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(54) AEROSOL-GENERATING ARTICLE AND AEROSOL-GENERATING SYSTEM

(57) An aerosol-generating article according to various embodiments includes a first segment and a second segment disposed downstream of the first segment, wherein, on the first segment and the second segment, nicotine is adsorbed, and the suction resistance of the first plasticizer may be greater than or equal to the suction resistance of the second plasticizer.

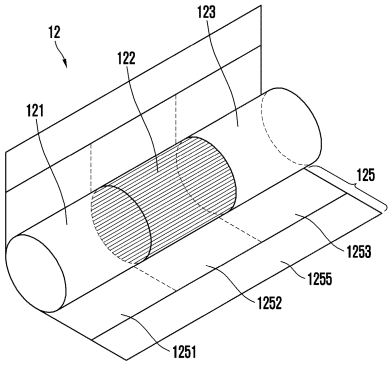

FIG. 3

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Description

TECHNICAL FIELD

[0001] The following embodiments relate to an aerosol-generating article and an aerosol-generating system.

BACKGROUND ART

[0002] Recently, demands for alternative articles of general cigarettes have increased. For example, there is an increasing demand for a device (e.g., a cigarette-type electronic cigarette) that generates an aerosol by electrically heating a cigarette stick. Accordingly, research on an electrically heated aerosol-generating device and a cigarette stick (or an aerosol-generating article) applied thereto is being actively conducted. For example, KR Patent Application Publication No. 10-2017-0132823 discloses a non-combustion-type flavor inhaler, a flavor inhalation component source unit, and an atomizing unit.

DISCLOSURE OF THE INVENTION

TECHNICAL GOALS

[0003] An embodiment is to provide an aerosol-generating article that does not require heating and an aerosol-generating system including the same.

[0004] An embodiment is to provide an aerosol-generating article that may ensure a uniform amount of nicotine transfer during smoking and an aerosol-generating system including the same.

[0005] An embodiment is to provide an aerosol-generating article that may ensure uniformity of smoking taste during smoking and an aerosol-generating system including the same.

[0006] An embodiment is to provide an aerosol-generating article that may minimize instability caused by free nicotine according to pH adjustment and an aerosol-generating system including the same.

[0007] An embodiment is to provide an aerosol-generating article that may selectively provide various intensities of smoking taste as a single aerosol-generating article and an aerosol-generating system including the same.

TECHNICAL SOLUTIONS

[0008] According to various embodiments, an aerosol-generating article may include a first segment and a second segment disposed downstream of the first segment, wherein nicotine may be adsorbed into the first segment or the second segment, and a draw resistance of the first segment may be greater than or equal to a draw resistance of the second segment.

[0009] In an embodiment, a draw resistance per unit length of the first segment may be greater than or equal to a draw resistance per unit length of the second segment.

[0010] In an embodiment, the first segment and the second segment may include cellulose acetate, and a mass of cellulose acetate per unit length of the first segment may be greater than or equal to a mass of cellulose acetate per unit length of the second segment.

[0011] In an embodiment, a monodenier of the cellulose acetate of the first segment may be less than or equal to a monodenier of the cellulose acetate of the second segment.

[0012] In an embodiment, the aerosol-generating article may further include a medium segment disposed between the first segment and the second segment, wherein the medium segment may include a pH-treated tobacco medium, and the nicotine adsorbed into the first segment or the second segment may be spread from the medium segment. The medium segment may be pH-treated such a pH thereof may be in a range of 7.0 to 9.5.

[0013] In an embodiment, the first segment or the second segment may be manufactured by cutting a filter portion to which free nicotine emitted from a medium raw material including nicotine is spread.

[0014] According to various embodiments, an aerosol-generating system may include an aerosol-generating article and an aerosol-generating device including a controller including at least one processor, an elongated empty space configured to receive the aerosol-generating article, and a vaporizer configured to generate an aerosol by heating a liquid composition and emit the aerosol toward the aerosol-generating article, wherein the aerosol-generating article may include a first segment and a second segment disposed downstream of the first segment, wherein the first segment or the second segment may include cellulose acetate into which nicotine is adsorbed, and a monodenier of the cellulose acetate of the first segment may be less than or equal to a monodenier of the cellulose acetate of the second segment.

[0015] In an embodiment, a draw resistance per unit length of the first segment may be greater than or equal to a draw

resistance per unit length of the second segment.

[0016] In an embodiment, the aerosol-generating article may further include a medium segment disposed between the first segment and the second segment, the medium segment may include a pH-treated tobacco medium, and the nicotine adsorbed into the first segment or the second segment may be spread from the medium segment. The aerosol-generating device may further include a heater for heating the first segment, the medium segment, or the second segment, and the controller may control a temperature to heat the first segment, the medium segment, or the second segment.

EFFECTS OF THE INVENTION

[0017] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may implement the transfer of aerosol without heating the aerosol-generating article.

[0018] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may ensure a uniform amount of nicotine transfer during smoking.

[0019] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may ensure uniformity of smoking taste during smoking.

[0020] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may use the aerosol-generating article without preheating a device.

[0021] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may minimize instability caused by free nicotine according to pH adjustment.

[0022] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may selectively provide various intensities of smoking taste as a single aerosol-generating article.

[0023] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may provide a feeling of smoking satisfaction to a user by guaranteeing sufficient nicotine transfer in a non-heating mode.

[0024] An aerosol-generating article and an aerosol-generating system including the same according to an embodiment may expect an effect of increasing a service life of a device as a non-heating mode is used.

[0025] The effects of the aerosol-generating article and the aerosol-generating system including the same according to an embodiment are not limited to the above-mentioned effects, and other unmentioned effects can be clearly understood from the following description by one of ordinary skill in the art.

BRIEF DESCRIPTION OF DRAWINGS

[0026] The accompanying drawings illustrate desired embodiments of the present disclosure and are provided together with the detailed description for better understanding of the technical idea of the present disclosure. Therefore, the present disclosure should not be construed as being limited to the embodiments set forth in the drawings.

FIG. 1 is a block diagram of an aerosol-generating system according to an embodiment.

FIGS. 2A and 2B are views schematically illustrating an aerosol-generating system in which an aerosol-generating article is coupled to an aerosol-generating device of an embodiment.

FIG. 3 schematically illustrating the structure of an aerosol-generating article of an embodiment.

FIG. 4 illustrates a nicotine transfer test for each segment of an aerosol-generating article.

BEST MODE FOR CARRYING OUT THE INVENTION

[0027] Hereinafter, embodiments will be described in detail with reference to the accompanying drawings. However, various alterations and modifications may be made to the embodiments and thus, the scope of the disclosure is not limited or restricted to the embodiments. The embodiments should be understood to include all changes, equivalents, and replacements within the idea and the technical scope of the disclosure.

[0028] The terminology used herein is for the purpose of describing particular example embodiments only and is not to be limiting of the example embodiments. The singular forms "a", "an", and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises/comprising" and/or "includes/including" when used herein, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components and/or groups thereof.

[0029] Unless otherwise defined, all terms including technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which example embodiments belong. It will be further understood that terms, such as those defined in commonly-used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0030] When describing the embodiments with reference to the accompanying drawings, like reference numerals refer to like constituent elements and a repeated description related thereto will be omitted. In the description of embodiments, detailed description of well-known related structures or functions will be omitted when it is deemed that such description will cause ambiguous interpretation of the present disclosure.

[0031] Also, in the description of the components, terms such as first, second, A, B, (a), (b) or the like may be used herein when describing components of the present disclosure. These terms are used only for the purpose of discriminating one constituent element from another constituent element, and the nature, the sequences, or the orders of the constituent elements are not limited by the terms. When one constituent element is described as being "connected", "coupled", or "attached" to another constituent element, it should be understood that one constituent element can be connected or attached directly to another constituent element, and an intervening constituent element can also be "connected", "coupled", or "attached" to the constituent elements.

[0032] The same name may be used to describe an element included in the embodiments described above and an element having a common function. Unless otherwise mentioned, the description on one embodiment may be applicable to other embodiments and thus, duplicated descriptions will be omitted for conciseness.

[0033] In the following embodiments, the "moisturizing agent" may refer to a substance capable of facilitating the formation of visible smoke and/or an aerosol. The moisturizing agent may include, for example, glycerin (GLY), propylene glycol (PG), ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol, but is not limited thereto. In the art, a moisturizing agent may be used interchangeably with a term such as an aerosol former, a humectant, or the like.

[0034] In the following embodiments, an "aerosol forming material" may refer to a material that forms an aerosol. The aerosol may include a volatile compound. The aerosol forming material may be solid or liquid. For example, a solid aerosol forming material may include a solid material based on a tobacco raw material, such as cut tobacco leaves, tobacco granules, or reconstituted tobacco. The reconstituted tobacco may be divided into slurry-type reconstituted tobacco sheets and paper-like reconstituted tobacco sheets according to its manufacturing method. The liquid aerosol forming material may include a liquid composition based on nicotine, tobacco extracts, and/or various flavoring agents. However, the scope of the disclosure is not limited to these examples.

[0035] In the following embodiments, the term "aerosol-generating article" may refer to an aerosol forming material, in other words, an article that accommodates a medium, in which an aerosol passes through the article and the medium is transferred. A representative example of the aerosol-generating article may be a cigarette. However, the scope of the disclosure is not limited thereto.

[0036] In the following embodiments, the term "aerosol-generating device" may refer to a device that generates an aerosol using an aerosol forming material to generate an aerosol that may be inhaled through the mouth of a user directly to the lungs of the user.

[0037] In the following embodiments, the term "upstream" or "upstream direction" may refer to a direction away from an oral region of a user (smoker), and the term "downstream" or "downstream direction" may refer to a direction approaching the oral region of the user. The terms "upstream" and "downstream" may be used to describe relative positions of components of an aerosol-generating article.

[0038] In the following embodiments, the term "puff" refers to inhalation by a user, and the inhalation refers to a situation in which a user draws in an aerosol into his or her oral cavity, nasal cavity, or lungs through the mouth or nose.

[0039] FIG. 1 is a block diagram of an aerosol-generating system according to an embodiment, FIGS. 2A and 2B are views schematically illustrating an aerosol-generating system in which an aerosol-generating article is coupled to an aerosol-generating device according to an embodiment, and FIG. 3 is a view schematically illustrating the structure of an aerosol-generating article according to an embodiment.

[0040] Referring to FIGS. 1 to 3, an aerosol-generating system 1 according to an embodiment may include an aerosol-generating device 11 and an aerosol-generating article 12.

[0041] Referring to FIGS. 1, 2A, and 2B, the aerosol-generating device 11 according to an embodiment may include a battery 111, a controller 112, a vaporizer 113, and an elongated empty space 115.

[0042] Only components related to the present embodiment are shown in the aerosol-generating device 11 shown in FIGS. 2A and 2B. Therefore, it is to be understood by those having ordinary skill in the art related to the present embodiment that the aerosol-generating device 11 may further include other general-purpose components in addition to the components shown in FIGS. 2A and 2B. In addition, the aerosol-generating device 11 may be in the form of a stick or a holder.

[0043] In an embodiment, the battery 111 may supply power to be used to operate the aerosol-generating device 11. For example, the battery 111 may supply current to the vaporizer 113 so that the vaporizer 113 may heat a liquid composition. In addition, the battery 111 may supply power required to operate a display, a sensor, a motor, or the like installed in the aerosol-generating device 11.

[0044] In an embodiment, the battery 111 may be a lithium iron phosphate ($LiFePO_4$) battery, but is not limited to the above example. For example, the battery 111 may correspond to a lithium cobalt oxide ($LiCoO_2$) battery, a lithium titanate

battery, a lithium ion battery, and the like.

[0045] For example, the battery 111 may have a cylindrical shape with a diameter of 10 mm and a length of 37 mm, but is not limited thereto. For example, the capacity of the battery 111 may have a range of 120 mAh to 250 mAh, but is not limited thereto. Further, the battery 111 may be a rechargeable battery or a disposable battery. For example, when the battery 111 is chargeable, the charge rate (C-rate) of the battery 111 may be 10 C, and the discharge rate (C-rate) thereof may be 10 C to 20 C, but is not limited thereto. In addition, for static use, the battery 111 may be manufactured so that 80% or more of the total capacity may be secured even when charging/discharging is performed 2000 times.

[0046] In an embodiment, the controller 112 may control the overall operation of the aerosol-generating device 11. Specifically, the controller 112 may control respective operations of other components included in the aerosol-generating device 11, in addition to the battery 111 and the vaporizer 113. In addition, the controller 112 may verify a state of each of the components of the aerosol-generating device 11 to determine whether the aerosol-generating device 11 is in an operable state.

[0047] In an embodiment, the controller 112 may include at least one processor. The at least one processor may be implemented as an array of a plurality of logic gates, or may be implemented as a combination of a general-purpose microprocessor and a memory in which a program executable by the microprocessor is stored. In addition, it is to be understood by one of ordinary skill in the art to which the disclosure pertains that the processor may be implemented in other types of hardware.

[0048] In an embodiment, the vaporizer 113 may generate an aerosol by heating the liquid composition and emit the generated aerosol toward the aerosol-generating article 12 inserted into the elongated empty space 115 such that the generated aerosol may pass through the inserted aerosol-generating article 12. Therefore, a tobacco flavor may be added to the aerosol that has passed through the aerosol-generating article 12, and a user may suck one end of the aerosol-generating article 12 through the mouth to inhale the aerosol with the tobacco flavor added. According to an embodiment, the vaporizer 113 may be referred to as a cartomizer or an atomizer. According to an embodiment, the vaporizer 113 may be coupled to the aerosol-generating device 11 in a replaceable manner.

[0049] In an embodiment, the aerosol-generating device 11 may further include a heater 114. The aerosol-generating article 12 according to an embodiment may migrate nicotine in a non-heating condition. In addition, in a low-temperature heating mode through the heater 114, an amount of nicotine transfer may increase by promoting the nicotine transfer. The low-temperature heating mode by the heater 114 may implement a higher level of intensity of smoking taste compared to the non-heating mode, and the amount of nicotine transfer may be easily adjusted through the non-heating mode and the low-temperature heating mode.

[0050] The heater 114 may be heated by power supplied by the battery 111. For example, when the aerosol-generating article 12 is inserted in the aerosol-generating device 11, the heater 114 may be disposed outside the aerosol-generating article 12. The heated heater 114 may thus raise the temperature of an aerosol-generating material in the aerosol-generating article 12.

[0051] For example, the heater 114 may be an electrically resistive heater. In this example, the heater 114 may include an electrically conductive track, and the heater 114 may be heated as a current flows through the electrically conductive track. However, the heater 114 is not limited to the foregoing example, and any example of heating the heater 114 up to a desired temperature may be applicable without limitation. Here, the desired temperature may be preset in the aerosol-generating device 11 or may be set by the user.

[0052] Meanwhile, as another example, the heater 114 may be an induction heater. Specifically, the heater 114 may include an electrically conductive coil for heating the aerosol-generating article 12 in an induction heating manner, and the aerosol-generating article 12 may include a susceptor to be heated by the induction heater.

[0053] For example, the heater 114 may include a tubular heat transfer element, a plate-shaped heat transfer element, a needle-shaped heat transfer element, or a rod-shaped heat transfer element, and may heat the inside or outside of the aerosol-generating article 12 according to the shape of a heat transfer element.

[0054] In addition, the heater 114 may be provided as a plurality of heaters in the aerosol-generating device 11. In this case, the plurality of heaters 114 may be disposed to be inserted into the aerosol-generating article 12 or may be disposed outside the aerosol-generating article 12. In addition, some of the plurality of heaters 114 may be disposed to be inserted into the aerosol-generating article 12, and the rest may be disposed outside the aerosol-generating article 12.

[0055] In an embodiment, the aerosol-generating article 12 may be received in the elongated empty space 115. In an embodiment, the heater 114 may be disposed to surround the outer surface of the elongated empty space 115, thereby heating the aerosol-generating article received in the elongated empty space 115. The heater 114 according to an embodiment may be disposed to surround at least a portion of the outer surface of the elongated empty space 115.

[0056] Meanwhile, the aerosol-generating device 11 may further include general-purpose components in addition to the battery 111, the controller 112, the vaporizer 113, and the elongated empty space 115. For example, the aerosol-generating device 11 may include a sensing unit 116, an output unit 117, a user input unit 118, a memory 119, and a communication unit 120.

[0057] The sensing unit 116 may sense a state of the aerosol-generating device 11 or a state of an environment around

the aerosol-generating device 11, and transmit sensed information to the controller 112. Based on the sensed information, the controller 112 may control the aerosol-generating device 11 to restrict smoking, determine whether the aerosol-generating article 12 (e.g., a cigarette, a cartridge, etc.) is inserted, display a notification, and perform other functions.

[0058] The sensing unit 116 may include at least one of a temperature sensor 1161, an insertion detection sensor 1162, or a puff sensor 1163, but is not limited thereto.

[0059] The temperature sensor 1161 may sense a temperature at which the heater 114 (or an aerosol-generating material) is heated. The aerosol-generating device 11 may include a separate temperature sensor for sensing the temperature of the heater 114, or the heater 114 itself may perform a function as a temperature sensor. Alternatively, the temperature sensor 1161 may be arranged around the battery 111 to monitor the temperature of the battery 111.

[0060] The insertion detection sensor 1162 may sense an insertion and/or removal of the aerosol-generating article 12. The insertion detection sensor 1162 may include, for example, at least one of a film sensor, a pressure sensor, a light sensor, a resistive sensor, a capacitive sensor, an inductive sensor, and an infrared sensor, and may sense a signal change caused when the aerosol-generating article 12 is inserted and/or removed.

[0061] The puff sensor 1163 may sense a puff from the user based on various physical changes in an airflow path or airflow channel. For example, the puff sensor 1163 may sense the puff from the user based on any one of a temperature change, a flow change, a voltage change, and a pressure change.

[0062] The sensing unit 116 may further include at least one of a temperature/humidity sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a gyroscope sensor, a position sensor (e.g., a global positioning system (GPS)), a proximity sensor, and a red, green, blue (RGB) sensor (e.g., an illuminance sensor), in addition to the sensors 1161 to 1163 described above. A function of each sensor may be intuitively inferable from its name by one of ordinary skill in the art, and thus, a more detailed description thereof will be omitted here.

[0063] The output unit 117 may output information about the state of the aerosol-generating device 11 and provide the information to the user. The output unit 117 may include at least one of a display 1171, a haptic portion 1172, and a sound outputter 1173, but is not limited thereto. When the display 1171 and a touchpad are provided in a layered structure to form a touchscreen, the display 1171 may be used as an input device in addition to an output device.

[0064] The display 1171 may visually provide information about the aerosol-generating device 11 to the user. The information about the aerosol-generating device 11 may include, for example, a charging/discharging state of the battery 111 of the aerosol-generating device 11, an insertion/removal state of the aerosol-generating article 12, a limited usage state (e.g., an abnormal article detected) of the aerosol-generating device 11, or the like, and the display 1171 may externally output the information. The display 1171 may be, for example, a liquid-crystal display (LCD) panel, an organic light-emitting diode (OLED) panel, or the like. The display 1171 may also be in the form of a light-emitting diode (LED) device.

[0065] The haptic portion 1172 may provide information about the aerosol-generating device 11 to the user in a haptic way by converting an electrical signal into a mechanical stimulus or an electrical stimulus. The haptic portion 1172 may include, for example, a motor, a piezoelectric element, or an electrical stimulation device.

[0066] The sound outputter 1173 may provide information about the aerosol-generating device 11 to the user in an auditory way. For example, the sound outputter 1173 may convert an electrical signal into a sound signal and externally output the sound signal.

[0067] The user input unit 118 may receive information input from the user or may output information to the user. For example, the user input unit 118 may include a keypad, a dome switch, a touchpad (e.g., a contact capacitive type, a pressure resistive film type, an infrared sensing type, a surface ultrasonic conduction type, an integral tension measurement type, a piezo effect type, etc.), a jog wheel, a jog switch, or the like, but is not limited thereto. In addition, although not shown in FIG. 1, the aerosol-generating device 11 may further include a connection interface such as a universal serial bus (USB) interface, and may be connected to another external device through the connection interface such as a USB interface to transmit and receive information or to charge the battery 111.

[0068] The memory 119, which is hardware for storing various pieces of data processed in the aerosol-generating device 11, may store data processed by the controller 112 and data to be processed thereby. The memory 119 may include at least one type of storage medium of a flash memory type memory, a hard disk type memory, a multimedia card micro type memory, a card type memory (e.g., an SD or XE memory), a random-access memory (RAM), a static random-access memory (SRAM), a read-only memory (ROM), an electrically erasable programmable read-only memory (EEPROM), a programmable read-only memory (PROM), a magnetic memory, a magnetic disk, or an optical disk. The memory 119 may store an operating time of the aerosol-generating device 11, a maximum number of puffs, a current number of puffs, at least one temperature profile, data associated with a smoking pattern of the user, and the like.

[0069] The communication unit 120 may include at least one component for communicating with another electronic device. For example, the communication unit 120 may include a short-range wireless communication unit 1201 and a wireless communication unit 1202.

[0070] The short-range wireless communication unit 1201 may include a Bluetooth communication unit, a Bluetooth low energy (BLE) communication unit, a near-field communication unit, a WLAN (Wi-Fi) communication unit, a ZigBee

communication unit, an infrared data association (IrDA) communication unit, a Wi-Fi direct (WFD) communication unit, an ultra-wideband (UWB) communication unit, and an Ant+ communication unit, but is not limited thereto.

[0071] The wireless communication unit 1202 may include, for example, a cellular network communicator, an Internet communicator, a computer network (e.g., a local area network (LAN) or a wide-area network (WAN)) communicator, and the like, but is not limited thereto. The wireless communication unit 1202 may use subscriber information (e.g., international mobile subscriber identity (IMSI)) to identify and authenticate the aerosol-generating device 11 in a communication network.

[0072] In an embodiment, the aerosol-generating device 11 may include at least one input device (e.g., a button) through which the user may control functions of the aerosol-generating device 11 and/or a terminal to be coupled with a cradle. For example, the user may execute various functions using the input device of the aerosol-generating device 11. The user may execute a desired function among the plurality of functions of the aerosol-generating device 11 by adjusting the number of times the user presses the input device (e.g., one time, two times, etc.) or the length of time the user presses the input device (e.g., 0.1 seconds, 0.2 seconds, etc.). As the user operates the input device, a function of preheating the heating element of the vaporizer 113, a function of adjusting the temperature of the heating element of the vaporizer 113, a function of cleaning the space in which the aerosol-generating article is inserted, a function of inspecting whether the aerosol-generating device 11 is in an operable state, a function of displaying the remaining level (available power) of the battery 111, a function of resetting the aerosol-generating device 11, and the like may be performed. However, the functions of the aerosol-generating device 11 are not limited to the examples described above.

[0073] In an embodiment, the aerosol-generating device 11 may include a puff detection sensor, a temperature detection sensor, and/or an aerosol-generating article insertion detection sensor. In addition, the aerosol-generating device 11 may be manufactured to have a structure allowing external air to flow in/flow out even while the aerosol-generating article is inserted.

[0074] According to an embodiment, the aerosol-generating device 11 may include a vaporizer 113 and an elongated empty space 115 arranged in series, as shown in FIG. 2A. According to another embodiment, the aerosol-generating device 11 may include a vaporizer 113 and an elongated empty space 115 arranged in parallel, as shown in FIG. 2B. In addition, the arrangement of the battery 111, the controller 112, the vaporizer 113, and the elongated empty space 115 of the aerosol-generating device 11 is not limited to FIGS. 2A and 2B, and may vary. For example, a heater (e.g., the heater 114 of FIG. 1) may be included in the aerosol-generating device 11.

[0075] Through the airflow path in the aerosol-generating device 11, the aerosol generated by the vaporizer 113 may flow into the elongated empty space 115 and pass through the aerosol-generating article 12. Therefore, a tobacco flavor or nicotine may be added to the aerosol that has passed through the aerosol-generating article 12, and the user may suck one end of the aerosol-generating article 12 through the mouth to inhale the aerosol with the tobacco flavor or nicotine added.

[0076] The vaporizer 113 according to an embodiment may include a liquid storage, a liquid transfer means, a heating element, and an airflow path. The components of the vaporizer 113 may be formed of a material of polycarbonate, but are not limited thereto.

[0077] In an embodiment, the liquid storage may store a liquid composition from which an aerosol may be generated when heated. According to an embodiment, the liquid composition may be a liquid containing a tobacco-containing material including a volatile tobacco flavor component, and according to another embodiment, the liquid composition may be a liquid containing a non-tobacco material. In addition, the liquid composition may store a liquid in a capacity of 0.1 to 2.0 mL, but is not limited thereto. Further, the liquid storage may be interchangeably coupled within the vaporizer 113.

[0078] The liquid composition may include, for example, water, a solvent, ethanol, a plant extract, a fragrance, a flavoring agent, or a vitamin mixture. The fragrance may include, for example, menthol, peppermint, spearmint oil, various fruit flavor ingredients, and the like, but is not limited thereto. The flavoring agent may include ingredients that provide a user with a variety of flavors or scents. The vitamin mixture may be a mixture of at least one of vitamin A, vitamin B, vitamin C, or vitamin E, but is not limited thereto. The liquid composition may also include an aerosol former such as glycerin and propylene glycol.

[0079] In an embodiment, the liquid transfer means may transfer the liquid composition in the liquid storage to the heating element. In an embodiment, the liquid transfer means may be a wick such as cotton fiber, ceramic fiber, glass fiber, or porous ceramic, and may transfer the liquid composition in the liquid storage to the heating element using capillary action.

[0080] In an embodiment, the heating element may be an element for heating the liquid composition transferred by the liquid transfer means, and may be a metal heating wire, a metal heating plate, a ceramic heater, or the like. In addition, the heating element may include a conductive filament such as a nichrome wire, and may be arranged in a structure wound around the liquid transfer means. The heating element may be heated as a current is supplied and may transfer heat to the liquid composition in contact with the heating element, and may thereby heat the liquid composition. As a result, an aerosol may be generated.

[0081] In an embodiment, the airflow path may be arranged such that the generated aerosol may be emitted toward the inserted aerosol-generating article 12. That is, the aerosol generated by the heating element may be emitted through the

airflow path.

[0082] In an embodiment, the controller 112 may control the temperature of the heating element by controlling the current supplied to the heating element. Accordingly, the controller 112 may control the amount of aerosol generated from the liquid composition by controlling the current supplied to the heating element. In addition, the controller 112 may control the current to be supplied to the heating element for a predetermined time when a puff of the user is sensed. For example, the controller 112 may control the current to be supplied to the heating element for 1 to 5 seconds from when a puff of the user is sensed.

[0083] In an embodiment, the controller 112 may control the amount of aerosol emitted from the vaporizer 113 by controlling the opening and closing state of the airflow path. Specifically, the controller 112 may increase the amount of aerosol emitted from the vaporizer 113 by increasing the size of an opening in the airflow path, and reduce the amount of aerosol emitted from the vaporizer 113 by reducing the size of the opening in the airflow path. For example, the controller 112 may control the opening in the airflow path by using a dial method.

[0084] In an embodiment, when the amount of the liquid composition in the liquid storage is less than a preset amount, the controller 112 may notify the user of information that the liquid composition is insufficient through a vibration motor or a display.

[0085] Referring to FIG. 3, the aerosol-generating article 12 according to an embodiment may include a first segment 121, a medium segment 122, a second segment 123, and a wrapper 125.

[0086] In an embodiment, the aerosol-generating article 12 may be wrapped with at least one wrapper 125. The wrapper 125 may have at least one hole through which external air flows in or internal gas flows out. The wrapper 125 may include a material with high thermal conductivity.

[0087] For example, the first segment 121 may be wrapped with a first wrapper 1251, the medium segment 122 may be wrapped with a second wrapper 1252, and the second segment 123 may be wrapped with a third wrapper 1253. In addition, the aerosol-generating article 12 may be entirely wrapped again with the fifth wrapper 1255.

[0088] In an embodiment, the first wrapper 1251, the second wrapper 1252, and the third wrapper 1253 may be formed with porous wrapping paper. For example, the porosity of each of the first wrapper 1251, the second wrapper 1252, and the third wrapper 1253 may be about 35000 CU, but is not limited thereto. In addition, the thickness of each of the first wrapper 1251, the second wrapper 1252, and the third wrapper 1253 may be in the range of 70 μm to 80 μm. In addition, the basis weight of each of the first wrapper 1251, the second wrapper 1252, and the third wrapper 1253 may be in the range of 20 g/m^2 to 25 g/m^2.

[0089] For example, the second wrapper 1252 may include an aluminum component. For example, the second wrapper 1252 may be a combination of general filter wrapping paper and a metal foil such as aluminum foil. Further, the second wrapper 1252 may be formed of sterile paper (e.g., MFW).

[0090] In an embodiment, the fifth wrapper 1255 may be formed of sterile paper (e.g., MFW). For example, the basis weight of the fifth wrapper 1255 may be in the range of 57 g/m^2 to 63 g/m^2. Also, the thickness of the fifth wrapper 1255 may be in the range of 64 μm to 70 μm.

[0091] In an embodiment, the first filter segment 121 may include a cellulose acetate filter. In addition, the first filter segment 121 may include a paper filter and a porous molding. For example, the length of the first segment 121 may be 4 to 15 mm, but is not limited thereto. In addition, the first segment 121 may be colored or flavored.

[0092] In an embodiment, the medium segment 122 may include a cavity, and the cavity may be filled with a medium. For example, the medium used to fill the medium segment 122 may include at least one component of granular tobacco (tobacco granules), reconstituted tobacco, or cut tobacco leaves. For example, a desirable length of the medium segment 122 may be adopted from a range of 6 mm to 18 mm, but is not limited thereto.

[0093] Generally, tobacco granules have a significantly lower content of moisture and/or aerosol former than other types of tobacco materials (e.g., cut tobacco leaves, reconstituted tobacco, and the like) and thus, may greatly reduce the generation of visible smoke, which may facilitate the implementation of a smokeless function of the aerosol-generating device 11. However, the tobacco granules may vary in diameter, density, filling rate, composition ratio of constituent materials, heating temperature, and the like, etc. depending on the embodiment. The diameter of tobacco granules may be about 0.3 mm to 1.2 mm. Within this numerical range, the proper hardness and ease of manufacture of the tobacco granules may be guaranteed, and the probability of vortex airstream in the cavity may be increased.

[0094] Also, the medium segment 122 may include an aerosol-generating material such as glycerin or the like. Further, the medium segment 122 may include other additives such as a flavoring agent, a humectant, and/or organic acid. In addition, the medium segment 122 may include a flavoring liquid such as menthol or a moisturizing agent that is added as being sprayed onto the medium segment 122.

[0095] In an embodiment, a pH-treated medium may be included in the medium segment 122. For example, the medium may be pH-treated by a pH control agent to have basicity, and the pH control agent may be basic and may include, for example, at least one of potassium carbonate (K_2CO_3), sodium bicarbonate ($NaHCO_3$), and calcium oxide (CaO). However, the material included in the pH control agent is not limited to the above examples, and a material that generates less negative odor during smoking may be used. A basic pH control agent may increase the pH of the medium included in

the medium segment 122. Compared to a medium not treated with a basic pH control agent, a medium pH-treated with a basic pH control agent may increase the amount of nicotine released therefrom when heated. That is, a medium pH-treated with a basic pH control agent may achieve a sufficient nicotine yield even when the medium segment 122 is heated at a low temperature.

[0096] In an embodiment, the medium segment 122 may include slurry or paper-like reconstituted tobacco sheets having a pH adjusted to a range of 7.0 to 9.5, or may include tobacco granules having a pH adjusted to a range of 7.0 to 9.5. The medium may include nicotine, and when the medium is pH-treated, free nicotine (e.g., nicotine gas) may be transferred from the medium even under non-heating conditions or relatively low temperature conditions. That is, by adjusting the pH of the medium in the medium segment 122 to a range of 7.0 to 9.5, volatile free nicotine may be transferred under non-heating conditions, and a sufficient level of intensity of smoking taste may be implemented.

[0097] In addition, when the aerosol-generating device 11 includes a heater (e.g., the heater 114 of FIG. 1), a relatively higher level of intensity of smoking taste may be implemented compared to the non-heating mode as the nicotine transfer is more promoted through low-temperature heating. As such, the amount of nicotine transfer may be easily adjusted even through non-heating or low-temperature heating in the aerosol-generating article 12 according to an embodiment.

[0098] In an embodiment, the second segment 123 may include a cellulose acetate filter. In addition, the second segment 123 may include at least one flavor capsule. For example, the second segment 123 may be a cellulose acetate filter into which at least one flavor capsule is inserted. In addition, the second segment 123 may include a cellulose acetate filter mixed with a flavored substance.

[0099] In an embodiment, nicotine may be adsorbed into at least one of the first segment 121 and the second segment 123. As the medium segment 122 is treated in the range of 7.0 to 9.5, nicotine in the medium segment 122 may vigorously become free nicotine even under non-heating conditions and may be spread to the first segment 121 or the second segment 123. Accordingly, the nicotine spread from the medium segment 122 may be adsorbed into at least one of the first segment 121 and the second segment 123. As the first segment 121 or the second segment 123 also includes nicotine along with the medium segment 122, the aerosol-generating article 12 may be used even without preheating the aerosol-generating device 11. This may not only increase the convenience of the user, but also contribute to providing smoking taste satisfaction according to a sufficient transfer of nicotine even without heating.

[0100] In an embodiment, the aerosol-generating article 12 may receive a nicotine spread treatment process. For example, the nicotine spread treatment process may be performed as follows. Firstly, the medium segment 122 may be pH-treated in the range of 7.0 to 9.5, and the first segment 121 and the second segment 123 may be combined by the wrapper 125 with the medium segment 122 therebetween. The aerosol-generating article 12 may then undergo a nicotine spread period at room temperature. For example, the nicotine spread period may be 4 weeks or more.

[0101] Table 1 below shows the amounts of nicotine spread for the first segment 121, a first medium segment (e.g., the medium segment 122), a second medium segment, and the second segment 123 over time. The following experiment was conducted under a temperature condition of 22°C.

[0102] Referring to FIG. 1, when four weeks have elapsed, it may be identified that nicotine is spread and adsorbed into the first segment 121 and the second segment 123, and according to a smoke component analysis value, an amount of nicotine increases while an amount of atomization remains constant.

[Table 1]

Classification	Nicotine Spread Amount (mg/seg)				Smoke Component Analysis Value (mg/stick)	
Time	First segment	First medium segment	Second medium segment	Second segment	Amount of atomization	Nicotine
0 weeks	-	-	-	-	37.8	0.15
4 weeks	0.33	0.60	1.05	0.27	38.8	0.31
6 weeks	0.35	0.55	0.98	0.31	38.6	0.32
8 weeks	0.37	0.66	0.75	0.30	39.0	0.31

[0103] In an embodiment, the first segment 121 or the second segment 123 of the aerosol-generating article 12 may be manufactured by cutting a cellulose acetate filter portion to which free nicotine emitted from a medium raw material including nicotine is spread.

[0104] For example, a medium raw material portion including a material containing nicotine, such as reconstituted tobacco leaves, wet tobacco granules, or leaf tobacco, may be provided, and the medium raw material portion may be pH-treated and may be accommodated in a sealed chamber. Then, the emission of free nicotine from the medium raw material

portion may be induced by heating. A filter portion may be provided in the chamber, and the filter portion may have a block or cylindrical shape including a cellulose acetate component. A nicotine spread in which free nicotine moves from the medium raw material portion to the filter portion may occur, and a circulation unit, such as a fan, may help smooth spread of nicotine. After a predetermined harmonization period (spread/adsorption period), a sufficient amount of nicotine may be adsorbed into the filter portion and the filter portion may be cut to conform to a designated shape. The cut filters may be applied to a first segment (e.g., the first segment 121 of FIG. 3) or a second segment (e.g., the second segment 123 of FIG. 3) of an aerosol-generating article (e.g., the aerosol-generating article 12 of FIG. 3).

[0105] Referring to FIGS. 1 to 3, in the aerosol-generating system 1 according to an embodiment, when the aerosol-generating device 11 includes a heater (e.g., the heater 114 of FIG. 1), the controller 112 may control a temperature at which the heater 114 heats the aerosol-generating article 12. For example, the controller 112 may adjust the temperature at which the heater 114 heats the first segment 121, the medium segment 122, or the second segment 123.

[0106] In an embodiment, the controller 112 may control the heater 114 in a non-heating mode and a low-temperature heating mode. In the non-heating mode, the heater 114 may not heat the aerosol-generating article 12. At this time, first segment 121, the medium segment 122, or the second segment 123 may not be heated. In the low-temperature heating mode, the heater 114 may heat the aerosol-generating article 12 at a low temperature of 0°C or more and 150°C or less. At this time, the first segment 121, the medium segment 122, or the second segment 123 may be heated at a low temperature of 0°C or more and 150°C or less. As the aerosol-generating article 12 switches between the non-heating mode and the low-temperature heating mode, the intensity of smoking taste may be adjusted. For example, in the non-heating mode, an amount of nicotine transferred from the first segment 121, the medium segment 122, or the second segment 123 may be relatively small, and thereby, the intensity of smoking taste may be relatively low. On the other hand, in the low-temperature heating mode, compared to the non-heating mode, the intensity of smoking taste may be relatively high as the amount of nicotine transferred from the first segment 121, the medium segment 122, or the second segment 123 is relatively great. Therefore, in the low-temperature heating mode, a sufficient intensity of smoking taste may be secured even when the medium segment 122 is not treated to have a high pH.

[0107] Although FIG. 3 illustrates that the medium segment 122 is provided between the first segment 121 and the second segment 123, the components of the aerosol-generating article 121 according to an embodiment is not limited thereto. For example, an atomization segment containing a moisturizing agent or another segment to which nicotine is spread may be provided at an upstream side of the first segment 121. Alternatively, another segment to which nicotine is spread may be applied between the first segment 121 and the medium segment 122. Alternatively, another segment into which nicotine is adsorbed may be provided at a downstream side of the second segment 123 or another segment into which nicotine is adsorbed may be provided between the second segment 123 and the medium segment 122. Alternatively, all segments may include cellulose acetate filter segments to which nicotine is spread.

[0108] In an embodiment, an amount of nicotine adsorption per unit length of the first segment 121 of the aerosol-generating article 12 may be the same as or greater than an amount of nicotine adsorption per unit length of the second segment 123. A detailed description thereof is provided below.

[0109] FIG. 4 illustrates a nicotine transfer test for each segment of an aerosol-generating article.

[0110] Referring to FIG. 4, samples are prepared by applying cellulose acetate (CA) filters, to which nicotine is applied, to different segments to analyze a residual amount of nicotine and an amount of nicotine spread. In an experimental example a of FIG. 4, a cellulose acetate filter to which nicotine is spread is disposed on an uppermost upstream side segment, in an experimental example b, a cellulose acetate filter to which nicotine is spread is disposed on a second segment from the upstream side, in an experimental example c, a cellulose acetate filter to which nicotine is spread is disposed on a third segment from the upstream side, and in an experimental example d, a cellulose acetate filter to which nicotine is spread is disposed on a lowermost downstream side segment. In an experimental example e, for comparison with the above experimental examples, cellulose acetate filters to which nicotine is spread are disposed on all segments. At this time, smoking resistance or a filtering effect may be set to be the same in each experimental example.

[0111] Table 2 below shows experimental results according to FIG. 4.

[Table 2]

Classification	Residual amount of nicotine (mg)				Amount of transfer (mg)
	First segment	Second segment	Third segment	Fourth segment	Nicotine
(a)	0.03	0.10	0.09	0.05	0.12
(b)	-	0.13	0.10	0.07	0.13
(c)	-	-	0.15	0.08	0.14
(d)	-	-	-	0.20	0.19

(continued)

Classification	Residual amount of nicotine (mg)				Amount of transfer (mg)
	First segment	Second segment	Third segment	Fourth segment	Nicotine
(e)	0.03	0.18	0.29	0.36	0.66

[0112] Referring to FIG. 4 and Table 2, comparing the experimental example a in which the cellulose acetate filter to which nicotine is spread is disposed on the upstream side with the experimental example d in which the cellulose acetate filter to which nicotine is spread is disposed on the downstream side, it may be identified that the amount of nicotine spread in the experimental example d is greater. In addition, when comparing the experimental examples a, b, c, and d in order, it may be identified that the amount of nicotine spread increases as the cellulose acetate filter to which nicotine is spread is disposed on the downstream side rather than the upstream side.

[0113] In addition, in the experimental example a, it may be identified that the nicotine transferred from the first segment may not be transferred to an oral cavity and may remain in the second segment, the third segment, and the fourth segment. The same trend may be found in the experimental examples b and c. This may also be identified in the experimental example e, and a tendency that a residual amount of nicotine increases from the upstream side to the downstream side may be shown.

[0114] As the cellulose acetate filter to which nicotine is spread is disposed on the downstream side, the amount of nicotine spread may increase due to a decrease in the filtering effect. Accordingly, the cellulose acetate filter to which nicotine is spread and which is disposed on the downstream side may be mainly involved in nicotine spread during a puff of a former part of smoking.

[0115] As the cellulose acetate filter to which nicotine is spread is disposed on the upstream side, an effect of filtering by the cellulose acetate filter disposed on the downstream side increases, and therefore, the cellulose acetate filter to which nicotine is spread is disposed on the upstream side may be mainly involved in the nicotine spread during a puff of a latter part of smoking.

[0116] Since the amount of nicotine adsorbed into the first segment 121 of the aerosol-generating article 12 according to an embodiment is greater than the amount of nicotine adsorbed into the second segment 123, during a puff of a former part of smoking, nicotine from the second segment 123 may be mainly transferred to the oral cavity, during a puff of a middle part of smoking, some nicotine from the first segment 121 may be transferred to the oral cavity, and during a puff of a latter part of smoking, the remaining nicotine from the first segment 121 may be transferred to the oral cavity. At this time, the remaining nicotine from the first segment 121 may be transferred to the oral cavity after being adsorbed (filtered) into the second segment 123.

[0117] That is, the reason why the amount of nicotine spread to the first segment 121 may be to ensure the uniformity of an intensity of smoking taste, and the nicotine adsorbed into the first segment 121 may contribute to a latter part of smoking and the nicotine adsorbed into the second segment 123 may contribute to a former part of smoking. That is, it may be preferable for more nicotine to be adsorbed into the first segment 121 because the nicotine adsorbed into the first segment 121 needs to pass through more obstacles to reach the oral cavity than the nicotine adsorbed into the second segment 123.

[0118] Accordingly, since the amount of nicotine adsorbed into the first segment 121 of the aerosol-generating article 12 is greater than the amount of nicotine adsorbed into the second segment 123, an amount of nicotine transferred to the oral cavity while smoking continues may be uniform, and due to this, the uniformity of the intensity of smoking taste may be ensured.

[0119] In an embodiment, a draw resistance of the first segment 121 may be greater than or equal to a draw resistance of the second segment 123. Preferably, the draw resistance per unit length of the first segment 121 may be greater than or equal to the draw resistance per unit length of the second segment 123. As the draw resistance increases, an amount of adsorbed nicotine may increase.

[0120] For example, when the first segment 121 includes cellulose acetate and the second segment 123 also includes cellulose acetate, a mass per unit length of the cellulose acetate of the first segment 121 may be greater than or equal to a mass per unit length of the cellulose acetate of the second segment 123. Since an amount of cellulose acetate per unit length of the first segment 121 is greater than or equal to an amount of cellulose acetate per unit length of the second segment 123, the draw resistance of the first segment 121 may be greater than or equal to the draw resistance of the second segment 123, and due to this, an amount of nicotine spread to the first segment 121 may be greater than or equal to an amount of nicotine spread to the second segment 123.

[0121] Table 3 below shows an experiment result of an amount of nicotine spread by a draw resistance.

[Table 3]

Sample Name		① Acetate	② Filter paper	③ Granule	Nicotine Sum (mg/cig)
		(mg/seg/cig)			
Experimental example (a) Cavity filter (plasticizer TA 4% applied, draw resistance 100 mmH_2O	Sample 1	0.97	0.11	4.51	5.59
	Sample 2	0.99	0.10	4.33	5.43
	Avg	**0.98**	0.10	4.42	5.51
	STDEV	0.02	0.00	0.13	0.12
	CV(%)	1.54	4.05	2.88	2.11
Experimental example (b) Cavity filter (plasticizer TA 4% applied, draw resistance 140 mmH_2O	Sample 1	1.03	0.10	4.01	5.15
	Sample 2	1.05	0.09	4.25	5.39
	Avg	**1.04**	0.10	4.13	5.27
	STDEV	0.01	0.01	0.17	0.17
	CV(%)	1.25	8.99	4.09	3.29
Experimental example (c) Cavity filter (plasticizer TA 7% applied, draw resistance 100 mmH_2O	Sample 1	1.19	0.11	4.18	5.48
	Sample 2	1.19	0.09	4.16	5.44
	Avg	**1.19**	0.10	4.17	5.46
	STDEV	0.00	0.01	0.01	0.03
	CV(%)	0.06	9.99	0.34	0.46
Experimental example (d) Cavity filter (plasticizer TA 7% applied, draw resistance 140 mmH_2O	Sample 1	1.30	0.10	3.90	5.30
	Sample 2	1.22	0.08	4.06	5.36
	Avg	**1.26**	0.09	3.98	5.33
	STDEV	0.06	0.02	0.12	0.04
	CV(%)	5.01	19.11	3.00	0.72
Experimental example (e) Cavity filter (plasticizer TEC 4% applied, draw resistance 100 mmH_2O	Sample 1	0.67	0.12	4.14	4.94
	Sample 2	0.70	0.13	4.69	5.51
	Avg	**0.68**	0.12	4.42	5.22
	STDEV	0.02	0.00	0.38	0.40
	CV(%)	2.56	3.16	8.67	7.74
Experimental example (f) Cavity filter (plasticizer TEC 4% applied, draw resistance 140 mmH_2O)	Sample 1	0.77	0.12	4.64	5.53
	Sample 2	0.72	0.11	4.71	5.54
	Avg	**0.74**	0.12	4.67	5.54
	STDEV	0.03	0.00	0.04	0.00
	CV(%)	4.70	3.88	0.95	0.09
Experimental example (g) Cavity filter (plasticizer TEC 7% applied, draw resistance 100 mmH_2O	Sample 1	0.93	0.14	4.49	5.56
	Sample 2	0.90	0.15	5.10	6.14
	Avg	**0.91**	0.14	4.79	5.85
	STDEV	0.03	0.01	0.43	0.41
	CV(%)	2.87	5.03	9.04	7.08

(continued)

Sample Name		① Acetate	② Filter paper	③ Granule	Nicotine Sum (mg/cig)
		(mg/seg/cig)			
Experimental example (h) Cavity filter (plasticizer TEC 7% applied, draw resistance 140 mmH_2O	Sample 1	1.02	0.14	4.45	5.61
	Sample 2	1.00	0.14	4.56	5.69
	Avg	**1.01**	0.14	4.51	5.65
	STDEV	0.02	0.00	0.08	0.06
	CV(%)	1.85	0.04	1.68	1.01

[0122] Referring to Table 3, in each of the experimental examples, after a cavity filter (e.g., the medium segment 122 of FIG. 3) is filled with a pH-treated tobacco medium, an amount of nicotine spread to an acetate filter (e.g., the first segment 121 or the second segment 123 of FIG. 3) is measured. In each of the experimental examples, an experiment is conducted with two samples (sample 1 and sample 2), and an average value (avg) is calculated. At this time, the plasticizer applied to each acetate filter is based on the same additional amount.

[0123] In experimental examples a and b, experiments are conducted under the same conditions in which triacetin (TA) 4% is applied as the plasticizer. In the experimental example a, the draw resistance is set to 100 mmH_2O, and in the experimental example b, the draw resistance is set to 140 mmH_2O. Comparing an average amount of nicotine spread to the acetate filter of the experimental example a with an average amount of nicotine spread to the acetate filter of the experimental example b, it may be identified that the average of the amount of nicotine spread per acetate filter segment in the experimental example a is 0.98 mg and the average of the amount of nicotine spread per acetate filter segment in the experimental example b is 1.04 mg.

[0124] Similarly, in experimental examples c and d, experiments are conducted under the same conditions in which TA 7% is applied as the plasticizer. In the experimental example c, the draw resistance is set to 100 mmH_2O, and in the experimental example d, the draw resistance is set to 140 mmH_2O. In this case, the average of the amount of nicotine spread per acetate filter segment in the experimental example c is 1.19 mg and the average of the amount of nicotine spread per acetate filter segment in the experimental example d is 1.26 mg.

[0125] In addition, in experimental examples e and f, experiments are conducted under the same conditions in which triethyl citrate (TEC) 7% is applied as the plasticizer. In the experimental example e, the draw resistance is set to 100 mmH_2O, and in the experimental example f, the draw resistance is set to 140 mmH_2O. Comparing an average amount of nicotine spread to the acetate filter of the experimental example e with an average amount of nicotine spread to the acetate filter of the experimental example f, it may be identified that the average of the amount of nicotine spread per acetate filter segment in the experimental example e is 0.68 mg and the average of the amount of nicotine spread per acetate filter segment in the experimental example f is 0.74 mg.

[0126] Similarly, in experimental examples g and h, experiments are conducted under the same conditions in which TEC 7% is applied as the plasticizer. In the experimental example g, the draw resistance is set to 100 mmH_2O, and in the experimental example h, the draw resistance is set to 140 mmH_2O. In this case, the average of the amount of nicotine spread per acetate filter segment in the experimental example g is 0.91 mg and the average of the amount of nicotine spread per acetate filter segment in the experimental example h is 1.01 mg.

[0127] In Table 3, it may be identified that under the same conditions, as the draw resistance increases, the amount of nicotine spread increases. Therefore, as the draw resistance of the first segment 121 of the aerosol-generating article 12 is equal to or greater than the draw resistance of the second segment 123, the amount of nicotine adsorption per unit length of the first segment 121 may be set to be equal to or greater than the amount of nicotine adsorption per unit length of the second segment 123.

[0128] In an embodiment, when the first segment 121 and the second segment include cellulose acetate, a monodenier of the cellulose acetate of the first segment 121 may be less than or equal to a monodenier of the cellulose acetate of the second segment 123.

[0129] Since a monodenier represents a weight of one strand of cellulose acetate, a lower monodenier at the same density may have a wider surface, and thus, as the monodenier of the cellulose acetate of the first segment 121 becomes less than the monodenier of the cellulose acetate of the second segment 123, the amount of nicotine adsorbed into the first segment 121 may become greater than the amount of nicotine adsorbed into the second segment 123.

[0130] Table 4 below shows an experiment result of an amount of nicotine spread for each cellulose acetate tow.

[Table 4]

	Tow item	First segment (10m)	Granule	Second segment (6 mm)	Third segment (10 mm)
Experimental example (a)	9Y PD 123	**0.78**	2.99	**0.49**	**0.12**
Experimental example (b)	12Y PD 123	**0.70**	3.80	**0.43**	**0.11**

[0131] The experimental conditions are as follows. An experimental subject sample is configured to sequentially arrange a first segment (e.g., the first segment 121 of FIG. 3), a granule segment (e.g., the medium segment 122 of FIG. 3), a second segment (e.g., the second segment 123 of FIG. 3), and a third segment. A TA 11% plasticizer is applied to the first segment and the second segment, and a TA 4% plasticizer is applied to the third segment. While vacuum-packing the experimental subject sample, nicotine was spread for three days at 40°C.

[0132] At this time, a monodenier of the cellulose acetate applied to the experimental example a is 9 deniers (9Y), and a monodenier of the cellulose acetate applied to the experimental example b is 12 deniers (12Y). In both examples, draw resistance was set to be the same at 123 mmH_2O (PD 123).

[0133] An amount of nicotine spread in the first segment is 0.70 mg in the experimental example a, and 0.70 mg in the experimental example b.

[0134] An amount of nicotine spread in the second segment is 0.49 mg in the experimental example a, and 0.43 mg in the experimental example b.

[0135] In addition, an amount of nicotine spread in the third segment is 0.12 mg in the experimental example a, and 0.11 mg in the experimental example b.

[0136] In Table 4, regardless of the segment, it may be identified that adsorption of nicotine in the experimental example a with a low monodenier of the cellulose acetate vigorously occurs compared to in the experimental example b. Therefore, as the monodenier of the cellulose acetate of the first segment 121 of the aerosol-generating article 12 according to an embodiment is equal to or less than the monodenier of the cellulose acetate of the second segment 123, the amount of nicotine adsorption per unit length of the first segment 121 may be set to be greater than or equal to the amount of nicotine adsorption per unit length of the second segment 123.

[0137] According to the aerosol-generating article 12 and the aerosol-generating system 1 including the same according to an embodiment, user convenience may increase by using the aerosol-generating article 12 without preheating the aerosol-generating device 11, and a feeling of smoking satisfaction may be provided to the user by guaranteeing sufficient nicotine transfer even in a non-heating mode. In addition, since the aerosol-generating device 11 may not include a heater, the lifespan of the device may increase.

[0138] The descriptions of the above-described embodiments are merely examples, and it will be understood by one of ordinary skill in the art that various changes and equivalents may be made thereto. Therefore, the scope of the disclosure should be defined by the appended claims, and all differences within the scope equivalent to those described in the claims will be construed as being included in the scope of protection defined by the claims.

[0139] The features and aspects of any embodiment(s) described above may be combined with features and aspects of any other embodiment(s) without resulting in apparent technical conflicts.

Claims

1. An aerosol-generating article comprising:

a first segment; and
a second segment disposed downstream of the first segment,
wherein nicotine is adsorbed into the first segment or the second segment, and
a draw resistance of the first segment is greater than or equal to a draw resistance of the second segment.

2. The aerosol-generating article of claim 1, wherein a draw resistance per unit length of the first segment is greater than or equal to a draw resistance per unit length of the second segment.

3. The aerosol-generating article of claim 1, wherein the first segment and the second segment comprise cellulose acetate, and a mass of cellulose acetate per unit length of the first segment is greater than or equal to a mass of cellulose acetate per unit length of the second segment.

4. The aerosol-generating article of claim 3, wherein a monodenier of the cellulose acetate of the first segment is less

than or equal to a monodenier of the cellulose acetate of the second segment.

5. The aerosol-generating article of claim 1, further comprising a medium segment disposed between the first segment and the second segment, wherein the medium segment comprises a pH-treated tobacco medium, and the nicotine adsorbed into the first segment or the second segment is spread from the medium segment.

6. The aerosol-generating article of claim 5, wherein the medium segment is pH-treated such a pH thereof is in a range of 7.0 to 9.5.

7. The aerosol-generating article of claim 1, wherein the first segment or the second segment is manufactured by cutting a filter portion to which free nicotine emitted from a medium raw material comprising nicotine is spread.

8. An aerosol-generating system comprising:

an aerosol-generating article; and
an aerosol-generating device comprising a controller comprising at least one processor, an elongated empty space configured to receive the aerosol-generating article, and a vaporizer configured to generate an aerosol by heating a liquid composition and emit the aerosol toward the aerosol-generating article,
wherein the aerosol-generating article comprises:

a first segment; and
a second segment disposed downstream of the first segment,
wherein the first segment or the second segment comprises cellulose acetate into which nicotine is adsorbed, and
a monodenier of the cellulose acetate of the first segment is less than or equal to a monodenier of the cellulose acetate of the second segment.

9. The aerosol-generating system of claim 8, wherein a draw resistance per unit length of the first segment is greater than or equal to a draw resistance per unit length of the second segment.

10. The aerosol-generating system of claim 8, wherein the aerosol-generating article further comprises a medium segment disposed between the first segment and the second segment,
the medium segment comprises a pH-treated tobacco medium, and the nicotine adsorbed into the first segment or the second segment is spread from the medium segment.

11. The aerosol-generating system of claim 10,wherein the aerosol-generating device further comprises a heater for heating the first segment, the medium segment, or the second segment, and the controller controls a temperature to heat the first segment, the medium segment, or the second segment.

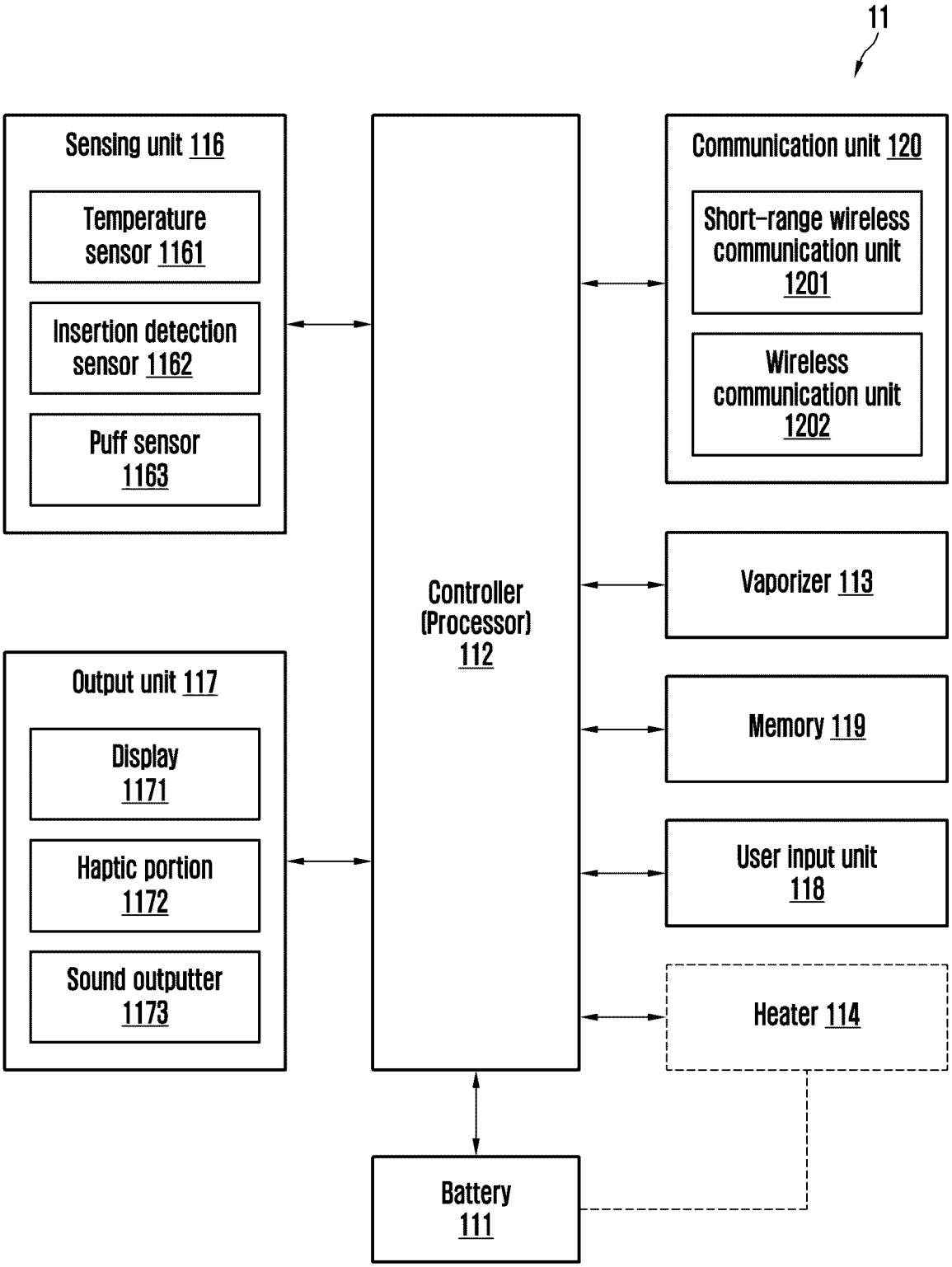
11
Sensing unit 116
Temperature sensor 1161
Insertion detection sensor 1162
Puff sensor 1163
Output unit 117
Display 1171
Haptic portion 1172
Sound outputter 1173
Controller (Processor) 112
Battery 111
Communication unit 120
Short-range wireless communication unit 1201
Wireless communication unit 1202
Vaporizer 113
Memory 119
User input unit 118
Heater 114

FIG. 1

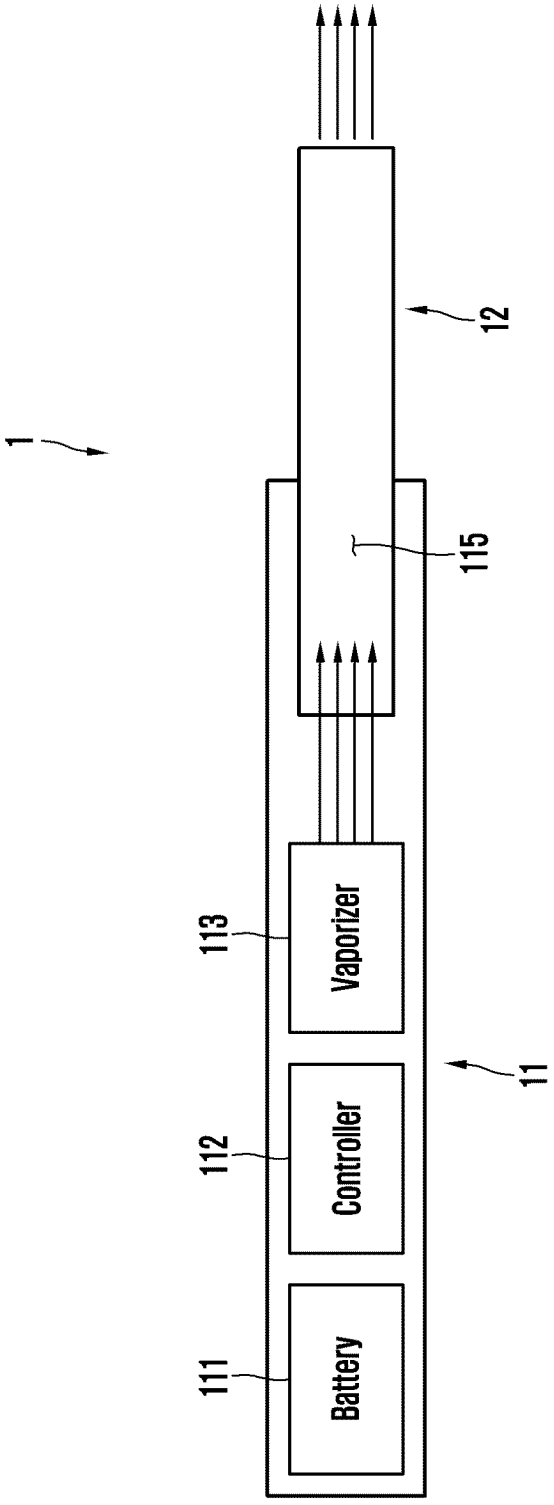

FIG. 2A

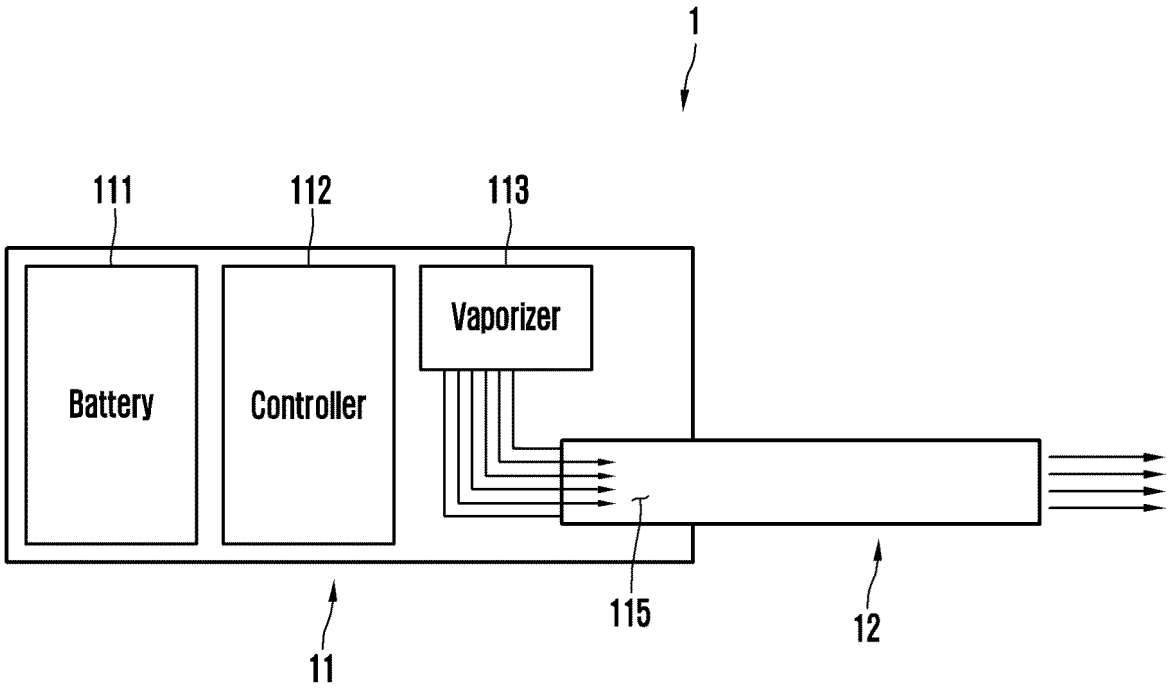

FIG. 2B

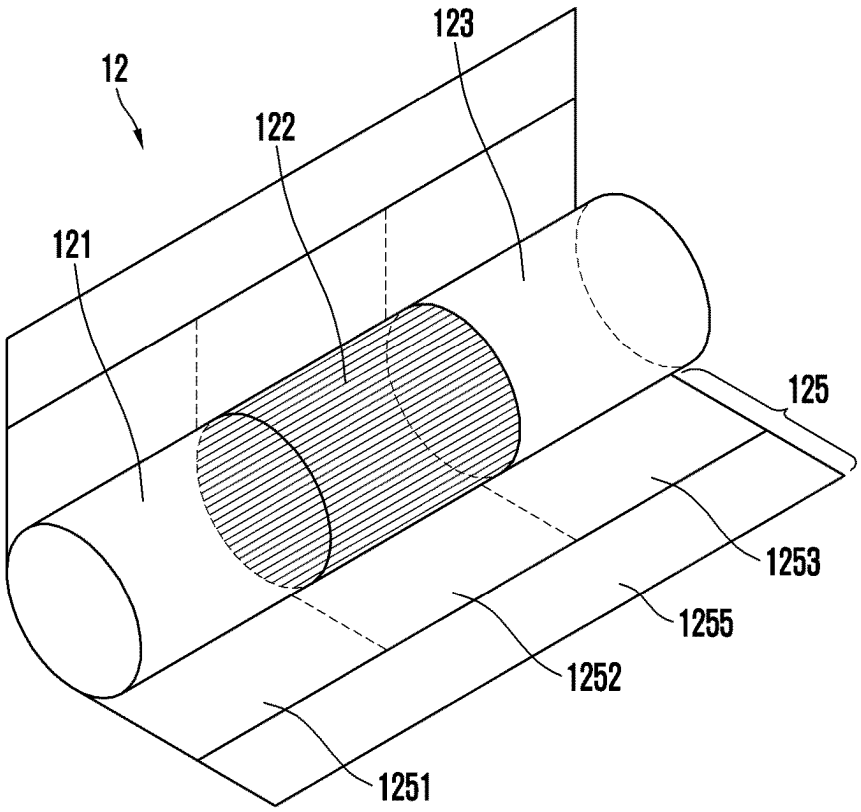

FIG. 3

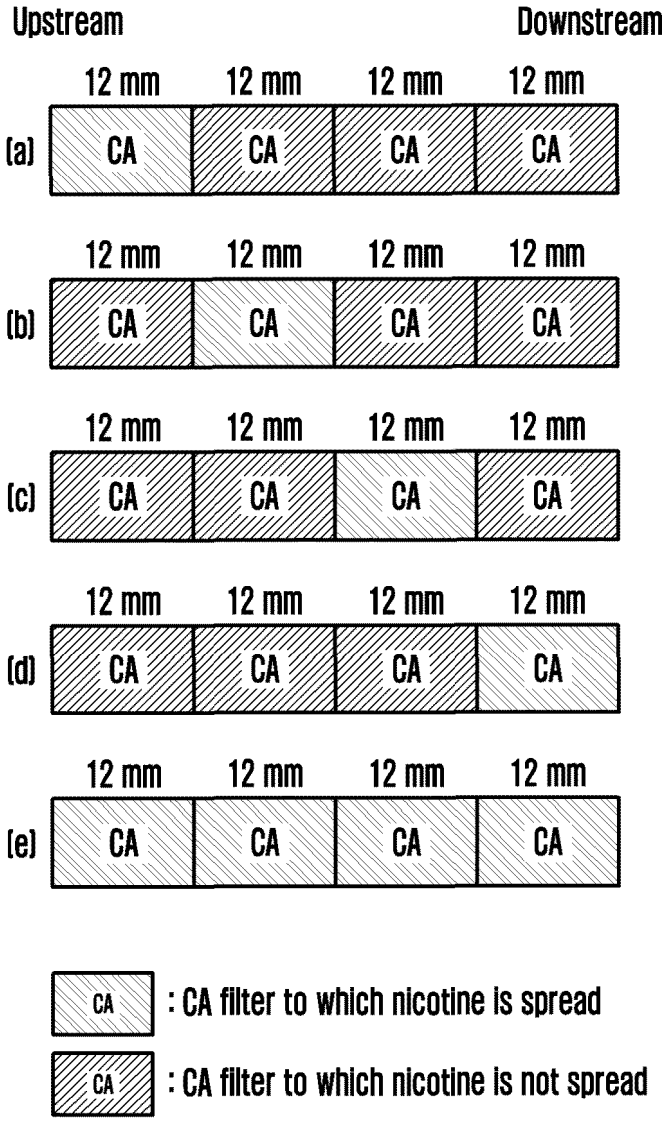
Upstream
Downstream
12 mm
12 mm
12 mm
12 mm
(a)
(b)
(c)
(d)
(e)
CA
CA : CA filter to which nicotine is spread
CA : CA filter to which nicotine is not spread

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2023/003348

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/30(2020.01)i; **A24D 1/20**(2020.01)i; **A24D 3/10**(2006.01)i; **A24D 3/02**(2006.01)i; **A24D 1/00**(2006.01)i; **A24F 40/50**(2020.01)i; **A24F 40/10**(2020.01)i; **A24F 40/20**(2020.01)i; **A24F 40/46**(2020.01)i; **A24F 40/57**(2020.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F 40/30(2020.01); A24B 15/14(2006.01); A24B 15/167(2020.01); A24B 3/14(2006.01); A24D 1/04(2006.01); A24F 40/10(2020.01); A24F 40/40(2020.01); A24F 47/00(2006.01)

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

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

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

eKOMPASS (KIPO internal) & keywords: 에어로졸(aerosol), 세그먼트(segment), 니코틴(nicotine), 흡인저항(suction resistance)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2021-0136474 A (KT & G CORPORATION) 17 November 2021 (2021-11-17) See claim 1; paragraphs [0018]-[0062]; and figures 2-4.	1-11
Y	CN 108433185 A (YUNNAN TOBACCO BIOTECH CO., LTD.) 24 August 2018 (2018-08-24) See claims 1 and 5; and paragraphs [0011]-[0016] and [0073].	1-11
A	KR 10-2022-0054500 A (KT & G CORPORATION) 03 May 2022 (2022-05-03) See entire document.	1-11
A	CN 109998171 A (SHENZHEN YUYAN INDUSTRY CO., LTD. et al.) 12 July 2019 (2019-07-12) See entire document.	1-11
A	US 2021-0177041 A1 (NICOVENTURES TRADING LIMITED) 17 June 2021 (2021-06-17) See entire document.	1-11

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 June 2023	**12 June 2023**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2023/003348

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		EP 3930507 A4	13 April 2022
		JP 2022-536013 A	12 August 2022
		US 2023-0133325 A1	04 May 2023
		WO 2021-225291 A1	11 November 2021
CN 108433185 A	24 August 2018	None	
KR 10-2022-0054500 A	03 May 2022	EP 4011220 A1	15 June 2022
		EP 4011220 A4	30 November 2022
		JP 2023-502301 A	24 January 2023
		KR 10-2527343 B1	02 May 2023
		WO 2022-086086 A1	28 April 2022
CN 109998171 A	12 July 2019	WO 2019-214603 A1	14 November 2019
US 2021-0177041 A1	17 June 2021	AU 2019-316188 A1	04 February 2021
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		CN 113395909 A	14 September 2021
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		WO 2020-025730 A1	06 February 2020

Form PCT/ISA/210 (patent family annex) (July 2022)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 1020170132823 **[0002]**