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(71) Applicants:
• **KT&G Corporation**
Daedeok-gu
Daejeon 34337 (KR)
• **Kolon Industries, Inc.**
Seoul 07793 (KR)

(72) Inventors:
• **HWANG, Min Hee**
34128 Daejeon (KR)
• **MOON, Sung Min**
34128 Daejeon (KR)
• **KI, Sung Jong**
34128 Daejeon (KR)
• **YANG, Jin Chul**
34128 Daejeon (KR)

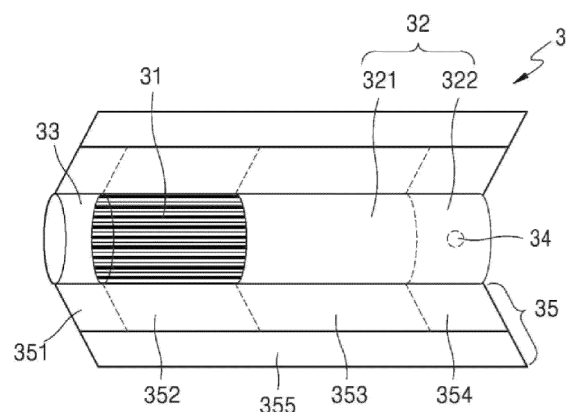
- **HA, Sung Hoon**
34128 Daejeon (KR)
- **LEE, John Tae**
34128 Daejeon (KR)
- **MA, Kyeng Bae**
34128 Daejeon (KR)
- **AHN, Ki Jin**
34128 Daejeon (KR)
- **JEONG, Jong Cheol**
07793 Seoul (KR)
- **JIN, Sang Woo**
07793 Seoul (KR)
- **PARK, Eun Young**
07793 Seoul (KR)
- **LEE, Jeong Hun**
07793 Seoul (KR)
- **SEO, Seung Dong**
07793 Seoul (KR)
- **HWANG, Yeong Nam**
07793 Seoul (KR)

(74) Representative: **Isarpatent**
Patent- und Rechtsanwälte
Barth Hassa Peckmann & Partner mbB
Friedrichstraße 31
80801 München (DE)

(54) **SMOKING ARTICLE INCLUDING LYOCELL TOW**

(57) A smoking article is provided. The smoking article includes a tobacco rod, a front-end plug disposed at one side of the tobacco rod, a first segment disposed at the other side opposite to the one side of the tobacco rod, and a second segment disposed at the other side of the first segment, wherein the second segment includes lyocell tow including a plurality of lyocell fibers.

FIG.4



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Description

[Technical Field]

- 5 **[0001]** The present invention relates to a smoking article which includes lyocell tow in a second segment constituting a filter portion of the smoking article, so that the smoking article prevents the tow in the second segment from melting, effectively reduces the heat generated during the initial puffs, and thus is capable of providing a richer improved smoking experience to a user.

10 [Background Art]

- [0002]** In smoking articles, the transfer of tobacco components (e.g., nicotine and tar) and the production of vapor have a significant impact on a user's smoking experience. Generally, the smoking article operates by a method in which a stick is heated to a high temperature of about 150 to 300 °C using a device, the applied heat is transferred to a medium portion to increase the temperature of the medium portion, and thus tobacco components such as nicotine and the like are smoothly transferred. In this process, materials such as glycerin and the like are heated to generate vapor, and the tobacco components contained in the vapor are delivered so that a user can inhale them. However, when the device is set to a temperature equal to or less than the boiling point of glycerin, vapor is not smoothly generated, and thus a problem that the transfer of tobacco components is limited occurs.

- 20 **[0003]** Meanwhile, conventional mouthpieces serve to filter components in mainstream smoke using cellulose acetate (hereinafter, abbreviated as "CA") tow. The CA tow melts or deforms at a temperature of about 70 °C or higher and then solidifies again, and this phenomenon interferes with smooth transfer of smoke, generates a negative off-flavor, and prevents a filtering function from working properly.

25 [Disclosure]

[Technical Problem]

- 30 **[0004]** One object of the present invention is to provide a smoking article which includes lyocell tow in a second segment constituting a filter portion of the smoking article, so that the smoking article prevents the tow in the second segment from melting, effectively reduces the heat generated during the initial puffs, and thus is capable of providing a richer improved smoking experience to a user.

- [0005]** The objects of the present invention are not limited to those mentioned above, and other unmentioned objects can be clearly understood by those skilled in the art to which the present invention pertains from the description below.

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[Technical Solution]

- [0006]** According to one aspect of the present application for achieving the one object, there is provided a smoking article which a tobacco rod, a front-end plug disposed at one side of the tobacco rod, a first segment disposed at the other side opposite to the one side of the tobacco rod, and a second segment disposed at the other side of the first segment, wherein the second segment includes lyocell tow including a plurality of lyocell fibers. In some embodiments, the front-end plug, the tobacco rod, the first segment, and the second segment may be sequentially arranged along the longitudinal direction of the smoking article.

- 45 **[0007]** In some embodiments, the lyocell fibers included in the lyocell tow may have a single fineness of 2.22 to 16.67 dtex (a monodener of 2 to 15), and the lyocell tow may have a total fineness of 1,111 to 4,444 tex (a total denier of 10,000 to 40,000).

- [0008]** In some embodiments, the second segment may have a draw resistance of 5 mmWG to 20 mmWG based on a second segment length of 14 mm.

- 50 **[0009]** In some embodiments, the second segment may have a draw resistance of 8 mmWG to 17 mmWG based on the second segment length of 14 mm.

- [0010]** In some embodiments, the front-end plug may include at least one of cellulose acetate and lyocell.

- [0011]** In some embodiments, the front-end plug may include at least one channel inside. At least one channel may extend in a longitudinal direction. At least one channel may extend in a longitudinal direction parallel to a longitudinal axis.

- [0012]** In some embodiments, the second segment may have a hardness of 60% to 100%.

- 55 **[0013]** In some embodiments, the second segment may have a hardness of 85% to 95%.

- [0014]** According to another aspect of the present application, there is provided a system including the above-described smoking article and an aerosol-generating device using the same.

[Advantageous Effects]

[0015] According to a smoking article according to an embodiment, since lyocell tow is applied to a second segment constituting a filter portion of a smoking article, the tow in the second segment is prevented from melting, the heat generated during the initial puffs is effectively reduced, and thus a richer improved smoking experience can be provided to a user.

[0016] Advantageous effects according to the technical spirit of the present disclosure are not limited to those mentioned above, and other unmentioned advantageous effects can be clearly understood by those of ordinary skill in the art from the description below.

[Description of Drawings]

[0017]

FIGS. 1 to 3 are diagrams showing examples in which a smoking article is inserted into an aerosol-generating device. FIG. 4 is a diagram showing a smoking article according to an embodiment.

[Modes of the Invention]

[0018] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Advantages and features of the present disclosure and methods of achieving the same should become clear with embodiments described in detail below with reference to the accompanying drawings. However, the technical spirit of the present disclosure is not limited to the following embodiments and may be implemented in various different forms. The following embodiments are only provided to make the technical spirit of the present disclosure complete and completely inform those of ordinary skill in the art to which the present disclosure pertains of the scope of the present disclosure. The technical spirit of the present disclosure is defined only by the scope of the claims.

[0019] In assigning reference numerals to components of each drawing, it should be noted that the same reference numerals are assigned to the same components wherever possible even when the components are illustrated in different drawings. Also, in describing the present disclosure, when it is determined that the detailed description of a known related configuration or function may obscure the gist of the present disclosure, the detailed description thereof will be omitted.

[0020] Unless otherwise defined, all terms including technical or scientific terms used herein have the same meaning as commonly understood by those of ordinary skill in the art to which the present disclosure pertains. Terms defined in commonly used dictionaries should not be interpreted in an idealized or overly formal sense unless expressly so defined herein. Terms used herein are for describing the embodiments and are not intended to limit the present disclosure. In the present specification, a singular expression includes a plural expression unless the context clearly indicates otherwise.

[0021] Also, in describing components of the present disclosure, terms such as first, second, A, B, (a), and (b) may be used. Such terms are only used for distinguishing one component from another component, and the essence, order, sequence, or the like of the corresponding component is not limited by the terms. In a case in which a certain component is described as being "connected," "coupled," or "linked" to another component, it should be understood that, although the component may be directly connected or linked to the other component, still another component may also be "connected," "coupled," or "linked" between the two components.

[0022] The terms "comprise" and/or "comprising" used herein do not preclude the presence or addition of one or more components, steps, operations, and/or devices other than those mentioned.

[0023] First, some terms used herein will be clarified.

[0024] In the present specification, a "smoking article" may refer to any product that can be smoked or any product that can provide a smoking experience, regardless of whether the product is based on tobacco, tobacco derivatives, expanded tobacco, reconstituted tobacco, or tobacco substitutes. For example, the smoking article may include products that can be smoked, such as cigarettes, cigars, and cigarillos.

[0025] In the present specification, a "smoking material" may refer to any type of material that can be used in a smoking article.

[0026] In the present specification, the term "user" may be used interchangeably with the term "consumer."

[0027] In the present specification, "upstream" or "upstream direction" may refer to a direction moving away from an oral region of a smoker, and "downstream" or "downstream direction" may refer to a direction approaching the oral region of the smoker.

[0028] In the present specification, a "longitudinal direction" may refer to a direction corresponding to a longitudinal axis of a smoking article. The "longitudinal axis" of a smoking article may refer to an imaginary line extending along the main longitudinal direction of a smoking article. This axis generally runs from one end (e.g., the mouthpiece or filter end) to the opposite end (e.g., the combustion or heat source end) of a smoking article.

[0029] In the present specification, a "lyocell filter" refers to a filter including or composed of lyocell tow.

[0030] In the present specification, "lyocell tow" includes or is composed of a plurality of lyocell fibers. In some embodiments, the lyocell tow may refer to a bundle formed by cross-connecting adjacent lyocell fibers.

[0031] In the present specification, "lyocell fibers" may refer to fibers made of lyocell cellulose. Particularly, lyocell fibers may be fibers made of cellulose derived or primarily derived from wood pulp, especially, semi-synthetic fibers.

[0032] In the present specification, a "shaped cross-section" is defined as a cross-section having a shape including a plurality of protrusions instead of having a circular shape. For example, a cross-section having a shape in which a plurality of protrusions branch and/or extend from the center and/or the center of the cross-section may be referred to as a shaped cross-section. Here, the "protrusion" may refer to a distinct, extended segment or arm extending outward from the central core or joining point of the cross-section of a lyocell fiber.

[0033] In some embodiments, the lyocell fibers may have a Y-shaped cross-section with three protrusions branching and/or extending from the center and/or the center of the cross-section, a cross-shaped cross-section with four protrusions, and/or a star-shaped cross-section with five protrusions, or an O-shaped cross-section, but the present invention is not limited thereto.

[0034] In some embodiments, the lyocell fibers may include three or more protrusions branching and/or extending from the center and/or the center of the cross-section.

[0035] In some embodiments, the lyocell fibers included in the lyocell tow may have a Y-shaped cross-section for application in cigarette filters.

[0036] In the present specification, a "hollow" may refer to a channel extending along the longitudinal direction.

[0037] In the present specification, when the cross-section of a channel formed inside a front-end plug has a "trilobal," "tetralobal," or "multilobal" shape, it may mean that the cross-section has a shape in which 3 protrusions, 4 protrusions, or more than 4 protrusions branch and/or extend from the center of the cross-section of the channel, respectively. Here, the "protrusion" may refer to a distinct, extended segment or arm extending outward from the central core or joining point of the cross-section of the channel.

[0038] In the present specification, "being composed of" an element may refer to including or consisting of the element.

[0039] In the present specification, a "tubular rod" as a filter rod may refer to a filter rod with a hollow formed therein, and a filter rod without a hollow formed therein may be referred to as a "cylindrical rod."

[0040] In the present specification, a "recess-type rod" as a filter rod may refer to a filter rod with one or more pores.

[0041] In the present specification, a "recessed filter" as a filter may refer to a filter with one or more pores.

[0042] In the present specification, the "wrapping" of a smoking article with a wrapper may mean that at least a portion of the peripheral surface along the longitudinal axis of each part (portion), segment and/or structure of a smoking article is surrounded by a wrapper.

[0043] In the present specification, basis weight refers to mass per unit area of wrapping paper and/or a wrapper. The basis weight of wrapping paper and/or a wrapper may be determined by measuring the mass and area of wrapping paper and/or a wrapper and dividing the mass of the wrapping paper and/or wrapper by the area. The unit of basis weight may be gram per square meter (gsm), that is, g/m^2 .

[0044] In the present specification, "hard wrapping paper" refers to wrapping paper having a basis weight greater than or equal to a certain value.

[0045] In some embodiments, "grease-resistant wrapping paper" may refer to wrapping paper whose surface has been treated to be grease-resistant, and "grease-resistant hard wrapping paper" may refer to hard wrapping paper whose surface has been treated to be grease-resistant.

[0046] In some embodiments, "general wrapping paper" may refer to wrapping paper whose surface has not been treated to be grease-resistant, and "general hard wrapping paper" may refer to hard wrapping paper whose surface has not been treated to be grease-resistant.

[0047] In the present specification, the "single fineness" of lyocell tow or cellulose acetate tow refers to the fineness of a monofilament strand separated from a multifilament of lyocell fibers or cellulose acetate fibers constituting lyocell tow or cellulose acetate tow.

[0048] In the present specification, the "total fineness" of lyocell tow or cellulose acetate tow refers to the fineness of a multifilament of lyocell fibers or cellulose acetate fibers constituting lyocell tow or cellulose acetate tow.

[0049] In the present specification, the hardness of each part (portion), segment and/or structure (e.g., a second segment) of a smoking article is a value obtained by quantifying the degree to which a diameter of the object is maintained when the object is pressed with a certain level of force in a direction perpendicular to the longitudinal direction of the object, and may be a percentage value of a ratio of a diameter of the object after the force is applied to a diameter of the object before the force is applied. For example, the hardness (%) of the object may be calculated by $(D-a)/D \times 100\%$. Here, D represents a diameter of the object, and a represents a distance the object moves downward due to a 300 g weight (i.e., the object is pressed). The measurement values required to calculate the hardness may be obtained, for example, using DHT 200™ commercially available from Filtrona Group. In measuring the hardness, the force applied to the object may be considered to be a value equivalent to the force applied to the smoking article by an actual user (e.g., the force at which an

actual user holds the smoking article).

[0050] A filter of a smoking article according to one aspect of the present invention may collect at least a portion of smoke generated during smoking of the smoking article. In some embodiments, the filter of the smoking article may collect total particulate matter (hereinafter, abbreviated as "TPM") including at least a portion of at least one of nicotine (hereinafter, abbreviated as "Nic"), tar, propylene glycol (hereinafter, abbreviated as "PG"), and glycerin (hereinafter, abbreviated as "Gly") included in smoke generated during smoking of the smoking article.

[0051] In the present specification, "draw resistance" refers to the static pressure difference between two ends of a sample when an airflow passes through the sample. In the present specification, "PDC" refers to a draw resistance value measured in a state in which a medium portion is open, the perforations of the filtering portion are blocked, and the inflow of external air is blocked, and "PDO" refers to a draw resistance value measured in a state in which a medium portion is open, the perforations of the filtering portion are not blocked, and the inflow of external air is allowed. For example, draw resistance may be measured according to the ISO standard 6565:2015 method. According to the ISO standard 6565:2015 method, draw resistance may refer to the static pressure difference between two ends of a sample when an airflow passes through the sample under normal conditions (22 ± 2 °C, $60 \pm 5\%$ relative humidity) with a volume flow rate of 17.5 mm/s at the discharge end.

[0052] In the present specification, organic acid is a general term for organic compounds that are acidic.

[0053] In some embodiments, room temperature may refer to 20 °C to 25 °C.

[0054] In the present specification, when no separate physical quantity is indicated, component percent (%) and component proportion refer to the weigh percent (wt%) and weight proportion of a component, respectively.

[0055] In the present specification, "puff" refers to an action of inhaling or drawing air through a smoking article for generating and inhaling smoke or vapor. "Puff count" may refer to the total number of inhaling or drawing actions during use of a smoking article. Alternatively or additionally, the puff count may be the maximum number of inhaling or drawing actions that a smoking article can provide before it is completely consumed or ceases to function.

[0056] In the present specification, Health Canada (HC) conditions may include a puff volume of 55 ml, a puff frequency of 30 seconds, and a puff duration of 2 seconds. Particularly, the HC conditions may be based on a state in which the perforations of a filter are blocked. In measurement under the HC conditions, the puff count may be 9.

[0057] In the present specification, the "ventilation rate (hereinafter, abbreviated as "Vent")" of a smoking article may be defined as a percentage value of a ratio of the total volume flow rate (e.g., ml/s) of air entering the smoking article without burning or heating through the front region, that is, the longitudinal upstream end, of the smoking article to the total volume flow rate (e.g., ml/s) of air at the outlet, that is, the longitudinal downstream end, of the smoking article. For example, the ventilation rate may be measured according to ISO 9512:2019. For example, the total volume flow rate of air entering the smoking article without burning or heating through the front region may be the total volume flow rate of air entering in a direction perpendicular to the longitudinal direction of the smoking article. For example, the total volume flow rate of air entering the smoking article without burning or heating through the front region may be the total volume flow rate of air entering the smoking article through wrapping paper.

[0058] The contents of components included in total particulate matter (TPM) in the collected smoke may be analyzed through gas chromatography-mass spectrometry (GC/MS). For example, the contents of components included in TPM in the collected smoke may be measured using a GC/MS device after a Cambridge filter (a Cambridge filter pad (CFP)) collecting smoke is immersed in isopropyl alcohol (IPA) for a predetermined time (e.g., 20 minutes to 16 hours) in the case of tar or nicotine and in methanol for a predetermined time (e.g., 2 hours to 16 hours) in the case of PG and Gly, then treated using a shaking device, and passed through a polytetrafluoroethylene (PTFE) syringe filter to remove impurities. The immersion time may be 20 minutes or more in the case of tar or nicotine and 2 hours or more in the case of PG and Gly.

[0059] The GC/MS may be, for example, a measuring device commercially available from Agilent Technologies, Inc.

[0060] In the present specification, the unit "mmWG" is a unit of pressure and refers to "mmH₂O."

[0061] Hereinafter, various embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0062] FIGS. 1 to 3 are diagrams showing examples in which a smoking article is inserted into an aerosol-generating device.

[0063] Referring to FIG. 1, an aerosol-generating device 1 includes a battery 11, a control unit 12, and a heater 13. Referring to FIGS. 2 and 3, the aerosol-generating device 1 may further include a vaporizer 14. In addition, a smoking article 3 may be inserted into the internal space of the aerosol-generating device 1.

[0064] In the aerosol-generating device 1 shown in FIGS. 1 to 3, components related to the present embodiment are illustrated. Therefore, it will be understood by those skilled in the art related to the present embodiment that other general-purpose components may be further included in the aerosol-generating device 1 in addition to the components shown in FIGS. 1 to 3.

[0065] In addition, although it is illustrated in FIGS. 2 and 3 that the aerosol-generating device 1 includes the heater 13, if necessary, the heater 13 may be omitted. In some embodiments, the aerosol-generating device 1 may not include a heater. In some embodiments, the battery 11, the control unit 12, and the vaporizer 14 are sequentially disposed, that is,

disposed in a row along the longitudinal direction of the smoking article 3.

[0066] In FIG. 1, it is illustrated that the battery 11, the control unit 12, and the heater 13 are disposed in a row. In some embodiments, the battery 11, the control unit 12, and the heater 13 are sequentially disposed along the longitudinal direction of the smoking article 3. Also, it is illustrated in FIG. 2 that the battery 11, the control unit 12, the vaporizer 14, and the heater 13 are disposed in a row along the longitudinal direction of the smoking article 3. Also, it is illustrated in FIG. 3 that the vaporizer 14 and the heater 13 are disposed in parallel. However, the internal structure of the aerosol-generating device 1 is not limited to those shown in FIGS. 1 to 3. In other words, the disposition of the battery 11, the control unit 12, the heater 13, and the vaporizer 14 may vary depending on the design of the aerosol-generating device 1.

[0067] When the smoking article 3 is inserted into the aerosol-generating device 1, the aerosol-generating device 1 may operate the heater 13 and/or the vaporizer 14 to generate an aerosol. The aerosol generated by the heater 13 and/or the vaporizer 14 is delivered to a user by passing through the smoking article 3.

[0068] If necessary, even when the smoking article 3 is not inserted into the aerosol-generating device 1, the aerosol-generating device 1 may operate the heater 13.

[0069] The battery 11 supplies power used to operate the aerosol-generating device 1. For example, the battery 11 may supply power so that the heater 13 and/or the vaporizer 14 can operate, and may supply power required to operate the control unit 12. Particularly, the battery 11 may supply power required to operate a display, a sensor, a motor, and the like installed in the aerosol-generating device 1.

[0070] The control unit 12 controls the overall operation of the aerosol-generating device 1. In particular, the control unit 12 controls the operation of not only the battery 11, the heater 13, and the vaporizer 14 but also other components included in the aerosol-generating device 1. Particularly, the control unit 12 may also determine whether the operation of the aerosol-generating device 1 is possible by checking the state of each component of the aerosol-generating device 1.

[0071] The control unit 12 includes at least one processor. The processor may be implemented as an array of multiple logic gates and implemented as a combination of a general-purpose microprocessor and a memory storing a program that can be executed on the microprocessor. Also, it will be understood by those skilled in the art to which the present embodiment pertains that the processor may be implemented as other types of hardware.

[0072] The heater 13 may be heated by the power supplied from the battery 11. For example, when the smoking article 3 is inserted into the aerosol-generating device 1, the heater 13 may be located outside the smoking article 3. Therefore, the heated heater 13 may increase the temperature of an aerosol-generating material in the smoking article 3.

[0073] The heater 13 may be an electrically resistant heater. For example, the heater 13 includes an electrically conductive track, and as current flows through the electrically conductive track, the heater 13 may be heated. However, the heater 13 is not limited to the above-described example, and any heater may be used without limitation as long as it can be heated to a desired temperature. Here, the desired temperature may be preset in the aerosol-generating device 1 or may be set by a user.

[0074] In another example, the heater 13 may be an induction heating-type heater. Particularly, the heater 13 may include an electrically conductive coil for heating the smoking article 3 by an induction heating method, and the smoking article 3 may include a susceptor that can be heated by the induction heating-type heater.

[0075] For example, the heater 13 may include a tubular heating element, a plate-shaped heating element, a needle-shaped heating element, and/or a rod-shaped heating element, and the inside and/or outside of the smoking article 3 may be heated according to the shape of a heating element.

[0076] Particularly, a plurality of heaters 13 may be disposed in the aerosol-generating device 1. In this case, a plurality of heaters 13 may be disposed so as to be inserted into the inside of the smoking article 3 or may be disposed outside the smoking article 3. Particularly, some of the plurality of heaters 13 may be disposed so as to be inserted into the inside of the smoking article 3, and the remainder may be disposed outside the smoking article 3. In some embodiments, the heater 13 may heat the inside and outside of the smoking article 3. Also, the shape of the heater 13 is not limited to the shapes shown in FIGS. 1 to 3, and the heater may be manufactured in various shapes. In some embodiments, the heater 13 may include an electrically resistant heater and an induction heating-type heater.

[0077] The vaporizer 14 may heat a liquid composition to generate an aerosol, and the generated aerosol may be delivered to a user by passing through the smoking article 3. In other words, the aerosol generated by the vaporizer 14 may move along the airflow path of the aerosol-generating device 1, and the airflow path may be configured so that the aerosol generated by the vaporizer 14 can be delivered to a user by passing through the smoking article 3. The vaporizer 14 may heat a liquid composition to generate an aerosol, and may release the aerosol toward the smoking article so that the aerosol passes through the smoking article inserted into a smoking article insertion unit.

[0078] For example, the vaporizer 14 may include a liquid reservoir, a liquid delivery means, and a heating element, but the present invention is not limited thereto. For example, the liquid reservoir, the liquid delivery means, and the heating element may be included as independent modules in the aerosol-generating device 1.

[0079] The liquid reservoir may store a liquid composition. For example, the liquid composition may be a liquid including a tobacco-containing material including a volatile tobacco flavor component. Alternatively or additionally, the liquid composition may be a liquid including a non-tobacco material. The liquid reservoir may be manufactured to be detachable

from/attachable to the vaporizer 14 or manufactured integrally with the vaporizer 14.

[0080] For example, the liquid composition may include water, a solvent, ethanol, a plant extract, a flavoring, a flavoring agent, and/or a vitamin mixture. The flavoring may include menthol, peppermint, spearmint oil, and/or various types of fruit flavoring components, but the present invention is not limited thereto. The flavoring agent may include a component that can provide various types of flavors to a user. The vitamin mixture may be a mixture of at least one of vitamin A, vitamin B, vitamin C, and vitamin E, but the present invention is not limited thereto. Particularly, the liquid composition may include an aerosol-forming agent such as glycerin and propylene glycol.

[0081] The liquid delivery means may deliver the liquid composition in the liquid reservoir to the heating element. For example, the liquid delivery means may be a wick such as cotton fiber, ceramic fiber, glass fiber, and/or a porous ceramic, but the present invention is not limited thereto.

[0082] The heating element is an element for heating the liquid composition delivered by the liquid delivery means. For example, the heating element may include a metal heating wire, a metal heating plate, and/or a ceramic heater, but the present invention is not limited thereto. Particularly, the heating element may be composed of a conductive filament such as a nichrome wire, and may be disposed in a structure that is wound around the liquid delivery means. The heating element may be heated by current supply and may heat the liquid composition by transferring heat to the liquid composition in contact with the heating element. As a result, an aerosol may be generated.

[0083] For example, the vaporizer 14 may be referred to as a cartomizer or an atomizer, but the present invention is not limited thereto.

[0084] Meanwhile, the aerosol-generating device 1 may further include general-purpose components in addition to the battery 11, the control unit 12, the heater 13, and the vaporizer 14. For example, the aerosol-generating device 1 may include a display capable of outputting visual information and/or a motor for outputting tactile information. Particularly, the aerosol-generating device 1 may include at least one sensor (a puff sensor, a temperature sensor, and/or a smoking article insertion sensor). Particularly, the aerosol-generating device 1 may be manufactured so that external air can be introduced or internal gas can be discharged even when the smoking article 3 is inserted.

[0085] Although not shown in FIGS. 1 to 3, the aerosol-generating device 1 may constitute a system together with a separate cradle. For example, the cradle may be used to charge the battery 11 of the aerosol-generating device 1. Alternatively or additionally, the heater 13 may be heated while the cradle and the aerosol-generating device 1 are combined.

[0086] The smoking article 3 may be similar to a general combustion-type smoking article. For example, the smoking article 3 may be divided into a tobacco rod 31 including a tobacco material and an aerosol-generating material and a filter rod 32 including a filter and the like. Optionally, an aerosol-generating material may also be included in the filter rod 32 of the smoking article 3. For example, a granular and/or capsule-type aerosol-generating material may be included in the tobacco rod 31 and optionally the filter rod 32.

[0087] The entire tobacco rod 31 may be inserted into the inside of the aerosol-generating device 1, and the filter rod 32 may be exposed to the outside. Alternatively, only a portion of the tobacco rod 31 may be inserted into the inside of the aerosol-generating device 1, or the entire tobacco rod 31 and a portion of the filter rod 32 may be inserted. A user may inhale an aerosol while holding the filter rod 32 in his/her mouth. In this case, an aerosol is generated by passing external air through the tobacco rod 31, and the generated aerosol is delivered to the user's mouth by passing through the filter rod 32.

[0088] In some embodiments, external air may be introduced through at least one air path formed in the aerosol-generating device 1. For example, the opening and closing and/or size of the air path formed in the aerosol-generating device 1 may be adjusted by a user. Accordingly, a vapor amount, a feeling of smoking, and the like may be adjusted by a user. In another example, external air may be introduced into the inside of the smoking article 3 through at least one hole formed in the surface of the smoking article 3.

[0089] Hereinafter, the structure of the smoking article will be described with reference to FIG. 4.

[0090] Referring to FIG. 4, the smoking article 3 includes a tobacco rod 31, a filter rod 32, and a front-end plug 33. The tobacco rod 31 includes a tobacco material and an aerosol-generating material. The tobacco material may be tobacco.

[0091] In some embodiments, in the smoking article, the front-end plug 33, the tobacco rod 31, and the filter rod 32 are sequentially arranged along the longitudinal direction of the smoking article 3.

[0092] The filter rod 32 may be adjacent to one side of the tobacco rod 31 or to the rear end (i.e., the downstream end) of the tobacco rod 31. The filter rod 32 may include a first segment 321 for cooling an aerosol and a second segment 322 for filtering a predetermined component contained in the aerosol. In some embodiments, the first segment 321 is disposed between the tobacco rod 31 and the second segment 322. In the present specification, to emphasize the function of the first and second segments 321 and 322 as filters, the first segment 321 may be referred to as a cooling structure 321, and the second segment 322 may be referred to as a mouthpiece 322.

[0093] The front-end plug 33 may be located at one side of the tobacco rod 31 opposite to the filter rod 32 or at the other side of the tobacco rod 31. The front-end plug 33 may be adjacent to the front end (i.e., the upstream end) of the tobacco rod 31. The front-end plug 33 may prevent the tobacco rod 31 from falling out of the smoking article and prevent the liquefied aerosol from flowing into the aerosol-generating device (Reference number '1' in FIGS. 1 to 3) from the tobacco rod 31

during smoking.

[0094] The smoking article 3 may be wrapped by at least one wrapper 35. The wrapper 35 may surround the smoking article 3. In some embodiments, the smoking article 3 may be wrapped by at least one wrapper 35 surrounding at least a portion of the smoking article 3. For example, the front-end plug 33 may be wrapped by a first wrapper 351, the tobacco rod 31 may be wrapped by a second wrapper 352, the first segment 321 may be wrapped by a third wrapper 353, and the second segment 322 may be wrapped by a fourth wrapper 354. Optionally, the smoking article 3 may be entirely wrapped by a fifth wrapper 355. In other words, the smoking article 3 wrapped by at least one of the first to third wrappers may be entirely further wrapped by the fifth wrapper 355. The fifth wrapper 355 may be referred to as an outer wrapper, and the first wrapper 351, the second wrapper 352, the third wrapper 353, and the fourth wrapper 354, which are surrounded by the fifth wrapper 355, may be referred to as inner wrappers.

[0095] The smoking article 3 may have a diameter in a range of 5 mm to 9 mm, but the present invention is not limited thereto. For example, the front-end plug 33 may have a length of about 4 mm to 20 mm (e.g., 7 mm), the tobacco rod 31 may have a length of about 13 mm to 17 mm (e.g., 15 mm), the first segment 321 may have a length of about 7 mm to 20 mm (e.g., 12 mm), and the second segment 322 may have a length of about 4 mm to 20 mm (e.g., 14 mm), but the present invention is not limited thereto.

[0096] The tobacco rod 31 may include, for example, at least one of glycerin, propylene glycol, ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol, which are aerosol-generating materials, but the present invention is not limited thereto. Particularly, the tobacco rod 31 may include one or more other additional materials such as a flavoring agent, a wetting agent, and/or an organic acid. Particularly, a flavoring liquid including menthol and/or a humectant may be added to the tobacco rod 31. Particularly, a flavoring liquid including menthol and/or a humectant may be added by spraying the same onto the tobacco rod 31.

[0097] The tobacco rod 31 may be manufactured in various forms. For example, the tobacco rod 31 may be manufactured in the form of a sheet. Alternatively or additionally, the tobacco rod 31 may be manufactured in the form of strands. Alternatively or additionally, the tobacco rod 31 may be manufactured in the form of shredded tobacco made by finely cutting a tobacco sheet. In some embodiments, the tobacco rod 31 may be manufactured in the form of strands and shredded tobacco made by finely cutting a tobacco sheet. Particularly, the tobacco rod 31 may be manufactured in the form of at least one of a tobacco particle, a tobacco sheet, a tobacco bead, a tobacco granule, and tobacco powder. When the tobacco rod 31 includes tobacco granules and the like, paper and/or lyocell tow and/or cellulose acetate tow may be further included to settle tobacco granules.

[0098] There is no limitation on the shape of the filter rod 32. For example, the filter rod 32 may be a cylindrical rod or a tubular rod with a hollow formed therein. Also, the filter rod 32 may be a recess-type rod. When the filter rod 32 is composed of a plurality of segments, at least one of the plurality of segments may be manufactured with a different shape from the remaining segments.

[0099] Hereinafter, each segment of the filter rod 32 will be described in detail.

[0100] The first segment 321 of the filter rod 32 may cool an aerosol generated by the heater 13 heating the tobacco rod 31. Therefore, a user may inhale an aerosol cooled to an appropriate temperature.

[0101] In some embodiments, the first segment 321 of the filter rod 32 may be a cellulose acetate filter, a paper tube filter, and/or a lyocell filter composed of lyocell tow including a plurality of lyocell fibers. When the first segment 321 is a cellulose acetate filter and/or a lyocell filter, the first segment 321 may be a tubular structure with a hollow formed therein. The hollow may extend along the longitudinal direction of the first segment 321. The hollow may be located in the center of a cross-section perpendicular to the longitudinal direction of the first segment 321 and extend along the longitudinal direction of the first segment 321. The hollow and the first segment 321 may be coaxial along the longitudinal direction. A length and/or diameter of the first segment 321 may vary depending on the shape of the smoking article 3. For example, a length of the first segment 321 may be appropriately adjusted in a range of 7 mm to 20 mm. Preferably, the first segment 321 may have a length of about 12 mm, but the present invention is not limited thereto.

[0102] When the tobacco rod 31 is inserted into the heater 13, the first segment 321 may prevent the internal material of the tobacco rod 31 from being pushed backward (i.e., in the opposite direction to the insertion direction) and provide an aerosol cooling effect. When the first segment 321 is a cellulose acetate filter with a hollow formed therein, the diameter of the hollow of the first segment 321 may be smaller than the outer diameter of the first segment 321 and the diameter of the smoking article 3 and appropriately adjusted in a range of 2 mm to 5.5 mm. When the first segment 321 is a lyocell filter with a hollow formed therein, the diameter of the hollow of the first segment 321 may be smaller than the outer diameter of the first segment 321 and the diameter of the smoking article 3 and appropriately adjusted in a range of 2 mm to 5.5 mm, and an appropriate diameter in a range of 2 mm to 5.5 mm, preferably 2.1 mm to 5 mm, more preferably 2.2 mm to 4.5 mm, and even more preferably 2.5 mm to 4 mm may be selected, but the present invention is not limited thereto. When the first segment 321 is a paper tube filter, the inner diameter may be smaller than the outer diameter of the first segment 321 and the diameter of the smoking article 3 and appropriately adjusted in a range of 5 mm to 7.5 mm, preferably, 6 mm to 7 mm, but the present invention is not limited thereto.

[0103] When the first segment 321 is composed of lyocell tow, the deformation of the first segment 321 resulting from the

heat transferred from a heater for heating the smoking article 3 or an aerosol generated in the smoking article 3 may be effectively prevented or minimized due to the excellent heat resistance of lyocell tow.

[0104] The second segment 322 of the filter rod 32 may cool an aerosol generated by the heater 13 heating the tobacco rod 31. Therefore, a user may inhale an aerosol cooled to an appropriate temperature. Particularly, the second segment 322 may serve as both a mouthpiece in contact with the oral region of a user and a filter that ultimately delivers the aerosol delivered from the upstream side to a user.

[0105] In one embodiment, the second segment 322 of the filter rod 32 may be a lyocell filter composed of lyocell tow including a plurality of lyocell fibers. A length of the second segment 322 may be appropriately adjusted in a range of 4 mm to 20 mm. For example, the second segment 322 may have a length of about 14 mm, but the present invention is not limited thereto.

[0106] In the present invention, the lyocell fibers included in the second segment 322 may be eco-friendly fibers made of cellulose extracted from wood pulp. The lyocell tow may refer to a bundle formed by cross-connecting adjacent lyocell fibers.

[0107] In some embodiments, the lyocell fibers may have a shaped cross-section. A shaped cross-section is defined as a cross-section having a shape including a plurality of protrusions instead of having a circular shape. For example, a cross-section having a shape in which a plurality of protrusions extend from the center may be referred to as a shaped cross-section.

[0108] In some embodiments, the lyocell fibers may have a Y-shaped cross-section with three protrusions branching from the center, a cross-shaped cross-section with four protrusions, a star-shaped cross-section with five protrusions, or an O-shaped cross-section, but the present invention is not limited thereto.

[0109] In some embodiments, the lyocell fibers included in the second segment 322 may have a single fineness of 2.22 to 16.67 dtex (a monodenier of 2 to 15), preferably 2.44 to 15.56 dtex (a monodenier of 2.2 to 14), more preferably 2.78 to 14.44 dtex (a monodenier of 2.5 to 13), and even more preferably 3.33 to 13.33 dtex (a monodenier of 3 to 12). In some embodiments, the second segment 322 may include lyocell tow having a total fineness of 1,111 to 4,444 tex (a total denier of 10,000 to 40,000), preferably 2,222 to 4,333 tex (a total denier of 20,000 to 39,000), and more preferably 2,778 to 4,222 tex (a total denier of 25,000 to 38,000).

[0110] In some embodiments, the second segment 322 may have a draw resistance of 5 mmWG to 20 mmWG, preferably 6 mmWG to 19 mmWG, more preferably 7 mmWG to 18 mmWG, and even more preferably 8 mmWG to 17 mmWG based on a second segment length of 14 mm. In some embodiments, the second segment 322 may have a draw resistance of 8.5 mmWG to 9.5 mmWG, 11.5 mmWG to 12.5 mmWG, or 15.5 mmWG to 16.5 mmWG, preferably 15.7 mmWG to 16.2 mmWG based on a second segment length of 14 mm. When the draw resistance falls within the above range, a moisture transfer amount in the aerosol generated during smoking is reduced, and thus the heat felt by a smoker during the initial puffs can be reduced, and the capacity to remove nicotine in the aerosol can be improved.

[0111] Hardness is a physical property related to the elasticity and resilience of the second segment 322 and refers to the degree to which the second segment 322 withstands pressure applied in a direction perpendicular to the longitudinal direction. In order to easily use the smoking article while maintaining the shape of the smoking article when used by a user, it is preferable to maintain a certain level or higher of hardness.

[0112] In some embodiments, the second segment 322 may have a hardness of 60% to 100%, preferably 70% to 99%, more preferably 75% to 98%, even more preferably 80% to 97%, and even more preferably 85% to 95%, but the present invention is not limited thereto. The hardness of the second segment 322 is a value obtained by quantifying the degree to which a diameter of the second segment 322 is maintained when the second segment 322 is pressed with a certain level of force in a direction perpendicular to the longitudinal direction of the second segment 322, and may be a ratio of a diameter of the second segment 322 after the force is applied to a diameter of the second segment 322 before the force is applied expressed as a percentage.

[0113] A circumference of the cross-section of the second segment 322, which is perpendicular to the longitudinal direction of the smoking article 3, may be 14 to 25 mm, preferably 22 mm to 23 mm, but the present invention is not limited thereto.

[0114] In some embodiments, the second segment 322 may further include at least one binder dispersed in the lyocell tow. The second segment 322 may have a predetermined hardness by further including at least one binder dispersed in the lyocell tow.

[0115] The front-end plug 33 may serve to prevent the liquefied aerosol from flowing into the aerosol-generating device (Reference number '1' in FIGS. 1 to 3) from the tobacco rod 31 during smoking.

[0116] A length and/or diameter of the front-end plug 33 may vary depending on the shape of the smoking article 3. For example, a length of the front-end plug 33 may be appropriately adjusted in a range of 4 mm to 20 mm. Preferably, the front-end plug 33 may have a length of about 7 mm, but the present invention is not limited thereto.

[0117] The front-end plug 33 may be manufactured to include or be composed of cellulose acetate and/or lyocell. Particularly, the front-end plug 33 may include at least one channel inside, and the cross-section of the channel may be manufactured in various shapes. For example, the cross-section of the channel formed inside the front-end plug 33 may

have various shapes such as trilobal, tetralobal, multilobal, polygonal, and/or hard shapes.

[0118] Hereinafter, the wrapper 35 will be described in detail.

[0119] The first wrapper 351 may be a combination of general filter wrapping paper and a metal foil such as aluminum foil. In some embodiments, the first wrapper 351 may be a combination of general filter wrapping paper and aluminum foil.

The second wrapper 352 and the third wrapper 353 may be made of general filter wrapping paper. For example, the second wrapper 352 and the third wrapper 353 may each independently be porous wrapping paper or non-porous wrapping paper.

[0120] In some embodiments, the fourth wrapper 354 that surrounds the second segment 322 may have a certain level or higher of basis weight and may be composed (made) of at least one of grease-resistant hard wrapping paper having been treated to be grease-resistant and general hard wrapping paper having not been treated to be grease-resistant.

Meanwhile, since the fourth wrapper 354 is composed of hard wrapping paper having a basis weight greater than or equal to a certain value, it can not only function as a wrapper that surrounds the second segment 322 including lyocell tow but also serve to impart a certain level or higher of hardness to the filter rod 32 according to the present invention. The fourth wrapper 354 may include grease-resistant hard wrapping paper and/or general hard wrapping paper and may particularly include wrapping paper having a basis weight of 30 gsm to 180 gsm, preferably 35 gsm to 170 gsm, more preferably 40 gsm to 160 gsm, even more preferably 50 gsm to 158 gsm, even more preferably 60 gsm to 155 gsm, even more preferably 70 gsm to 150 gsm, and even more preferably 75 gsm to 150 gsm, but the present invention is not limited thereto.

[0121] Hereinafter, the configurations of the present invention and the advantageous effects according thereto will be described in more detail using examples and comparative examples. However, the examples are merely for describing the present invention in more detail, and the scope of the present invention is not limited to these examples.

Example 1

[0122] A smoking article with the structure shown in FIG. 1, which includes a front-end plug having a length of 7 mm, a tobacco rod including a tobacco material and having a length of 15 mm, a first segment having an inner diameter of 6 mm and a length of 12 mm and composed of a paper tube filter, and a second segment having a length of 14 mm and composed of lyocell tow, was manufactured under the conditions shown in Example 1 of Table 1.

Comparative Example 1

[0123] A smoking article was manufactured under the conditions shown in Comparative Example 1 of Table 1 in the same manner as in Example 1, except that a second segment was manufactured using cellulose acetate tow.

[Table 1]

Classification	Weight (mg)	Circumference (mm)	Vent (%)	PDO (mmH ₂ O)	PDC (mmH ₂ O)
Example 1	616.3	22.6	58.01	121.8	156.4
Comparative Example 1	604.9	22.6	57.17	118.6	151.4

[0124] (In Table 1, PDC refers to a draw resistance value measured in a state in which the tobacco rod is open, the perforations of the filter rod are blocked, and the inflow of external air is blocked, PDO refers to a draw resistance value measured in a state in which the tobacco rod is open, the perforations of the filter rod are not blocked, and the inflow of external air is allowed, and Vent refers to a ventilation rate (VR).)

Experimental Example 1. Measurement of mainstream smoke temperature by puff according to material of second segment

[0125] In order to compare the mainstream smoke temperature by puff of the smoking articles according to Example 1 and Comparative Example 1, the tobacco rods of the smoking articles according to Example 1 and Comparative Example 1 were heated to a heating temperature of 190 °C to 280 °C by an external heating method, and the temperature of the generated mainstream smoke was measured and shown in Table 2 below.

[0126] Particularly, an experiment was conducted using the smoking articles according to Comparative Example 1 and Example 1 in a smoking room with an internal temperature of about 22 ± 2 °C and an internal relative humidity of about 60 ± 5% (specifically, a temperature of about 21.9 °C and a relative humidity of 64.3%), smoking was performed under Health Canada (HC) conditions (puff volume: 55 ml, puff frequency: 30 s, puff duration: 2 s, and puff count: 9 puffs), a thermocouple sensor was positioned within 5 mm from the end of the second segment, and the mainstream smoke temperature was measured.

[Table 2]

Puff counts	1	2	3	4	5	6	7	8	9
Example 1	52.3 °C	55.0 °C	51.3 °C	48.0 °C	45.8 °C	43.3 °C	41.1 °C	38.9 °C	35.9 °C
Comparative Example 1	66.3 °C	63.4 °C	59.7 °C	56.7 °C	53.4 °C	49.6 °C	44.9 °C	40.3 °C	36.6 °C

[0127] Referring to Table 2, when the mainstream smoke temperatures of the smoking articles of Example 1 and Comparative Example 1 having similar physical properties were compared, it can be confirmed that the mainstream smoke temperature of the smoking article of Example 1 was lower than that of the smoking article of Comparative Example 1 for each puff, and in initial puffs (specifically, the first to fourth puffs), the smoking article of Example 1 exhibited a mainstream smoke temperature at least 8 °C lower than that of the smoking article of Comparative Example 1. From the above result, it can be seen that a lyocell material has an excellent cooling effect, specifically, an excellent cooling effect in initial puffs compared to a cellulose acetate material.

Example 2

[0128] Lyocell tow having a single fineness of 3.33 dtex (a monodener of 3.0) and a total fineness of 3,889 tex (a total denier of 35,000) was manufactured.

Examples 3 to 5

[0129] Filters (second segments) including the lyocell tow of Example 2 were manufactured to have a length of 14 mm under the conditions shown in Table 3 below. The manufactured filters (the second segments) were named Example 3, Example 4, and Example 5 according to the magnitude of draw resistance, and as the wrapper used to manufacture the filters, wrapping paper having a basis weight of 75 gsm and having not been treated to be grease-resistant was used.

[Table 3]

Classification	Example 3	Example 4	Example 5
Weight (mg)	15.88	14.15	12.44
Draw resistance (mmWG)	16.00	12.13	8.97
Hardness (%)	93.49	91.43	85.91

[0130] Subsequently, using the filters of Examples 3 to 5, smoking articles with the structure shown in FIG. 4, which includes a front-end plug having a length of 7 mm, a tobacco rod including a tobacco material and having a length of 15 mm, a first segment having an inner diameter of 6 mm and a length of 12 mm and composed of a paper tube filter, and each second segment of Examples 3 to 5 having a length of 14 mm, were manufactured under the conditions shown in Table 4.

[Table 4]

Classification	Weight (mg)	Circumference (mm)	Vent (%)	PDO (mmH ₂ O)	PDC (mmH ₂ O)
Smoking article of Example 3	655.8	22.746	1.43	139.3	139.3
Smoking article of Example 4	648.0	22.885	1.48	111.6	111.6
Smoking article of Example 5	642.9	22.788	1.63	94.8	94.8

[0131] (In Table 4, PDC refers to a draw resistance value measured in a state in which the tobacco rod is open, the perforations of the filter rod are blocked, and the inflow of external air is blocked, PDO refers to a draw resistance value measured in a state in which the tobacco rod is open, the perforations of the filter rod are not blocked, and the inflow of external air is allowed, and Vent refers to a ventilation rate (VR).)

Experimental Example 2. Analysis of components in smoke according to draw resistance of second segment

[0132] In order to compare the components in smoke according to the draw resistance of the second segment, the tobacco rods of the smoking articles according to Examples 3 to 5 were heated to a heating temperature of 190 °C to 280 °C

by an external heating method, and total particulate matter (TPM), nicotine component, and moisture contents were measured and shown in Table 5 below.

[0133] Particularly, an experiment was conducted using the smoking articles according to Examples 3 to 5 in a smoking room with an internal temperature of about 22 ± 2 °C and an internal relative humidity of about $60 \pm 5\%$ (specifically, a temperature of about 21.9 °C and a relative humidity of 64.3%), smoking was performed under HC conditions (puff volume: 55 ml, puff frequency: 30 s, puff duration: 2 s, and puff count: 9 puffs), and the generated smoke was collected on a Cambridge filter (i.e., a Cambridge filter pad (CFP)) and analyzed. The total particulate matter (TPM) is a value obtained by measuring the change in weight of the Cambridge filter before and after smoking using a smoking device. For the remaining components, the collected smoke was analyzed by gas chromatography (GC).

[Table 5]

Classification	TPM (mg)	Tar (mg)	Nic (mg)	PG (mg)	Gly (mg)	Moisture (mg)
Example 3	34.99	17.90	0.38	0.75	3.23	16.71
Example 4	34.94	17.53	0.42	0.86	3.54	16.99
Example 5	40.37	20.50	0.63	1.43	4.88	19.24

[0134] Referring to Table 5, the smoke components transferred during smoking may differ depending on the difference in draw resistance of the second segment. Particularly, it can be confirmed that the smoking article of Example 3 in which the second segment had high draw resistance exhibited a moisture transfer amount of 16.71 mg, and the smoking article of Example 5 in which the second segment had low draw resistance exhibited a moisture transfer amount of 19.24 mg, indicating that as draw resistance is higher, a moisture transfer amount in mainstream smoke is smaller, and thus the effect of reducing the heat felt by a user during puffs is better. (Smokers feel a greater sensation of heat at the same temperature when a lot of moisture is present in mainstream smoke.)

Experimental Example 3. Nicotine removal capacity according to draw resistance of second segment

[0135] In order to compare nicotine removal capacity according to the draw resistance of the second segment, the tobacco rods of the smoking articles according to Examples 3 to 5 were heated to a heating temperature of 190 °C to 280 °C by an external heating method, and a nicotine component amount included in the transferred aerosol and a nicotine component amount remaining in the second segment (the filter) were measured. Then, the measurement results were substituted into Equation 1 below to calculate the nicotine removal capacity of the filter and into Equation 2 to calculate the nicotine transfer rate of the filter, and the calculation results are shown in Table 6 below.

[0136] A nicotine component amount included in the aerosol was measured by collecting the smoke generated in Experimental Example 2 on a Cambridge filter (i.e., a Cambridge filter pad (CFP)) and analyzing the collected smoke by gas chromatography (GC), and a nicotine component amount remaining in the second segment (the filter) was measured by immersing the second segment after smoking in water to extract residual components and analyzing the extracted components using a GC/MS device. In this case, the second segment (the filter) was immersed in a container containing distilled water overnight, and a solution containing the extracted components was used in GC/MS analysis.

$$\text{-->Removal capacity (\%)} = (\text{Residual amount in second segment (filter) after smoking}) / (\text{Residual amount in second segment (filter) after smoking} + \text{Aerosol transfer amount after smoking}) \times 100 \quad [\text{Equation 1}]$$

[Equation 2]

$$\text{Transfer rate (\%)} = 100 (\%) - \text{Removal capacity (\%)}$$

[Table 6]

Classification	Aerosol transfer amount (mg)	Residual amount in filter (mg)	Transfer rate (%)	Removal capacity (%)
Example 3	0.38	1.30	22.5	77.5
Example 4	0.42	1.05	28.5	71.5

(continued)

Classification	Aerosol transfer amount (mg)	Residual amount in filter (mg)	Transfer rate (%)	Removal capacity (%)
Example 5	0.63	1.04	37.7	62.3

[0137] Referring to Table 6, it can be confirmed that the filter of Example 3 having high draw resistance exhibited a nicotine removal capacity of 77.5%, and the filter of Example 5 having low draw resistance exhibited a nicotine removal capacity of 62.3%, indicating that as draw resistance is higher, nicotine removal capacity is better.

[0138] Although the embodiments of the present disclosure have been described above with reference to the accompanying drawings, those of ordinary skill in the art to which the present disclosure pertains should understand that the present disclosure may be embodied in other specific forms without changing the technical spirit or essential features thereof. Therefore, the embodiments described above should be understood as being illustrative, instead of limiting, in all aspects. The scope of protection of the present disclosure should be interpreted by the claims below, and all technical ideas within the scope equivalent to the claims should be interpreted as falling within the scope of rights of the technical spirit defined by the present disclosure.

[EXPLANATION OF DRAWING SYMBOLS]

[0139]

3: smoking article
31: tobacco rod
32: filter rod
321: first segment
322: second segment
33: front-end plug

Claims

1. A smoking article comprising:

a tobacco rod;
a front-end plug disposed at one side of the tobacco rod;
a first segment disposed at the other side opposite to the one side of the tobacco rod; and
a second segment disposed at the other side of the first segment,
wherein the second segment includes lyocell tow including a plurality of lyocell fibers.

2. The smoking article of claim 1, wherein the lyocell fibers included in the lyocell tow have a monodenier of 2 to 15, and the lyocell tow has a total denier of 10,000 to 40,000.

3. The smoking article of claim 1, wherein the second segment has a draw resistance of 5 mmWG to 20 mmWG based on a second segment length of 14 mm.

4. The smoking article of claim 3, wherein the second segment has a draw resistance of 8 mmWG to 17 mmWG based on the second segment length of 14 mm.

5. The smoking article of claim 1, wherein the front-end plug includes at least one of cellulose acetate and lyocell.

6. The smoking article of claim 1, wherein the front-end plug includes at least one channel inside.

7. The smoking article of claim 1, wherein the second segment has a hardness of 60% to 100%.

8. The smoking article of claim 7, wherein the second segment has a hardness of 85% to 95%.

FIG.1

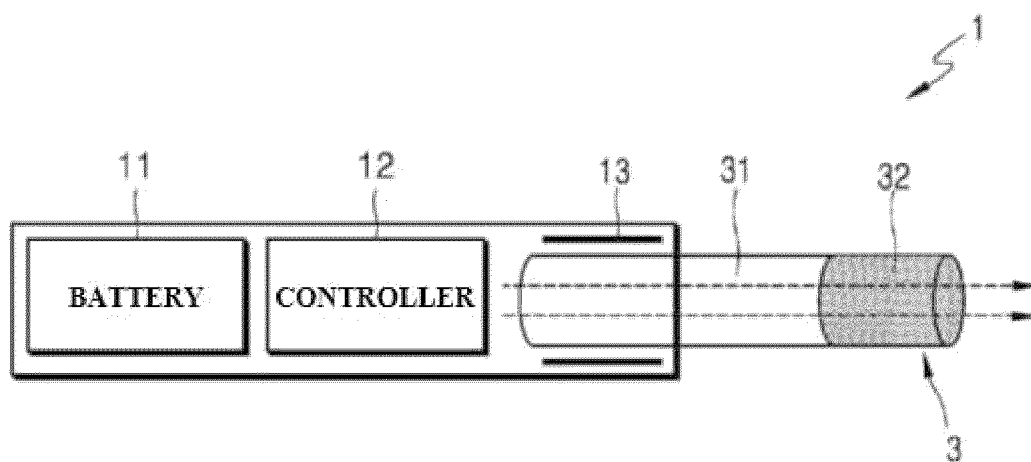


FIG.2

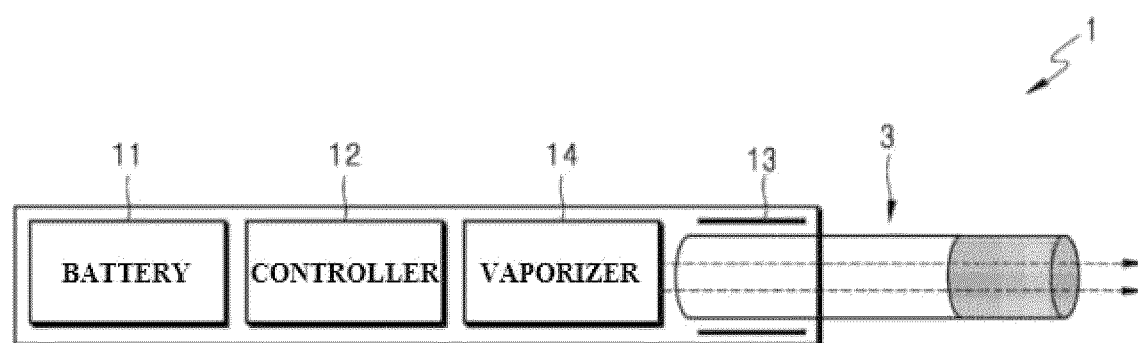


FIG.3

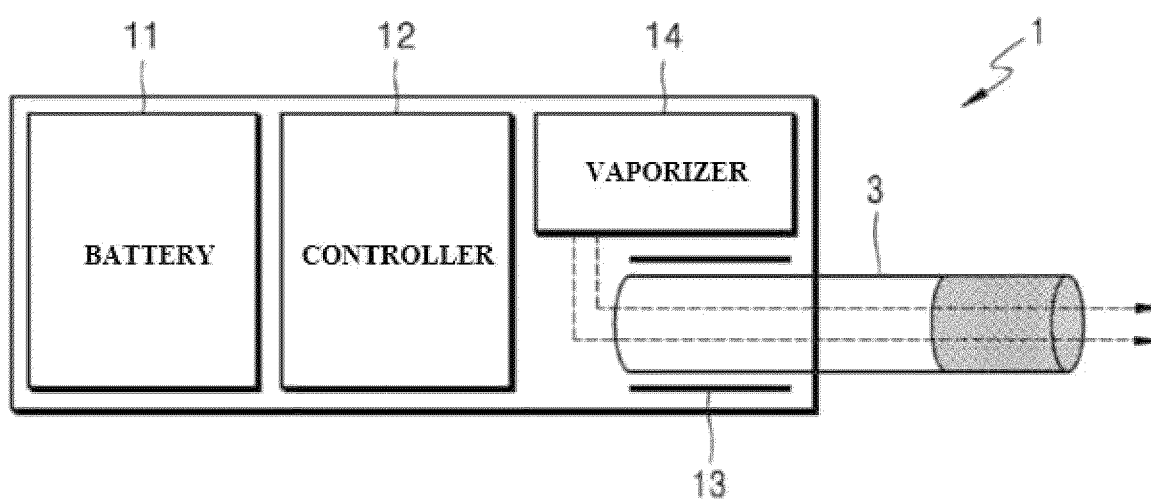
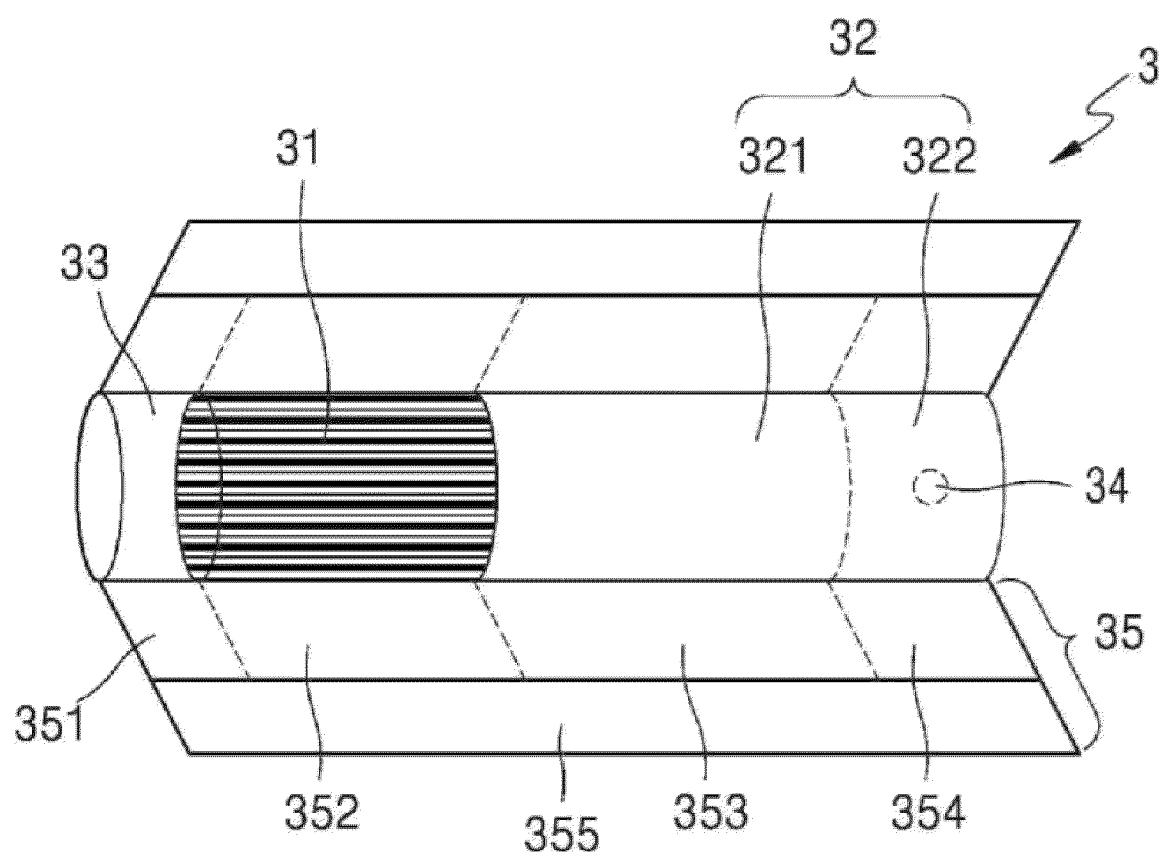


FIG.4





EUROPEAN SEARCH REPORT

Application Number

EP 25 15 1958

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Y	* paragraph [0001] - paragraph [0108]; figures *	2-4,7,8	A24D3/06
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		25 May 2025	Alevisopoulos, S
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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25-05-2025

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