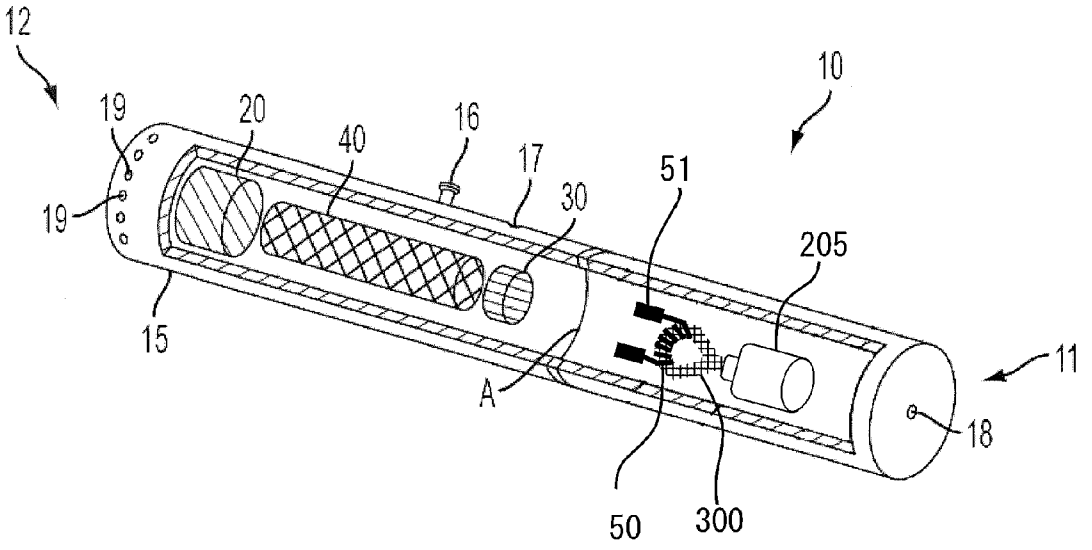


FIG. 1

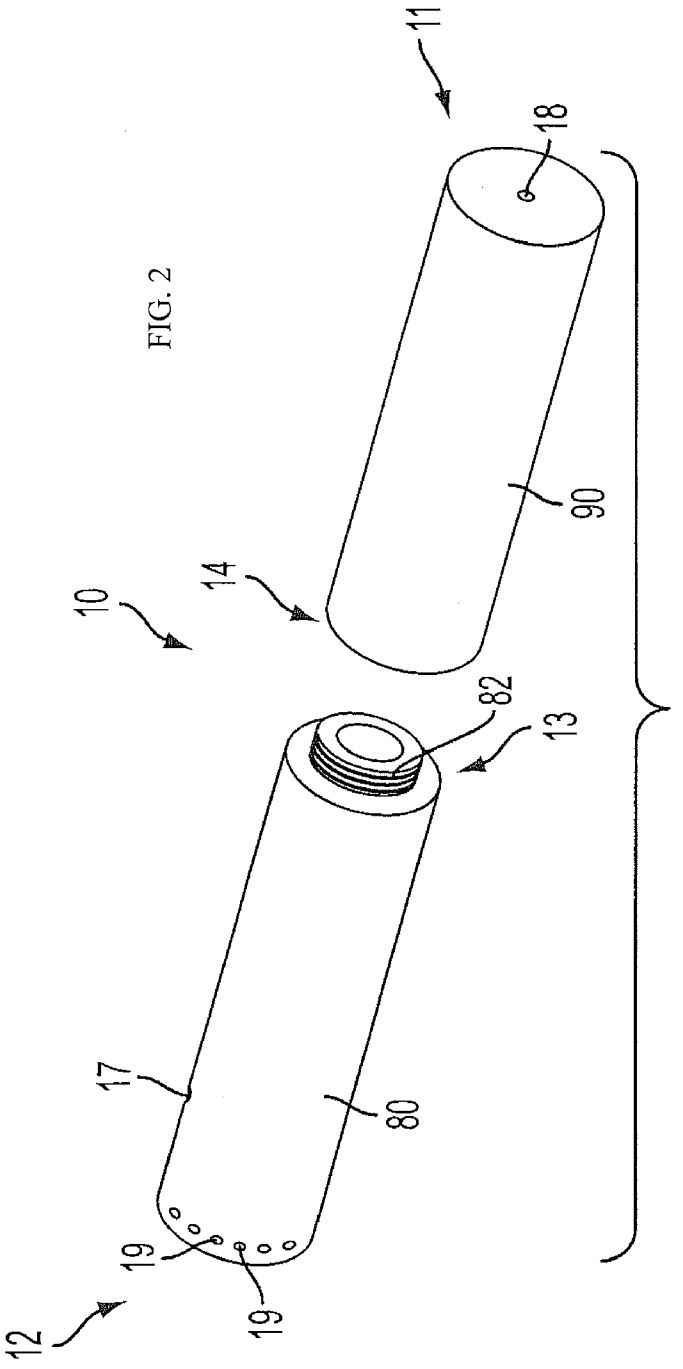


FIG. 2

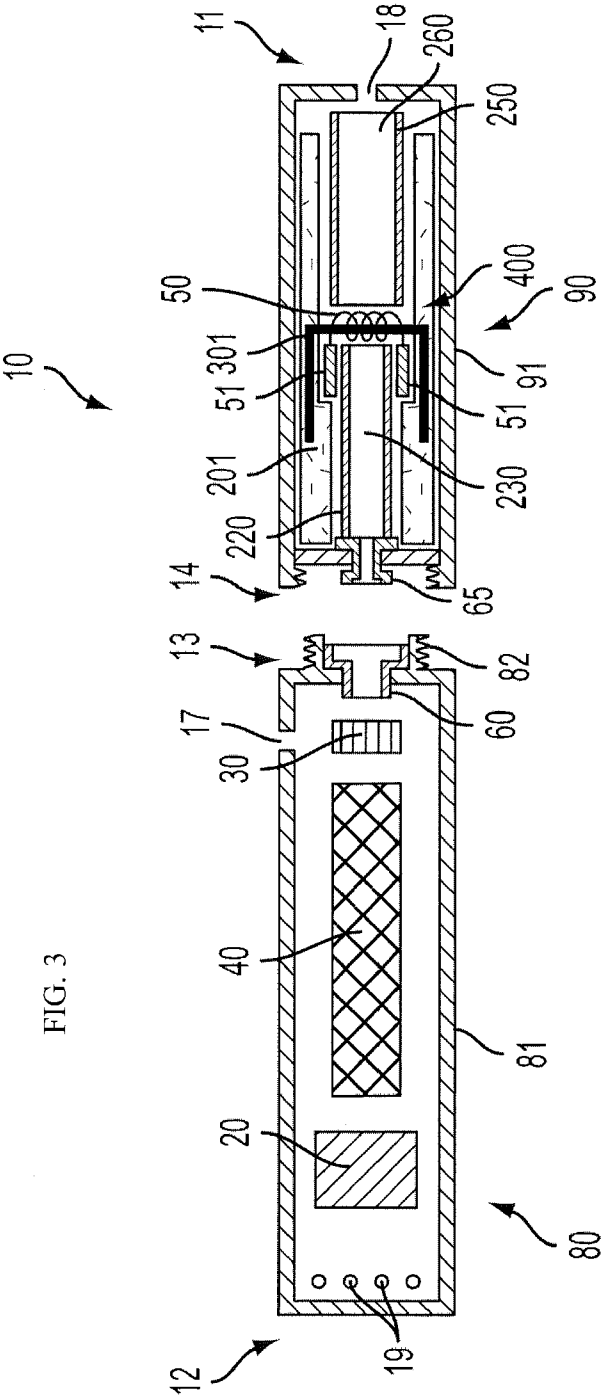

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FIG. 3

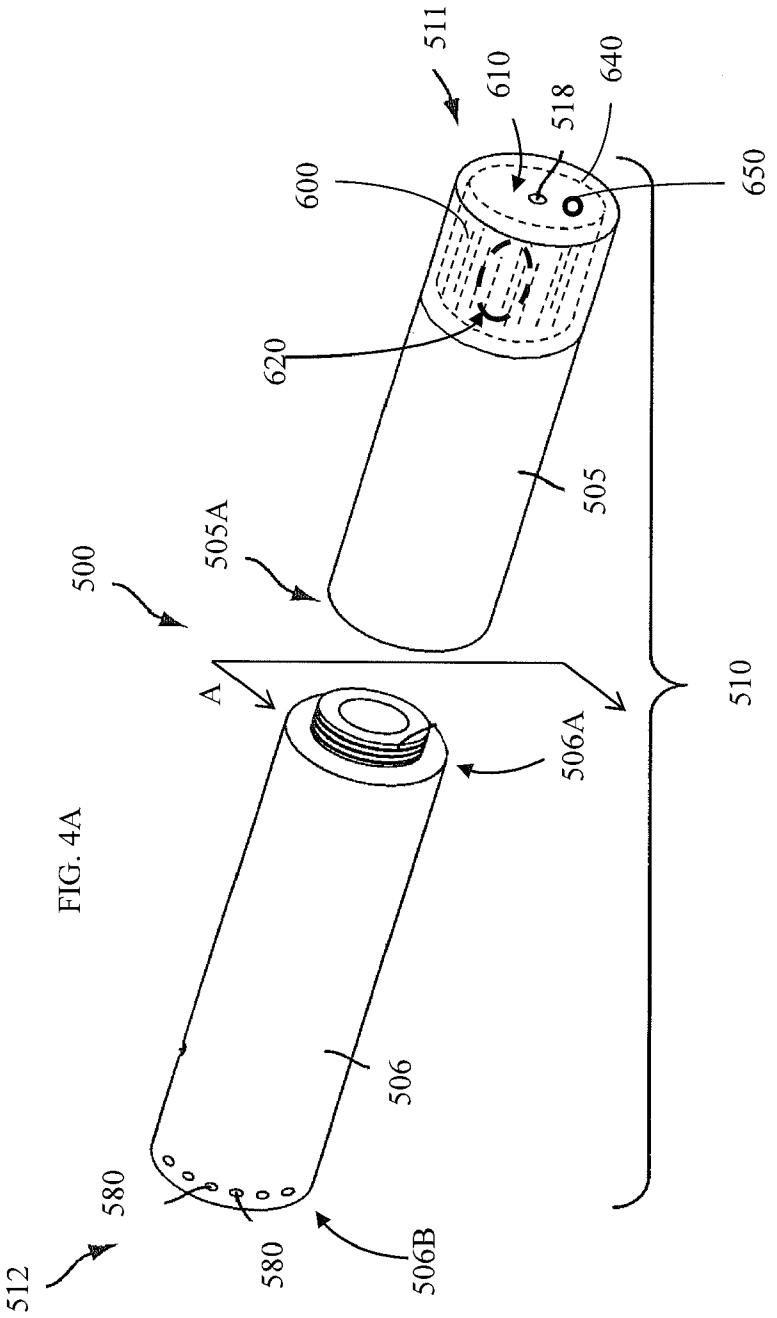
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FIG. 4A

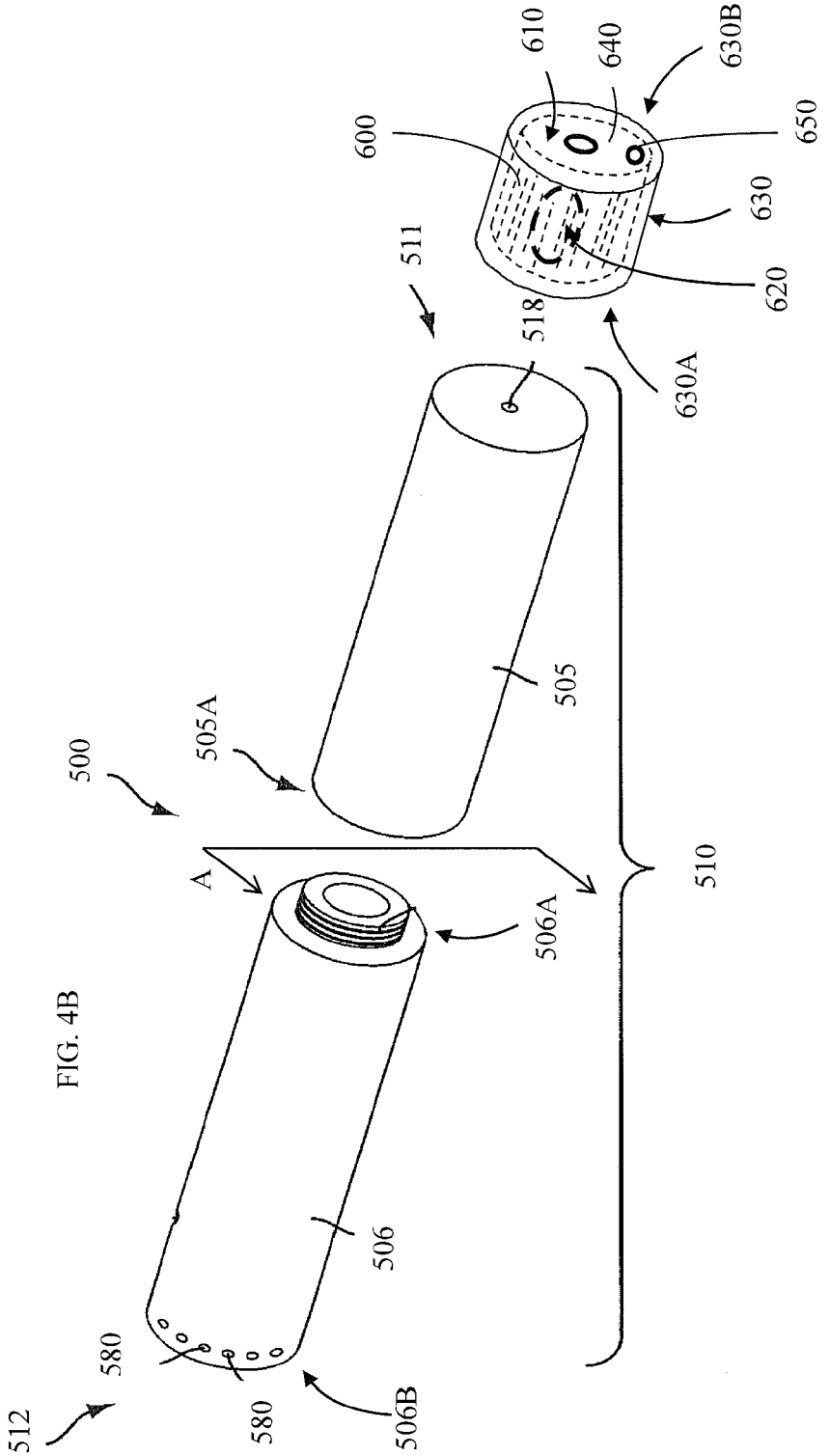
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FIG. 4B

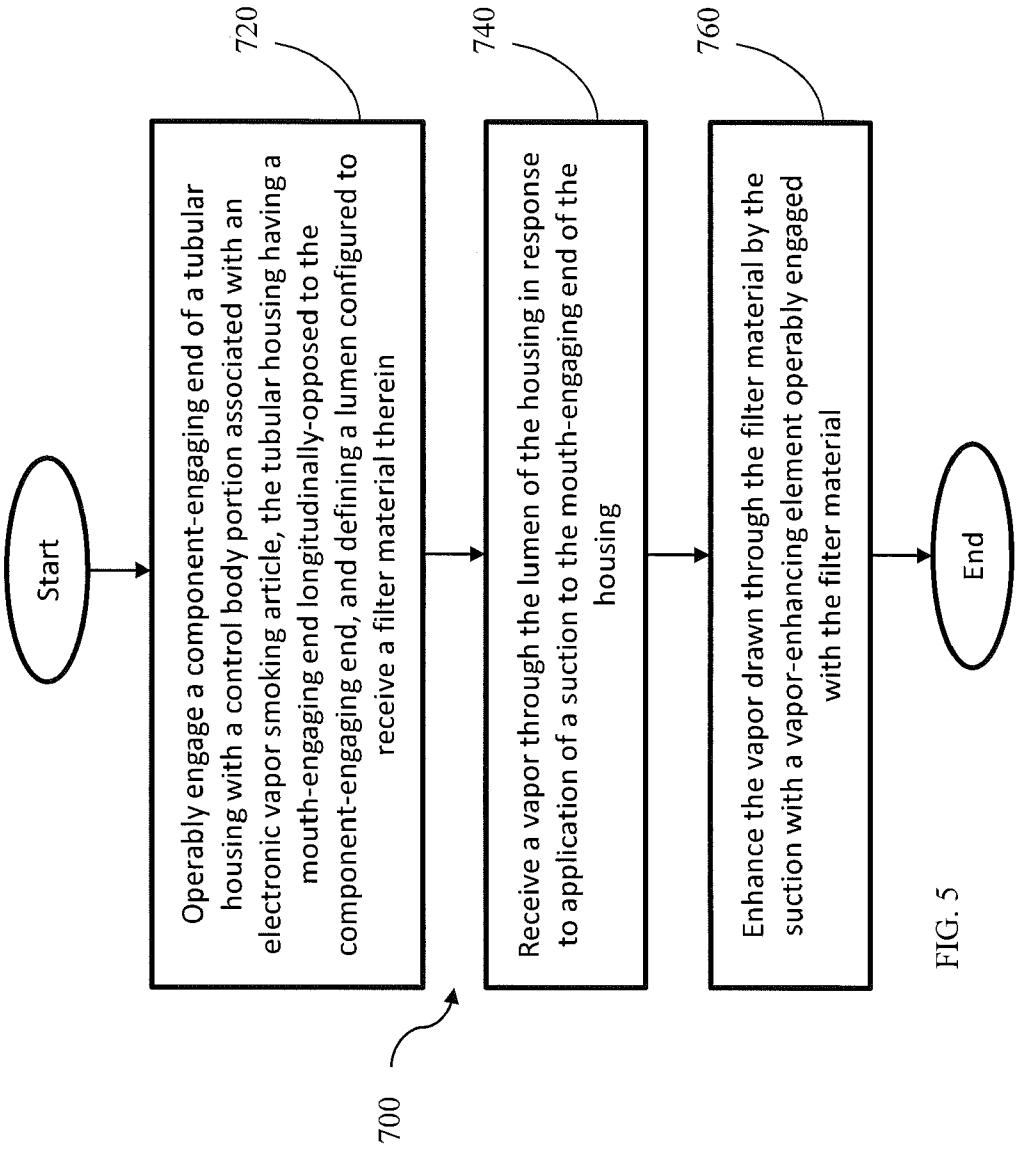
Start
720
Operably engage a component-engaging end of a tubular housing with a control body portion associated with an electronic vapor smoking article, the tubular housing having a mouth-engaging end longitudinally-opposed to the component-engaging end, and defining a lumen configured to receive a filter material therein
740
Receive a vapor through the lumen of the housing in response to application of a suction to the mouth-engaging end of the housing
760
Enhance the vapor drawn through the filter material by the suction with a vapor-enhancing element operably engaged with the filter material
End
700

FIG. 5

ELECTRONIC SMOKING ARTICLE HAVING A VAPOR-ENHANCING APPARATUS AND ASSOCIATED METHOD

BACKGROUND OF THE DISCLOSURE

[0001] 1. Field of the Disclosure

[0002] The present disclosure relates to aerosol delivery articles and uses thereof, and in particular to articles that can be considered to be smoking articles for purposes of yielding components of tobacco and other materials in an inhalable form. Highly preferred components of such articles are made or derived from tobacco, or those articles can be characterized as otherwise incorporating tobacco for human consumption.

[0003] 2. Description of Related Art

[0004] Many smoking devices have been proposed through the years as improvements upon, or alternatives to, smoking products that require combusting tobacco for use. Many of those devices purportedly have been designed to provide the sensations associated with cigarette, cigar, or pipe smoking, but without delivering considerable quantities of incomplete combustion and pyrolysis products that result from the burning of tobacco. To this end, there have been proposed numerous smoking products, flavor generators, and medicinal inhalers that 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. patent application Ser. No. 13/647,000, filed Oct. 8, 2012, to Sears et al., which are incorporated herein by reference.

[0005] Certain tobacco products that have employed electrical energy to produce heat for smoke or aerosol formation, and in particular, certain products that have been referred to as electronic cigarette products, have been commercially available throughout the world. 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; CIRRUS™ and FLING™ by White Cloud Cigarettes; 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; GREEN 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 LXE™ 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.; 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.; VEPPO™ by E-CigaretteDirect, LLC and VUSE® by R. J. Reynolds Vapor Company. 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 BLU™; COOLER VISIONS™; DIRECT E-CIG™; DRAGONFLY™; EMIST™; EVERSMOKE™; GAMUCCI®; HYBRID FLAME™; KNIGHT STICKS™; ROYAL BLUES™; SMOKETIP® and SOUTH BEACH SMOKE™.

[0006] It would be desirable to provide a smoking article that employs heat produced by electrical energy to provide the sensations of cigarette, cigar, or pipe smoking, that does so without combusting tobacco to any significant degree, that does so without the need of a combustion heat source, and that does so without necessarily delivering considerable quantities of incomplete combustion and pyrolysis products.

BRIEF SUMMARY OF THE DISCLOSURE

[0007] The above and other needs are met by the present disclosure which, in one aspect, provides a vapor-enhancing apparatus for an electronic vapor smoking article. Such an apparatus comprises a filter material and a tubular housing defining a lumen. The tubular housing has a mouth-engaging end and a longitudinally-opposed component-engaging end, and the lumen is configured to receive the filter material therein. The component-engaging end is adapted to engage a cartridge body portion associated with the electronic vapor smoking article and to receive a vapor therefrom. A vapor-enhancing element is operably engaged with the filter material and is configured to enhance the vapor drawn from the cartridge body portion associated with the electronic vapor smoking article through the filter material within the lumen, and through the mouth-engaging end, by application of a suction to the mouth-engaging end of the housing.

[0008] Another aspect of the present disclosure provides a method of enhancing a vapor produced by an electronic vapor smoking article. Such a method comprises engaging a component-engaging end of a tubular housing with a cartridge body portion associated with the electronic vapor smoking article, wherein the tubular housing has a mouth-engaging end longitudinally-opposed to the component-engaging end, and defines a lumen configured to receive a filter material therein. A vapor is received in the lumen of the housing from the cartridge body portion in response to application of a suction to the mouth-engaging end of the housing, and the vapor drawn through the filter material by the suction is enhanced with a vapor-enhancing element operably engaged with the filter material.

[0009] Aspects of the present disclosure thus address the identified needs and provide other advantages as detailed herein.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0010] 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:

[0011] FIG. **1** is a perspective view of an example embodiment of an electronic vapor smoking article according to the disclosure, wherein a portion of an outer shell of the article is cut away to reveal the interior components thereof;

[0012] FIG. **2** is a perspective view of an example embodiment of an electronic vapor smoking article according to the disclosure, wherein the article comprises a control body and a cartridge that are attachable and detachable with respect to each other;

[0013] FIG. **3** is a longitudinal cross-section of an example embodiment of an electronic vapor smoking article according to another aspect of the disclosure, wherein the article comprises a control body and a cartridge that are attachable and detachable with respect to each other;

[0014] FIG. **4**A is a perspective view of an example embodiment of an electronic vapor smoking article according to the disclosure, wherein the article comprises a control body and a cartridge that are attachable and detachable with respect to each other, and wherein a vapor-enhancing aspect is engaged with a mouth-end portion of the electronic vapor smoking article;

[0015] FIG. **4**B is a perspective view of an example embodiment of an electronic vapor smoking article according to the disclosure, wherein the article comprises a control body and a cartridge that are attachable and detachable with respect to each other, and wherein a vapor-enhancing aspect is disengaged from a mouth-end portion of the electronic vapor smoking article; and

[0016] FIG. **5** is a schematic of a method of enhancing a vapor produced by an electronic vapor smoking article, according to one aspect of the disclosure.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0017] The present disclosure will now be described more fully hereinafter with reference to exemplary embodiments thereof. These exemplary 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 may be 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.

[0018] The present disclosure provides descriptions of articles that use electrical energy to heat a material (preferably without combusting the material to any significant degree) to form an inhalable substance; such articles most preferably being sufficiently compact to be considered "hand-held" devices. In certain highly preferred embodiments, the articles can be characterized as smoking articles. As used herein, the term "smoking article" is intended to mean an article 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 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 the 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 can be considered to be visible aerosols that might be considered to be described as smoke-like) resulting from volatilization or vaporization of certain components of the article or device. In highly preferred embodiments, articles or devices characterized as smoking articles incorporate tobacco and/or components derived from tobacco.

[0019] Articles or devices of the present disclosure also can be characterized as being vapor-producing articles, aerosol delivery articles or medicament delivery articles. Thus, such articles or devices can be adapted so as to provide one or more substances (e.g., flavors and/or pharmaceutical active ingredients) in an inhalable form or state. For example, inhalable substances can be substantially in the form of a vapor (i.e., a substance that is in the gas phase at a temperature lower than its critical point). Alternatively, inhalable substances can be in the form of an aerosol (i.e., 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.

[0020] In use, smoking articles of the present disclosure are subjected 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). For example, the user of a smoking article of the present disclosure can hold that article much like a traditional type of smoking article, draw on one end of that article for inhalation of aerosol produced by that article, and take puffs at selected intervals of time.

[0021] Smoking articles of the present disclosure generally include a number of components provided within an outer shell or body. The overall design of the outer shell or body can vary, and the format or configuration of the outer body that can define the overall size and shape of the smoking article can vary. Typically, an elongated body resembling the shape of a cigarette or cigar can be a formed from a single, unitary shell; or the elongated body can be formed of two or more separable pieces. For example, a smoking article can comprise an elongated shell or body that can be substantially tubular in shape, and as such, resemble the shape of a conventional cigarette or cigar. In one embodiment, all of the components of the smoking article are contained within one outer body or shell. Alternatively, a smoking article can comprise two shells that are joined and are separable. For example, a smoking article can possess at one end a control body comprising a shell containing one or more reusable components (e.g., a rechargeable battery and various electronics for controlling the operation of that article), and at the other end and removably attached thereto a shell containing a disposable portion (e.g., a disposable flavor-containing cartridge). More specific formats, configurations and arrangements of components within the single shell type of unit or within a multi-piece separable shell type of unit will be evident in light of the further disclosure provided herein. Additionally, various smoking article designs and component arrangements can be appreciated upon consideration of the commercially available electronic smoking articles, such as those representative products listed in the background art section of the present disclosure.

[0022] Smoking articles of the present disclosure most preferably comprise some combination of a power source (i.e., an electrical power source), at least one control component (e.g., means for actuating, controlling, regulating and ceasing power for heat generation, such as by controlling

electrical current flow from the power source to other components of the article), a heater or heat generation component (e.g., an electrical resistance heating element or component commonly referred to as an "atomizer"), and an aerosol precursor component (e.g., commonly a liquid capable of yielding an aerosol upon application of sufficient heat, such as ingredients commonly referred to as "smoke juice," "e-liquid" and "e-juice"), and a mouth-end region, portion, or tip for allowing draw upon the smoking article for aerosol inhalation (e.g., a defined air flow path through the article such that aerosol generated can be withdrawn therefrom upon draw). Alignment of the components within the article can vary. In specific embodiments, the aerosol precursor component can be located near an end of the article (e.g., with a cartridge which, in certain circumstances, can be replaceable and disposable) that is proximal to the mouth of a user so as to maximize aerosol delivery to the user. Other configurations, however, are not excluded. Generally, the heater component can be positioned sufficiently near that aerosol precursor component so that heat from the heater component can volatilize the aerosol precursor (as well as one or more flavorants, medicaments, or the like that may likewise be provided for delivery to a user) and form an aerosol for delivery to the user. When the heating member heats the aerosol precursor component, 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 components can be appreciated upon consideration of the commercially available electronic smoking articles, such as those representative products listed in the background art section of the present disclosure.

[0023] A smoking article incorporates a battery or other electrical power source to provide current flow sufficient to provide various functionalities to the article, such as resistive heating, powering of control systems, powering of indicators, and the like. The power source can take on various embodiments. Preferably, the power source is able to deliver sufficient power to rapidly heat the heating member to provide for aerosol formation and power the article through use for the desired duration of time. The power source preferably is sized to fit conveniently within the article so that the article can be easily handled; and additionally, preferred a preferred power source is of a sufficiently light weight to not detract from a desirable smoking experience.

[0024] Examples of useful power sources include lithium ion batteries that preferably are rechargeable (e.g., a rechargeable lithium-manganese dioxide battery). In particular, lithium polymer batteries can be used as such batteries can provide increased safety. Other types of batteries—e.g., N50-AAA CADNICA nickel-cadmium cells—may also be used. Even further examples of batteries that can be used according to the disclosure are described in US Pub. App. No. 2010/0028766, the disclosure of which is incorporated herein by reference in its entirety. Thin film batteries may be used in certain embodiments of the disclosure. Any of these batteries or combinations thereof can be used in the power source, but rechargeable batteries are preferred because of cost and disposal considerations associated with disposable batteries. In embodiments wherein disposable batteries are provided, smoking article can include access for removal and replacement of the battery. Alternatively, in embodiments where rechargeable batteries are used, the smoking article can comprise charging contacts, for interaction with corresponding contacts in a conventional recharging unit deriving power from a standard 120-volt AC wall outlet, or other sources such as an automobile electrical system or a separate portable power supply, including USB connections. Means for recharging the battery can be provided in a portable charging case that can include, for example, a relatively larger battery unit that can provide multiple charges for the relatively smaller batteries present in the smoking article. The article further can include components for providing a non-contact inductive recharging system such that the article can be charged without being physically connected to an external power source. Thus, the article can include components to facilitate transfer of energy from an electromagnetic field to the rechargeable battery within the article.

[0025] In further embodiments, the power source also can comprise one or more capacitors. Capacitors are capable of discharging more quickly than batteries and can be charged between puffs, allowing the battery to discharge into the capacitor at a lower rate than if it were used to power the heating member directly. For example, a supercapacitor—i.e., an electric double-layer capacitor (EDLC)—may be used separate from or in combination with a battery. When used alone, the supercapacitor may be recharged before each use of the article. Thus, the disclosure also may include a charger component that can be attached to the smoking article between uses to replenish the supercapacitor.

[0026] The smoking article can further include a variety of power management software, hardware, and/or other electronic control components. For example, such software, hardware, and/or electronic controls can include carrying out charging of the battery, detecting the battery charge and discharge status, performing power save operations, preventing unintentional or over-discharge of the battery, or the like.

[0027] A "controller" or "control component" according to the present disclosure can encompass a variety of elements useful in the present smoking article. Moreover, a smoking article according to the disclosure can include one, two, or even more control components that can be combined into a unitary element or that can be present at separate locations within the smoking article, and individual control components can be utilized for carrying out different control aspects. For example, a smoking article can include a control component that is integral to or otherwise combined with a battery so as to control power discharge from the battery. The smoking article separately can include a control component that controls other aspects of the article. Alternatively, a single controller may be provided that carries out multiple control aspects or all control aspects of the article. Likewise, a sensor (e.g., a puff sensor) used in the article can include a control component that controls the actuation of power discharge from the power source in response to a stimulus. The smoking article separately can include a control component that controls other aspects of the article. Alternatively, a single controller may be provided in or otherwise associated with the sensor for carrying out multiple control aspects or all control aspects of the article. Thus, it can be seen that a variety of combinations of controllers may be combined in the present smoking article to provide the desired level of control of all aspects of the device.

[0028] The smoking article also can comprise one or more controller components useful for controlling flow of electrical energy from the power source to further components of the article, such as to a resistive heating element. Specifically, the article can comprise a control component that actuates current flow from the power source, such as to the resistive heating element. For example, in some embodiments, the article can include a pushbutton that can be linked to a control circuit for manual control of power flow, wherein a consumer can use the pushbutton to turn on the article and/or to actuate current flow into the resistive heating element. Multiple buttons can be provided for manual performance of powering the article on and off, and for activating heating for aerosol generation. One or more pushbuttons present can be substantially flush with an outer surface of the smoking article.

[0029] Instead of (or in addition to) the pushbutton, the inventive article can include one or more control components responsive to the consumer's drawing on the article (i.e., puff-actuated heating). For example, the article may include a switch that is sensitive either to pressure changes or air flow changes as the consumer draws on the article (i.e., a puff-actuated switch). Other suitable current actuation/deactuation mechanisms may include a temperature actuated on/off switch or a lip pressure actuated switch. An exemplary mechanism that can provide such puff-actuation capability includes a Model 163PC01D36 silicon sensor, manufactured by the MicroSwitch division of Honeywell, Inc., Freeport, Ill. With such sensor, the resistive heating element can be activated rapidly by a change in pressure when the consumer draws on the article. In addition, flow sensing devices, such as those using hot-wire anemometry principles, may be used to cause the energizing of the resistive heating element sufficiently rapidly after sensing a change in air flow. A further puff actuated switch that may be used is a pressure differential switch, such as Model No. MPL-502-V, range A, from Micro Pneumatic Logic, Inc., Ft. Lauderdale, Fla. Another suitable puff actuated mechanism is a sensitive pressure transducer (e.g., equipped with an amplifier or gain stage) which is in turn coupled with a comparator for detecting a predetermined threshold pressure. Yet another suitable puff actuated mechanism is a vane which is deflected by airflow, the motion of which vane is detected by a movement sensing means. Yet another suitable actuation mechanism is a piezoelectric switch. Also useful is a suitably connected Honeywell MicroSwitch Microbridge Airflow Sensor, Part No. AWM 2100V from MicroSwitch Division of Honeywell, Inc., Freeport, Ill. Further examples of demand-operated electrical switches that may be employed in a heating circuit according to the present disclosure are described in U.S. Pat. No. 4,735,217 to Gerth et al., which is incorporated herein by reference in its entirety. Other suitable differential switches, analog pressure sensors, flow rate sensors, or the like, will be apparent to the skilled artisan with the knowledge of the present disclosure. A pressure-sensing tube or other passage providing fluid connection between the puff actuated switch and an air flow passage within the smoking article can be included so that pressure changes during draw are readily identified by the switch. Further description of current regulating circuits and other control components, including microcontrollers, that can be useful in the present smoking article are provided in U.S. Pat. Nos. 4,922,901, 4,947,874, and 4,947,875, all to Brooks et al., U.S. Pat. No. 5,372,148 to McCafferty et al., U.S. Pat. No. 6,040,560 to Fleischhauer et al., and U.S. Pat. No. 7,040,314 to Nguyen et al., all of which are incorporated herein by reference in their entireties.

[0030] Capacitive sensing components in particular can be incorporated into the device in a variety of manners to allow for diverse types of "power-up" and/or "power-down" for one or more components of the device. Capacitive sensing can include the use of any sensor incorporating technology based on capacitive coupling including, but not limited to, sensors that detect and/or measure proximity, position or displacement, humidity, fluid level, pressure, or acceleration. Capacitive sensing can arise from electronic components providing for surface capacitance, projected capacitance, mutual capacitance, or self capacitance. Capacitive sensors generally can detect anything that is conductive or has a dielectric different than that of air. Capacitive sensors, for example, can replace mechanical buttons (i.e., the push-button referenced above) with capacitive alternatives. Thus, one specific application of capacitive sensing according to the disclosure is a touch capacitive sensor. For example, a touch pad can be present on the smoking article that allows the user to input a variety of commands. Most basically, the touch pad can provide for powering the heating element much in the same manner as a push button, as already described above. In other embodiments, capacitive sensing can be applied near the mouth end of the smoking article such that the pressure of the lips on the smoking article to draw on the article can signal the device to provide power to the heating element. In addition to touch capacitance sensors, motion capacitance sensors, liquid capacitance sensors, and accelerometers can be utilized according to the disclosure to illicit a variety of response from the smoking article. Further, photoelectric sensors also can be incorporated into the inventive smoking article.

[0031] Sensors utilized in the present articles can expressly signal for power flow to the heating element so as to heat the substrate including the aerosol precursor material and form a vapor or aerosol for inhalation by a user. Sensors also can provide further functions. For example, a "wake-up" sensor can be included. Other sensing methods providing similar function likewise can be utilized according to the disclosure.

[0032] When the consumer draws on the mouth end of the smoking article, the current actuation means can permit unrestricted or uninterrupted flow of current through the resistive heating member to generate heat rapidly. Because of the rapid heating, it can be useful to include current regulating components to (i) regulate current flow through the heating member to control heating of the resistive element and the temperature experienced thereby, and (ii) prevent overheating and degradation of the substrate or other component carrying the aerosol precursor material and/or other flavors or inhalable materials.

[0033] The current regulating circuit particularly may be time based. Specifically, such a circuit includes a means for permitting uninterrupted current flow through the heating element for an initial time period during draw, and a timer means for subsequently regulating current flow until draw is completed. For example, the subsequent regulation can include the rapid on-off switching of current flow (e.g., on the order of about every 1 to 50 milliseconds) to maintain the heating element within the desired temperature range. Further, regulation may comprise simply allowing uninterrupted current flow until the desired temperature is achieved then turning off the current flow completely. The heating member may be reactivated by the consumer initiating another puff on the article (or manually actuating the pushbutton, depending

upon the specific switch embodiment employed for activating the heater). Alternatively, the subsequent regulation can involve the modulation of current flow through the heating element to maintain the heating element within a desired temperature range. In some embodiments, so as to release the desired dosing of the inhalable substance, the heating member may be energized for a duration of about 0.2 second to about 5.0 seconds, about 0.3 second to about 4.5 seconds, about 0.5 second to about 4.0 seconds, about 0.5 second to about 3.5 seconds, or about 0.6 second to about 3.0 seconds. One exemplary time-based current regulating circuit can include a transistor, a timer, a comparator, and a capacitor. Suitable transistors, timers, comparators, and capacitors are commercially available and will be apparent to the skilled artisan. Exemplary timers are those available from NEC Electronics as C-1555C and from General Electric Intersil, Inc. as ICM7555, as well as various other sizes and configurations of so-called "555 Timers". An exemplary comparator is available from National Semiconductor as LM311. Further description of such time-based current regulating circuits and other control components that can be useful in the present smoking article are provided in U.S. Pat. Nos. 4,922,901, 4,947,874, and 4,947,875, all to Brooks et al., all of which are incorporated herein by reference in their entireties.

[0034] The control components particularly can be configured to closely control the amount of heat provided to the resistive heating element. In some embodiments, the current regulating component can function to stop current flow to the resistive heating element once a defined temperature has been achieved. Such defined temperature can be in a range that is substantially high enough to volatilize the aerosol precursor material and any further inhalable substances and provide an amount of aerosol equivalent to a typical puff on a conventional cigarette, as otherwise discussed herein. While the heat needed to volatilize the aerosol precursor material in a sufficient volume to provide a desired volume for a single puff can vary, it can be particularly useful for the heating member to heat to a temperature of about 120° C. or greater, about 130° C. or greater, about 140° C. or greater, or about 160° C. In some embodiments, in order to volatilize an appropriate amount of the aerosol precursor material, the heating temperature may be about 180° C. or greater, about 200° C. or greater, about 300° C. or greater, or about 350° C. or greater. In further embodiments, the defined temperature for aerosol formation can be about 120° C. to about 350° C., about 140° C. to about 300° C., or about 150° C. to about 250° C. The temperature and time of heating can be controlled by one or more components contained in the control housing. The current regulating component likewise can cycle the current to the resistive heating element off and on once a defined temperature has been achieved so as to maintain the defined temperature for a defined period of time.

[0035] Still further, the current regulating component can cycle the current to the resistive heating element off and on to maintain a first temperature that is below an aerosol forming temperature and then allow an increased current flow in response to a current actuation control component so as to achieve a second temperature that is greater than the first temperature and that is an aerosol forming temperature. Such controlling can improve the response time of the article for aerosol formation such that aerosol formation begins almost instantaneously upon initiation of a puff by a consumer. In some embodiments, the first temperature (which can be characterized as a standby temperature) can be only slightly less than the aerosol forming temperature defined above. Specifically, the standby temperature can be about 50° C. to about 150° C., about 70° C. to about 140° C., about 80° C. to about 120° C., or about 90° C. to about 110° C.

[0036] In addition to the above control elements, the smoking article also may comprise one or more indicators. Such indicators may be lights (e.g., light emitting diodes) that can provide indication of multiple aspects of use of the inventive article. Further, LED indicators may be positioned at the distal end of the smoking article to simulate color changes seen when a conventional cigarette is lit and drawn on by a user. Other indices of operation also are encompassed. For example, visual indicators of operation also may include changes in light color or intensity to show progression of the smoking experience. Tactile indicators of operation and sound indicators of operation similarly are encompassed by the disclosure. Moreover, combinations of such indicators of operation also may be used in a single article.

[0037] A smoking article according to the disclosure further can comprise a heating member that heats an aerosol precursor component to produce an aerosol for inhalation by a user. In various embodiments, the heating member can be formed of a material that provides resistive heating when an electrical current is applied thereto. Preferably, the resistive heating element exhibits an electrical resistance making the resistive heating element useful for providing a sufficient quantity of heat when electrical current flows therethrough. Interaction of the heating member with the aerosol precursor component/composition may be through, for example, heat conduction, heat radiation, and/or heat convection.

[0038] Electrically conductive materials useful as resistive heating elements can be those having low mass, low density, and moderate resistivity and that are thermally stable at the temperatures experienced during use. Useful heating elements heat and cool rapidly, and thus provide for the efficient use of energy. Rapid heating of the element can be beneficial to provide almost immediate volatilization of an aerosol precursor material in proximity thereto. Rapid cooling (i.e., to a temperature below the volatilization temperature of the aerosol precursor component/composition/material) prevents substantial volatilization (and hence waste) of the aerosol precursor material during periods when aerosol formation is not desired. Such heating elements also permit relatively precise control of the temperature range experienced by the aerosol precursor material, especially when time based current control is employed. Useful electrically conductive materials preferably are chemically non-reactive with the materials being heated (e.g., aerosol precursor materials and other inhalable substance materials) so as not to adversely affect the flavor or content of the aerosol or vapor that is produced. Exemplary, non-limiting, materials that can be used as the electrically conductive material include carbon, graphite, carbon/graphite composites, metals, metallic and non-metallic carbides, nitrides, silicides, inter-metallic compounds, cermets, metal alloys, and metal foils. In particular, refractory materials may be useful. Various, different materials can be mixed to achieve the desired properties of resistivity, mass, and thermal conductivity. In specific embodiments, metals that can be utilized include, for example, nickel, chromium, alloys of nickel and chromium (e.g., nichrome), and steel. Materials that can be useful for providing resistive heating are described in U.S. Pat. No. 5,060,671 to Counts et al.; U.S. Pat. No. 5,093,894 to Deevi et al.; U.S. Pat. No. 5,224,498 to Deevi et al.; U.S. Pat. No. 5,228,460 to Sprinkel

Jr., et al.; U.S. Pat. No. 5,322,075 to Deevi et al.; U.S. Pat. No. 5,353,813 to Deevi et al.; U.S. Pat. No. 5,468,936 to Deevi et al.; U.S. Pat. No. 5,498,850 to Das; U.S. Pat. No. 5,659,656 to Das; U.S. Pat. No. 5,498,855 to Deevi et al.; U.S. Pat. No. 5,530,225 to Hajaligol; U.S. Pat. No. 5,665,262 to Hajaligol; U.S. Pat. No. 5,573,692 to Das et al.; and U.S. Pat. No. 5,591,368 to Fleischhauer et al., the disclosures of which are incorporated herein by reference in their entireties.

[0039] The resistive heating element can be provided in a variety forms, such as in the form of a foil, a foam, discs, spirals, fibers, wires, films, yarns, strips, ribbons, or cylinders, as well as irregular shapes of varying dimensions. In some embodiments, a resistive heating element according to the present disclosure can be a conductive substrate, such as described in co-pending U.S. patent application Ser. No. 13/432,406, filed Mar. 28, 2012, the disclosure of which is incorporated herein by reference in its entirety. The resistive heating element also may be present as part of a microheater component, such as described in co-pending U.S. patent application Ser. No. 13/602,871, filed Sep. 4, 2012, the disclosure of which is incorporated herein by reference in its entirety.

[0040] Beneficially, the resistive heating element can be provided in a form that enables the heating element to be positioned in intimate contact with or in close proximity to the aerosol precursor material (i.e. to provide heat to the aerosol precursor material through, for example, conduction, radiation, or convection). In other embodiments, the resistive heating element can be provided in a form such that the aerosol precursor material can be delivered to the resistive heating element for aerosolization. Such delivery can take on a variety of embodiments, such as wicking of the aerosol precursor to the resistive heating element and flowing the aerosol precursor to the resistive heating element, such as through a capillary, which may include valve flow regulation. As such, the aerosol precursor material may be provided in liquid form in one or more reservoirs positioned sufficiently away from the resistive heating element to prevent premature aerosolization, but positioned sufficiently close to the resistive heating element to facilitate transport of the aerosol precursor material, in the desired amount, to the resistive heating element for aerosolization.

[0041] In certain embodiments, a smoking article according to the present disclosure can include tobacco, a tobacco component, or a tobacco-derived material (i.e., a material that is found naturally in tobacco that may be isolated directly from the tobacco or synthetically prepared). The tobacco that is employed can include, or can 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.; US Pat. App. Pub. No. 2004/0255965 to Perfetti et al.; PCT Pub. 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.

[0042] The tobacco that is incorporated within the smoking article can be employed in various forms; and combinations of various forms of tobacco can be employed, or different forms of tobacco can be employed at different locations within the smoking article. For example, the tobacco can be employed in the form of a tobacco extract. See, for example, U.S. Pat. No. 7,647,932 to Cantrell et al.; U.S. Pat. No. 8,079,371 to Robinson et al.; and US Pat. Pub. No. 2007/0215167 to Crooks et al., the disclosures of which are incorporated herein by reference in their entireties.

[0043] The smoking article can incorporate tobacco additives of the type that are traditionally used for the manufacture of tobacco products. Those additives can 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 can 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. Preferred casing materials 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 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 can be added include those disclosed in U.S. Pat. No. 4,830,028 to Lawson et al. and US Pat. Pub. No. 2008/0245377 to Marshall et al., the disclosures of which are incorporated herein by reference in their entireties.

[0044] 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.; US Pat. App. Pub. No. 2005/0016549 to Banerjee et al.; and US Pat. App. Pub. No. 2007/0215167 to Crooks et al.; the disclosures of which are incorporated herein by reference in their entireties.

[0045] Further tobacco materials, such as a tobacco aroma oil, a tobacco essence, a spray dried tobacco extract, a freeze dried tobacco extract, tobacco dust, or the like may be included in the vapor precursor or aerosol precursor composition. As used herein, the term "tobacco extract" means components separated from, removed from, or derived from, tobacco using tobacco extraction processing conditions and techniques. Purified extracts of tobacco or other botanicals specifically can be used. Typically, tobacco extracts are obtained using solvents, such as solvents having an aqueous nature (e.g., water) or organic solvents (e.g., alcohols, such as ethanol or alkanes, such as hexane). As such, extracted tobacco components are removed from tobacco and separated from the unextracted tobacco components; and for extracted tobacco components that are present within a solvent, (i) the solvent can be removed from the extracted tobacco compo-

nents, or (ii) the mixture of extracted tobacco components and solvent can be used as such. Exemplary types of tobacco extracts, tobacco essences, solvents, tobacco extraction processing conditions and techniques, and tobacco extract collection and isolation procedures, are set forth in Australia Pat. No. 276,250 to Schachner; U.S. Pat. No. 2,805,669 to Meriro; U.S. Pat. No. 3,316,919 to Green et al.; U.S. Pat. No. 3,398,754 to Tughan; U.S. Pat. No. 3,424,171 to Rooker; U.S. Pat. No. 3,476,118 to Luttich; U.S. Pat. No. 4,150,677 to Osborne; U.S. Pat. No. 4,131,117 to Kite; U.S. Pat. No. 4,506,682 to Muller; U.S. Pat. No. 4,986,286 to Roberts et al.; U.S. Pat. No. 5,005,593 to Fagg; U.S. Pat. No. 5,065,775 to Fagg; U.S. Pat. No. 5,060,669 to White et al.; U.S. Pat. No. 5,074,319 to White et al.; U.S. Pat. No. 5,099,862 to White et al.; U.S. Pat. No. 5,121,757 to White et al.; U.S. Pat. No. 5,131,415 to Munoz et al.; U.S. Pat. No. 5,230,354 to Smith et al.; U.S. Pat. No. 5,235,992 to Sensabaugh; U.S. Pat. No. 5,243,999 to Smith; U.S. Pat. No. 5,301,694 to Raymond; U.S. Pat. No. 5,318,050 to Gonzalez-Parra et al.; U.S. Pat. No. 5,435,325 to Clapp et al.; and U.S. Pat. No. 5,445,169 to Brinkley et al.; the disclosures of which are incorporated herein by reference in their entireties.

[0046] The aerosol precursor or vapor precursor material can comprise one or more different components. For example, the aerosol precursor can include a polyhydric alcohol (e.g., glycerin, propylene glycol, or a mixture thereof). Representative types of further aerosol precursor materials 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 embodiments, an aerosol precursor composition can produce a visible aerosol upon the application of sufficient heat thereto (and cooling with air, if necessary), and the aerosol precursor composition can produce an aerosol that can be considered to be "smoke-like." In other embodiments, the aerosol precursor composition can produce an aerosol that can be substantially non-visible but can be recognized as present by other characteristics, such as flavor or texture. Thus, the nature of the produced aerosol can vary depending upon the specific components of the aerosol precursor composition. The aerosol precursor composition can be chemically simple relative to the chemical nature of the smoke produced by burning tobacco.

[0047] Aerosol precursor materials can be combined with other liquid materials. For example, aerosol precursor material formulations can incorporate mixtures of glycerin and water, or mixtures of propylene glycol and water, or mixtures of propylene glycol and glycerin, or mixtures of propylene glycol, glycerin, and water. Exemplary aerosol precursor materials also include those types of materials incorporated within devices available through Atlanta Imports Inc., Acworth, Ga., USA., as an electronic cigar having the brand name E-CIG, which can be employed using associated Smoking Cartridges Type C1a, C2a, C3a, C4a, C1b, C2b, C3b and C4b; and as Ruyan Atomizing Electronic Pipe and Ruyan Atomizing Electronic Cigarette from Ruyan SBT Technology and Development Co., Ltd., Beijing, China.

[0048] The smoking article further can comprise one or more flavors, medicaments, or other inhalable materials. For example, liquid nicotine can be used. Such further materials may be combined with the aerosol precursor or vapor precursor material. Thus, the aerosol precursor or vapor precursor material may be described as comprising an inhalable substance in addition to the aerosol. Such inhalable substance can include flavors, medicaments, and other materials as discussed herein. Particularly, an inhalable substance delivered using a smoking article according to the present disclosure can comprise a tobacco component or a tobacco-derived material. For example, the aerosol precursor material can be in a slurry with tobacco or a tobacco component, or in solution with a tobacco-derived material. Alternately, the flavor, medicament, or other inhalable material can be provided separate from the aerosol precursor—e.g., in a reservoir. As such, defined aliquots of the flavor, medicament, or other inhalable material may be separately or simultaneously delivered to the resistive heating element to release the flavor, medicament, or other inhalable material into an air stream to be inhaled by a user along with the aerosol precursor or vapor precursor material. Alternatively, the flavor, medicament, or other inhalable material may be provided in a separate portion of the smoking article or a component thereof. In specific embodiments, the flavor, medicament, or other inhalable material can be deposited on a substrate (e.g., a paper or other porous material) that is located in proximity to the resistive heating element. The proximity preferably is sufficient such that heating of the resistive heating element provides heat to the substrate sufficient to volatilize and release the flavor, medicament, or other inhalable material from the substrate.

[0049] 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, can be employed. Such flavoring agents can be provided from sources other than tobacco, can be natural or artificial in nature, and can be employed as concentrates or flavor packages. Of particular interest are flavoring agents that are applied to, or incorporated within, those regions of the smoking article where aerosol is generated. Again, such agents can be supplied directly to the resistive heating element or may be provided on a substrate as already noted above. Exemplary flavoring agents include 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, also can be employed. Flavoring agents also can include acidic or basic characteristics (e.g., organic acids, such as levulinic acid, succinic acid, and pyruvic acid). The flavoring agents can be combined with the aerosol-generating material if desired. Exemplary plant-derived compositions that may be used are disclosed in U.S. application Ser. No. 12/971,746 to Dube et al. and U.S. application Ser. No. 13/015,744 to Dube et al., the disclosures of which are incorporated herein by reference in their entireties. The selection of such further components can vary based upon factors such as the sensory characteristics that are desired for the present article, and the present disclosure is intended to encompass any such further components that may be 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 incor-

porated herein by reference in their entireties. Any of the materials, such as flavorings, casings, and the like that can be useful in combination with a tobacco material to affect sensory properties thereof, including organoleptic properties, such as already described herein, may be combined with the aerosol precursor material. Organic acids particularly may be incorporated into the aerosol precursor composition to affect the flavor, sensation, or organoleptic properties of medicaments, such as nicotine, that may be combined with the aerosol precursor composition. For example, organic acids, such as levulinic acid, lactic acid, and pyruvic acid, may be included in the aerosol precursor composition with nicotine in amounts up to being equimolar (based on total organic acid content) with the nicotine. Any combination of organic acids can be used. For example, the aerosol precursor composition can include about 0.1 to about 0.5 moles of levulinic acid per one mole of nicotine, about 0.1 to about 0.5 moles of pyruvic acid per one mole of nicotine, about 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 aerosol precursor composition.

[0050] The aerosol precursor material may take on a variety of conformations based upon the various amounts of materials utilized therein. For example, a useful aerosol precursor material may comprise up to about 98% by weight up to about 95% by weight, or up to about 90% by weight of a polyol. This total amount can be split in any combination between two or more different polyols. For example, one polyol can comprise about 50% to about 90%, about 60% to about 90%, or about 75% to about 90% by weight of the aerosol precursor material, and a second polyol can comprise about 2% to about 45%, about 2% to about 25%, or about 2% to about 10% by weight of the aerosol precursor material. A useful aerosol precursor material also can comprise up to about 25% by weight, about 20% by weight or about 15% by weight water—particularly about 2% to about 25%, about 5% to about 20%, or about 7% to about 15% by weight water. Flavors and the like (which can include medicaments, such as nicotine) can comprise up to about 10%, up to about 8%, or up to about 5% by weight of the aerosol precursor material. In some aspects, the aerosol precursor material may also include an effervescent material added to the aerosol formation arrangement, wherein decomposition of the effervescent material may facilitate aerosol formation.

[0051] As a non-limiting example, an aerosol precursor material according to the disclosure can comprise glycerol, propylene glycol, water, nicotine, and one or more flavors. Specifically, the glycerol can be present in an amount of about 70% to about 90% by weight, about 70% to about 85% by weight, or about 75% to about 85% by weight, the propylene glycol can be present in an amount of about 1% to about 10% by weight, about 1% to about 8% by weight, or about 2% to about 6% by weight, the water can be present in an amount of about 10% to about 20% by weight, about 10% to about 18% by weight, or about 12% to about 16% by weight, the nicotine can be present in an amount of about 0.1% to about 5% by weight, about 0.5% to about 4% by weight, or about 1% to about 3% by weight, and the flavors can be present in an amount of up to about 5% by weight, up to about 3% by weight, or up to about 1% by weight, all amounts being based on the total weight of the aerosol precursor material. One specific, non-limiting example of an aerosol precursor material comprises about 75% to about 80% by weight glycerol, about 13% to about 15% by weight water, about 4% to about 6% by weight propylene glycol, about 2% to about 3% by weight nicotine, and about 0.1% to about 0.5% by weight flavors. The nicotine, for example, can be a high nicotine content tobacco extract.

[0052] In embodiments of the aerosol precursor material that contain a tobacco extract, including pharmaceutical grade nicotine derived from tobacco, it is advantageous for the tobacco extract to be characterized as substantially free of compounds collectively known as Hoffmann analytes, including, for example, tobacco-specific nitrosamines (TSNAs), including N'-nitrosonornicotine (NNN), (4-methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), N'-nitrosoanatabine (NAT), and N'-nitrosoanabasine (NAB); polyaromatic hydrocarbons (PAHs), including benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene, and the like. In certain embodiments, the aerosol precursor material can be characterized as completely free of any Hoffmann analytes, including TSNAs and PAHs. Embodiments of the aerosol precursor material may have TSNA levels (or other Hoffmann analyte levels) in the range of less than about 5 ppm, less than about 3 ppm, less than about 1 ppm, or less than about 0.1 ppm, or even below any detectable limit. Certain extraction processes or treatment processes can be used to achieve reductions in Hoffmann analyte concentration. For example, a tobacco extract can be brought into contact with an imprinted polymer or non-imprinted polymer such as described, for example, in US Pat. Pub. Nos. 2007/0186940 to Bhattacharyya et al; 2011/0041859 to Rees et al.; and 2011/0159160 to Jonsson et al; and U.S. patent application Ser. No. 13/111,330 to Byrd et al., filed May 19, 2011, all of which are incorporated herein by reference. Further, the tobacco extract could be treated with ion exchange materials having amine functionality, which can remove certain aldehydes and other compounds. See, for example, U.S. Pat. No. 4,033,361 to Horsewell et al. and U.S. Pat. No. 6,779,529 to Figlar et al., which are incorporated by reference herein.

[0053] The amount of aerosol precursor material that is used within the smoking article is such that the article exhibits acceptable sensory and organoleptic properties, and desirable performance characteristics. For example, it is highly preferred that sufficient aerosol precursor material, such as glycerin and/or propylene glycol, be employed in order to provide for the generation of a visible mainstream aerosol that in many regards resembles the appearance of tobacco smoke. Typically, the amount of aerosol-generating material incorporated into the smoking article is in the range of about 1.5 g or less, about 1 g or less, or about 0.5 g or less. The amount of aerosol precursor material can be dependent upon factors such as the number of puffs desired per cartridge used with the smoking article. It is desirable for the aerosol-generating composition not to introduce significant degrees of unacceptable off-taste, filmy mouth-feel, or an overall sensory experience that is significantly different from that of a traditional type of cigarette that generates mainstream smoke by burning tobacco cut filler. The selection of the particular aerosol-generating material and reservoir material, the amounts of those components used, and the types of tobacco material used, can be altered in order to control the overall chemical composition of the mainstream aerosol produced by the smoking article.

[0054] The amount of aerosol released by the inventive article can vary. Preferably, the article is configured with a sufficient amount of the aerosol precursor material, with a sufficient amount of any further inhalable substance, and to function at a sufficient temperature for a sufficient time to release a desired content of aerosolized materials over a course of use. The content may be provided in a single inhalation from the article or may be divided so as to be provided through a number of puffs from the article over a relatively short length of time (e.g., less than 30 minutes, less than 20 minutes, less than 15 minutes, less than 10 minutes, or less than 5 minutes). For example, the article may provide nicotine in an amount of about 0.01 mg to about 0.5 mg, about 0.05 mg to about 0.3 mg, or about 0.1 mg to about 0.2 mg, per puff on the article. For purposes of calculations, an average puff time of about 2 seconds can deliver a puff volume of about 5 ml to about 100 ml, about 15 ml to about 70 ml, about 20 ml to about 60 ml, or about 25 ml to about 50 ml. A smoking article according to the disclosure can be configured to provide any number of puffs calculable by the total amount of aerosol or other inhalable substance to be delivered divided by the amount to be delivered per puff. The one or more reservoirs can be loaded with the appropriate amount of aerosol precursor or other inhalable substance to achieve the desired number of puffs and/or the desired total amount of material to be delivered.

[0055] In further embodiments, heating can be characterized in relation to the amount of aerosol to be generated. Specifically, the article can be configured to provide an amount of heat necessary to generate a defined volume of aerosol (e.g., about 5 ml to about 100 ml, or any other volume deemed useful in a smoking article, such as otherwise described herein). In certain, the amount of heat generated can be measured in relation to a two second puff providing about 35 ml of aerosol at a heater temperature of about 290° C. In some embodiments, the article preferably can provide about 1 to about 50 Joules of heat per second (J/s), about 2 J/s to about 40 J/s, about 3 J/s to about 35 J/s, or about 5 J/s to about 30 J/s.

[0056] The resistive heating element preferably is in electrical connection with the power source of the smoking article such that electrical energy can be provided to the resistive heating element to produce heat and subsequently aerosolize the aerosol precursor material and any other inhalable substance provided by the smoking article. Such electrical connection can be permanent (e.g., hard wired) or can be removable (e.g., wherein the resistive heating element is provided in a cartridge that can be attached to and detached from a control body that includes the power source).

[0057] Although a variety of materials for use in a smoking article according to the present disclosure have been described above—such as heaters, batteries, capacitors, switching components, aerosol precursors, and the like, the disclosure should not be construed as being limited to only the exemplified embodiments. Rather, one of skill in the art can recognize based on the present disclosure similar components in the field that may be interchanged with any specific component of the present disclosure. For example, U.S. Pat. No. 5,261,424 to Sprinkel, Jr. discloses piezoelectric sensors that can be associated with the mouth-end of a device to detect user lip activity associated with taking a draw and then trigger heating; U.S. Pat. No. 5,372,148 to McCafferty et al. discloses a puff sensor for controlling energy flow into a heating load array in response to pressure drop through a mouthpiece; U.S. Pat. No. 5,967,148 to Harris et al. discloses receptacles in a smoking device that include an identifier that detects a non-uniformity in infrared transmissivity of an inserted component and a controller that executes a detection routine as the component is inserted into the receptacle; U.S. Pat. No. 6,040,560 to Fleischhauer et al. describes a defined executable power cycle with multiple differential phases; U.S. Pat. No. 5,934,289 to Watkins et al. discloses photonic-optronic components; U.S. Pat. No. 5,954,979 to Counts et al. discloses means for altering draw resistance through a smoking device; U.S. Pat. No. 6,803,545 to Blake et al. discloses specific battery configurations for use in smoking devices; U.S. Pat. No. 7,293,565 to Griffen et al. discloses various charging systems for use with smoking devices; US 2009/0320863 by Fernando et al. discloses computer interfacing means for smoking devices to facilitate charging and allow computer control of the device; US 2010/0163063 by Fernando et al. discloses identification systems for smoking devices; and WO 2010/003480 by Flick discloses a fluid flow sensing system indicative of a puff in an aerosol generating system; all of the foregoing disclosures being incorporated herein by reference in their entireties. Further examples of components related to electronic aerosol delivery articles and disclosing materials or components that may be used in the present article include U.S. Pat. No. 4,735,217 to Gerth et al.; U.S. Pat. No. 5,249,586 to Morgan 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. 7,896,006 to Hamano; U.S. Pat. No. 6,772,756 to Shayan; US Pat. Pub. Nos. 2009/0095311, 2006/0196518, 2009/0126745, and 2009/0188490 to Hon; US Pat. Pub. No. 2009/0272379 to Thorens et al.; US Pat. Pub. Nos. 2009/0260641 and 2009/0260642 to Monsees et al.; US Pat. Pub. Nos. 2008/0149118 and 2010/0024834 to Oglesby et al.; US Pat. Pub. No. 2010/0307518 to Wang; and WO 2010/091593 to Hon. A variety of the materials disclosed by the foregoing documents may be incorporated into the present devices in various embodiments, and all of the foregoing disclosures are incorporated herein by reference in their entireties.

[0058] Although an article according to the disclosure may take on a variety of embodiments, as discussed in detail below, the use of the article by a consumer will be similar in scope. In particular, the article can be provided as a single unit or as a plurality of components that are combined by the consumer for use and then are dismantled by the consumer thereafter. Generally, a smoking article according to the disclosure can comprise a first unit that is engagable and disengagable with a second unit, the first unit comprising the resistive heating element, and the second unit comprising the electrical power source. In some embodiments, the second unit further can comprise one or more control components that actuate or regulate current flow from the electrical power source. The first unit can comprise a distal end that engages the second unit and an opposing, proximate end that includes a mouthpiece (or simply the mouth end) with an opening at a proximate end thereof. The first unit can comprise an air flow path opening into the mouthpiece of the first unit, and the air flow path can provide for passage of aerosol formed from the resistive heating element into the mouthpiece. In preferred embodiments, the first unit can be disposable. Likewise, the second unit can be reusable.

[0059] More specifically, a smoking article according to the disclosure can have a reusable control body that is substantially cylindrical in shape having a connecting end and an opposing, closed end. The closed end of the control housing may include one or more indicators of active use of the article. The article further can comprise a cartridge with a connecting end that engages the connecting end of the control body and with an opposing mouth end. To use the article, the consumer can connect a connecting end of the cartridge to the connecting end of the control body or otherwise combine the cartridge with the control body so that the article is operable as discussed herein. In some embodiments, the connecting ends of the control body and the cartridge can be threaded for a screw-type engagement. In other embodiments, the connecting ends can have a press-fit engagement.

[0060] During use, the consumer initiates heating of the resistive heating element, the heat produced by the resistive heating element aerosolizes the aerosol precursor material and, optionally, further inhalable substances. Such heating releases at least a portion of the aerosol precursor material in the form of an aerosol (which can include any further inhalable substances included therewith), and such aerosol is provided within a space inside the cartridge that is in fluid communication with the mouth end of the cartridge. When the consumer inhales on the mouth end of the cartridge, air is drawn through the cartridge, and the combination of the drawn air and the aerosol is inhaled by the consumer as the drawn materials exit the mouth end of the cartridge (and any optional mouthpiece present) into the mouth of the consumer. To initiate heating, the consumer may actuate a pushbutton, capacitive sensor, or similar component that causes the resistive heating element to receive electrical energy from the battery or other energy source (such as a capacitor). The electrical energy may be supplied for a pre-determined length of time or may be manually controlled. Preferably, flow of electrical energy does not substantially proceed in between puffs on the article (although energy flow may proceed to maintain a baseline temperature greater than ambient temperature—e.g., a temperature that facilitates rapid heating to the active heating temperature). In further embodiments, heating may be initiated by the puffing action of the consumer through use of various sensors, as otherwise described herein. Once the puff is discontinued, heating will stop or be reduced. When the consumer has taken a sufficient number of puffs so as to have released a sufficient amount of the inhalable substance (e.g., an amount sufficient to equate to a typical smoking experience), the cartridge can be removed from the control housing and discarded. Indication that the cartridge is spent (i.e., the aerosol precursor material has been substantially removed by the consumer) can be provided. In some embodiments, a single cartridge can provide more than a single smoking experience and thus may provide a sufficient content of aerosol precursor material to simulate as much as full pack of conventional cigarettes or even more. Likewise, a plurality of individual reservoirs can be provided in a single smoking article to provide a defined number of puffs, conventional cigarette equivalents, or the like.

[0061] The foregoing description of use of the article can be applied to the various embodiments described through minor modifications, which can be apparent to the person of skill in the art in light of the further disclosure provided herein. The above 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 of the present disclosure.

[0062] Referring now to FIG. **1**, a smoking article **10** according to the disclosure generally can comprise a shell **15** and a plurality of components provided within the shell. The article can be characterized as having a mouth end **11** (i.e., the end upon which a consumer can draw to inhale aerosol from the article), and a distal end **12**. The illustrated article is provided as a single unitary device (however, line A indicates an optional demarcation whereby the device can be two separate components that are joined together, either removably or permanently, such as by gluing). As will be evident from the further disclosure herein, it can be preferable for further embodiments of the article to be formed of two or more detachable units, each housing separate components of the article. The various components shown in the embodiment of FIG. **1** can be present in other embodiments, including embodiments formed of multiple units.

[0063] The article **10** according to the disclosure can have an overall shape that may be defined as being substantially rod-like or substantially tubular shaped or substantially cylindrically shaped. As illustrated in FIG. **1**, the article has a substantially round cross-section; however, other cross-sectional shapes (e.g., oval, square, triangle, etc.) also are encompassed by the present disclosure. Such language that is descriptive of the physical shape of the article may also be applied to the individual units of the article in embodiments comprising multiple units, such as a control body and a cartridge.

[0064] The shell **15** of the smoking article **10** can be formed of any material suitable for forming and maintaining an appropriate conformation, such as a tubular shape, and for retaining therein the suitable components of the article. The shell can be formed of a single wall, as shown in FIG. **1**. In some embodiments, the shell can be formed of a material (natural or synthetic) that is heat resistant so as to retain its structural integrity—e.g., does not degrade—at least at a temperature that is the heating temperature provided by the resistive heating element, as further discussed herein. In some embodiments, a heat resistant polymer may be used. In other embodiments, the shell can be formed from paper, such as a paper that is substantially straw-shaped. As further discussed herein, the shell, such as a paper tube, may have one or more layers associated therewith that function to substantially prevent movement of vapor therethrough. In one example, an aluminum foil layer may be laminated to one surface of the shell. Ceramic materials also may be used.

[0065] The shell **15**, when formed of a single layer, can have a thickness of about 0.2 mm to about 5.0 mm, about 0.5 mm to about 4.0 mm, about 0.5 mm to about 3.0 mm, or about 1.0 mm to about 3.0 mm. Further exemplary types of components and materials that may be used to provide the functions described above or be used as alternatives to the materials and components noted above can be those of the types set forth in US Pub. No. 2010/00186757 to Crooks et al.; US Pub. No. 2010/00186757 to Crooks et al.; and US Pub. No. 2011/0041861 to Sebastian et al.; the disclosures of which are incorporated herein by reference in their entireties.

[0066] As seen in the embodiment of FIG. **1**, the smoking article **10** generally includes an electronic control component **20**, a flow sensor **30**, and a battery **40**, and these components can be placed in a variety of orders within the article. Although not expressly shown, it is understood that the article

10 can include wiring as necessary to provide power from the battery **40** to the further components and to interconnect the components for appropriate operation of the necessary functions provided by the article. The article **10** further includes a resistive heating element **50** as described herein. In the illustrated embodiment, the resistive heating element **50** is a metal coil that can be electrically connected to the battery **40** through appropriate wiring of the terminals **51** to facilitate formation of a closed electrical circuit with current flow through the heating element. Further wiring (not illustrated) can be included to provide the necessary electrical connections within the article. In specific embodiments, the article **10** can be wired with an electrical circuit such that the control component **20** delivers, controls, or otherwise modulates power from the battery **40** for energizing the resistive heating element **50** according to one or more defined algorithms, such as already described above. Such electrical circuit can specifically incorporate the flow sensor **30** such that the article **10** is only active at times of use by the consumer. For example, when a consumer puffs on the article **10**, the flow sensor detects the puff, and the control component **20** is then activated to direct power through the article such that the resistive heating element **50** produces heat and thus provides aerosol for inhalation by the consumer. The control algorithm may call for power to the resistive heating element **50** to cycle and thus maintain a defined temperature. The control algorithm therefore can be programmed to automatically deactivate the article **10** and discontinue power flow through the article after a defined time lapse without a puff by a consumer. Moreover, the article can include a temperature sensor to provide feedback to the control component. Such sensor can be, for example, in direct contact with the resistive heating element **50**. Alternative temperature sensing means likewise may be used, such as relying upon logic control components to evaluate resistance through the resistive heating element and correlate such resistance to the temperature of the element. In other embodiments, the flow sensor **30** may be replaced by appropriate components to provide alternative sensing means, such as capacitive sensing, as otherwise described herein. Any variety of sensors and combinations thereof can be incorporated, as already described herein. Still further, one or more control buttons **16** can be included to allow for manual actuation by a consumer to elicit a variety of functions, such as powering the article **10** on and off, turning on the heating element **50** to generate a vapor or aerosol for inhalation, or the like.

[0067] Additionally, the article can include on or more status indicators **19** positioned on the shell **15**. Such indicators, as discussed above, can show the number of puffs taken or remaining from the article, can be indicative of an active or inactive status, can light up in response to a puff, or the like. Although six indicators are illustrated, more or fewer indicators can be present, and the indicators can take on different shapes and can even being simply an opening in the shell (such as for release of sound when such indicators are present).

[0068] As illustrated in the embodiment of FIG. **1**, a reservoir **205** is shown in proximity to the heating element **50**, and a wick **300** extends from the reservoir **205** and into the coil of the resistive heating element **50**. The reservoir is one embodiment illustrating means of storing an aerosol precursor material. The wick utilizes capillary action to draw the aerosol precursor material from the reservoir and into a heating zone defined by the area in and around the resistive heating element **50** in the form of a metal wire coil. As such, heat produced by the resistive heating element causes the aerosol precursor material to aerosolize. The formed aerosol is then drawn by a user through the mouth end **11** of the smoking article **10**. As the aerosol precursor material in the heating zone is aerosolized by the heating of the resistive heating element, further aerosol precursor material is wicked out of the reservoir **205** to the heating zone for aerosolization. The cycle continues until substantially all of the aerosol precursor material has been aerosolized.

[0069] As seen in the embodiment of FIG. **1**, the mouth end **11** of the article **10** is substantially an open cavity with the resistive heating element **50** and the reservoir **205** disposed therein. Such open cavity provides a volume for release of the aerosol from the wick **300** as it is withdrawn from the reservoir and heated by the resistive heating element. The article also includes a mouth opening **18** in the mouth end **11** to allow for withdrawal of the aerosol from the cavity around the resistive heating element **50**. To facilitate air flow through the article, an air intake **17** can be provided and can substantially comprise an aperture in the shell **15** that allows for air flow into the interior of the article. A plurality of air intakes can be provided, and the air intakes can be positioned at any location upstream from the mouth end of the article such that air from the air intake can mingle with and facilitate removal of the formed aerosol from the cavity around the resistive heating element/substrate and through the opening in the mouth end of the article. Although not illustrated, if desired, structural elements can be provided within the article so as to effectively isolate one or more components within the article from the air flowing from the air intake to the opening in the mouth end. In other words, a defined air flow path can be provided, and such defined air flow path can substantially avoid air flowing through the air flow path from coming into physical contact with one or both of the battery **40** and the control component **20**. As illustrated in FIG. **1**, air taken in through the air intake **17** passes the flow sensor **30** before entering the cavity surrounding the heating element/substrate such that activation of the flow sensor will facilitate heating of the heating element, as otherwise described herein.

[0070] In preferred embodiments, the article **10** may take on a size that is comparative to a cigarette or cigar shape. Thus, the article may have a diameter of about 5 mm to about 25 mm, about 5 mm to about 20 mm, about 6 mm to about 15 mm, or about 6 mm to about 10 mm. Such dimension may particularly correspond to the outer diameter of the shell **15**.

[0071] The smoking article **10** in the embodiment illustrated in FIG. **1** can be characterized as a disposable article. Accordingly, it can be desirable for the reservoir containing the aerosol precursor material in such embodiments to include a sufficient amount of aerosol precursor material so that a consumer can obtain more than a single use of the article. For example, the article can include sufficient aerosolizable and/or inhalable materials such that the article can provide a number of puffs substantially equivalent to the number of puffs (of about two seconds duration) available from a plurality of conventional cigarettes—e.g., 2 or more, 5 or more, 10 or more, or 20 or more conventional cigarettes. More particularly, a disposable, single unit article according to the embodiment of FIG. **1** can provide about 20 or more, about 50 or more, or about 100 or more puffs, a single puff being measured as already described herein.

[0072] In particularly preferred embodiments an article according to the disclosure can comprise two units that are

attachable and detachable from each other. For example, FIG. **2** shows a smoking article **10** according to one embodiment that is formed of a control body **80** and a cartridge **90**. In specific embodiments, the control body may be referred to as being reusable, and the cartridge may be referred to as being disposable. In some embodiments, the entire article may be characterized as being disposable in that the control body may be configured for only a limited number of uses (e.g., until a battery power component no longer provides sufficient power to the article) with a limited number of cartridges and, thereafter, the entire article **10**, including the control body, may be discarded. In other embodiments, the control body may have a replaceable battery such that the control body can be reused through a number of battery exchanges and with many cartridges. Similarly, the article **10** may be rechargeable and thus may be combined with any type of recharging technology, including connection to a typical electrical outlet, connection to a car charger (i.e., cigarette lighter receptacle), and connection to a computer, such as through a USB cable.

[0073] The control body **80** and the cartridge **90** are specifically configured so as to engage one another and form an interconnected, functioning device. As illustrated in FIG. **2**, the control body **80** includes a proximal attachment end **13** that includes a projection **82** having a reduced diameter in relation to the control body. The cartridge includes a distal attachment end **14** that engages the proximal engagement end of the control body **80** to provide the smoking article **10** in a functioning, usable form. In FIG. **2**, the control body projection **82** includes threads that allow the cartridge **90** to screw onto the control body **80** via corresponding threads (not visible in FIG. **2**) in the distal attachment end of the cartridge. Thus, the distal attachment end of the cartridge **90** can include an open cavity for receiving the control body projection **82**. Although a threaded engagement is illustrated in FIG. **2**, it is understood that further means of engagement are encompassed, such as a press-fit engagement, a magnetic engagement, or the like.

[0074] The functioning relationship between the control body **80** and the cartridge **90** is further seen in FIG. **3**, which shows the two detached units in cross section. The control body **80** includes the control component **20**, flow sensor **30**, and battery **40**. Although these components are illustrated in a specific alignment, it is understood that various alignments of the components are encompassed by the disclosure. The control body **80** further includes a plurality of indicators **19** and an air intake **17** in the control body shell **81**. A variety of positions for one or more air intakes are encompassed by the disclosure. As shown, the air intake **17** is positioned such that air drawn through the intake sufficiently contacts the flow sensor **30** to activate the sensor (although other positions are encompassed, particular if different sensing means are provided or if manual actuation, such as with a push button, is provided). In other instances, the air intake **17** may be positioned, for example, toward the distal end **12**, with the flow sensor **30** being disposed proximally to the distal end **12**, toward the proximal attachment end **13**. In such instances, for instance, the disposition of the air intake toward the distal end **12** may provide additional lead time from detecting the puff for the heating element **50** to be actuated, thereby providing a faster response (i.e., delivery of the aerosol) in response to the puff. The shell **81** can be formed of materials already described herein in relation to the embodiment of FIG. **1**. A receptacle **60** also is included at the proximal attachment end **13** of the control body **80** and extends into the control body projection **82** to allow for ease of electrical connection with the resistive heating element **50** when the cartridge **90** is attached to the control body. In the illustrated embodiment, the receptacle **60** includes a central open passage to facilitate air flow from the air intake in the control body into the cartridge during use of the article **10**.

[0075] The cartridge **90** includes a cartridge shell **91** with a mouth opening **18** at the mouth end **11** thereof to allow passage of air and entrained vapor (and further inhalable materials, if present) from the cartridge to a consumer during draw on the article **10**. The cartridge shell **91** can be formed of materials as already described herein as being useful for such purpose. The cartridge **90** further includes a resistive heating element **50** in the form of a metal wire coil. The resistive heating element includes terminals **51** (e.g., positive and negative terminals) at the opposing ends thereof for facilitating current flow through the resistive heating element and for attachment of the appropriate wiring (not illustrated) to form an electrical connection of the resistive heating element with the battery **40** when the cartridge **90** is connected to the control body **80**. Specifically, a plug **65** is positioned at the distal attachment end **14** of the cartridge. When the cartridge **90** is connected to the control body **80**, the plug **65** engages the receptacle **60** to form an electrical connection such that current controllably flows from the battery **40**, through the receptacle and plug, and to the resistive heating element **50**. The cartridge shell **91** can continue across the distal attachment end such that this end of the cartridge is substantially closed with the plug protruding therefrom. As illustrated in FIG. **3**, the plug **65** includes an open central passage that aligns with the open central passage in the receptacle **60** to allow air to flow from the control body **80** and into the cartridge **90**.

[0076] A reservoir for use according to the present disclosure can be any component that functions to store and release one or more components of the aerosol precursor material. In some embodiments, such as illustrated in FIG. **1**, the reservoir can be a container in which the aerosol precursor material is stored. The container can be substantially impermeable in relation to the aerosol precursor such that the material cannot escape through the walls of the container. In such embodiments, an opening can be provided for passage of the aerosol precursor material therefrom. For example, in FIG. **1**, a wick **300** is shown filling an opening in the reservoir **205**. In some instances, the reservoir **205** may comprise a "bottle," which may generally encompass any container having walls and at least one opening. The aerosol precursor material in the reservoir thus moves out of the reservoir by capillary action via the wick. Other systems for passage of the aerosol precursor material from a reservoir are also encompassed by the disclosure. For example, a tube or other conduit can be used for passage of the aerosol precursor material out of the reservoir and through the tube or other conduit. Such passage also can occur via capillary action. Alternately, passive flow of the liquid from the reservoir can be controlled with an appropriate valve mechanism that can be opened to allow flow of the aerosol precursor material when the smoking article is in use and to prevent flow of the aerosol precursor material when the smoking article is not in use. Active flow mechanisms incorporating micro-pump devices also are envisioned for use according to the present disclosure. Such a reservoir can be formed of any suitable material that is not substantially reactive with any components of the aerosol precursor material,

and is thermally and mechanically stable, such as glass, metal, low- or no-porosity ceramics, plastics, and the like.

[0077] In some embodiments, a reservoir can be a container that is provided without an opening, but a portion or all of the walls of the container can be porous and thus allow permeation of the aerosol precursor material out of the container through the walls thereof. For example, porous ceramics can be useful in such regard. Any other material of suitable porosity likewise could be used.

[0078] In particular embodiments, a reservoir can be a woven or non-woven fabric or another mass of fibers suitable for retaining the aerosol precursor material (e.g., through absorption, adsorption, or the like) and allowing wicking away of the aerosol precursor material for transport to the heating zone. For example, FIG. **3** illustrates a reservoir layer **201** retaining one or more components of the aerosol precursor material. The reservoir layer is essentially a non-woven layer of fibers rolled into the form of a tube that lines a portion of the inner surface of the cartridge shell **91**. Such reservoir layer can be formed of natural fibers, synthetic fibers, or combinations thereof. Non-limiting examples of useful materials include cotton, cellulose, cellulose acetate, polyesters, polyamides, polylactic acids, combinations thereof, and the like. Similarly, reservoir layers can be formed of ceramics.

[0079] A wick **301** (as seen in FIG. **3**) for use according to the present disclosure can be any component that functions to transport one or more aerosol precursor materials from a reservoir to a heating zone in the smoking article where a resistive heating element aerosolizes the aerosol precursor material and thus form an aerosol. A wick particularly can be a component that utilizes capillary action in the transport of liquids. A wick for use according to the disclosure thus can be any material that provides sufficient wicking action to transport one or more components of the aerosol precursor material to the heating zone. Non-limiting examples include natural and synthetic fibers, such as cotton, cellulose, polyesters, polyamides, polyimides, polylactic acids, glass fibers, combinations thereof, and the like. Wicks further can be coated with materials that alter the capillary action of the fibers, and the fibers used in forming wicks can have specific cross-sectional shape and can be grooved so as to alter the capillary action of the fibers. Fibers used in forming wicks can be bundled, provided as a woven fabric, or provided as a non-woven fabric.

[0080] FIGS. **4**A and **4**B schematically illustrate alternate aspects of a smoking article **500** according to the present disclosure. In such aspects, the smoking article **500** may generally comprise a shell **510** having a mouth end **511** (i.e., the end upon which a consumer can draw to inhale aerosol from the article), and an opposed distal end **512**. Such a smoking article **500**, in some aspects, can include a filter material **600** (such as cellulose acetate or polypropylene) in (see, e.g., FIG. **4**A), engaged with (see, e.g., FIG. **4**B), or otherwise associated with the mouth end **511** thereof, for example, to increase the structural integrity thereof and/or to provide filtering capacity, if desired, and/or to provide resistance to draw. In some instances, the filter material **600** may be configured to provide an enhancing effect on the vapor/aerosol drawn through the mouth end **511**. For example, in some aspects, the filter material **600** may include a flavorant, medicament, or other inhalable material, implemented in a suitable manner so as to selectively direct the same into an air stream to be inhaled by a user along with the aerosol precursor or vapor precursor material.

[0081] In one aspect, such a vapor-enhancing aspect may include the aforementioned filter material **600** and a tubular housing defining a lumen **610**, with the housing having a mouth-engaging end and a longitudinally-opposed component-engaging end. The lumen **610** may be configured to receive the filter material **600** therein, and the component-engaging end may be adapted to operably engage a control body portion **506** associated with the smoking article **500**, if the housing comprises a component of the cartridge body portion **505** itself (i.e., is at least partially defined by the shell **510**; see, e.g., FIG. **4**A), or the component-engaging end may be adapted to engage the cartridge body portion **505**, if the housing is a discrete component with respect to the cartridge body portion **505** and the control body portion **506** (see, e.g., FIG. **4**B). In any instance, the vapor-enhancing aspect may be configured to receive the vapor/aerosol through the lumen defined thereby. In particular aspects, the vapor-enhancing aspect may include a vapor-enhancing element (see, e.g., element **620** in FIGS. **4**A and **4**B) operably engaged with the filter material **600** and configured to enhance the vapor drawn through the filter material **600** within the lumen **610**, and through the mouth-engaging end, by application of a suction to the mouth-engaging end of the housing of the vapor-enhancing aspect.

[0082] In some aspects, the filter material **600** may comprise a suitable filter material such as, for example, cellulose acetate tow, regenerated cellulose fiber tow, gathered paper, nonwoven polypropylene web, gathered strands of shredded web, any other suitable fibrous tow material, and/or combinations thereof, and/or any such suitable filter material having a coating or film (reactive or non-reactive) applied thereto. A suitable filter material, for example, may exhibit a desirable resistance to draw (suction), may provide an expected taste or other perception, and/or may be biodegradable. Such example, however, do not preclude other desirable properties of such filter materials.

[0083] In one aspect, as shown, for example, in FIG. **4**A, the housing is configured as a component of a cartridge body portion **505** (i.e., is at least partially defined by the shell **510**) of the electronic vapor smoking article **500**, wherein the cartridge body portion **505**, as disclosed herein, is engaged with the control body portion **506**. In such instances, the mouth-engaging end of the housing **511** is configured to retain the filter material **600**, and optionally the vapor-enhancing element **620**, within the lumen **610**. In another aspect, as shown, for example, in FIG. **4**B, the component-engaging end **630**A of the housing **630** is configured to be removably engaged with a cartridge body portion **505** of the electronic vapor smoking article **500**, wherein the cartridge body portion **505** is engaged between the housing **630** and the control body portion **506**, such that the housing **630** is replaceable with respect to the cartridge body portion **505**. That is, the housing **630** may comprise a discrete component with respect to the cartridge body portion **505** and the control body portion **506**. Such a discrete housing **630** may also be configured to house the vapor-enhancing element **620**. In either instance, the housing **630** may further comprise a flange **640** disposed about the mouth-engaging end **630**B thereof, wherein the flange **640** extends radially inward with respect to the housing **630** so as to retain the filter material **600** within the lumen **610**.

[0084] In some aspects, the housing **630** (or shell **510** in aspects where the shell **510** at least partially defines the housing **630**) and/or the filter material **600** may comprise an indicia (see, e.g., element **650** in FIGS. **4**A and **4**B) indicative of

a nature of the enhancement of the vapor provided by the vapor-enhancing element **620** associated therewith. For example, the housing **630** and/or the filter material **600** may have a particular color to correspond to a flavor enhancement. In other instances, for example, a graphic may be provided on the housing **630** to indicate the flavor or other enhancement provided by the vapor-enhancing element **620**. In other instances, the housing **630** and/or the filter material **600** may comprise an indicia (see, e.g., element **650** in FIGS. **4**A and **4**B) indicative of a remaining service life of the enhancement of the vapor provided by the vapor-enhancing element **620**. For example, a particular color of the filter material **600** corresponding to a flavor enhancement may fade to a white color as the service life of the vapor-enhancing element is expended. In other instances, for example, the housing may include a gradated level including a series of markers that successively fade or disappear as the service life of the vapor-enhancing element is expended. In the alternative, instead of indicating the remaining service life, the indicia (see, e.g., element **650** in FIGS. **4**A and **4**B) may be indicative of an expended service life of the enhancement of the vapor provided by the vapor-enhancing element. For example, the housing **630** may include a numerical indicia that increases in number as the service life of the vapor-enhancing element is expended. In yet other instances, the housing and/or the filter material may comprise an indicia indicative of compatibility of one of the vapor-enhancing element, the filter material, and the housing with the control body portion **506**, upon operable engagement between the housing **630** and the control body portion **506** (or upon operable engagement between the cartridge body portion **505** and the control body portion **506**, when the vapor-enhancing aspect is integral with the cartridge body portion **505**). For example, the housing **630** may include an electrically-powered indicia that flashes green upon operable engagement between the housing **630** and the control body portion **506**, wherein, if the housing is not compatible or authorized for use with the control body portion, the green light may not flash, or may be replaced with a flashing red indicia. As such, one skilled in the art will also appreciate that the example presented herein are not intended to be limiting in any manner, since such an indicia may take many different forms, as necessary or appropriate.

[0085] The vapor-enhancing element **620** may take many different forms. For example, the vapor-enhancing element may comprise a liquid engaged with the filter material. That is, the filter material may be treated with the liquid prior to being incorporated into the housing. In other instances, the liquid may be introduced to the filter material once the filter material has been inserted into the housing. In other aspects, the housing **630** (or the shell **510** of the cartridge body portion **505** in instances when the vapor-enhancing aspect is integral with the cartridge body portion **505**) may be configured to be resilient, and the vapor-enhancing element **620** may comprise a frangible member introduced into the filter material. The frangible member **620** may be configured to house or otherwise include an enhancement substance. In such instances, the frangible member may be further configured to be responsive to a compressive force applied to the resilient housing (i.e., a mechanical force such as squeezing or twisting) to rupture and release the enhancement substance into engagement with the filter material. That is, in one example, the frangible member **620** may comprise, for example, a capsule member or a plurality of capsule members (or microcapsule members), wherein each capsule member may include an enhancement substance comprising, for example, a liquid flavorant. In such instances, compression or other mechanical manipulation of the resilient housing may cause the frangible member to rupture and release the liquid payload (i.e., a flavorant) into the filter material **600**.

[0086] The vapor-enhancing element **620** may, in some aspects, comprise one element/object, a plurality of elements/objects, or a combination of elements/objects. In other aspects, the vapor-enhancing element **620** may comprise one of a thread, a filament, a microcapsule, a capsule, a pellet, a granule, a flavorant, and combinations thereof. In some instances, the vapor-enhancing element **620** may comprise a plurality of serially-engaged objects. In instances where the vapor comprises a tobacco component or a tobacco-derived material, the filter material and/or the vapor-enhancing element, in the form of the one or more elements/objects or combination of elements/objects, may be configured to alter a characteristic of the vapor. See, for example, U.S. Pat. No. 5,724,997 to Smith et al.; U.S. Pat. No. 8,079,369 to Andresen et al.; U.S. Pat. No. 7,972,254 to Stokes et al.; U.S. Pat. No. 8,262,550 to Barnes et al.; U.S. Pat. No. 7,740,019 to Barnes et al.; U.S. Pat. No. 7,836,895 to Dube et al.; U.S. Pat. No. 7,793,665 to Dube et al.; U.S. Pat. No. 7,984,719 to Dube et al.; U.S. Pat. No. 8,066,011 to Clark et al.; U.S. Pat. No. 7,115,085 to Deal; U.S. Pat. No. 7,654,945 to Deal; U.S. Pat. No. 7,833,146 to Deal; and U.S. Pat. No. 7,479,098 to Thomas et al.; U.S. Patent Application Publication Nos. US2010/0192962 to Barnes et al.; US2012/0037173 to Clark et al.; US 2008/0142028 to Fagg; US2010/0101589 to Nelson et al.; and **2011/0271968** to Carpenter et al.; U.S. patent application Ser. No. 13/248,847 to Novak, III, et al.; and U.S. patent application Ser. No. 13/675,187 to Ademe, et al.; each of which is incorporated herein by reference in its entirety.

[0087] In one aspect, the vapor-enhancing element **620** may be configured to be electrically-actuated. In such instances, the housing **630** (or the cartridge body portion **505** in instances when the vapor-enhancing aspect is integral with the cartridge body portion **505**) may be configured to form an electrically-conductive connection between the vapor-enhancing element **620** and the control body portion **506** upon operable engagement of the housing with the control body portion. For example, the housing may have a conductive element associated therewith and configured to complementarily engage a corresponding conductive element associated with the control body portion and extending into electrical engagement with the battery **40**. Further, the conductive element of the housing may extend into electrical engagement with the vapor-enhancing element so as to be capable of actuating the vapor-enhancing element. For example, the vapor-enhancing element may have a resistive coil associated therewith wherein, in such instances, electrical actuation of the resistive element, in turn, heats the vapor-enhancing element (i.e., a thermal mechanism) to actuate the vapor enhancement aspect. In other instances, for example, the electrically-conductive connection may be implemented to actuate a physical mechanism for releasing the vapor-enhancing aspect from the vapor-enhancing element **620**. More particularly, in some instances, the vapor-enhancing aspect may comprise a liquid, vapor, or gas stored in a containing member (not shown) having a release port, wherein the release port can be electrically actuated, as necessary or desired, to release the vapor-enhancing aspect into the filter material **600** for interaction with the vapor drawn therethrough.

[0088] In summary, or as may otherwise be additionally disclosed herein, aspects of an electronic vapor smoking article **500** incorporating a filter material **600** having a vapor-enhancing element **620** associated therewith, may be particularly configured to provide a vapor enhancement effect (i.e., a flavor) by way of the filter element through which the vapor is drawn by the user. For example, menthol or other volatile flavor may be added to the drawn vapor via a mouth-end portion of the electronic vapor smoking article **500**. In one aspect, the vapor-enhancing element **620** may be, for instance, liquid menthol or other liquid flavor injected, dripped, poured, or otherwise introduced into a cellulose acetate filter material **600** (or a filter material **600** of any other suitable material or combination of materials) during the process of making the filter element. In particular aspects, it may be desirable to implement a relatively high Denier-per-fiber (DPF) filter tow or other suitable filter material (i.e., between about 4 DPF and about 8 DPF), in order to facilitate maximum throughput of the vapor (i.e., a filter material configured for minimal removal efficiency).

[0089] As previously discussed, the filter element may be configured, for example, to be an integral component of the electronic vapor smoking article **500** (or "vapor-producing device"), or otherwise configured to be an addition or supplemental component to an existing electronic vapor smoking article **500**. For example, in an integral configuration, the filter element (i.e., the filter material **600** and the vapor-enhancing element **620**) may be inserted into the tubular housing of the electronic vapor smoking article **500**. In a two-piece configuration, the filler element may be inserted into the cartridge body portion **505** or the control body portion **506**, as necessary or desired, such that the filter element is in communication with the vapor source and disposed within the vapor pathway between the vapor source and the mouth-end portion of the electronic vapor smoking article **500**. In some instances, the filter element may be inserted directly into the tubular housing of the electronic vapor smoking article **500**, with the filter element being longitudinally retained by an appropriate retention element. For example, the filter element may be separated from the vapor source by a porous element disposed in the vapor pathway therebetween. An appropriate porous element is desirably configured to retain the filter element in a longitudinal position along the housing, while allowing the vapor to pass therethrough, and may comprise, for instance, an o-ring, a perforated disc, or any other suitable porous element for separating the filter element from the vapor source, vaporizer, or vaporizing liquid. Toward the mouth-end portion, the filter element may be longitudinally retained by an appropriate mechanism such as, for example, an end cap engaged with the housing, a flange, or a crimp in the housing.

[0090] In yet other integral configuration aspects, the filter element may be self-contained in a filter element housing, wherein the filter element housing may include a porous or perforated end configured to be disposed toward the vapor source, and an opposing crimped, flanged, or capped end configured to be disposed toward the mouth-end portion. In such instances, the filter element housing may be configured to be inserted into the tubular housing and maintained in the desired longitudinal position by an appropriate mechanism, or even in a friction fit, as will be appreciated by one skilled in the art.

[0091] In still further aspects, the filter element may be configured to be engaged with the electronic vapor smoking article as a supplemental or additional accessory. More particularly, the filter element may be self-contained in a filter element housing having a porous or perforated end configured to be disposed toward the vapor source, and an opposing crimped, flanged, or capped end configured to be disposed toward the mouth-end portion. The filter element housing may be further configured, for example, as the housing **630** previously discussed, or may otherwise be configured to attach to one end of the cartridge body portion **505** or the control body portion **506**. For example, the filter element housing may be configured to be attached to the mouth-end portion of the cartridge body portion **505**, as previously disclosed. One skilled in the art will appreciate, however, that the filter element housing may be configured to be attached between the cartridge body portion **505** and the control body portion **506** in an appropriately-configured electronic vapor smoking article. In instances where the filter element housing is externally exposed, particularly in instances where the filter element housing is engaged with the mouth-end portion of the electronic vapor smoking article **500**, the filter element housing may be configured or otherwise comprised of a material suitable to provide or impart a soft feel or otherwise pleasingly tactile texture to the lips, teeth, and/or fingers of the user.

[0092] In such instances wherein the filter element housing is externally exposed, particularly in instances where the filter element housing is engaged with the mouth-end portion of the electronic vapor smoking article **500**, the vapor-enhancing element **620** may be further configured to provide pleasing sensations to the user. For example, as previously disclosed, the vapor-enhancing element **620** may be configured to be electrically-actuated. Accordingly, whether the electrical conduction is implemented to actuate a physical mechanism, or implemented to provide a thermal mechanism (i.e., heating without decomposition), for providing the vapor-enhancing aspect, heat may be generated. As such, in those instances, the filter element housing may be configured to receive the vapor-enhancing element **620** such that, upon actuation of the vapor-enhancing element **620** in a manner that generates heat, a relatively low level of heat is experienced by the user via the filter element housing. For example, heating menthol, as the vapor-enhancing element within the filter material, may be accomplished at relatively low temperatures which, in turn, may heat the filter element housing, for instance, to a temperature between about 25° C. and about 60° C. In such an instance, the "warm" filter element housing may be pleasing to the user, while the elevated temperature of the filter element housing may allow the electrical/thermal process associated with actuation of the vapor-enhancing element **620** to operate at a higher temperature, thereby possibly enhancing the release/actuation of the vapor-enhancing aspect.

[0093] In instances where the filter element housing is engaged with the mouth-end portion of the electronic vapor smoking article **500**, the vapor-enhancing element **620** may be further configured to be actuated upon engagement between the filter element housing and the mouth end portion. For example, the vapor-enhancing element **620** may be disposed or otherwise arranged about the interaction/interface between the filter element housing and the mouth-end portion such that engagement therebetween physically actuates that vapor-enhancing element **620**. More particularly, the vapor-enhancing element may comprise a capsule or other frangible reservoir, and the filter element housing and the mouth-end portion may be configured for a threaded engagement therebetween. In such configurations, the threaded engagement

between the filter element housing and the mouth-end portion may compress, squeeze, pinch, twist, or otherwise impinge upon the capsule/reservoir and cause rupture or other mechanical breach thereof, and thereby releasing the vapor-enhancing aspect into the filter material for interaction with the vapor.

[0094] In additional aspects, the vapor-enhancing element **620** may comprise, for example, a crushable capsule containing a flavoring substance; a plurality of microcapsules, each containing a flavoring substance, one or more threads of cellulose acetate, cotton, rayon or other suitable absorbent material, saturated with a flavoring (liquid) substance.

[0095] In other aspects, the filter material may comprise other highly porous fibers, tows, films, pellets, threads, or non-woven materials such as, for example, rayon, polyester, polypropylene, in addition to or instead of cellulose acetate, wherein the highly porous fibers may be configured to collect and retain a liquid flavorant. In other instances, a vapor enhancing element **620** comprising, for example, a flavorant, may be compounded into a plastic material such as low density or high density polyethylene, wherein the flavorant would be subject to slow or long term release. The compounded vapor enhancing element **620** may be provided, for example, as a pellet, or may be compounded prior to the plastic (i.e., a non-woven material) being created.

[0096] In yet other aspects, the filter element may be comprised of cellulose acetate, wherein a hollow center portion therein may be shaped or otherwise configured to facilitate flow of the vapor therethrough while still infusing the vapor with the vapor-enhancing element **620**, such as a flavorant. The vapor-enhancing element **620** may be associated with the filter material **600**, as previously disclosed, or may be disposed within the hollow center portion of the fitter element. Further, the vapor-enhancing element **620** may be configured to be responsive to or actuated by chemicals or moisture in the vapor drawn into engagement therewith. For example, the vapor may be chemically reactive with the vapor-enhancing element, wherein the chemical reaction provides the desired vapor-enhancing effect, or moisture in the vapor may dissolve or otherwise draw the vapor-enhancing element into the vapor.

[0097] In other aspects, the filter may be configured to include a separate heating element configured and disposed to interact with the vapor-enhancing element **620** so as to, for example, facilitate release of the vapor enhancement (i.e., a flavorant) into the filter material **600**.

[0098] In still other aspects, the filter element (i.e., the filter material and/or the vapor-enhancing element **620**) may include, for example, exothermic chemical reactants configured to react with the vapor to create heat, wherein the heat, in turn may facilitate release of the vapor enhancement (i.e., a flavorant) into the filter material **600**.

[0099] In some aspects, the vapor-enhancing element **620** may comprise, for example, an enhancement-impregnated adsorbent material such as activated carbon, clay, or other suitable adsorbent material, wherein the enhancement impregnated into the adsorbent may comprise, for instance, a flavorant.

[0100] In other instances, the vapor-enhancing element **620** may comprise, for example, a liquid flavorant or other vapor-enhancing substance contained or otherwise housed in a reservoir. In such instances, the liquid flavorant or other vapor-enhancing substance may be configured to wick or otherwise be delivered from the reservoir and into the filter material **600** to initially treat filter material **600** or to refresh, supplement, or change the flavorant already included in the filter material **600**. Further, in such instances, the liquid flavorant or other vapor-enhancing substance may be manually delivered from the reservoir to the filter material **600**, on demand, by user actuation of an appropriate mechanism such as, for instance, a squeeze or pump action applied to the reservoir either directly or via compression of the filter material **600** or housing of the electronic vapor smoking article **500**.

[0101] In still other instances, the vapor-enhancing element **620** may be configured, for example, to facilitate vapor dispersion or vapor cooling, upon interaction with the vapor drawn through the filter element by the user, prior to the enhanced vapor entering the user's mouth.

[0102] In still further aspects, the vapor-enhancing element **620** may comprise or otherwise incorporate, for example, an acidic coating applied to the filter material **600** or acidic particles added to the filter material **600**, with the acidic substance being configured to protonate nicotine and impart to the vapor a smoother vapor sensation or flavor characteristic. In such instances, suitable acidic substances may include, for example, levulenic acid, purovic acid, and/or citric acid.

[0103] Of course, one skilled in the art will further appreciate that the disclosure herein may also be associated with corresponding methods. In one aspect, as shown in FIG. **5**, such a method may comprise a method of enhancing a vapor produced by an electronic vapor smoking article (element **700**), wherein such a method may comprise operably engaging a component-engaging end of a tubular housing with a control body portion associated with the electronic vapor smoking article, wherein the tubular housing has a mouth-engaging end longitudinally-opposed to the component-engaging end, and defines a lumen configured to receive a filter material therein (block **720**). A vapor is received through the lumen of the housing in response to application of suction to the mouth-engaging end of the housing (block **740**). In doing so, the vapor drawn through the filter material by the suction is enhanced with a vapor-enhancing element operably engaged with the filter material (block **760**). The filter material may comprise one of a cellulose acetate tow, a regenerated cellulose fiber tow, gathered paper, a nonwoven polypropylene web, gathered strands of shredded web, any other suitable fibrous tow material, or combinations thereof.

[0104] In some aspects, the methods may further comprise displaying an indicia about one of the housing and the filter material, wherein the indicia may be indicative of at least one of a nature of the enhancement of the vapor provided by the vapor-enhancing element; a remaining service life of the enhancement of the vapor provided by the vapor-enhancing element; an expended service life of the enhancement of the vapor provided by the vapor-enhancing element; and a compatibility of one of the vapor-enhancing element, the filler material, and the housing with the control body portion, upon operable engagement between the housing and the control body portion. The vapor-enhancing element may comprise, for example, a liquid engaged with the filter material. In other instances, the housing may be configured to be resilient, and the vapor-enhancing element may comprise a frangible member introduced into the filter material and housing an enhancement substance, wherein the method further comprises rupturing the frangible member in response to a compressive force applied to the resilient housing, and releasing

the enhancement substance from the frangible member into engagement with the filter material.

[0105] In various aspects, the vapor drawn through the filter material may be enhanced with a vapor-enhancing element comprising one of a plurality of objects deposited within the filter material, a thread, a filament, a microcapsule, a capsule, a pellet, a granule, a flavorant, a plurality of serially-engaged objects, and combinations thereof. In particular instances, the vapor may be enhanced by altering a characteristic of the vapor, wherein the vapor comprises a tobacco component or a tobacco-derived material, with the filter material and/or the vapor-enhancing element. For example, a filter material comprising cellulose acetate may provide a sensory experience, such as by altering the flavor of the tobacco component or a tobacco-derived material, expected by a user of a conventional smoking article (i.e., cigarette).

[0106] 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.

That which is claimed:

1. A vapor-enhancing apparatus for an electronic vapor smoking article, comprising:

a filter material;

a tubular housing defining a lumen, and having a mouth-engaging end and a longitudinally-opposed component-engaging end, the lumen being configured to receive the filter material therein, and the component-engaging end being adapted to operably engage a control body portion associated with the electronic vapor smoking article and to receive a vapor therethrough; and

a vapor-enhancing element operably engaged with the filter material and configured to enhance the vapor drawn through the filter material within the lumen, and through the mouth-engaging end, by application of suction to the mouth-engaging end of the housing.

2. An apparatus according to claim **1**, wherein the filter material comprises one of a cellulose acetate tow, a regenerated cellulose fiber tow, gathered paper, a nonwoven polypropylene web, and gathered strands of shredded web.

3. An apparatus according to claim **1**, wherein the component-engaging end of the housing is configured to be removably engaged with a cartridge body portion of the electronic vapor smoking article, the cartridge body portion being engaged between the housing and the control body portion, such that the housing is replaceable with respect to the cartridge body portion.

4. An apparatus according to claim **1**, wherein the housing is configured as a component of a cartridge body portion of the electronic vapor smoking article, the cartridge body portion being engaged with the control body portion, and the mouth-engaging end of the housing being configured to retain the filter material within the lumen.

5. An apparatus according to claim **1**, wherein the housing further comprises a flange disposed about the mouth-engaging end thereof, the flange extending radially inward with respect to the housing so as to retain the filter material within the lumen.

6. An apparatus according to claim **1**, wherein one of the housing and the filter material comprises an indicia indicative of a nature of the enhancement of the vapor provided by the vapor-enhancing element.

7. An apparatus according to claim **1**, wherein one of the housing and the filter material comprises an indicia indicative of a remaining service life of the enhancement of the vapor provided by the vapor-enhancing element.

8. An apparatus according to claim **1**, wherein one of the housing and the filter material comprises an indicia indicative of an expended service life of the enhancement of the vapor provided by the vapor-enhancing element.

9. An apparatus according to claim **1**, wherein one of the housing and the filter material comprises an indicia indicative of compatibility of one of the vapor-enhancing element, the filter material, and the housing with the control body portion, upon operable engagement between the housing and the control body portion.

10. An apparatus according to claim **1**, wherein the vapor-enhancing element comprises a liquid engaged with the filter material

11. An apparatus according to claim **1**, wherein the housing is configured to be resilient, and the vapor-enhancing element comprises a frangible member introduced into the filter material and housing an enhancement substance, the frangible member being configured to be responsive to a compressive force applied to the resilient housing to rupture and release the enhancement substance into engagement with the filter material.

12. An apparatus according to claim **3**, wherein the vapor-enhancing element is operably engaged with the housing about an interface thereof with the cartridge body portion, and wherein the vapor-enhancing element is configured to be actuated upon engagement between the housing and the cartridge body portion at the interface.

13. An apparatus according to claim **1**, wherein the vapor-enhancing element comprises a plurality of objects deposited within the filter material.

14. An apparatus according to claim **1**, wherein the vapor-enhancing element comprises one of a thread, a filament, a microcapsule, a capsule, a pellet, a granule, a flavorant, and combinations thereof.

15. An apparatus according to claim **1**, wherein the vapor-enhancing element comprises a plurality of serially-engaged objects.

16. An apparatus according to claim **1**, wherein the vapor-enhancing element is configured to be electrically-actuated, and the housing is configured to form an electrically-conductive connection between the vapor-enhancing element and the control body portion upon operable engagement with the control body portion.

17. An apparatus according to claim **1**, wherein the vapor comprises a tobacco component or a tobacco-derived material, and one of the filter material and the vapor-enhancing element is configured to alter a characteristic of the vapor.

18. A method of enhancing a vapor produced by an electronic vapor smoking article, said method comprising:

operably engaging a component-engaging end of a tubular housing with a control body portion associated with the electronic vapor smoking article, the tubular housing having a mouth-engaging end longitudinally-opposed to

the component-engaging end, and defining a lumen configured to receive a filter material therein;

receiving a vapor through the lumen of the housing in response to application of a suction to the mouth-engaging end of the housing; and

enhancing the vapor drawn through the filter material by the suction with a vapor-enhancing element operably engaged with the filter material.

19. A method according to claim **18**, wherein enhancing the vapor further comprises enhancing the vapor drawn through the filter material comprising one of a cellulose acetate tow, a regenerated cellulose fiber tow, gathered paper, a nonwoven polypropylene web, and gathered strands of shredded web.

20. A method according to claim **18**, wherein operably engaging a component-engaging end of a tubular housing with a control body portion further comprises removably engaging the component-engaging end of the tubular housing with a cartridge body portion of the electronic vapor smoking article, the cartridge body portion being engaged between the housing and the control body portion, so as to render the housing replaceable with respect to the electronic vapor smoking article.

21. A method according to claim **18**, wherein the housing is configured as a component of a cartridge body portion of the electronic vapor smoking article, the cartridge body portion being engaged with the control body portion, and enhancing the vapor further comprises enhancing the vapor drawn through the filter material disposed in the lumen and retained therein by the mouth-engaging end of the housing.

22. A method according to claim **18**, wherein enhancing the vapor further comprises enhancing the vapor drawn through the filter material disposed in the lumen and retained therein by a flange disposed about the mouth-engaging end of the housing and extending radially inward with respect to the housing.

23. A method according to claim **18**, further comprising displaying an indicia about one of the housing and the filter material, the indicia being indicative of at least one of a nature of the enhancement of the vapor provided by the vapor-enhancing element; a remaining service life of the enhancement of the vapor provided by the vapor-enhancing element; an expended service life of the enhancement of the vapor provided by the vapor-enhancing element; and a compatibility of one of the vapor-enhancing element, the filter material, and the housing with the control body portion, upon operable engagement between the housing and the control body portion.

24. A method according to claim **20**, wherein the vapor-enhancing element is operably engaged with the housing about an interface thereof with the cartridge body portion, and wherein the method further comprises actuating the vapor-enhancing element upon engagement between the housing and the cartridge body portion at the interface.

25. A method according to claim **18**, wherein enhancing the vapor further comprises enhancing the vapor drawn through the filter material engaged with a liquid.

26. A method according to claim **18**, wherein the housing is configured to be resilient, and the vapor-enhancing element comprises a frangible member introduced into the filter material and housing an enhancement substance, and the method further comprises rupturing the frangible member in response to a compressive force applied to the resilient housing, and releasing the enhancement substance from the frangible member into engagement with the filter material.

27. A method according to claim **18**, wherein enhancing the vapor further comprises enhancing the vapor drawn through the filter material with a vapor-enhancing element comprising one of a plurality of objects deposited within the filter material, a thread, a filament, a microcapsule, a capsule, a pellet, a granule, a flavorant, a plurality of serially-engaged objects, and combinations thereof.

28. A method according to claim **18**, wherein the vapor-enhancing element is configured to be electrically-actuated, and the method further comprises forming an electrically-conductive connection between the vapor-enhancing element and the control body portion upon operable engagement of the housing with the control body portion.

29. A method according to claim **18**, wherein enhancing the vapor further comprises altering a characteristic of the vapor comprising a tobacco component or a tobacco-derived material, with one of the filter material and the vapor-enhancing element.

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