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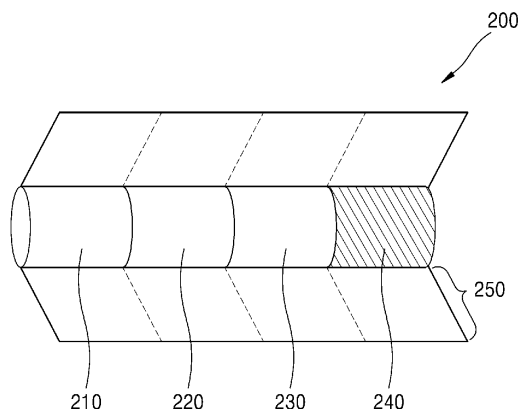
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(54) **CELLULOSE ACETATE TOW, FILTER COMPRISING SAME, AND AEROSOL-GENERATING ARTICLE COMPRISING FILTER**

(57) One or more embodiments relate to a cellulose acetate tow, a filter including the same, and an aerosol generating article including the filter.

FIG. 5



Description

TECHNICAL FIELD

5 **[0001]** One or more embodiments relate to a cellulose acetate tow, a filter including the same, and an aerosol generating article including the filter.

BACKGROUND ART

10 **[0002]** Recently, the demand for alternative methods to overcome the disadvantages of traditional cigarettes has increased. For example, there is growing demand for an aerosol generating device which generates aerosol by heating an aerosol generating material, rather than by combusting cigarettes. Accordingly, research into a smoking article or device operating in various ways has been actively conducted.

15 DESCRIPTION OF EMBODIMENTS

TECHNICAL PROBLEM

20 **[0003]** A heated cigarette that generates aerosol as an aerosol generating material in the cigarette is heated provides a relatively less amount of smoke to a user than a previous traditional combustion cigarette, due to a relatively high absorption resistance and an aerosol removal capacity of a filter. Thus, research into increasing the amount of smoke provided to a user by the heated cigarette has been required.

[0004] The objectives of one or more embodiments are to provide an aerosol generating article including a cellulose acetate tow for realizing a filter having a low absorption resistance; and a filter having a low absorption resistance.

25 **[0005]** The problems to be solved by one or more embodiments are not limited to those described above, and other objectives that are not described may be clearly understood by one of ordinary skill in the art from the present specification and the accompanying drawings.

SOLUTION TO PROBLEM

30 **[0006]** As a means for achieving the technical objectives described above, one or more embodiments provide an aerosol generating article including: a first portion including an aerosol generating material impregnated with an aerosol generating element; a second portion including a tobacco element; a third portion including a cooling element; and a fourth portion including a filter element, wherein the first portion, the second portion, the third portion, and the fourth portion are sequentially arranged in a longitudinal direction of the aerosol generating article, and the filter element includes a cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

[0007] One or more embodiments provide a filter including a cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

40 **[0008]** One or more embodiments provide a cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

[0009] The means for solving the problems is not limited thereto and may include all configurations which may be derived throughout the specification by one of ordinary skill in the art.

45 ADVANTAGEOUS EFFECTS OF DISCLOSURE

[0010] An aerosol generating article according to one or more embodiments may include a cellulose acetate tow including relatively thick fibers, and thus, may have reduced absorption resistance and may provide improved smoking satisfaction to a user. Also, while a low absorption resistance is maintained, the amount of cellulose acetate tow may be increased, and thus, the rigidity of the filter may be increased, and the user convenience may be improved.

50 **[0011]** Effects of the embodiments are not limited thereto and may include all effects which may be derived from the configurations described below.

BRIEF DESCRIPTION OF DRAWINGS

55 **[0012]** FIGS. 1 through 3 are diagrams showing examples in which an aerosol generating article is inserted into an aerosol generating device.

[0013] FIG. 4 is a view of an example of an aerosol generating device using induction heating.

[0014] FIG. 5 is a schematic view of a structure of an aerosol generating article of an embodiment.

BEST MODE

[0015] According to one or more embodiments, an aerosol generating article includes: a first portion including an aerosol generating material impregnated with an aerosol generating element; a second portion including a tobacco element; a third portion including a cooling element; and a fourth portion including a filter element, wherein the first portion, the second portion, the third portion, and the fourth portion are sequentially arranged in a longitudinal direction of the aerosol generating article, and the filter element includes a cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

[0016] The cellulose acetate tow may have a denier per filament of about 18 to about 23 and a total denier of about 15,000 to about 35,000.

[0017] The fourth portion may include about 320 mg to about 510 mg of the cellulose acetate tow.

[0018] A circumference of a cross-section of the fourth portion, the cross-section being perpendicular to the longitudinal direction of the aerosol generating article, may be about 14 mm to about 25 mm.

[0019] An absorption resistance of the fourth portion may be about 0.5 mmH₂O to about 2.5 mmH₂O.

[0020] The second portion may further include the aerosol generating element, and the second portion may include the aerosol generating element in about 10 weight percent (wt%) or less with respect to a dry weight of the aerosol generating material.

[0021] The first portion may include the aerosol generating element in about 65 to about 95 weight percent (wt%) with respect to a dry weight of the aerosol generating material.

[0022] According to one or more embodiments, a filter included in an aerosol generating article includes: a cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

[0023] The cellulose acetate tow may have a denier per filament of about 18 to about 23 and a total denier of about 15,000 to about 35,000.

[0024] The filter may include about 350 mg to about 510 mg of the cellulose acetate tow.

[0025] A circumference of a cross-section of the filter, the cross-section being perpendicular to a longitudinal direction of the filter, may be about 14 mm to about 25 mm.

[0026] An absorption resistance of the filter may be about 0.5 mmH₂O to about 2.5 mmH₂O.

[0027] According to one or more embodiments, a cellulose acetate tow has a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

[0028] The cellulose acetate tow may have a denier per filament of about 18 to about 23 and a total denier of about 15,000 to about 35,000.

MODE OF DISCLOSURE

[0029] With respect to the terms used to describe in the various embodiments, the general terms which are currently and widely used are selected in consideration of functions of structural elements in the various embodiments of the present disclosure. However, meanings of the terms can be changed according to intention, a judicial precedence, the appearance of a new technology, and the like. In addition, in certain cases, a term which is not commonly used can be selected. In such a case, the meaning of the term will be described in detail at the corresponding portion in the description of the present disclosure. Therefore, the terms used in the various embodiments of the present disclosure should be defined based on the meanings of the terms and the descriptions provided herein.

[0030] In addition, unless explicitly described to the contrary, the word "comprise" and variations such as "comprises" or "comprising" will be understood to imply the inclusion of stated elements but not the exclusion of any other elements. In addition, the terms "-er", "-or", and "module" described in the specification mean units for processing at least one function and operation and can be implemented by hardware components or software components and combinations thereof.

[0031] Also, the terms used in this specification that include ordinal numbers such as "first," "second," etc. may be used to describe various components, but the components shall not be limited by those terms. The terms may be used for distinguishing one component from another component.

[0032] Throughout the specification, an "aerosol generating article" refers to an article used for smoking. As another example, the aerosol generating article may refer to a general combustion cigarette that is ignited and combusted or a heated cigarette heated by an aerosol generating device. As another example, the aerosol generating article may refer to an article including a cartridge containing a liquid that is heated.

[0033] Throughout the specification, a "longitudinal direction of the aerosol generating article" denotes a direction in which a length of the aerosol generating article extends or a direction in which the aerosol generating article is inserted into an aerosol generating device.

[0034] Throughout the specification, a "tobacco element" denotes an element including a tobacco material.

[0035] Throughout the specification, a "tobacco material" denotes all types of materials including a component originated from a tobacco leaf.

[0036] Throughout the specification, a "cooling element" denotes an element for cooling a material. For example, the cooling element may cool aerosol generated from an aerosol generating element or a tobacco element.

[0037] Throughout the specification, a "filter element" denotes an element including a filtering material. For example, the filter element may include a plurality of fiber strands.

[0038] Throughout the specification, a "denier per filament" denotes a denier of fibers, represented by a weight (g) of a strand of cellulose acetate fiber per 9000 m that is a unit length.

[0039] Throughout the specification, the "total denier" denotes a denier of a tow, represented by a weight (g) of the tow per 9000 m that is a unit length.

[0040] Hereinafter, embodiments of the disclosure are described in detail with reference to the accompanying drawings so that one of ordinary skill in the art may easily execute the embodiments of the disclosure. However, the disclosure may be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein.

[0041] Hereinafter, embodiments of the present disclosure will be described in detail with reference to the drawings.

[0042] FIGS. 1 through 3 are diagrams showing examples in which an aerosol generating article is inserted into an aerosol generating device.

[0043] Referring to FIG. 1, the aerosol generating device 100 may include a battery 110, a controller 120, and a heater 130.

[0044] Referring to FIGS. 2 and 3, the aerosol generating device 100 may further include a vaporizer 140. Also, the aerosol generating article 200 may be inserted into an inner space of the aerosol generating device 100.

[0045] FIGS. 1 through 3 illustrate components of the aerosol generating device 100, which are related to the present embodiment. Therefore, it will be understood by one of ordinary skill in the art related to the present embodiment that other general-purpose components may be further included in the aerosol generating device 100, in addition to the components illustrated in FIGS. 1 through 3.

[0046] Also, FIGS. 2 and 3 illustrate that the aerosol generating device 100 includes the heater 130. However, as necessary, the heater 130 may be omitted.

[0047] FIG. 1 illustrates that the battery 110, the controller 120, and the heater 130 are arranged in series. Also, FIG. 2 illustrates that the battery 110, the controller 120, the vaporizer 140, and the heater 130 are arranged in series. Also, FIG. 3 illustrates that the vaporizer 140 and the heater 130 are arranged in parallel. However, the internal structure of the aerosol generating device 100 is not limited to the structures illustrated in FIGS. 1 through 3. In other words, according to the design of the aerosol generating device 100, the battery 110, the controller 120, the heater 130, and the vaporizer 140 may be differently arranged.

[0048] When the aerosol generating article 200 is inserted into the aerosol generating device 100, the aerosol generating device 100 may operate the heater 130 and/or the vaporizer 140 to generate aerosol from the aerosol generating article 200 and/or the vaporizer 140. The aerosol generated by the heater 130 and/or the vaporizer 140 is delivered to a user by passing through the aerosol generating article 200.

[0049] As necessary, even when the aerosol generating article 200 is not inserted into the aerosol generating device 100, the aerosol generating device 100 may heat the heater 130.

[0050] The battery 110 may supply power to be used for the aerosol generating device 100 to operate. For example, the battery 110 may supply power to heat the heater 130 or the vaporizer 140, and may supply power for operating the controller 120. Also, the battery 110 may supply power for operations of a display, a sensor, a motor, etc. mounted in the aerosol generating device 100.

[0051] The controller 120 may generally control operations of the aerosol generating device 100. In detail, the controller 120 may control not only operations of the battery 110, the heater 130, and the vaporizer 140, but also operations of other components included in the aerosol generating device 100. Also, the controller 120 may check a state of each of the components of the aerosol generating device 100 to determine whether or not the aerosol generating device 100 is able to operate.

[0052] The controller 120 may include at least one processor. A processor can be implemented as an array of a plurality of logic gates or can be implemented as a combination of a general-purpose microprocessor and a memory in which a program executable in the microprocessor is stored. It will be understood by one of ordinary skill in the art that the processor can be implemented in other forms of hardware.

[0053] The heater 130 may be heated by the power supplied from the battery 110. For example, when the aerosol generating article 200 is inserted into the aerosol generating device 100, the heater 130 may be located outside the aerosol generating article 200. Thus, the heated heater 130 may increase a temperature of an aerosol generating material in the aerosol generating article 200.

[0054] The heater 130 may include an electro-resistive heater. For example, the heater 130 may include an electrically conductive track, and the heater 130 may be heated when currents flow through the electrically conductive track. However,

the heater 130 is not limited to the example described above and may include all heaters which may be heated to a desired temperature. Here, the desired temperature may be pre-set in the aerosol generating device 100 or may be set by a user.

[0055] As another example, the heater 130 may include an induction heater. In detail, the heater 130 may include an electrically conductive coil for heating an aerosol generating article in an induction heating method, and the aerosol generating article may include a susceptor which may be heated by the induction heater.

[0056] For example, the heater 130 may include a tube-type heating element, a plate-type heating element, a needle-type heating element, or a rod-type heating element, and may heat the inside or the outside of the aerosol generating article 200, according to the shape of the heating element.

[0057] Also, the aerosol generating device 100 may include a plurality of heaters 130. Here, the plurality of heaters 130 may be inserted into the aerosol generating article 200 or may be arranged outside the aerosol generating article 200. Also, some of the plurality of heaters 130 may be inserted into the aerosol generating article 200 and the others may be arranged outside the aerosol generating article 200. In addition, the shape of the heater 130 is not limited to the shapes illustrated in FIGS. 1 through 3 and may include various shapes.

[0058] The vaporizer 140 may generate aerosol by heating a liquid composition and the generated aerosol may pass through the aerosol generating article 200 to be delivered to a user. In other words, the aerosol generated via the vaporizer 140 may move along an air flow passage of the aerosol generating device 100 and the air flow passage may be configured such that the aerosol generated via the vaporizer 140 passes through the aerosol generating article 200 to be delivered to the user.

[0059] For example, the vaporizer 140 may include a liquid storage, a liquid delivery element, and a heating element, but it is not limited thereto. For example, the liquid storage, the liquid delivery element, and the heating element may be included in the aerosol generating device 100 as independent modules.

[0060] The liquid storage may store a liquid composition. For example, the liquid composition may be a liquid including a tobacco-containing material having a volatile tobacco flavor component, or a liquid including a non-tobacco material.

The liquid storage may be formed to be detachable from the vaporizer 140 or may be formed integrally with the vaporizer 140.

[0061] For example, the liquid composition may include water, a solvent, ethanol, plant extract, spices, flavorings, or a vitamin mixture. The spices may include menthol, peppermint, spearmint oil, and various fruit-flavored ingredients, but are not limited thereto. The flavorings may include ingredients capable of providing various flavors or tastes to a user. Vitamin mixtures may be a mixture of at least one of vitamin A, vitamin B, vitamin C, and vitamin E, but are not limited thereto. Also, the liquid composition may include an aerosol forming substance, such as glycerin and propylene glycol.

[0062] The liquid delivery element may deliver the liquid composition of the liquid storage to the heating element. For example, the liquid delivery element may be a wick such as cotton fiber, ceramic fiber, glass fiber, or porous ceramic, but is not limited thereto.

[0063] The heating element is an element for heating the liquid composition delivered by the liquid delivery element. For example, the heating element may be a metal heating wire, a metal hot plate, a ceramic heater, or the like, but is not limited thereto. In addition, the heating element may include a conductive filament such as nichrome wire and may be positioned as being wound around the liquid delivery element. The heating element may be heated by a current supply and may transfer heat to the liquid composition in contact with the heating element, thereby heating the liquid composition. As a result, aerosol may be generated.

[0064] For example, the vaporizer 140 may be referred to as a cartomizer or an atomizer, but it is not limited thereto.

[0065] The aerosol generating device 100 may further include general-purpose components in addition to the battery 110, the controller 120, the heater 130, and the vaporizer 140. For example, the aerosol generating device 100 may include a display capable of outputting visual information and/or a motor for outputting haptic information. Also, the aerosol generating device 100 may include at least one sensor (a puff sensor, a temperature sensor, an aerosol generating article insertion detecting sensor, etc.). Also, the aerosol generating device 100 may be formed as a structure that, even when the aerosol generating article 200 is inserted into the aerosol generating device 100, may introduce external air or discharge internal air.

[0066] Although not illustrated in FIGS. 1 through 3, the aerosol generating device 100 and an additional cradle may form together a system. For example, the cradle may be used to charge the battery 110 of the aerosol generating device 100. Alternatively, the heater 130 may be heated when the cradle and the aerosol generating device 100 are coupled to each other.

[0067] The aerosol generating article 200 may be similar to a general combustive cigarette. For example, the aerosol generating article 200 may be divided into a first portion including an aerosol generating material and a second portion including a filter, etc. Alternatively, the second portion of the aerosol generating article 200 may also include an aerosol generating material. For example, an aerosol generating material made in the form of granules or capsules may be inserted into the second portion.

[0068] The entire first portion may be inserted into the aerosol generating device 100, and the second portion may be

exposed to the outside. Alternatively, only a portion of the first portion may be inserted into the aerosol generating device 100, or the entire first portion and a portion of the second portion may be inserted into the aerosol generating device 100. The user may puff aerosol while holding the second portion by the mouth of the user. In this case, the aerosol is generated by the external air passing through the first portion, and the generated aerosol passes through the second portion and is delivered to the user's mouth.

[0069] For example, the external air may flow into at least one air passage formed in the aerosol generating device 100. For example, opening and closing of the air passage and/or a size of the air passage formed in the aerosol generating device 100 may be adjusted by the user. Accordingly, the amount and the quality of smoking may be adjusted by the user. As another example, the external air may flow into the aerosol generating article 200 through at least one hole formed in a surface of the aerosol generating article 200.

[0070] FIG. 4 is a view of an example of an aerosol generating device using induction heating.

[0071] Referring to FIG. 4, the aerosol generating device 100 may include the battery 110, the controller 120, a coil C, and a susceptor S. Also, at least a portion of the aerosol generating article 200 may be accommodated in a cavity V of the aerosol generating device 100. The aerosol generating article 200, the battery 110, and the controller 120 of FIG. 4 may correspond to the aerosol generating article 200, the battery 110, and the controller 120 of FIGS. 1 through 3. Also, the coil C and the susceptor S may be included in the heater 13000. Thus, the same descriptions are omitted.

[0072] With respect to the aerosol generating device 100 illustrated in FIG. 4, components related to the present embodiment are illustrated. Therefore, it will be understood by one of ordinary skill in the art that other general-purpose components may further be included in the aerosol generating device 100, in addition to the components illustrated in FIG. 4.

[0073] The coil C may be located around the cavity V. FIG. 4 illustrates that the coil C is arranged to surround the cavity V. However, it is not limited thereto.

[0074] When the aerosol generating article 200 is accommodated in the cavity V of the aerosol generating device 100, the aerosol generating device 100 may supply power to the coil C for the coil C to generate a magnetic field. As the magnetic field generated by the coil C penetrates through the susceptor S, the susceptor S may be heated.

[0075] The induction heating described above is a well-known phenomenon that is explained by the Faraday's law of induction. In detail, when magnetic induction in the susceptor S is changed, an electric field may be generated in the susceptor S so that an eddy current may flow in the susceptor S. The eddy current may generate heat that is proportional to a current density and a conductor resistance in the susceptor S.

[0076] When the susceptor S is heated by the eddy current, and an aerosol generating material in the aerosol generating article 200 is heated by the heated susceptor S, aerosol may be generated. The aerosol generated from the aerosol generating material may be transferred to a user after passing through the aerosol generating article 200.

[0077] The battery 110 may supply power for the coil C to generate a magnetic field. The controller 120 may be electrically connected to the coil C.

[0078] The coil C may be an electrically conductive coil configured to generate a magnetic field from the power supplied from the battery 110. The coil C may be arranged to surround at least a portion of the cavity V. The magnetic field generated by the coil C may be applied to the susceptor S arranged at an inner end of the cavity V.

[0079] The susceptor S may be heated as the magnetic field generated from the coil C passes therethrough and may include metal or carbon. For example, the susceptor S may include at least one of a ferrite, a ferromagnetic alloy, stainless steel, and Al.

[0080] The susceptor S may include at least one of ceramics, such as graphite, Mo, silicon carbide, Nb, a nickel alloy, a metal film, zirconia, etc., a transition metal, such as Ni, Co, etc., and a metalloid, such as B, P, etc. However, the susceptor is not limited to the example described above and may include any material which may be heated to a desired temperature when a magnetic field is applied thereto. Here, the desired temperature may be predetermined in the aerosol generating device 100 or may be set as a desired temperature by a user.

[0081] When the aerosol generating article 200 is inserted into the cavity V of the aerosol generating device 100, the susceptor S may be arranged to surround at least a portion of the aerosol generating article 200. Thus, the heated susceptor S may increase a temperature of the aerosol generating material in the aerosol generating article 200.

[0082] FIG. 4 illustrates that the susceptor S is arranged to surround at least a portion of the aerosol generating article. However, the susceptor S is not limited thereto. For example, the susceptor S may include a tube-type heating element, a plate-type heating element, a needle-type heating element, or a rod-type heating element and may heat inside or outside the aerosol generating article 200 according to a shape of the heating element.

[0083] Also, the susceptor S may be arranged in a multiple number in the aerosol generating device 100. Here, the plurality of susceptors S may be arranged outside the aerosol generating article 200 or may be inserted into the aerosol generating article 200. Also, some of the plurality of susceptors S may be inserted into the aerosol generating article 200, and the others may be arranged outside the aerosol generating article 200. Also, a shape of the susceptor S is not limited to the shape illustrated in FIG. 4, and the susceptor S may include various shapes.

[0084] FIG. 5 is a schematic view of a structure of the aerosol generating article 200 according to an embodiment.

[0085] Referring to FIG. 5, the aerosol generating article 200 may include a first portion 210, a second portion 220, a third portion 230, and a fourth portion 240. In detail, the first portion 210, the second portion 220, the third portion 230, and the fourth portion 240 may include an aerosol generating element, a tobacco element, a cooling element, and a filter element, respectively. For example, the first portion 210 may include an aerosol generating material, the second

portion 220 may include a tobacco material and a moisturizer, the third portion 230 may cool a current passing through the first portion 210 and the second portion 220, and the fourth portion 240 may include a filter material.

[0086] Referring to FIG. 5, the first portion 210, the second portion 220, the third portion 230, and the fourth portion 240 may be sequentially arranged in a longitudinal direction of the aerosol generating article 200. Here, the longitudinal direction of the aerosol generating article 200 may be a direction in which a length of the aerosol generating article 200 extends. For example, the longitudinal direction of the aerosol generating article 200 may be a direction from the first portion 210 toward the fourth portion 240. Accordingly, aerosol generated from at least one of the first portion 210 and the second portion 220 may sequentially pass through the third portion 230 and the fourth portion 240 and may form a current, and thus, a smoker may absorb the aerosol from the fourth portion 240.

[0087] The first portion 210 may include an aerosol generating element. Also, the first portion 210 may contain other additives, such as a flavor agent, a wetting agent, and/or an organic acid, or may contain a flavored liquid, such as menthol or a moisturizer. Here, the aerosol generating element may include, for example, at least one of glycerin, propylene glycol, ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol. However, the disclosure is not limited to the examples described above and may include all of various types of aerosol generating elements that are well-known in the art.

[0088] The first portion 210 may include an aerosol generating material impregnated with the aerosol generating element. An example of the aerosol generating material may include a wound sheet, and the aerosol generating element may be included in the first portion 210 by being impregnated in the wound sheet. Also, other additives, such as a flavor agent, a wetting agent, and/or an organic acid, and a flavored liquid may be included in the first portion 210 by being absorbed by the wound sheet.

[0089] The wound sheet may be a sheet including a polymer material. For example, the polymer material may include at least one of a paper, cellulose acetate, lyocell, and polylactic acid. For example, the wound sheet may be a paper sheet from which a smell is not generated due to heat even when the paper is heated to a high temperature. However, it is not limited thereto.

[0090] The first portion 210 may extend from an end of the aerosol generating article 200 by about 7 to about 20 mm, and the second portion 220 may extend from the last end of the first portion 210 by about 7 to about 20 mm. However, it is not necessarily limited to this numerical range. Each of the lengths in which the first portion 210 and the second portion 220 extend may be appropriately adjusted within a range that may be easily changed by one of ordinary skill in the art.

[0091] The second portion 220 may include a tobacco element. The tobacco element may be a predetermined type of tobacco material. For example, the tobacco element may be a type of pipe tobacco, a type of tobacco particle, a type of tobacco sheet, a type of tobacco beads, a type of tobacco granule, a type of tobacco powder, or a type of tobacco extract. Also, the tobacco material may include, for example, at least one from a tobacco leaf, lateral veins of tobacco leaves, a puff tobacco, a cut tobacco pipe, a tobacco sheet, and a reformulated tobacco.

[0092] The third portion 230 may cool a current passing through the first portion 210 and the second portion 220. The third portion 230 may be formed of a polymer material or a biodegradable polymer material and may have a cooling function. For example, the third portion 230 may be formed of polylactic acid (PLA) fibers, but is not limited thereto. Alternatively, the third portion 230 may be formed of a cellulose acetate filter having a plurality of holes. However, the third portion 230 is not limited to the examples described above and may include any materials which may cool aerosol. For example, the third portion 230 may include a tube filter or a paper pipe including a cavity.

[0093] The fourth portion 240 may include a filter element. For example, the fourth portion 240 may be a cellulose acetate filter. A shape of the fourth portion 240 is not particularly limited. For example, the fourth portion 240 may be a cylindrical-type rod or a tubular-type rod including a hole. Also, the fourth portion 240 may be a recess-type rod. When the fourth portion 240 includes a plurality of segments, at least one of the plurality of segments may be formed to have a different shape from the other segments.

[0094] The fourth portion 240 may be formed to generate spices. For example, a flavored liquid may be injected into the fourth portion 240, or an additional fiber coated with a flavored liquid may be inserted into the fourth portion 240.

[0095] The aerosol generating article 200 may include a wrapper 250 surrounding at least one of the first through fourth portions 210 through 240. Also, the aerosol generating article 200 may include the wrapper 250 surrounding all of the first through fourth portions 210 through 240. The wrapper 250 may be located at an outermost end of the aerosol generating article 200, and the wrapper 250 may include a single wrapper or a combination of a plurality of wrappers.

[0096] For example, the first portion 210 of the aerosol generating article 200 may include a wound wrinkled sheet containing an aerosol generating material, the second portion 220 may include a tobacco sheet as a tobacco material and glycerin as a moisturizer, the third portion 230 may include a paper pipe, and the fourth portion 240 may include

cellulose acetate (CA) fibers. However, the disclosure is not necessarily limited thereto.

[0097] Hereinafter, the fourth portion 240 of the aerosol generating article 200 is described in more detail.

[0098] As described above, the fourth portion 240 may include the filter element, and the filter element may include a CA tow having a denier per filament of 17 to 29 and a total denier of 10,000 to 40,000.

[0099] The CA tow refers to an article formed by appropriately processing CA for forming a filter of the aerosol generating article. That is, the CA tow is CA made as thin fibers, and a thickness of the CA fibers affects physical factors such as the absorption resistance, a rigid circumference, etc. of the aerosol generating article. A CA tow used for a filter of a previous general combustion cigarette may have a denier per filament of 3.0 to 6.0, and a CA tow used for a filter of a common heated cigarette may have a denier per filament of 9.0 in general.

[0100] The CA tow included in the filter element according to an embodiment may have a greater denier per filament and a greater total denier than the CA tow used in the previous general heated cigarette. Due to the increase of the denier per filament of fibers included in the CA tow, the fibers become thicker, and in the case of a tow having thicker fibers, more empty spaces are formed between the fibers than in the case of a tow having thinner fibers, and thus, the absorption resistance and an aerosol removal capacity of the filter may be reduced. Thus, when the filter including the CA tow according to an embodiment is used, the amount of smoke inhaled by a user may be increased.

[0101] Desirably, the CA tow may have a denier per filament of 18 to 23 and a total denier of 15,000 to 35,000. Here, the absorption resistance and the aerosol removal capacity of the filter may be reduced, and at the same time, smoking satisfaction experienced by the user during smoking, with respect to a hitting sense, a harmonious flavor, stimulation, a sense of fulfillment, etc. may be increased.

[0102] According to an embodiment, the fourth portion 240 may include the CA tow of 320 to 510 mg. The fourth portion 240 of the aerosol generating article 200 according to an embodiment may include the CA tow having relatively thick fibers, and thus, even when a greater amount of tow than the previous CA tow having relatively thin fibers is injected, a low absorption resistance may be maintained. Because a relatively greater amount of CA tow may be included in the fourth portion 240 of the aerosol generating article 200, the roundness and the rigidity of the fourth portion 240 may be increased. For example, the fourth portion 240 of the aerosol generating article 200 according to an embodiment may have a roundness that is greater than or equal to 93% and a rigidity that is greater than or equal to 95%.

[0103] The roundness denotes a degree of roundness of a cross-section of the fourth portion 240 and may be measured by a well-known art. For example, the roundness of the cross-section of the fourth portion 240 may be measured by using a comparator, etc. by rotating the fourth portion 240 after supporting the central portion of the fourth portion 240, and an error of a radius may be obtained based on the movement of the measurer.

[0104] The rigidity is a property related to elasticity and resilience of the fourth portion 240 and denotes a degree of resistance to the pressure applied in a vertical direction of the longitudinal direction of the fourth portion 240. In order that a user may easily use an aerosol generating article, with the aerosol generating article maintaining its shape, a predetermined level of rigidity may have to be maintained.

[0105] When the aerosol generating article 200 includes the CA tow that is less than 320 mg, a recess phenomenon in which the CA tow located at the central portion of the cross-section of the fourth portion 240 is recessed in the longitudinal direction of the fourth portion 240 may occur. When the aerosol generating article 200 includes the CA tow that is greater than 510 mg, the amount of CA tow may become excessive, and thus, a wrapping state using the wrapper 250 is inferior or the wrapper 250 is damaged, and a standard deviation of results of repeated measurements of the absorption resistance is too high, and thus, it is difficult to provide the uniform performance.

[0106] A circumference of the cross-section of the fourth portion 240, the cross-section being perpendicular to the longitudinal direction of the aerosol generating article 200, may be 14 to 25 mm. As described above, the aerosol generating article 200 according to an embodiment may include the CA tow having relatively thick fibers, and thus, the rigidity of the aerosol generating article 200 may be improved. The circumferential range described above corresponds to a relatively smaller numerical value compared to a circumference of a cross-section of a general aerosol generating article 200. Even when a thickness, that is, a sectional circumference, of the fourth portion 240 and the aerosol generating article 200 is decreased, the rigidity of the fourth portion 240 and the aerosol generating article 200 may be improved to maintain the shape of the fourth portion 240 and the aerosol generating article 200, and thus, the usability may be secured.

[0107] An absorption resistance of the fourth portion 240 may be 0.5 mmH₂O to 2.5 mmH₂O. The fourth portion 240 of the aerosol generating article 200 according to an embodiment may include the CA tow having relatively thick fibers, and thus, a low absorption resistance may be realized. The corresponding absorption resistance may provide satisfaction to the user by preventing an excessive force from being taken to absorb aerosol when the user uses the aerosol generating article 200. Also, the aerosol generating article 200 according to an embodiment not only may have the low absorption resistance, but also may maintain the rigidity by including the tow including thick fibers, which allows the usability to be secured.

[0108] A tensile strength of the CA tow may be less than about 3.5 kgf, and more desirably, may be equal to or less than about 3.0 kgf. Due to relatively thick fibers of the CA tow according to an embodiment, a yield rate of the CA tow

according to an embodiment may be improved at a tensile strength that is less than about 3.5 kgf. When the tensile strength of the CA tow is equal to or greater than about 3.5 kgf, due to thick fibers, a folding property may become insufficient during a process of crimping the tow, and a mass production may become difficult.

[0109] The second portion 220 may further include an aerosol generating element, wherein the second portion 220 may include the aerosol generating element in 10 weight percent (wt%) or less with respect to a dry weight of an aerosol generating material. Also, the first portion 210 may include the aerosol generating element in 65 to 95 wt% with respect to the dry weight of the aerosol generating material. The filter including the CA tow according to an embodiment may have a low aerosol removal capacity, and thus, even when a relatively small amount of aerosol generating element is included in the first portion 210 and the second portion 220, a sufficient amount of smoke and satisfaction may be provided to the user.

[0110] Because it may be possible to improve the smoking satisfaction of the user during smoking, with respect to a hitting sense, a harmonious flavor, stimulation, fulfillment, etc., the second portion 220 may further include an aerosol generating element, wherein the second portion 220 may include the aerosol generating element in 3 wt% or less with respect to a dry weight of an aerosol generating material. Also, the first portion 210 may include the aerosol generating element in 65 to 80 wt% with respect to the dry weight of the aerosol generating material.

Embodiment 1. A CA tow

[0111] A CA tow having a denier per filament of 20.0 and a total denier of 25,000 is formed.

Embodiment 2. Filters including the CA tow

[0112] Filters including the CA tow of Embodiment 1 are formed under conditions shown in Table 1 below. The formed filters are referred to by Embodiment 2-1, Embodiment 2-2, Embodiment 2-3, and Embodiment 2-4, respectively, according to weights (415 mg, 380 mg, 350 mg, and 506 mg) of the AC tow included in the filters. As a wrapper for forming the filters, a general paper having a basis weight of 75 gsm is used, and as a plasticizer, triacetin is used.

Table 1

Division	Tow weight (mg)	Filter weight (mg)	Circumference (mm)	Quality factor of a cross-section of a filter	Quality factor of an operation
Embodiment 2-1	415	645	21.95	Good	Good
Embodiment 2-2	380	610	22.01	Good	Good
Embodiment 2-3	350	520	21.90	Occurrence of a recess phenomenon	-
Embodiment 2-4	506	676	21.92	Bad	-

[0113] Also, a quality factor of a cross-section of the filter and a quality factor of an operation are evaluated in the process of forming the filter. Here, the quality factor of the cross-section of the filter is a value evaluated with respect to whether the cross-section of the filter is uniformly formed in a process of cutting the filter, and the quality factor of the operation is a value evaluated with respect to whether a wrapping operation using the wrapper in the process of forming the filter is processed well. As shown in Table 2, in the case of Embodiment 2-3 in which the tow weight is 350 mg, a recess phenomenon in which the CA tow in the central portion of the cross-section of the filter is recessed in a longitudinal direction of the filter occurs, and because the amount of injected CA tow is excessively low, the wrapping state using the wrapper is bad. Also, in the case of Embodiment 2-4 in which the tow weight is 506 mg, the filter is not formed to have a uniform cross-section, and because the amount of injected CA tow is excessively high, the wrapping state using the wrapper is bad.

Comparative Embodiment 1. A CA tow

[0114] A common CA tow used for a filter of a heated cigarette is used.

Comparative Embodiment 2. A filter including the CA tow

[0115] A filter including the CA tow of Comparative Embodiment 1 is formed under a condition shown in Table 2 below. Also, like Embodiments 2-1 through 2-4, the quality factor of a cross-section of the filter and the quality factor of an operation in a process of forming the filter are evaluated and described in Table 2 below.

Table 2

Division	Tow weight (mg)	Filterweight (mg)	Circum - ference (mm)	Quality factor of a cross-section of a filter	Quality factor of an operation
Comparative Embodiment 2	330	550	22.00	Good	Good

Experimental Embodiment 1 Assessment of an absorption resistance and the physical performance of the filters including the CA tow

[0116] The absorption resistance, the roundness, and the rigidity of the filters of Embodiments 2-1 through 2-4 and Comparative Embodiment 2 are assessed, and results thereof are indicated in Table 3 below.

Table 3

Division	Absorption resistance (mmH ₂ O)	Roundness (%)	Rigidity (%)
Embodiment 2-1	106.3	92.95	96.8
Embodiment 2-2	88.1	94.92	95.6
Embodiment 2-3	78.4	93.88	-
Embodiment 2-4	151.7	93.53	-
Comparative Embodiment 2	136.7	94.97	95.9

[0117] As shown in Table 3, the absorption resistances of Embodiment 2-1 and Embodiment 2-2 are 106.3 and 88.1 mmH₂O, respectively, which are lower than the absorption resistance of Comparative Embodiment 2. However, the roundness and the rigidity of Embodiment 2-1 and Embodiment 2-2 maintain a similar level to those of Comparative Embodiment 2. Embodiment 2-3 and Embodiment 2-4 have absorption resistances proportional to the weights of the injected tow. Also, as expected from the evaluation of the quality factor of the cross-section of the filter and the quality factor of the operation described above, the roundness is decreased, and the wrapping state using the wrapper is bad, and thus, it is impossible to measure the rigidity.

Experimental Embodiment 2 An analysis of the amount of aerosol fulfillment

[0118] An aerosol generating article is formed by using the filters of Embodiment 2-1, Embodiment 2-2, and Comparative Embodiment 2. The component amounts of nicotine, propylene glycol (PG), glycerin (Gly), and water, either included in aerosol fulfilled through the formed aerosol generating article or remaining in the filters after smoking, are measured, and results of the measurement are substituted in Equation 1 below to calculate removal capacities of the filters.

[Equation 1]

Removal capacity (%) = (the remaining amount in the filter after smoking)/(the amount of fulfillment of aerosol + the remaining amount in the filter after smoking) x 100

[0119] The aerosol generating article is formed as two types to include different configurations from each other, and the results of analysis with respect to the amount of aerosol fulfillment of the formed two types of aerosol generating articles are separately indicated in Table 4 and Table 5 below.

Table 4

Applied filter	The amount of aerosol fulfillment (mg)				The remaining amount in the filter after smoking (mg)			A removal capacity (%)		
	nicotine	PG	Gly	water	nicotine	PG	Gly	nicotine	PG	Gly
Embodi-ment 2-1	0.74	3.13	9.55	25.0	0.67	2.93	3.51	47.7	48.4	26.9
Embodi-ment 2-2	0.79	3.84	12.32	26.8	0.62	2.87	3.44	44.0	42.8	21.8
Comparative Embodiment 2	0.81	4.02	13.73	24.1	0.55	2.33	2.81	40.6	36.7	17.0

[Table 5]

Applied filter	The amount of aerosol fulfillment (mg)				The remaining amount in the filter after smoking (mg)			A removal capacity (%)		
	nicotine	PG	Gly	water	nicotine	PG	Gly	nicotine	PG	Gly
Embodi - ment 2-1	0.62	2.46	8.60	20.1	0.52	3.57	5.49	45.7	59.2	38.9
Embodi - ment 2-2	0.66	2.79	9.30	21.7	0.49	3.49	5.21	44.2	55.6	35.9
Comparative Embodiment 2	0.74	2.90	9.67	22.5	0.46	3.31	4.83	38.1	53.3	33.3

[0120] As shown in Table 4 and Table 5, compared to the aerosol generating article using the filter of Comparative Embodiment 2, the aerosol generating article using the filters of Embodiment 2-1 and Embodiment 2-2 generally has the improved amount of aerosol fulfillment.

Experimental Embodiment 3. Sensory evaluation of the aerosol generating article

[0121] A sensory evaluation using the aerosol generating articles including the filters of Embodiment 2-1 and Comparative Embodiment 2-2 is performed on 20 adults. The aerosol generating article is formed as two types like the case of Experimental Embodiment 2. The sensory evaluation is performed on the total 6 factors including a hitting sense, a force taken for absorbing smoke, a harmonious flavor, the amount of smoke, stimulation, and satisfaction, and a score for each item is recorded after a single use of an aerosol generating device into which the aerosol generating article is inserted. An average value of each item is indicated in Table 6 and Table 7 below according to the type of aerosol generating article.

Table 6

Evaluation item	Embodiment 2-1	Comparative Embodiment 2
Hitting sense	4.6	4.8
Force taken for absorbing smoke	4.2	4.3
Harmonious flavor	4.625	4.675
The amount of smoke	5.625	5.3
Stimulation	4.075	4.525
Satisfaction	5.1	5.0

[Table 7]

Evaluation item	Embodiment 2-1	Comparative Embodiment 2
Hitting sense	4.275	4.275
Force taken for absorbing smoke	3.225	3.75
Harmonious flavor	4.575	4.55
The amount of smoke	6.0	5.6
Stimulation	4.35	4.125
Satisfaction	4.975	5.15

[0122] As shown in Table 6 and Table 7, the aerosol generating article including the filter of Embodiment 2-1 provides the greater amount of smoke than the aerosol generating article including the filter of Comparative Embodiment 2, and takes a less amount of force for absorbing smoke than the aerosol generating article including the filter of Comparative Embodiment 2.

[0123] Those of ordinary skill in the art related to the present embodiments may understand that various changes in form and details can be made therein without departing from the scope of the characteristics described above. Therefore, the disclosed methods should be considered in a descriptive point of view, not a restrictive point of view. The scope of the present disclosure is defined by the appended claims rather than by the foregoing description, and all differences within the scope of equivalents thereof should be construed as being included in the present disclosure.

Claims

1. An aerosol generating article comprising:

a first portion including an aerosol generating material impregnated with an aerosol generating element;
a second portion including a tobacco element;
a third portion including a cooling element; and
a fourth portion including a filter element,
wherein the first portion, the second portion, the third portion, and the fourth portion are sequentially arranged in a longitudinal direction of the aerosol generating article, and
the filter element includes a cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

2. The aerosol generating article of claim 1, wherein the cellulose acetate tow has a denier per filament of about 18 to about 23 and a total denier of about 15,000 to about 35,000.

3. The aerosol generating article of claim 1, wherein the fourth portion includes about 320 mg to about 510 mg of the cellulose acetate tow.

4. The aerosol generating article of claim 1, wherein a circumference of a cross-section of the fourth portion, the cross-section being perpendicular to the longitudinal direction of the aerosol generating article, is about 14 mm to about 25 mm.

5. The aerosol generating article of claim 1, wherein an absorption resistance of the fourth portion is about 0.5 mmH₂O to about 2.5 mmH₂O.

6. The aerosol generating article of claim 1, wherein the second portion further includes the aerosol generating element, and
the second portion includes the aerosol generating element in about 10 weight percent (wt%) or less with respect to a dry weight of the aerosol generating material.

7. The aerosol generating article of claim 1, wherein the first portion includes the aerosol generating element in about 65 to about 95 weight percent (wt%) with respect to a dry weight of the aerosol generating material.

8. A filter included in an aerosol generating article, the filter comprising:
a cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

5 9. The filter of claim 8, wherein the cellulose acetate tow has a denier per filament of about 18 to about 23 and a total denier of about 15,000 to about 35,000.

10. The filter of claim 8, wherein the filter includes about 350 mg to about 510 mg of the cellulose acetate tow.

10 11. The filter of claim 8, wherein a circumference of a cross-section of the filter, the cross-section being perpendicular to a longitudinal direction of the filter, is about 14 mm to about 25 mm.

12. The filter of claim 8, wherein an absorption resistance of the filter is about 0.5 mmH₂O to about 2.5 mmH₂O.

15 13. A cellulose acetate tow having a denier per filament of about 17 to about 29 and a total denier of about 10,000 to about 40,000.

14. The cellulose acetate tow of claim 13, wherein the cellulose acetate tow has a denier per filament of about 18 to about 23 and a total denier of about 15,000 to about 35,000.

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FIG. 1

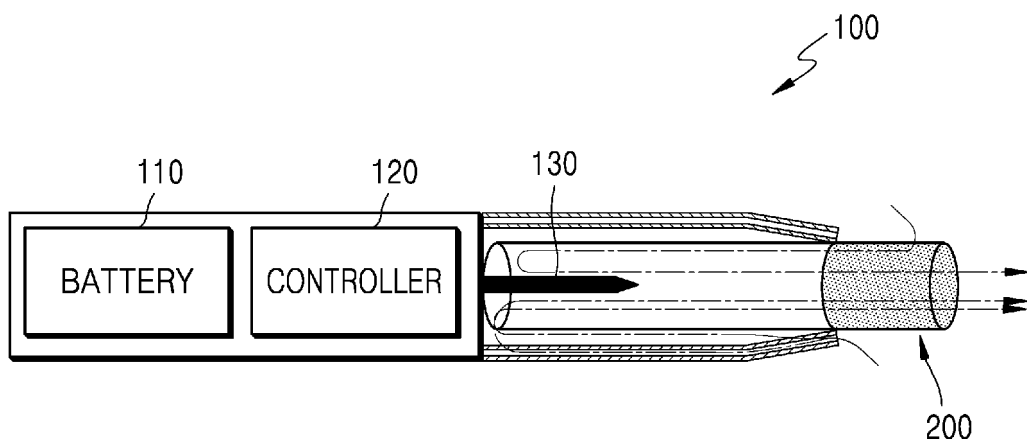


FIG. 2

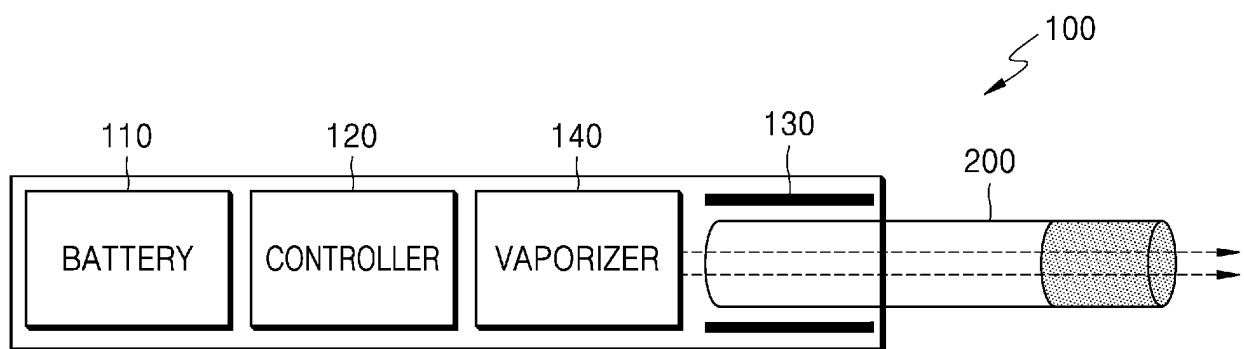


FIG. 3

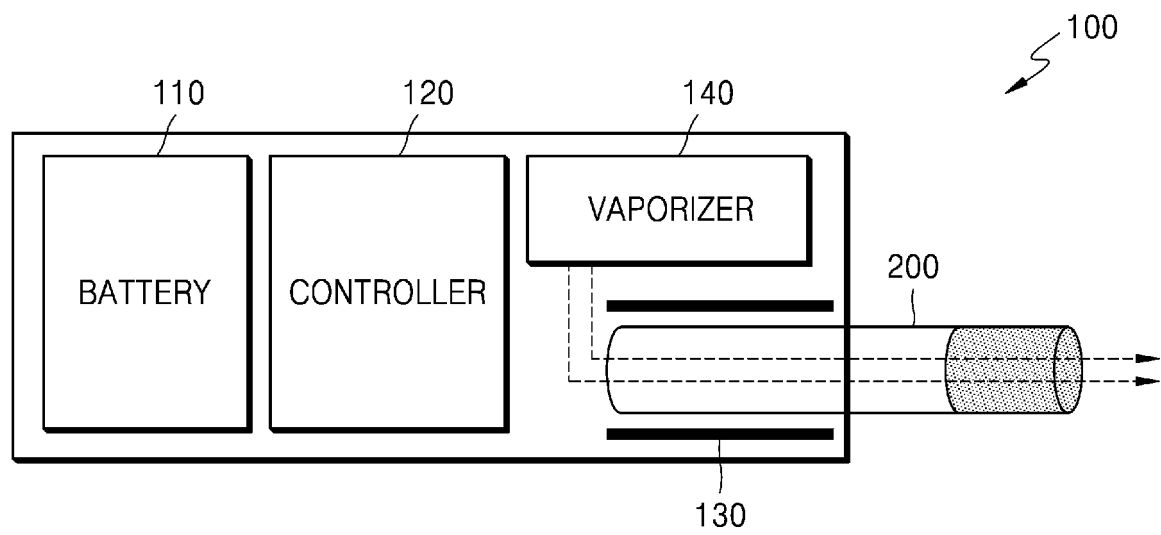


FIG. 4

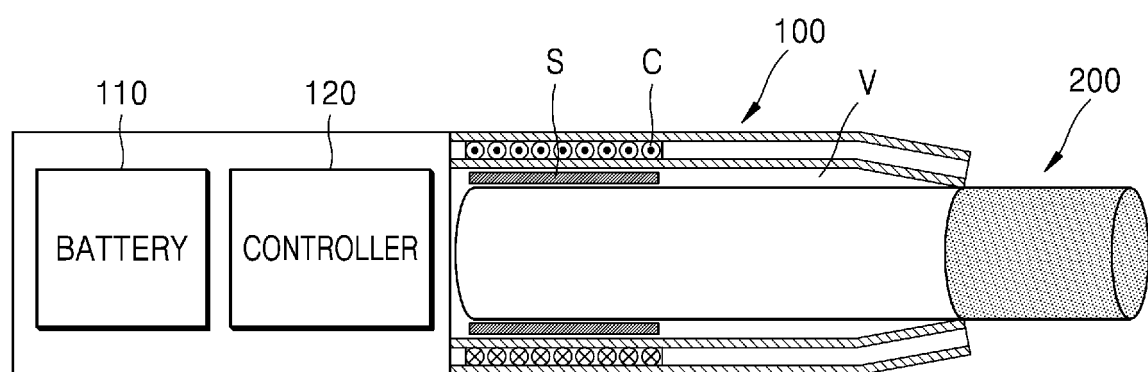
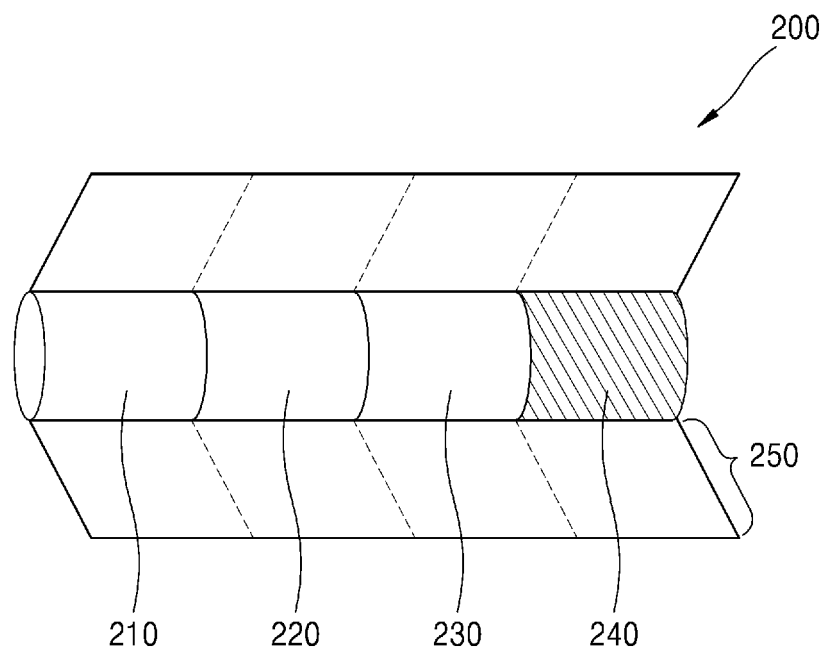


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2021/014479

A. CLASSIFICATION OF SUBJECT MATTER

A24D 1/04(2006.01)i; A24D 1/20(2020.01)i; A24D 3/10(2006.01)i; A24D 3/17(2020.01)i; A24D 3/06(2006.01)i;
A24D 3/04(2006.01)i; A24D 3/02(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)

A24D 1/04(2006.01); A24B 15/16(2006.01); A24B 15/167(2020.01); A24D 3/02(2006.01); A24D 3/04(2006.01);
A24D 3/10(2006.01); A24F 47/00(2006.01); B65B 27/12(2006.01)

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

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

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

eKOMPASS (KIPO internal) & keywords: 에어로졸(aerosol), 필터(filter), 필라멘트(filament), 데니어(denier)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2020-0047672 A (ACETATE INTERNATIONAL LLC) 07 May 2020 (2020-05-07) See claims 1-7; and paragraphs [0013]-[0082].	8,9,11-14
Y		1-7,10
Y	KR 10-2020-0061098 A (KT & G CORPORATION) 02 June 2020 (2020-06-02) See paragraphs [0047]-[0076]; and figure 4.	1-7,10
A	KR 10-2016-0069064 A (TORAY CHEMICAL KOREA INC.) 16 June 2016 (2016-06-16) See entire document.	1-14
A	KR 10-2020-0024926 A (BRITISH AMERICAN TOBACCO INVESTMENTS LTD) 09 March 2020 (2020-03-09) See entire document.	1-14

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

24 January 2022

Date of mailing of the international search report

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Name and mailing address of the ISA/KR

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Form PCT/ISA/210 (second sheet) (July 2019)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2021/014479

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT
Information on patent family members

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		RU 2019136878 A3	29 September 2021
		WO 2018-224679 A1	13 December 2018

Form PCT/ISA/210 (patent family annex) (July 2019)