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(71) Applicant: **KT&G Corporation**

**Daedeok-gu**

**Daejeon 34337 (KR)**

(72) Inventors:

• **JANG, Chul Ho**

**Daejeon 34128 (KR)**

• **GO, Gyoung Min**

**Daejeon 34128 (KR)**

• **BAE, Hyung Jin**

**Daejeon 34128 (KR)**

• **SEO, Jangwon**

**Daejeon 34128 (KR)**

• **JEONG, Jong Seong**

**Daejeon 34128 (KR)**

• **JUNG, Jinchul**

**Daejeon 34128 (KR)**

(74) Representative: **Ter Meer Steinmeister & Partner**

**Patentanwälte mbB**

**Nymphenburger Straße 4**

**80335 München (DE)**

(54) **AEROSOL-GENERATING ARTICLE, AND APPARATUS AND METHOD FOR PRODUCING MEDIUM SEGMENTS**

(57) An aerosol-generating article according to various embodiments includes a first end face, a second end face opposite the first end face, a side face formed between the first and second end faces, a medium segment, a first segment, and a second segment, wherein the first segment is disposed on the downstream side of the medium segment, the second segment is disposed on the upstream side of the medium segment, the medium segment includes a cylindrical frame and a medium portion surrounding the outer surface of the frame, and the medium portion may be exposed to the outside through the side surface of the aerosol-generating article.

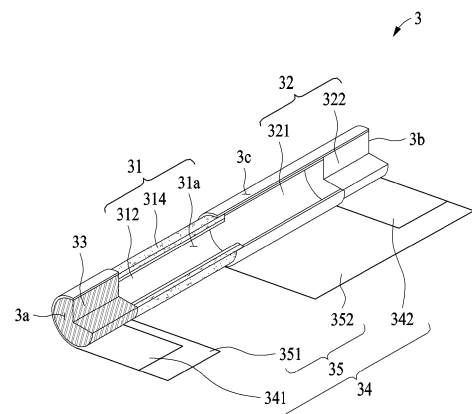


FIG. 3A

## Description

### Technical Field

**[0001]** The following embodiments relate to an aerosol generating article and a device and method for manufacturing a medium segment.

### Background Art

**[0002]** Recently, demands for alternative articles to overcome disadvantages 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, Korean 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 object according to an embodiment is to provide an aerosol generating article in which a heat loss is reduced through heating by a laser heating source, and a device and method for manufacturing a medium segment of the aerosol generating article.

**[0004]** Another object according to an embodiment is to provide a device and method for manufacturing an aerosol generating article with a medium exposed to outside.

#### Technical Solutions

**[0005]** An aerosol generating article according to various embodiments includes a first end surface, a second end surface on a side opposite to the first end surface, a side surface formed between the first end surface and the second end surface, a medium segment, a first segment, and a second segment. The first segment is disposed on a downstream side of the medium segment and the second segment is disposed on an upstream side of the medium segment. The medium segment includes a cylindrical frame, and a medium portion surrounding an outer surface of the frame, and the medium portion is exposed to outside through the side surface of the aerosol generating article.

**[0006]** A device for manufacturing a medium segment according to various embodiments includes a frame forming unit including a base substrate included in the frame, and a shaft that rotates such that the base substrate is wound obliquely, and configured to form the frame, a medium coating unit configured to apply a

medium to the frame formed in the frame forming unit, an extrusion unit configured to compress the applied medium onto the frame, a drying unit configured to dry the extruded medium, and a cutting unit configured to cut the medium segment to a predetermined length.

**[0007]** In an embodiment, the medium coating unit may include a container including the medium in a form of a slurry, and a nozzle connected to the container to supply the medium to the frame.

**[0008]** A method of manufacturing a medium segment according to various embodiments includes forming the frame, applying a medium in a form of a slurry to the frame, compressing and extracting the medium applied to the frame, and drying the medium in the form of a slurry applied to the frame.

**[0009]** In an embodiment, the forming of the frame may include supplying a base substrate obliquely to an axial direction of a shaft, winding the base substrate around an outer surface of the shaft, and adhering an overlapping region of the base substrate.

**[0010]** In an embodiment, the base substrate may be formed of at least one of paper, cellulose, or a combination thereof.

**[0011]** In an embodiment, a shape of a cross section of the shaft perpendicular to a longitudinal direction of the shaft may include at least one of a circle, triangle, rectangle, hexagon, octagon, or star shape.

**[0012]** In an embodiment, the applying of the medium to the frame may include supplying the medium in the form of a slurry from a container to a nozzle, and applying the medium to the frame from the nozzle.

**[0013]** The method may further include cutting the medium segment to a predetermined length.

#### Effects

**[0014]** The aerosol generating article according to an embodiment may reduce a heat loss through heating by a laser heating source.

**[0015]** The device and method for manufacturing the medium segment of the aerosol generating article according to an embodiment may manufacture an aerosol generating article in which a medium is exposed to the outside.

**[0016]** The effects of the aerosol generating article and the device and method for manufacturing the medium segment according to an embodiment may not be limited to the above-mentioned effects, and other unmentioned effects may be clearly understood from the following description by one of ordinary skill in the art.

#### Brief Description of Drawings

##### [0017]

FIGS. 1 and 2 are diagrams illustrating examples of a cigarette according to an embodiment.

FIGS. 3A and 3B are a perspective view and a cross-

sectional view of an aerosol generating article according to an embodiment.

FIG. 4A is a perspective view schematically illustrating a medium segment manufacturing device according to an embodiment.

FIG. 4B is a cross-sectional view of an area A of the medium segment manufacturing device according to an embodiment of FIG. 4A.

FIG. 5 is a flowchart of a method of manufacturing a medium segment according to an embodiment.

FIG. 6 is a flowchart of a method of manufacturing a medium segment according to an embodiment.

#### Best Mode for Carrying Out the Invention

**[0018]** The terms used in the embodiments are selected from among common terms that are currently widely used, in consideration of their function in the disclosure. However, the terms may become different according to an intention of one of ordinary skill in the art, a precedent, or the advent of new technology. Also, in particular cases, the terms are discretionally selected by the applicant of the disclosure, and the meaning of those terms will be described in detail in the corresponding part of the detailed description. Therefore, the terms used in the disclosure are not merely designations of the terms, but the terms are defined based on the meaning of the terms and content throughout the disclosure.

**[0019]** It will be understood that when a certain part "includes" a certain component, the part does not exclude another component but may further include another component, unless the context clearly dictates otherwise. Also, terms such as "unit," "module," etc., as used in the specification may refer to a part for processing at least one function or operation and which may be implemented as hardware, software, or a combination of hardware and software.

**[0020]** As used herein, an expression such as "at least one of" that precedes listed components modifies not each of the listed components but all the listed components. For example, the expression "at least one of a, b, or c" should be construed as including a, b, c, a and b, a and c, b and c, or a, b, and c.

**[0021]** In the following embodiments, the term "aerosol generating article" may refer to 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.

**[0022]** 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.

**[0023]** 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.

**[0024]** In an embodiment, an aerosol generating device may be a device that generates an aerosol by electrically heating an aerosol generating article accommodated in an inner space.

**[0025]** The aerosol generating device may include a heater. In an embodiment, the heater may be an electrically resistive heater. For example, the heater may include an electrically conductive track, and the heater may be heated as a current flows through the electrically conductive track.

**[0026]** The heater may include a tubular heating element, a plate-shaped heating element, a needle-shaped heating element, or a rod-shaped heating element, and may heat the inside or outside of the aerosol generating article according to the shape of a heating element.

**[0027]** The aerosol generating article may include a tobacco rod and a filter rod. The tobacco rod may be formed as a sheet or a strand, or may be formed of tobacco leaves finely cut from a tobacco sheet. In addition, the tobacco rod may be enveloped by a thermally conductive material. For example, the thermally conductive material may be metal foil such as aluminum foil. However, embodiments are not limited thereto.

**[0028]** The filter rod may be a cellulose acetate filter. The filter rod may include at least one segment. For example, the filter rod may include a first segment that cools an aerosol and a second segment that filters a predetermined ingredient contained in the aerosol.

**[0029]** In another embodiment, the aerosol generating device may be a device that generates an aerosol using a cartridge containing an aerosol generating material.

**[0030]** The aerosol generating device may include a cartridge containing the aerosol generating material and a main body supporting the cartridge. The cartridge may be detachably coupled to the main body. However, embodiments are not limited thereto. The cartridge may be integrally formed or assembled with the main body, and may be secured to the main body so as not to be detached by a user. The cartridge may be mounted on the main body while the aerosol generating material is accommodated therein. However, embodiments are not limited thereto. The aerosol generating material may be injected into the cartridge while the cartridge is coupled to the main body.

**[0031]** The cartridge may hold the aerosol generating material in any one of various states, such as a liquid state, a solid state, a gaseous state, and a gel state. The aerosol generating material may include a liquid composition. For example, the liquid composition may be a liquid including a tobacco-containing material having a volatile tobacco flavor component, or may be a liquid including a non-tobacco material.

**[0032]** The cartridge may be operated by an electrical

signal or a wireless signal transmitted from the main body to perform the function of generating an aerosol by converting a phase of the aerosol generating material inside the cartridge to a gaseous phase. The aerosol may refer to a gas in which vaporized particles generated from the aerosol generating material are mixed with air.

**[0033]** In another embodiment, the aerosol generating device may generate an aerosol by heating the liquid composition, and the generated aerosol may pass through the cigarette and be delivered to the user. That is, the aerosol generated from the liquid composition may travel along an airflow path of the aerosol generating device, and the airflow path may be configured to allow the aerosol to pass through the cigarette and be delivered to the user.

**[0034]** In another embodiment, the aerosol generating device may be a device that generates an aerosol from the aerosol generating material using an ultrasonic vibration manner. In this case, the ultrasonic vibration manner may refer to a manner of generating an aerosol by atomizing the aerosol generating material with ultrasonic vibration generated by a vibrator.

**[0035]** The aerosol generating device may include a vibrator, and may generate vibration at short intervals through the vibrator to atomize the aerosol generating material. The vibration generated by the vibrator may be ultrasonic vibration, and a frequency band of the ultrasonic vibration may be from about 100 kilohertz (kHz) to about 3.5 megahertz (MHz). However, embodiments are not limited thereto.

**[0036]** The aerosol generating device may further include a wick that absorbs the aerosol generating material. For example, the wick may be disposed to surround at least one area of the vibrator or may be disposed to contact at least one area of the vibrator.

**[0037]** As a voltage (e.g., an alternating voltage) is applied to the vibrator, the vibrator may generate heat and/or ultrasonic vibration, and the heat and/or ultrasonic vibration generated by the vibrator may be transmitted to the aerosol generating material absorbed in the wick. The aerosol generating material absorbed in the wick may be converted into a gas phase by the heat and/or ultrasonic vibration transmitted from the vibrator, and consequently, an aerosol may be generated.

**[0038]** For example, the viscosity of the aerosol generating material absorbed in the wick may be lowered by the heat generated by the vibrator, and the aerosol generating material whose viscosity is lowered may change to fine particles by the ultrasonic vibration generated by the vibrator, so that an aerosol may be generated. However, embodiments are not limited thereto.

**[0039]** In another embodiment, the aerosol generating device may be a device that generates an aerosol by heating the aerosol generating article accommodated therein in an induction heating manner.

**[0040]** The aerosol generating device may include a susceptor and a coil. In an embodiment, the coil may apply a magnetic field to the susceptor. As the aerosol

generating device supplies power to the coil, a magnetic field may be formed inside the coil. In an embodiment, the susceptor may be a magnetic body that generates heat by an external magnetic field. As the susceptor is positioned inside the coil and generates heat with the magnetic field applied, the aerosol generating article may be heated. Also, optionally, the susceptor may be positioned in the aerosol generating article.

**[0041]** In another embodiment, the aerosol generating device may further include a cradle.

**[0042]** The aerosol generating device and the separate cradle may form a system together. For example, the cradle may be used to charge a battery of the aerosol generating device. Alternatively, a heater may be heated when the cradle and the aerosol generating device are coupled to each other.

**[0043]** Hereinafter, embodiments of the disclosure will be described in detail with reference to the accompanying drawings such that one of ordinary skill in the art may easily practice the disclosure. The disclosure may be practiced in forms that are implementable in the aerosol generating devices according to various embodiments described above or may be embodied and practiced in many different forms and is not limited to the embodiments described herein.

**[0044]** Hereinafter, embodiments of the disclosure will be described in detail with reference to the drawings.

**[0045]** Hereinafter, examples of a cigarette 1 will be described with reference to FIGS. 1 and 2.

**[0046]** FIGS. 1 and 2 are diagrams illustrating examples of a cigarette.

**[0047]** Referring to FIG. 1, the cigarette 1 may include a tobacco rod 11 and a filter rod 12.

**[0048]** Although the filter rod 12 is illustrated as having a single segment in FIG. 1, embodiments are not limited thereto. That is, the filter rod 12 may include a plurality of segments. For example, the filter rod 12 may include a segment that cools an aerosol and a segment that filters a predetermined ingredient contained in an aerosol. In addition, the filter rod 12 may further include at least one segment that performs another function, as needed.

**[0049]** The diameter of the cigarette 1 may be in a range of 5 millimeters (mm) to 9 mm, and the length thereof may be approximately 48 mm. However, embodiments are not limited thereto. For example, the length of the tobacco rod 11 may be about 12 mm, the length of a first segment of the filter rod 12 may be about 10 mm, the length of a second segment of the filter rod 12 may be about 14 mm, and the length of a third segment of the filter rod 12 may be about 12 mm. However, embodiments are not limited thereto.

**[0050]** The cigarette 1 may be wrapped with at least one wrapper 14. The wrapper 14 may have at least one hole through which external air is introduced or internal gas flows out. In an example, the cigarette 1 may be wrapped with one wrapper 14. For another example, the cigarette 1 may be wrapped with two or more wrappers 14 in an overlapping manner. For example, the tobacco rod

11 may be wrapped with a first wrapper 141, and the filter rod 12 may be wrapped with wrappers 242, 243, and 244. In addition, the cigarette 1 may be entirely wrapped again with a single wrapper 145. For example, when the filter rod 12 includes a plurality of segments, the plurality of segments may be wrapped with the wrappers 142, 143, and 144, respectively.

**[0051]** The first wrapper 141 and the second wrapper 142 may be formed with general filter wrapping paper. For example, the first wrapper 141 and the second wrapper 142 may be porous wrapping paper or non-porous wrapping paper. In addition, the first wrapper 141 and the second wrapper 142 may be formed of oilproof paper and/or an aluminum laminated wrapping material.

**[0052]** The third wrapper 143 may be formed of hard wrapping paper. For example, a basis weight of the third wrapper 143 may be in a range of 88 grams per square (g/m<sup>2</sup>) to 96 g/m<sup>2</sup>, and desirably, may be in a range of 90 g/m<sup>2</sup> to 94 g/m<sup>2</sup>. In addition, a thickness of the third wrapper 143 may be in a range of 120 μm to 130 μm, and may be desirably about 125 μm.

**[0053]** The fourth wrapper 144 may be formed of oil-proof hard wrapping paper. For example, a basis weight of the fourth wrapper 144 may be in a range of 88 g/m<sup>2</sup> to 96 g/m<sup>2</sup>, and desirably, may be in a range of 90 g/m<sup>2</sup> to 94 g/m<sup>2</sup>. In addition, a thickness of the fourth wrapper 144 may be in a range of 120 μm to 130 μm, and may be desirably about 125 μm.

**[0054]** The fifth wrapper 145 may be formed of sterile paper (e.g., MFW). Here, the sterile paper (MFW) may refer to paper specially prepared such that it has enhanced tensile strength, water resistance, smoothness, or the like, compared to general paper. For example, a basis weight of the fifth wrapper 145 may be in a range of 57 g/m<sup>2</sup> to 63 g/m<sup>2</sup>, and may be desirably about 60 g/m<sup>2</sup>. In addition, a thickness of the fifth wrapper 145 may be in a range of 64 μm to 70 μm, and may be desirably about 67 μm.

**[0055]** The fifth wrapper 145 may have a predetermined material internally added thereto. The predetermined material herein may be, for example, silicon. However, embodiments are not limited thereto. Silicon may have properties, such as, for example, heat resistance which is characterized by less change by temperature, oxidation resistance which refers to resistance to oxidation, resistance to various chemicals, water repellency against water, or electrical insulation. However, silicon may not be necessarily used, but any material having such properties described above may be applied to (or used to coat) the fifth wrapper 145 without limitation.

**[0056]** The fifth wrapper 145 may prevent the cigarette 1 from burning. For example, there may be a probability that the cigarette 1 burns when the tobacco rod 11 is heated by a heater. Specifically, when the temperature rises above an ignition point of any one of materials included in the tobacco rod 11, the cigarette 1 may burn. Even in this case, it may still be possible to prevent the cigarette 1 from burning because the fifth wrapper 145

includes a non-combustible material.

**[0057]** In addition, the fifth wrapper 145 may prevent a holder from being contaminated by substances produced in the cigarette 1. For example, liquid substances may be produced in the cigarette 1 when a user puffs. For example, as an aerosol generated in the cigarette 1 is cooled by external air, liquid substances (e.g., water, etc.) may be produced. Thus, wrapping the cigarette 1 with the fifth wrapper 145 may prevent the liquid substances produced in the cigarette 1 from leaking out of the cigarette 1.

**[0058]** The tobacco rod 11 may include an aerosol generating material. The aerosol generating material may include, for example, at least one of glycerin, propylene glycol, ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, or oleyl alcohol. However, embodiments are not limited thereto. The tobacco rod 11 may also include other additives such as a flavoring agent, a wetting agent, and/or an organic acid. In addition, the tobacco rod 11 may include a flavoring liquid such as menthol or a moisturizing agent that is added as being sprayed onto the tobacco rod 11.

**[0059]** The tobacco rod 11 may be manufactured in various forms. For example, the tobacco rod 11 may be formed as a sheet or a strand. The tobacco rod 11 may also be formed of tobacco leaves finely cut from a tobacco sheet. In addition, the tobacco rod 11 may be enveloped by a thermally conductive material. The thermally conductive material may be, for example, a metal foil such as an aluminum foil, but is not limited thereto. For example, the thermally conductive material enveloping the tobacco rod 11 may evenly distribute the heat transferred to the tobacco rod 11 to improve the thermal conductivity to be applied to the tobacco rod 11, thereby improving the taste of tobacco. The thermally conductive material enveloping the tobacco rod 11 may function as a susceptor heated by an induction heater. In this case, although not shown, the tobacco rod 11 may further include an additional susceptor in addition to the thermally conductive material enveloping the outside thereof.

**[0060]** The filter rod 12 may be a cellulose acetate filter. However, a shape of the filter rod 12 is not limited. For example, the filter rod 12 may be a cylindrical rod or a tubular rod including a hollow therein. The filter rod 12 may also be a recess-type rod. For example, when the filter rod 12 includes a plurality of segments, at least one of the segments may be manufactured in a different shape.

**[0061]** A first segment of the filter rod 12 may be a cellulose acetate filter. For example, the first segment may be a tubular structure including a hollow therein. The first segment may prevent internal materials of the tobacco rod 11 from being pushed back when the heater is inserted, and generate an aerosol cooling effect. A desirable diameter of the hollow included in the first segment may be adopted from a range of 2 mm to 4.5 mm, but is not limited thereto.

**[0062]** A desirable length of the first segment may be adopted from a range of 4 mm to 30 mm, but is not limited thereto. The length of the first segment may be desirably 10 mm, but is not limited thereto.

**[0063]** The first segment may have a hardness that is adjusted by adjusting the content of a plasticizer in a process of manufacturing the first segment. In addition, the first segment may be manufactured by inserting a structure such as a film or a tube of the same or different materials inside (e.g., the hollow).

**[0064]** A second segment of the filter rod 12 may cool an aerosol generated as the heater heats the tobacco rod 11. The user may thus inhale the aerosol cooled down to a suitable temperature.

**[0065]** A length or diameter of the second segment may be determined in various ways according to the shape of the cigarette 1. For example, a desirable length of the second segment may be adopted from a range of 7 mm to 20 mm. The length of the second segment may be desirably approximately 14 mm, but is not limited thereto.

**[0066]** The second segment may be manufactured by weaving a polymer fiber. In this case, a flavoring liquid may be applied to a fiber formed of a polymer. Alternatively, the second segment may be manufactured by weaving a separate fiber to which a flavoring liquid is applied and the fiber formed of the polymer together. Alternatively, the second segment may be formed of a crimped polymer sheet.

**[0067]** For example, the polymer may be prepared with a material selected from the group consisting of polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polyethylene terephthalate (PET), polylactic acid (PLA), cellulose acetate (CA,) and aluminum foil.

**[0068]** As the second segment is formed of the woven polymer fiber or the crimped polymer sheet, the second segment may include a single channel or a plurality of channels extending in a longitudinal direction. A channel used herein may refer to a path through which a gas (e.g., air or aerosol) passes.

**[0069]** For example, the second segment formed of the crimped polymer sheet may be formed of a material having a thickness between about 5  $\mu\text{m}$  and about 300  $\mu\text{m}$ , for example, between about 10  $\mu\text{m}$  and about 250  $\mu\text{m}$ . In addition, a total surface area of the second segment may be between about 300 square millimeters per millimeter ( $\text{mm}^2/\text{mm}$ ) and about 1000  $\text{mm}^2/\text{mm}$ . Further, an aerosol cooling element may be formed of a material having a specific surface area between about 10  $\text{mm}^2/\text{mg}$  and about 100  $\text{mm}^2/\text{mg}$ .

**[0070]** The second segment may include a thread containing a volatile flavor ingredient. The volatile flavor ingredient may be menthol. However, embodiments are not limited thereto. For example, the thread may be filled with an amount of menthol sufficient to provide at least 1.5 milligrams (mg) of menthol to the second segment.

**[0071]** A third segment of the filter rod 12 may be a cellulose acetate filter. A desirable length of the third segment may be adopted from a range of 4 mm to 20

mm. For example, the length of the third segment may be about 12 mm, but is not limited thereto.

**[0072]** The third segment may be manufactured such that a flavor is generated by spraying a flavoring liquid onto the third segment in a process of manufacturing the third segment. Alternatively, a separate fiber to which the flavoring liquid is applied may be inserted into the third segment. An aerosol generated in the tobacco rod 11 may be cooled as it passes through the second segment of the filter rod 12, and the cooled aerosol may pass through the third segment into the user. Accordingly, when a flavoring element is added to the third segment, the durability of the flavor to be delivered to the user may be enhanced.

**[0073]** In addition, the filter rod 12 may include at least one capsule 13. The capsule 13 may perform a function of generating a flavor or a function of generating an aerosol. For example, the capsule 13 may have a structure in which a liquid containing a fragrance is wrapped with a film. The capsule 13 may have a spherical or cylindrical shape, but is not limited thereto.

**[0074]** Referring to FIG. 2, a cigarette 2 may further include a front end plug 23. The front end plug 23 may be disposed on one side of a tobacco rod 21 opposite to a filter rod 22. The front end plug 23 may prevent the tobacco rod 21 from escaping to the outside, and may also prevent an aerosol liquefied in the tobacco rod 21 during smoking from flowing into an aerosol generating device.

**[0075]** The filter rod 22 may include a first segment 221 and a second segment 222. Here, the first segment 221 may correspond to the first segment of the filter rod 12 of FIG. 1, and the second segment 222 may correspond to the third segment of the filter rod 12 of FIG. 1.

**[0076]** A diameter and a total length of the cigarette 2 may correspond to the diameter and the total length of the cigarette 1 of FIG. 1. For example, a length of the front end plug 23 may be about 7 mm, a length of the tobacco rod 21 may be about 15 mm, a length of the first segment 221 may be about 12 mm, and a length of the second segment 222 may be about 14 mm. However, embodiments are not limited thereto.

**[0077]** The cigarette 2 may be wrapped with at least one wrapper 25. The wrapper 25 may have at least one hole through which external air is introduced or internal gas flows out. For example, the front end plug 23 may be wrapped with a first wrapper 251, the tobacco rod 21 may be wrapped with a second wrapper 252, the first segment 221 may be wrapped with a third wrapper 253, and the second segment 222 may be wrapped with a fourth wrapper 254. In addition, the cigarette 2 may be entirely wrapped again with a fifth wrapper 255.

**[0078]** In addition, at least one perforation 26 may be formed in the fifth wrapper 255. For example, the perforation 26 may be formed in an area surrounding the tobacco rod 21. However, embodiments are not limited thereto. The perforation 26 may perform a function of transferring heat generated by a heater to the inside of the tobacco

rod 21.

**[0079]** In addition, the second segment 222 may include at least one capsule 24. The capsule 24 may perform a function of generating a flavor or a function of generating an aerosol. For example, the capsule 24 may have a structure in which a liquid containing a fragrance is wrapped with a film. The capsule 24 may have a spherical or cylindrical shape, but is not limited thereto.

**[0080]** The first wrapper 251 may be a combination of general filter wrapping paper and metal foil such as aluminum foil. For example, a total thickness of the first wrapper 251 may be in a range of 45  $\mu\text{m}$  to 55  $\mu\text{m}$ , and may be desirably 50.3  $\mu\text{m}$ . In addition, a thickness of the metal foil of the first wrapper 251 may be in a range of 6  $\mu\text{m}$  to 7  $\mu\text{m}$ , and may be desirably 6.3  $\mu\text{m}$ . In addition, a basis weight of the first wrapper 251 may be in a range of 50  $\text{g/m}^2$  to 55  $\text{g/m}^2$ , and may be desirably 53  $\text{g/m}^2$ .

**[0081]** The second wrapper 252 and the third wrapper 253 may be formed with general filter wrapping paper. For example, the second wrapper 252 and the third wrapper 253 may be porous wrapping paper or non-porous wrapping paper.

**[0082]** For example, a porosity of the second wrapper 252 may be about 35000 CU, but is not limited thereto. In addition, a thickness of the second wrapper 252 may be in a range of 70  $\mu\text{m}$  to 80  $\mu\text{m}$ , and may be desirably 78  $\mu\text{m}$ . In addition, a basis weight of the second wrapper 252 may be in a range of 20  $\text{g/m}^2$  to 25  $\text{g/m}^2$ , and may be desirably 23.5  $\text{g/m}^2$ .

**[0083]** For example, a porosity of the third wrapper 253 may be about 24000 CU, but is not limited thereto. In addition, a thickness of the third wrapper 253 may be in a range of 60  $\mu\text{m}$  to 70  $\mu\text{m}$ , and may be desirably 68  $\mu\text{m}$ . In addition, a basis weight of the third wrapper 253 may be in a range of 20  $\text{g/m}^2$  to 25  $\text{g/m}^2$ , and may be desirably 21  $\text{g/m}^2$ .

**[0084]** The fourth wrapper 254 may be formed of polylactic acid (PLA) laminated paper. The PLA laminated paper may refer to three-ply paper including a paper layer, a PLA layer, and a paper layer. For example, a thickness of the fourth wrapper 254 may be in a range of 100  $\mu\text{m}$  to 120  $\mu\text{m}$ , and may be desirably 110  $\mu\text{m}$ . In addition, a basis weight of the fourth wrapper 254 may be in a range of 80  $\text{g/m}^2$  to 100  $\text{g/m}^2$ , and may be desirably 88  $\text{g/m}^2$ .

**[0085]** The fifth wrapper 255 may be formed of sterile paper (e.g., MFW). Here, the sterile paper (MFW) may refer to paper specially prepared such that it has enhanced tensile strength, water resistance, smoothness, or the like, compared to general paper. For example, a basis weight of the fifth wrapper 255 may be in a range of 57  $\text{g/m}^2$  to 63  $\text{g/m}^2$ , and may be desirably 60  $\text{g/m}^2$ . In addition, a thickness of the fifth wrapper 255 may be in a range of 64  $\mu\text{m}$  to 70  $\mu\text{m}$ , and may be desirably 67  $\mu\text{m}$ .

**[0086]** The fifth wrapper 255 may have a predetermined material internally added thereto. The predetermined material herein may be, for example, silicon. However, embodiments are not limited thereto. Silicon may

have properties, such as, for example, heat resistance which is characterized by less change by temperature, oxidation resistance which refers to resistance to oxidation, resistance to various chemicals, water repellency against water, or electrical insulation. However, silicon may not be necessarily used, but any material having such properties described above may be applied to (or used to coat) the fifth wrapper 255 without limitation.

**[0087]** The front end plug 23 may be formed of cellulose acetate. For example, the front end plug 23 may be manufactured by adding a plasticizer (e.g., triacetin) to cellulose acetate tow. A mono denier of a filament constituting the cellulose acetate tow may be in a range of 1.0 to 10.0, and may be desirably in a range of 4.0 to 6.0. The mono denier of the filament of the front end plug 23 may be more desirably 5.0. In addition, a cross section of the filament constituting the front end plug 23 may be Y-shaped. A total denier of the front end plug 23 may be in a range of 20000 to 30000, and may be desirably in a range of 25000 to 30000. The total denier of the front end plug 23 may be more desirably 28000.

**[0088]** In addition, as needed, the front end plug 23 may include at least one channel, and a cross-sectional shape of the channel may be provided in various ways.

**[0089]** The tobacco rod 21 may correspond to the tobacco rod 11 described above with reference to FIG. 1. Thus, a detailed description of the tobacco rod 21 will be omitted here.

**[0090]** The first segment 221 may be formed of cellulose acetate. For example, the first segment may be a tubular structure including a hollow therein. The first segment 221 may be manufactured by adding a plasticizer (e.g., triacetin) to cellulose acetate tow. For example, a mono denier and a total denier of the first segment 221 may be the same as the mono denier and the total denier of the front end plug 23.

**[0091]** The second segment 222 may be formed of cellulose acetate. A mono denier of a filament of the second segment 222 may be in a range of 1.0 to 10.0, and may be desirably in a range of 8.0 to 10.0. The mono denier of the filament of the second segment 222 may be more desirably 9.0. In addition, a cross section of the filament of the second segment 222 may be Y-shaped. A total denier of the second segment 222 may be in a range of 20000 to 30000, and may be desirably 25000.

**[0092]** FIG. 3A is a perspective view of an aerosol generating article 3 according to an embodiment. FIG. 3B is a cross-sectional view of a medium segment 31 of the aerosol generating article 3 according to an embodiment.

**[0093]** In an embodiment, the aerosol generating article 3 may include all components of the aerosol generating article according to the embodiment described above (e.g., the aerosol generating article 1 of FIG. 1 or the aerosol generating article 2 of FIG. 2). The common components to those in the aerosol generating article according to the embodiment described above (e.g., the aerosol generating article 1 of FIG. 1 or the aerosol

generating article 2 of FIG. 2) have been described in detail with reference to FIGS. 1 and 2, and therefore, the description thereof will be omitted hereinafter.

**[0094]** In an embodiment, the aerosol generating article 3 may include a first end surface 3a, a second end surface 3b formed on a side opposite to the first end surface 3a, and a side surface 3c formed between the first end surface 3a and the second end surface 3b. In an embodiment, the aerosol generating article 3 may include the medium segment 31, a first segment 32 disposed on a downstream side of the medium segment 31, a second segment 33 disposed on an upstream side of the medium segment 31, inner wrapping paper 34, and an outer wrapper 35.

**[0095]** In an embodiment, the medium segment 31 may include a medium. For example, the medium may include solid materials based on tobacco raw materials such as tobacco sheets, cut tobacco leaves, and reconstituted tobacco and a liquid composition based on nicotine, a tobacco extract, and/or various fragrances. However, embodiments are not limited thereto. For example, the medium segment according to an embodiment may be attached by compressing a slurry medium. In an embodiment, the medium segment 31 may include a hollow tube 31a. In an embodiment, an aerosol generated as the medium segment 31 is heated may move toward the second end surface 3b through the hollow tube 31a formed in the middle of the medium segment 31. For example, the aerosol may be smoothly delivered to the user's mouth through the hollow tube 31a formed in the middle of the medium segment 31. In an embodiment, the medium segment 31 may include a frame 312 and a medium portion 314. In an embodiment, the frame 312 may be formed in a cylindrical shape. In an embodiment, the frame 312 may perform a function of a base to which the medium portion 314 is applied. In an embodiment, the frame 312 may be formed of a material such as paper, a synthetic resin, a nonferrous metal, or the like. In an embodiment, the medium portion 314 may be disposed to surround an outer surface of the frame 312. In an embodiment, the medium portion 314 of the medium segment 31 may be exposed to the outside of the aerosol generating article 3. For example, the wrapper (34; 35) may be peeled off in the vicinity of the medium segment 31.

**[0096]** In an embodiment, the first segment 32 may be disposed in contact with a downstream side of the medium segment 31. The first segment 32 according to an embodiment may include a cooling portion 321 and a filter portion 322. The cooling portion 321 according to an embodiment may include a cavity therein. In an embodiment, the cooling portion 321 may cool an aerosol generated in the medium segment 31. In an embodiment, FIG. 3A shows the filter portion 322 as a single segment. However, embodiments are not limited thereto. That is, the filter portion 322 may include a plurality of segments. For example, the filter portion 322 may include a segment that cools an aerosol and a segment that filters a pre-

determined ingredient contained in an aerosol. In addition, the filter portion 322 may further include at least one segment that performs another function, as needed. The filter portion 322 may be a cellulose acetate filter. However, a shape of the filter portion 322 is not limited. For example, the filter portion 322 may be a cylindrical rod, a tubular rod including a hollow therein, or a recess-type rod.

**[0097]** In an embodiment, the second segment 33 may prevent the medium of the medium segment 31 from falling off. For example, the second segment 33 may include a front end plug. The front end plug may be positioned on one side opposite to the first segment 32. In an embodiment, the front end plug may prevent a medium from escaping to the outside, and may also prevent an aerosol liquefied from a medium segment during smoking from flowing into an aerosol generating device. In an embodiment, the front end plug may be formed of cellulose acetate. For example, the front end plug may be manufactured by adding a plasticizer (e.g., triacetin) to cellulose acetate tow. In an embodiment, a cross section of the filament constituting the front end plug may be Y-shaped. In an embodiment, the front end plug may include at least one channel, and a cross-sectional shape of the channel may be provided in various ways.

**[0098]** In an embodiment, the aerosol generating article 3 may be wrapped with at least one wrapper (34; 35). In an embodiment, the wrapper (34; 35) may include the inner wrapping paper 34 and the outer wrapper 35. In an embodiment, the inner wrapping paper 34 may wrap at least a portion of side surfaces of the first segment 32 and the second segment 33. In an embodiment, the inner wrapping paper 34 may include first inner wrapping paper 341 wrapping at least a portion of the second segment 33, and second inner wrapping paper 342 wrapping at least a portion of the first segment 32. In an embodiment, the inner wrapping paper 34 may be porous wrapping paper or non-porous wrapping paper. In addition, the inner wrapping paper 34 may be formed of oilproof paper and/or an aluminum laminated wrapping material. In an embodiment, the outer wrapper 35 may wrap an outermost surface of the side surface 3c of the aerosol generating article 3 to maintain the shape of the aerosol generating article 3. In an embodiment, the outer wrapper 35 may include a first wrapper 351 wrapping at least a portion of the second segment 33, and a second wrapper 352 wrapping at least a portion of the first segment 32. The outer wrapper 35 may prevent the aerosol generating article 3 from burning. Specifically, when the temperature rises above the ignition point of any one of the materials included in the medium segment 31, the aerosol generating article 3 may burn. Even in this case, it may still be possible to prevent the aerosol generating article 3 from burning because the outer wrapper 35 includes a non-combustible material.

**[0099]** In addition, the outer wrapper 35 may prevent a holder from being contaminated by substances produced

in the aerosol generating article 3. Liquid substances may be produced in the aerosol generating article 3 when a user puffs. For example, as an aerosol generated in the aerosol generating article 3 is cooled by external air, such liquid substances (e.g., moisture, etc.) may be produced. As the aerosol generating article 3 is wrapped with the outer wrapper 35, the liquid substances generated within the aerosol generating article 3 may be prevented from leaking out of the aerosol generating article 3. The wrapper (34; 35) according to an embodiment may have at least one hole (not shown) through which external air is introduced or internal gas flows out.

**[0100]** FIG. 4A is a perspective view schematically illustrating a medium segment manufacturing device 100 according to an embodiment. FIG. 4B is a cross-sectional view of an area A of the medium segment manufacturing device 100 according to an embodiment of FIG. 4A.

**[0101]** In an embodiment, the medium segment manufacturing device 100 may include a frame forming unit 110, a medium coating unit 120, an extrusion unit 130, a drying unit 140, and a cutting unit 150.

**[0102]** In an embodiment, the frame forming unit 110 may include a base substrate 112 and a shaft 114. In an embodiment, the base substrate 112 may form a frame (e.g., the frame 312 of FIGS. 3A and 3B) of a medium segment (e.g., the medium segment 31 of FIGS. 3A and 3B) of an aerosol generating article (e.g., the aerosol generating article 3 of FIGS. 3A and 3B). In an embodiment, the base substrate 112 may be disposed obliquely to a longitudinal direction of the shaft 114. In an embodiment, the shaft 114 may rotate in one direction (e.g., a direction of an arrow of FIG. 4A). The base substrate 112 may be continuously wound around the shaft 114 as the shaft 114 rotates in the one direction. In an embodiment, the shaft 114 may rotate in the one direction by a bearing (not shown). In an embodiment, the base substrate 112 may be stored in a state in which the substrate continuously extending in the one direction is rolled. In an embodiment, the base substrate 112 may be formed of at least one material of paper, cellulose, a synthetic resin, a nonferrous metal, or a combination thereof. In an embodiment, the shaft 114 may be formed of a material having high stiffness and strength. For example, the shaft 114 may be formed of at least a portion of a ferrous metal, nonferrous metal, aluminum, or stainless steel. In an embodiment, a shape of a cross section of the shaft 114 (e.g., a cross section perpendicular to the longitudinal direction of the shaft 114) may include at least one of a circle, triangle, rectangle, hexagon, octagon, or star shape.

**[0103]** In an embodiment, referring to FIG. 3B, the medium coating unit 120 may include a container 122 and a nozzle 124. The medium coating unit 120 may apply a medium to a surface of the frame 312 formed in the frame forming unit 110. The container 122 according to an embodiment may include a solid medium and a liquid solution therein. The medium and the solution

mixed in the container 122 according to an embodiment may be stored in the form of a slurry. The medium in the form of a slurry may have a viscosity increased compared to that of a solid medium. In an embodiment, the medium in the form of a slurry may be sprayed or discharged toward the frame 312 through the nozzle 124. In an embodiment, since the frame 312 rotates in the one direction together with the shaft 114 while being fixed to an outer surface of the shaft 114, the medium sprayed or discharged through the nozzle 124 may be evenly applied to the outer surface of the frame 312. In an embodiment, the medium in the form of a slurry that is evenly applied to the outer surface of the frame 312 may form the medium portion 314 of the medium segment 31.

**[0104]** In an embodiment, the extrusion unit 130 may compress the medium in the form of a slurry that is applied to the outer surface of the frame 312 such that the medium may smoothly adhere to the frame 312. In an embodiment, the extrusion unit 130 may be formed adjacent to the medium coating unit 120. In an embodiment, the extrusion unit 130 may be formed to protrude from a device including the container 122 and the nozzle 124 of the medium coating unit 120. In an embodiment, the extrusion unit 130 may be formed to surround a periphery of the shaft 114. In an embodiment, the extrusion unit 130 may include an inclined element 132. The inclined element 132 according to an embodiment may be formed to be inclined in a direction toward the shaft 114 as it moves in a direction away from the medium coating unit 120. In an embodiment, the medium applied to the frame 312 by the inclined element 132 may be more firmly compressed onto the frame 312 as it passes through the extrusion unit 130.

**[0105]** In an embodiment, the drying unit 140 may dry the extruded medium. The medium that has passed through the extrusion unit 130 according to an embodiment may be firmly compressed onto the frame 312, however, the medium may still remain wet, since the medium is applied in the form of a slurry in the medium coating unit 120. In an embodiment, the drying unit 140 may evaporate and solidify a liquid from the medium in the form of a slurry included in the medium portion 314. In an embodiment, the drying unit 140 may include one or more drying elements 140a. The drying elements 140a according to an embodiment may be disposed at a lower end or both side ends of the shaft 114. The drying elements 140a according to an embodiment may blow dry air toward the shaft 114. The drying elements 140a according to an embodiment may directly apply heat to the shaft 114. The drying elements 140a according to an embodiment may include two or more drying elements 140a, and the plurality of drying elements 140a may be disposed side by side along the longitudinal direction of the shaft 114.

**[0106]** In an embodiment, the cutting unit 150 may cut the medium segment 31 to a specific length. In an embodiment, the cutting unit 150 may include a cutting element in the form of a blade. In an embodiment, the cutting unit 150 may move toward the shaft 114 in a

direction perpendicular to the longitudinal direction of the shaft 114 every preset time. In an embodiment, the medium segment 31 cut by the cutting unit 150 may be included as a component of an aerosol generating article (e.g., the aerosol generating article 3 of FIG. 3A).

**[0107]** FIG. 5 is a flowchart of a method S of manufacturing a medium segment (e.g., the medium segment 31 of FIG. 3A) of an aerosol generating article (e.g., the aerosol generating article 3 of FIG. 3A) according to an embodiment.

**[0108]** In an embodiment, the method S of manufacturing a medium segment may include step S1 of forming a frame (e.g., the frame 312 of FIG. 3A and/or FIG. 3B), step S2 of applying a medium in a form of a slurry to a frame 312, step S3 of compressing and extracting the medium applied to the frame 312, step S4 of drying the medium applied to the frame 312, and step S5 of cutting a medium segment (e.g., the medium segment 31 of FIG. 3A) to a predetermined length.

**[0109]** In an embodiment, step S1 of forming the frame 312 may be performed in a frame forming unit (e.g., the frame forming unit 110 of FIG. 4A) of a device (e.g., the medium segment manufacturing device 100 of FIG. 4A) for manufacturing the medium segment 31 of an aerosol generating article (e.g., the aerosol generating article 3 of FIG. 3A). In an embodiment, step S1 of forming the frame 312 may form a frame (e.g., the frame 312 of FIGS. 3A and 3B) of a medium segment (e.g., the medium segment 31 of FIGS. 3A and 3B) of an aerosol generating article (e.g., the aerosol generating article 3 of FIGS. 3A and 3B). In an embodiment, a base substrate (e.g., the base substrate 112 of FIG. 4A) may be disposed obliquely to a longitudinal direction of a shaft (e.g., the shaft 114 of FIG. 4A). In an embodiment, the shaft 114 may rotate in one direction. The base substrate 112 may be continuously wound around the shaft 114 as the shaft 114 rotates in the one direction. In an embodiment, the shaft 114 may rotate in the one direction by a bearing (not shown). In an embodiment, the base substrate 112 may be stored in a state in which the substrate continuously extending in the one direction is rolled. In an embodiment, the base substrate 112 may be formed of at least one material of paper, cellulose, a synthetic resin, a nonferrous metal, or a combination thereof. In an embodiment, the shaft 114 may be formed of a material having high stiffness and strength. For example, the shaft 114 may be formed of at least a portion of a ferrous metal, nonferrous metal, aluminum, or stainless steel.

**[0110]** FIG. 6 is a specific flowchart of step S1 of forming the frame of the method of manufacturing the medium segment according to an embodiment. In an embodiment, step S1 of forming the frame may include step T1 of supplying a base substrate obliquely to an axial direction of a shaft, step T2 of winding the base substrate around an outer surface of the shaft, and step T3 of adhering an overlapping area of the base substrate.

**[0111]** In an embodiment, step S2 of applying the medium in the form of a slurry to the frame 312 may be

performed in the medium coating unit 120 of a device (e.g., the medium segment manufacturing device 100 of FIG. 4A) for manufacturing the medium segment 31. Step S2 of applying the medium in the form of a slurry to the frame 312 may include applying the medium to a surface of the frame 312 formed in a frame forming unit (e.g., the frame forming unit 110 of FIG. 4A). A container (e.g., the container 122 of FIG. 4B) according to an embodiment may include a solid medium and a liquid solution therein.

10 The medium and the solution mixed in the container 122 according to an embodiment may be stored in the form of a slurry. The medium in the form of a slurry may have a viscosity increased compared to that of a solid medium. In an embodiment, the medium in the form of a slurry may be sprayed or discharged toward the frame 312 through a nozzle (e.g., the nozzle 124 of FIG. 4B). In an embodiment, since the frame 312 rotates in the one direction together with a shaft (e.g., the shaft 114 of FIG. 4A and/or FIG. 4B) while being fixed to an outer surface of the shaft 114, the medium sprayed or discharged through the nozzle 124 may be evenly applied to the outer surface of the frame 312. In an embodiment, the medium in the form of a slurry that is evenly applied to the outer surface of the frame 312 may form a medium portion (e.g., the medium portion 314 of FIGS. 3A to 4B) of a medium segment (e.g., the medium segment 31 of FIG. 3A, FIG. 3B, and/or FIG. 4A).

**[0112]** In an embodiment, step S3 of compressing and extracting the medium applied to the frame 312 may be performed in the extrusion unit 130 of a device (e.g., the medium segment manufacturing device 100 of FIG. 4A) for manufacturing the medium segment 31. In an embodiment, step S3 of compressing and extracting the medium applied to the frame 312 may include compressing the medium in the form of a slurry that is applied to the outer surface of the frame 312 such that the medium may smoothly adhere to the frame 312. In an embodiment, the medium applied to the frame 312 may be more firmly compressed onto the frame 312 through step S3 of compressing and extracting the medium.

**[0113]** In an embodiment, step S4 of drying the medium applied to the frame 312 may be performed in the drying unit 140 of a device (e.g., the medium segment manufacturing device 100 of FIG. 4A) for manufacturing a medium segment (e.g., the medium segment 31 of FIG. 3A, FIG. 3B, and/or FIG. 4A). The medium that has passed through step S3 of compressing and extracting the medium may be firmly compressed onto the frame 312, however, the medium may still remain wet, since the medium is applied in the form of a slurry in step S2 of applying the medium to the frame. In an embodiment, step S4 of drying the medium may include evaporating and solidifying a liquid from the medium in the form of a slurry included in a medium portion (e.g., the medium portion 314 of FIGS. 3A to 4B).

**[0114]** In an embodiment, step S5 of cutting the medium segment 31 to the predetermined length may be performed in the cutting unit 150 of a device (e.g., the

medium segment manufacturing device 100 of FIG. 4A) for manufacturing the medium segment 31. In step of cutting the medium segment 31 to the predetermined length, a cutting operation may be activated every preset time. In an embodiment, the medium segment 31 cut in step S5 of cutting the medium segment 31 to the predetermined length may be included as a component of an aerosol generating article (e.g., the aerosol generating article 3 of FIG. 3A).

**[0115]** While the embodiments are described with reference to drawings, it will be apparent to one of ordinary skill in the art that various alterations and modifications in form and details may be made in these embodiments without departing from the spirit and scope of the claims and their equivalents. For example, suitable results may be achieved if the described techniques are performed in a different order, and/or if components in a described system, architecture, device, or circuit are combined in a different manner, or replaced or supplemented by other components or their equivalents.

**[0116]** Therefore, other implementations, other embodiments, and equivalents of the claims are within the scope of the following claims.

## Claims

### 1. An aerosol generating article comprising:

a first end surface;  
a second end surface on a side opposite to the first end surface;  
a side surface formed between the first end surface and the second end surface;  
a medium segment;  
a first segment; and  
a second segment,  
wherein the first segment is disposed on a downstream side of the medium segment and the second segment is disposed on an upstream side of the medium segment, and  
wherein the medium segment comprises a cylindrical frame, and a medium portion surrounding an outer surface of the frame, and the medium portion is exposed to outside through the side surface of the aerosol generating article.

### 2. A device for manufacturing a medium segment included in the aerosol generating article of claim 1, the device comprising:

a frame forming unit comprising a base substrate included in the frame, and a shaft that rotates such that the base substrate is wound obliquely, and configured to form the frame;  
a medium coating unit configured to apply a medium to the frame formed in the frame forming unit;

an extrusion unit configured to compress the applied medium onto the frame;  
a drying unit configured to dry the extruded medium; and  
a cutting unit configured to cut the medium segment to a predetermined length.

### 3. The device of claim 2, wherein the medium coating unit comprises:

a container comprising the medium in a form of a slurry; and  
a nozzle connected to the container to supply the medium to the frame.

### 4. A method of manufacturing a medium segment of the aerosol generating article of claim 1, the method comprising:

forming the frame;  
applying a medium in a form of a slurry to the frame;  
compressing and extracting the medium applied to the frame; and  
drying the medium in the form of a slurry applied to the frame.

### 5. The method of claim 4, wherein the forming of the frame comprises:

supplying a base substrate obliquely to an axial direction of a shaft;  
winding the base substrate around an outer surface of the shaft; and  
adhering an overlapping region of the base substrate.

### 6. The method of claim 5, wherein the base substrate is formed of at least one of paper, cellulose, or a combination thereof.

### 7. The method of claim 5 or 6, wherein a shape of a cross section of the shaft perpendicular to a longitudinal direction of the shaft comprises at least one of a circle, triangle, rectangle, hexagon, octagon, or star shape.

### 8. The method of claim 4, wherein the applying of the medium to the frame comprises:

supplying the medium in the form of a slurry from a container to a nozzle; and  
applying the medium to the frame from the nozzle.

### 9. The method of claim 4, further comprising: cutting the medium segment to a predetermined length.

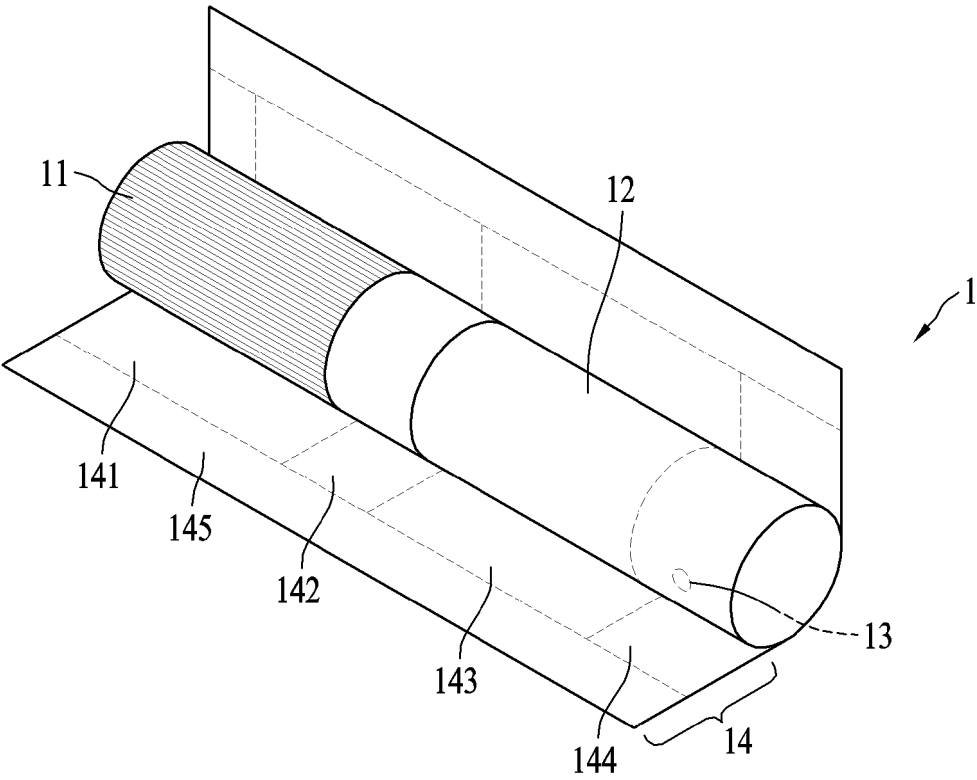


FIG. 1

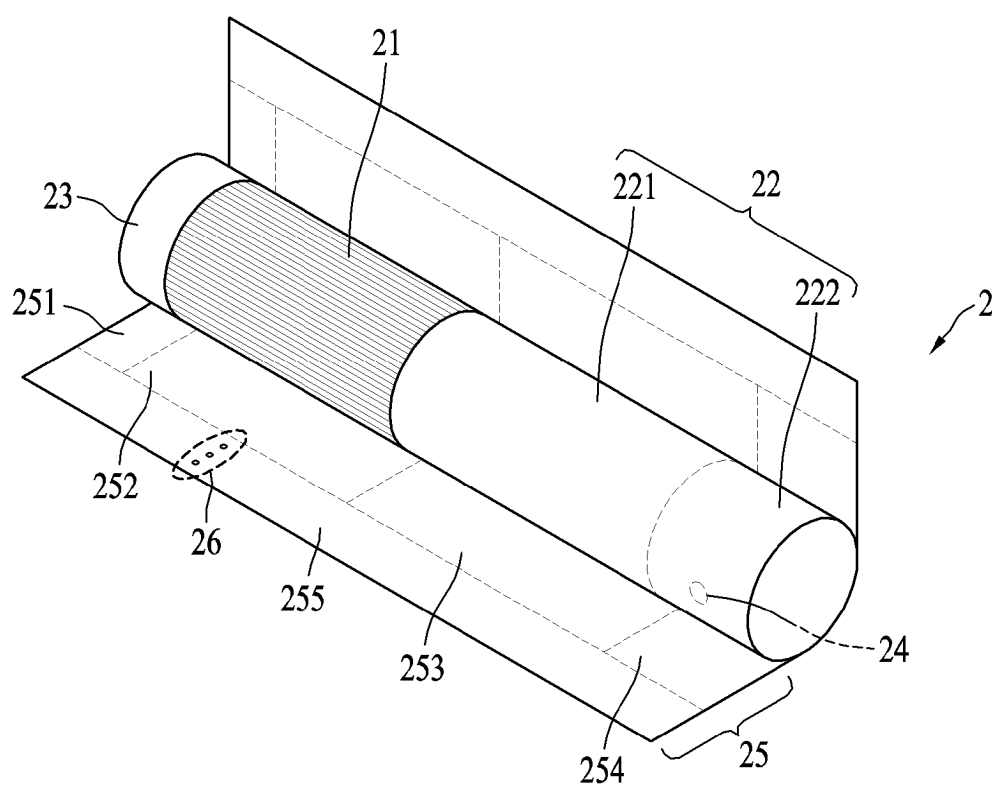


FIG. 2

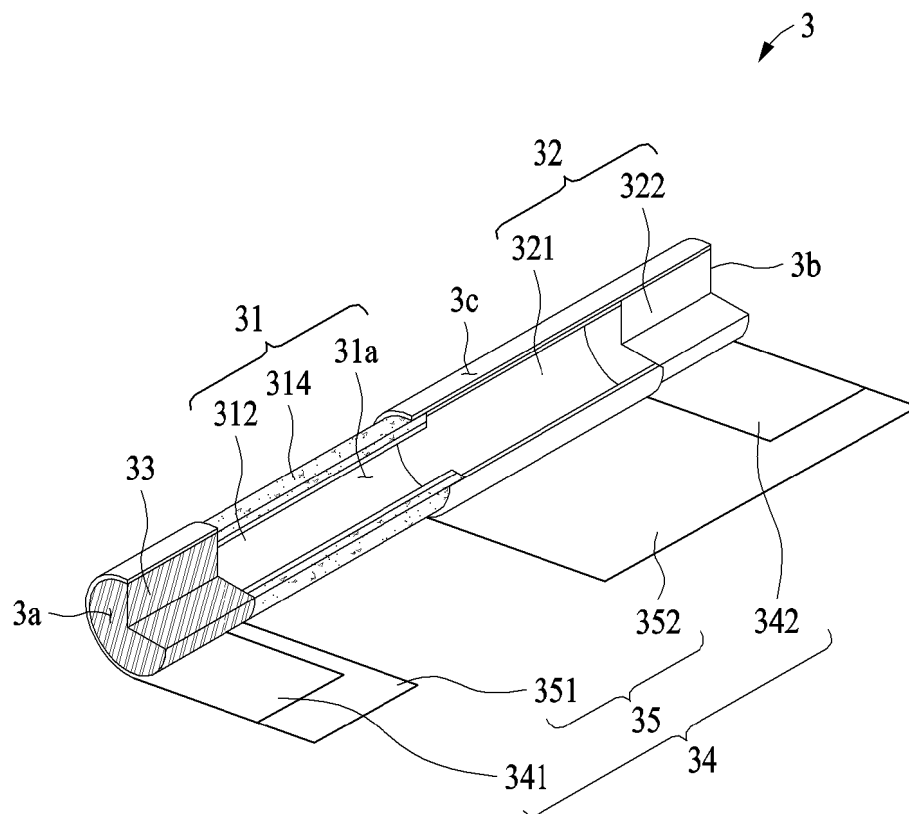


FIG. 3A

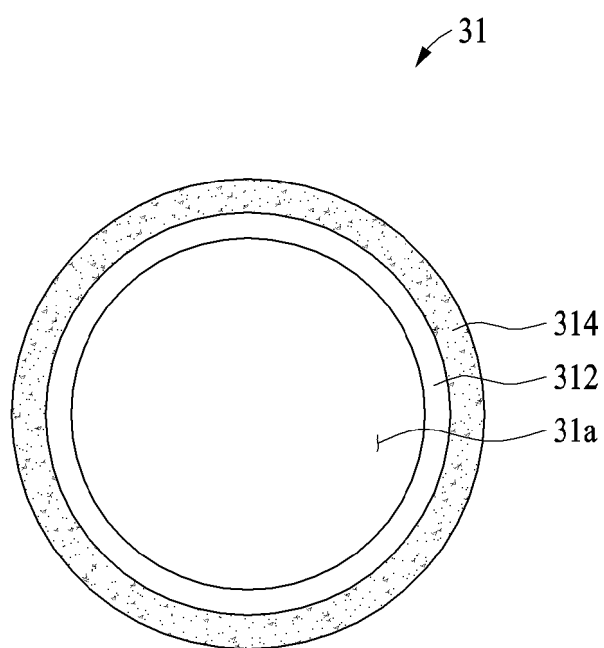


FIG. 3B

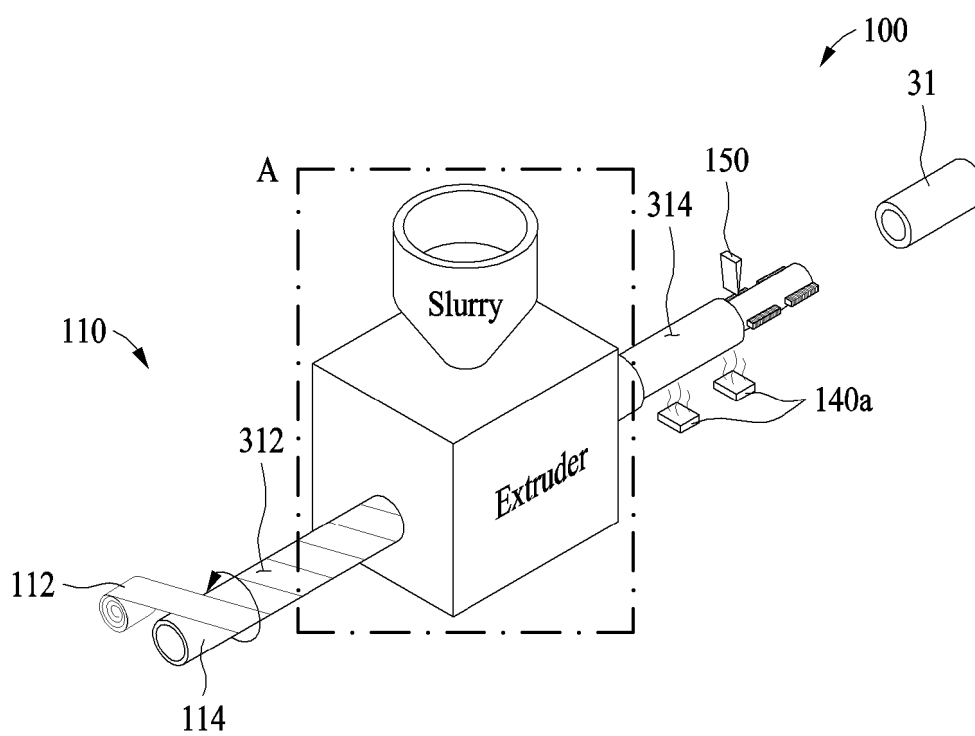


FIG. 4A

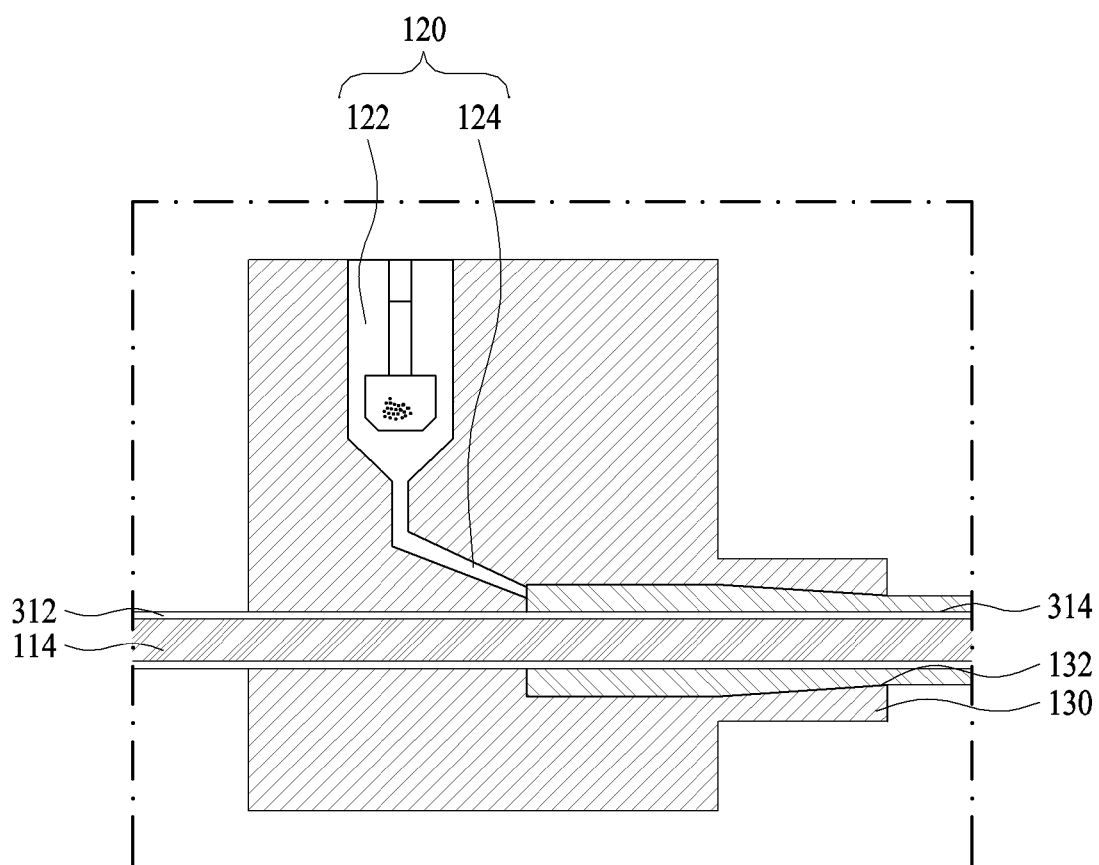


FIG. 4B

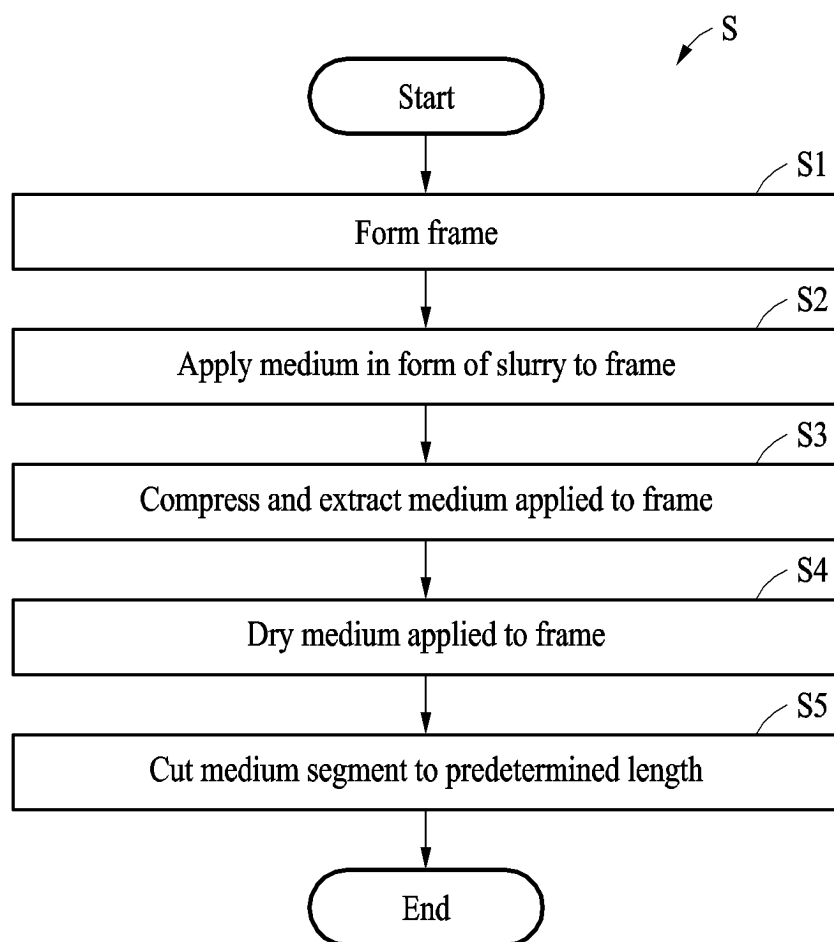


FIG. 5

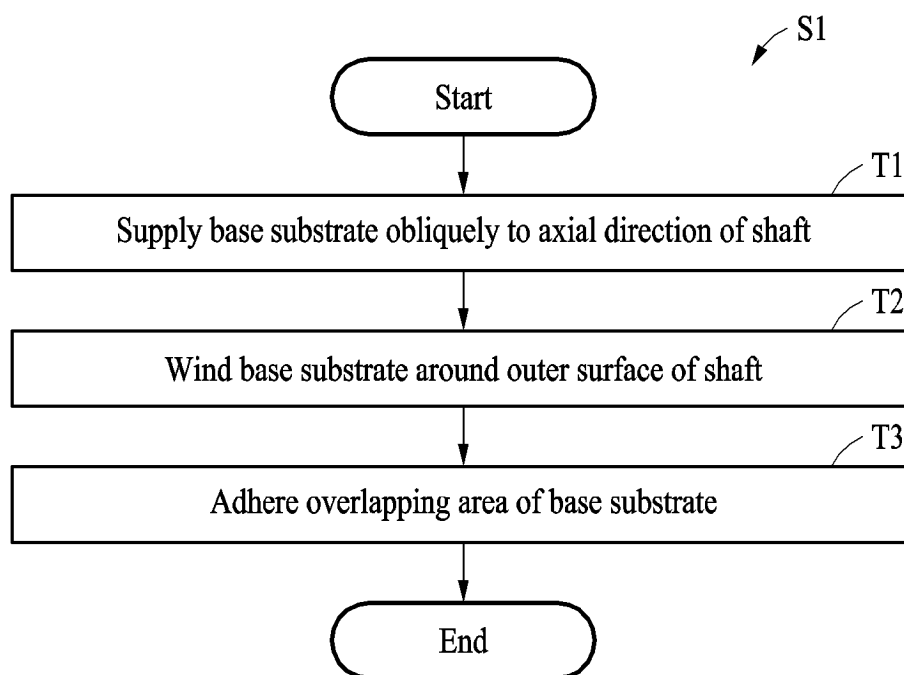


FIG. 6

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2023/007652

## A. CLASSIFICATION OF SUBJECT MATTER

A24C 5/01(2020.01)i; A24D 1/20(2020.01)i; A24C 5/18(2006.01)i; A24C 5/28(2006.01)i; A24C 5/24(2006.01)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)

A24C 5/01(2020.01); A24B 3/14(2006.01); A24D 1/00(2006.01); A24D 3/02(2006.01); A24D 3/10(2006.01);  
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) &amp; keywords: 에어로졸(aerosol), 매질세그먼트(tobacco medium segment), 프레임(frame), 샤프트(shaft), 도포(coating), 압출(extrude), 건조(dry), 커팅(cutting)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                  | Relevant to claim No. |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Y         | KR 10-2441486 B1 (KT & G CORPORATION) 07 September 2022 (2022-09-07)<br>See claim 1; paragraphs [0015] and [0084]; and figure 1.                    | 1-9                   |
| Y         | US 2018-0192687 A1 (PHILIP MORRIS PRODUCTS S.A.) 12 July 2018 (2018-07-12)<br>See claims 1 and 9-10; paragraphs [0031] and [0048]; and figures 1-3. | 1-9                   |
| A         | KR 10-2343888 B1 (KT & G CORPORATION) 27 December 2021 (2021-12-27)<br>See entire document.                                                         | 1-9                   |
| A         | CN 106954893 A (YUNNAN CHINA TOBACCO NEW MATERIAL TECHNOLOGY CO., LTD.) 18 July 2017 (2017-07-18)<br>See entire document.                           | 1-9                   |
| A         | KR 10-2017-0076729 A (BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED) 04 July 2017 (2017-07-04)<br>See entire document.                             | 1-9                   |

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

|                                                                                                                                                                         |                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| * Special categories of cited documents:                                                                                                                                | "I" 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                                              |
| "A" document defining the general state of the art which is not considered to be of particular relevance                                                                | "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                                                                     |
| "D" document cited by the applicant in the international application                                                                                                    | "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 |
| "E" earlier application or patent but published on or after the international filing date                                                                               | "&" document member of the same patent family                                                                                                                                                                                                    |
| "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                                                                  |                                                                                                                                                                                                                                                  |

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| Name and mailing address of the ISA/KR<br><b>Korean Intellectual Property Office<br/>Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208</b><br>Facsimile No. +82-42-481-8578 | Authorized officer<br><br>Telephone No.                                        |

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**INTERNATIONAL SEARCH REPORT**  
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