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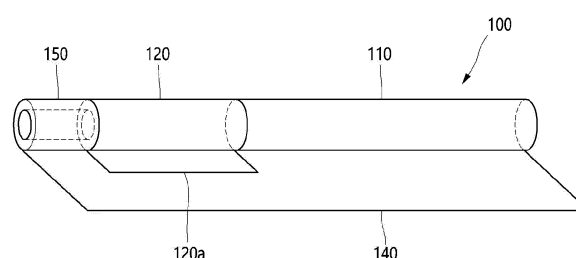
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(54) **NOVEL CIGARETTE FILTER CONTAINING HUMECTANT**

(57) The present disclosure provides a cigarette filter including lyocell tow including a bundle of lyocell fibers, a moisturizer, and a binder, a smoking article including the cigarette filter, and a method of producing the cigarette filter.

FIG. 1



Description

[Technical Field]

5 **[0001]** The present disclosure relates to a novel cigarette filter containing a moisturizer and a smoking article to which the novel cigarette filter is applied.

[Background Art]

10 **[0002]** The related art utilizes technologies such as adding a moisturizer to a cigarette filter to enhance vapor production which is one factor that determines the smoking satisfaction. However, since the moisturizer releases steam at high temperatures, and cellulose acetate (CA) which is a conventionally-used cigarette filter material has a characteristic of being dissolved at high temperatures, there is a disadvantage that simultaneously applying the moisturizer and CA for use is difficult.

15 **[0003]** Accordingly, in order to address the above problem, a paper filter which utilizes base paper and to which a moisturizer such as glycerin or propylene glycol is added to increase an amount of aerosol during smoking has been used in place of a CA cigarette filter in some cases.

[0004] However, even in the case of the paper filter to which a moisturizer is added, the following specific problems occur.

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- i) An off-flavor peculiar to paper is generated in a case in which base paper is used.
 - ii) At least two weeks is required for a filter conditioning period.
 - iii) Due to characteristics of utilizing base paper and crimped paper, it is difficult to implement uniform resistance to draw.
 - 25 iv) An exterior of a cross-section of the filter is not aesthetically pleasing due to the filter being produced by utilizing crimped paper.

[Disclosure]

30 [Technical Problem]

[0005] In order to overcome the problems and/or limitations of the related art, the present disclosure is directed to providing a novel cigarette filter containing a moisturizer and/or a smoking article including the novel cigarette filter in which, in place of a cellulose acetate filter or a paper filter, a cigarette filter utilizing lyocell fibers is applied and the cigarette filter is produced by adding a moisturizer.

35 **[0006]** However, objectives to be achieved by the present disclosure are not limited to that mentioned above, and other unmentioned objectives should be clearly understood by those of ordinary skill in the art from the description below.

[Technical Solution]

40 **[0007]** One aspect of the present disclosure provides a cigarette filter including lyocell tow including a bundle of lyocell fibers, a moisturizer, and a binder.

[0008] Another aspect of the present disclosure provides a smoking article including a tobacco medium portion, a filter portion, and a wrapper, wherein the filter portion includes lyocell tow including lyocell fibers, a moisturizer, and a binder, the moisturizer includes one or more of propylene glycol (PG) and glycerin, and the moisturizer and the binder are dispersed in the lyocell tow by a brush type or spray type method.

45 **[0009]** Still another aspect of the present disclosure provides a method of producing a cigarette filter, the method including: preparing lyocell tow including a bundle of lyocell fibers (S1); mixing a moisturizer and a binder to prepare a mixed solution (S2); and dispersing the mixed solution in the lyocell tow (S3), wherein the moisturizer includes one or more of propylene glycol (PG) and glycerin, the binder includes one or more selected from the group consisting of hydroxypropyl methylcellulose (HPMC), hydroxypropyl cellulose (HPC), ethyl cellulose (EC), methyl cellulose (MC), carboxymethyl cellulose (CMC), polyvinylpyrrolidone (PVP), polyvinyl alcohol (PVA), ethylene vinyl acetate (EVA), polyvinyl acetate (PVAc), starch, dextrin, and a polyester-based binder, the polyester-based binder includes one or more selected from the group consisting of a C5-C12 alkylene, C5-C12 arylene, and C5-C12 hetero-arylene, and the operation

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55 (S3) includes dispersing the mixed solution in the lyocell tow by a brush type or spray type method.

[Advantageous Effects]

[0010] According to one aspect of the present disclosure, since lyocell fibers having a cellulose network structure are formed into tow to form a filter rod for application to a cigarette filter, there are advantageous effects that it is similar to the production of a cellulose acetate (CA) filter, the exterior of the produced filter is aesthetically pleasing, and an off-flavor of base paper is not generated. Also, compared to a paper filter, the filter produced through the formation of lyocell fibers into tow has less variation in resistance to draw and thus exhibits uniform resistance to draw.

[0011] Further, since lyocell is hydrophilic, and thin lyocell tow is made of fibers and has a high specific surface area, there are advantages that, compared to a paper filter, a hydrophilic moisturizer is more rapidly absorbed and resistance to draw is stabilized. Also, unlike CA, lyocell has no glass transition temperature (T_g) and allows the shape of the filter rod to be preserved even at high temperatures of 300 °C or higher at which a moisturizer releases steam, and thus there is an advantageous effect that the lyocell material can be used in combination with a moisturizer.

[0012] Advantageous effects of the present disclosure are not limited to those mentioned above and should be understood as including all advantageous effects inferable from the detailed description of the present disclosure or the configuration of the disclosure stated in the claims.

[Description of Drawings]

[0013]

FIG. 1 is a view illustrating a schematic configuration of a non-combustion heating type smoking article including a filter according to one embodiment of the present disclosure.

FIG. 2 is a view illustrating a schematic configuration of a combustion-type smoking article including the filter according to one embodiment of the present disclosure.

[Modes of the Invention]

[0014] Hereinafter, embodiments will be described in detail with reference to the accompanying drawings. However, various changes may be made to the embodiments, and thus, the scope of rights of the application is not limited or restricted by the embodiments. All changes, equivalents, or substitutes relating to the embodiments should be understood as belonging to the scope of rights of the application.

[0015] Terms used in the embodiments are used for description purposes only and should not be construed as limiting. A singular expression includes a plural expression unless the context clearly indicates otherwise. In the application, terms such as "include" or "have" should be understood as indicating the presence of features, numbers, steps, operations, elements, parts, or combinations thereof and not excluding the possibility of the presence or addition of one or more other features, numbers, steps, operations, elements, parts, or combinations thereof in advance.

[0016] Unless otherwise defined, all terms including technical or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the embodiments pertain. Terms, such as those defined in commonly used dictionaries, should be construed as having a meaning that is consistent with their meaning in the context of the relevant art and are not to be construed in an idealized or overly formal sense unless expressly so defined herein.

[0017] Also, in giving descriptions with reference to the accompanying drawings, the same reference numerals are assigned to the same components wherever possible even when the components are illustrated in different drawings, and repeated description thereof will be omitted. In describing the embodiments, when detailed description of a known related art is determined as having the possibility of unnecessarily obscuring the gist of the embodiments, the detailed description thereof will be omitted.

[0018] Also, in describing components of the embodiments, terms such as first, second, A, B, (a), and (b) may be used. Such terms are only for distinguishing one component from another component, and the essence, order, sequence, or the like of the corresponding component is not limited by the terms.

[0019] A component including a common function with a component included in any one embodiment will be described using the same name in another embodiment. Unless the context clearly indicates otherwise, description made in any one embodiment may apply to another embodiment and detailed description will be omitted in a repeated range.

[0020] In this specification, a "smoking article" may refer to anything capable of generating an aerosol, such as tobacco (cigarette) and cigars. The smoking article may include an aerosol-generating material or an aerosol-forming substrate. Also, the smoking article may include a solid material based on tobacco raw materials, such as reconstituted tobacco leaves, cut tobacco leaves, and reconstituted tobacco. A smoking material may include a volatile compound.

[0021] Also, in this specification, "upstream" or "upstream direction" refers to a direction moving away from an oral region of a user smoking a smoking article 100, and "downstream" or "downstream direction" refers to a direction

approaching the oral region of the user smoking the smoking article 100. For example, in the smoking article 100 illustrated in FIG. 1, a tobacco medium portion 120 is disposed upstream or in an upstream direction of a cigarette filter 110.

[0022] Further, in the specification, even when only one of a case in which the smoking article 100 is a combustion-type cigarette and a case in which the smoking article 100 is a non-combustion heating type cigarette used along with an aerosol generation device (not illustrated), such as an electronic cigarette device, is described as an example, the present disclosure is not limited thereto and may include both of the above concepts.

[0023] One embodiment of the present disclosure provides a cigarette filter including lyocell tow including a bundle of lyocell fibers, a moisturizer, and a binder.

[0024] In a case in which the cigarette filter of the present disclosure includes the moisturizer, the type of moisturizer may include one or more of propylene glycol (PG) and glycerin. By including the moisturizer, vapor production may be more effectively enhanced as compared to the conventional smoking articles, and a user's smoking satisfaction may be further improved.

[0025] The content of the moisturizer included in the cigarette filter may be, based on the length of the cigarette filter, 1 mg to 5 mg per 1 mm of the filter or may be 3 mg to 5 mg per 1 mm of the filter.

[0026] Meanwhile, unlike the above, the content of the moisturizer may be shown based on the weight of the lyocell tow and may be 0.1 mg to 0.5 mg per 1 mg of the lyocell tow.

[0027] In a case in which the content of the moisturizer is less than the above lower limits, an effect of enhancing vapor production by adding a moisturizer may be insignificant, and in a case in which the content of the moisturizer exceeds the above upper limits, the moisturizer may leak after the filter is produced and contaminate a package of the filter while the filter is supplied.

[0028] As a framework (support structure) forming the cigarette filter of the present disclosure, the lyocell tow including the bundle of lyocell fibers may be included, and the binder serves to connect a plurality of fiber bundles and tow made thereof which form the framework.

[0029] In the case of a filter made of cellulose acetate (CA) which has been commonly used as a support structure of the conventional cigarette filters, when a moisturizer such as glycerin mentioned above is added, there is a problem that the CA material is dissolved at high temperature. In particular, in a case in which the CA filter is heated at a temperature of 200 °C or higher as in an electronic cigarette, there are disadvantages that the CA filter material containing a moisturizer melts and causes a damping phenomenon (CA begins melting at a temperature in a range of 80 °C to 90 °C) and affects the exterior and sensory characteristics of the filter. In particular, in a case in which 2 mg of glycerin (moisturizer) is added per 1 mm of the CA filter, similar to the lyocell filter of the present disclosure, there is a problem that a liquid leaks onto a filter cardboard tray.

[0030] Also, in addition to the CA filter, base paper may be utilized as a support structure of a cigarette filter, but there are problems that an off-flavor peculiar to the base paper is generated, and at least two weeks is separately required for a filter conditioning period. Also, because a paper filter is produced by utilizing crimped paper, there are disadvantages that it is difficult to implement uniform resistance to draw as compared to the CA filter or the lyocell filter, and an exterior of a cross-section of the filter is not aesthetically pleasing.

[0031] On the other hand, the lyocell tow included in the cigarette filter according to one embodiment of the present disclosure is made of a bundle of hydrophilic lyocell fibers and has a high specific surface area, thus not only having an advantage that a hydrophilic moisturizer can be rapidly absorbed, but also, due to a characteristic of not melting even at high temperatures, maintaining the shape of the filter rod even at high temperatures at which the moisturizer is vaporized, implementing uniform resistance to draw (small variation in the resistance to draw), and not causing problems such as an off-flavor of the paper filter. Therefore, the cigarette filter according to one embodiment of the present disclosure is more suitable as a cigarette filter containing a moisturizer, compared to the filters made of other fiber materials.

[0032] In the present disclosure, specifically, the binder which serves to connect the plurality of fiber bundles and the tow made thereof may include one or more selected from the group consisting of hydroxypropyl methylcellulose (HPMC), hydroxypropyl cellulose (HPC), ethyl cellulose (EC), methyl cellulose (MC), carboxymethyl cellulose (CMC), polyvinylpyrrolidone (PVP), polyvinyl alcohol (PVA), ethylene vinyl acetate (EVA), polyvinyl acetate (PVAc), starch, dextrin, and a polyester-based binder, and here, the polyester-based binder may include one or more selected from the group consisting of a C5-C12 alkylene, C5-C12 arylene, and C5-C12 hetero-arylene.

[0033] Further, in addition to the tow including the fiber bundles and the binder, the filter according to one embodiment of the present disclosure may further include triethyl citrate (TEC) to enhance a tobacco taste or further include an emulsifier or the like to address a layer separation phenomenon in a mixed solution of the moisturizer and the binder during the production of the filter. In a case in which the layer separation phenomenon is addressed by the emulsifier or the like, the mixed solution can be more homogeneously sprayed on the lyocell tow.

[0034] The TEC may be included at 3 wt% to 7 wt% with respect to the weight of the lyocell tow constituting the cigarette filter, and as a specific type of emulsifier, one or more of a fatty acid carboxyl-based compound, a sorbitan ester-based compound, a sorbate-based compound, and an ethoxy-based compound may be used.

[0035] Meanwhile, the addition of the moisturizer such as PG and glycerin may be realized by homogeneously dispersing the solution including the moisturizer and the binder in the lyocell tow.

[0036] In this case, the dispersion of the solution may be performed by a brush type or spray type method, but the present disclosure is not limited thereto. For example, the moisturizer solution may be homogeneously sprayed onto a lyocell surface as when adding a plasticizer to general CA tow, or one-fluid and two-fluid sprays may be applied. In this way, various spraying methods may be utilized. Meanwhile, the brush type refers to a liquid spraying method in which a liquid is bounced through rotation of a brush roller, and the spray type refers to a method in which a liquid is sprayed using a spray nozzle method. Meanwhile, for preventing fume formation and more homogeneously spraying the solution, the brush-type spraying method may be more suitable.

[0037] Another embodiment of the present disclosure may provide a smoking article including a tobacco medium portion, a filter portion, and a wrapper, wherein the filter portion includes lyocell tow including lyocell fibers, a moisturizer, and a binder, the moisturizer includes one or more of propylene glycol (PG) and glycerin, and the moisturizer and the binder are dispersed in the lyocell tow by the brush type or spray type method.

[0038] In this case, the filter portion may be divided into two or more segments. The filter portion may be divided into a first segment, a second segment, and the like, and as long as one of the two or more segments includes the cigarette filter according to one embodiment of the present disclosure including the moisturizer and the lyocell tow, regardless of where the one segment is disposed, the filter portion may be included within the scope of the smoking article of the present disclosure.

[0039] For example, referring to FIG. 1, the cigarette filter 110 may be disposed at a rear end of the tobacco medium portion 120 and may be made of a single segment or made of a plurality of segments (not illustrated). In a case in which the cigarette filter 110 is divided into a plurality of segments such as a first segment and a second segment, the first segment of the filter portion may include a cooling material and cool an aerosol generated as the tobacco medium portion is heated and allow a user to inhale the aerosol cooled to a suitable temperature.

[0040] Also, in addition to the cigarette filter 110 disposed at a lower end of the tobacco medium portion 120, the smoking article 100 according to one embodiment of the present disclosure may include a front end plug 150 disposed at an upper end of the tobacco medium portion 120. The front end plug 150 may serve to prevent a tobacco rod from falling to the outside or prevent a liquefied aerosol from flowing into an aerosol generation device from the tobacco rod during smoking and may be made of the cigarette filter according to one embodiment of the present disclosure.

[0041] Further, the tobacco medium portion constituting the smoking article may include a tobacco material including nicotine such as tobacco leaves and may further include an excipient such as a binder or other additives. As an example, a tobacco medium included in the tobacco medium portion of the present disclosure may be produced in the form of granules including the tobacco material, the excipient, and the like.

[0042] In the present disclosure, the tobacco material is a material forming an aerosol-generating substrate and may be pieces of tobacco leaves, tobacco stems, tobacco powder generated while processing tobacco, and/or strips of tobacco leaves. The tobacco leaves may be at least one or more selected from bright tobacco leaves, burley tobacco leaves, oriental tobacco leaves, cigar tobacco leaves, and toasted tobacco leaves, but the present disclosure is not limited thereto.

[0043] Also, the wrapper constituting the smoking article may be produced using cigarette paper configured to wrap around the tobacco medium portion or filter wrapping paper configured to wrap around the filter portion. One or more perforations may be selectively formed in a circumferential direction in a tipping wrapper configured to combine the tobacco medium portion and the filter portion in order to allow outside air to enter or an internal gas to exit. In this way, there are advantageous effects that an air dilution rate of a cigarette can be increased, and the amount of delivered mainstream smoke components can be controlled.

[0044] The smoking article according to one embodiment of the present disclosure may correspond to a combustion-type or non-combustion heating type smoking article, and in a case in which the smoking article is the non-combustion heating type smoking article, the smoking article may be separately inserted into an aerosol generation device. Here, the aerosol generation device includes an accommodating groove in which an aerosol-generating article may be accommodated and may further include, in addition to the accommodating groove, a heater configured to heat the aerosol-generating article to generate an aerosol, a controller configured to control the overall operation of the aerosol generation device, a battery configured to provide power used in the operation of the aerosol generation device, and a detector configured to detect the insertion of the aerosol-generating article into the aerosol generation device. The existing aerosol generation devices generally heat a smoking article to 200 °C or higher using an internal/external heating method. In this regard, it may be more desirable in terms of effectiveness when the smoking article according to one embodiment of the present disclosure is the non-combustion heating type smoking article.

[0045] Meanwhile, one embodiment of the present disclosure provides a cigarette filter production method including: preparing lyocell tow including a bundle of lyocell fibers (S1); mixing a moisturizer and a binder to prepare a mixed solution (S2); and dispersing the mixed solution in the lyocell tow (S3).

[0046] The moisturizer and the binder used here may be substantially the same as the moisturizer and the binder

included in the cigarette filter which has been described in detail above, and a method of dispersing the mixed solution in the operation (S3) may also be the brush type or spray type method described above.

[0047] Hereinafter, the configurations of the present disclosure and the advantageous effects according thereto will be described in more detail using examples and comparative examples. However, the examples are merely for describing the present disclosure in more detail, and the scope of the present disclosure is not limited by the examples.

Examples

(1) Production Example: Production of liquid lyocell filter

[0048] A mixed solution was prepared by mixing glycerin as a moisturizer, hydroxypropyl methylcellulose (HPMC) as a binder, and triethyl citrate. Then, the mixed solution was directly sprayed on lyocell tow including a bundle of lyocell fibers using a spray liquid spraying method through rotation of a brush roller of a filter production machine (Sanjo or Hauni method). Then, the lyocell tow on which the mixed solution had been sprayed was wrapped with wrapping paper to form a filter rod.

[0049] In this way, a lyocell filter of the present disclosure including 3 mg of moisturizer per mm of the filter was produced.

(2) Experimental Example 1: Evaluation and Comparison of Physical Properties of Liquid Lyocell Filter and Liquid Paper Filter

[0050] A liquid lyocell filter was produced in the same manner as in the above production example except that the content of glycerin as a moisturizer was varied as shown in Table 1 below. Even for a paper filter, a liquid paper filter was produced by varying the content of glycerin as a moisturizer.

[0051] Physical properties of the produced filters were evaluated, and the results are shown in Table 1 below.

[Table 1]

Information	Weight (mg)	Amount of added glycerin per filter length (mg/mm)	Amount of added glycerin per filter weight (mg of glycerin/mg of tow)	Circumference (mm)	Resistance to draw (mmH ₂ O)	Filter conditioning period
Liquid paper filter	750	0	0	22.06	120	-
	1050	5	0.29	22.06	230	2 weeks
Liquid lyocell filter	301.7	0	0.00	22.02	243.3	-
	361.7	1	0.17		275.6	1 week
	481.7	3	0.37		302.3	
	601.7	5	0.50		358.1	

[0052] (The "Weight (mg)" indicates the weight of the tow excluding filter wrapping paper added to one filter.)

[0053] As shown in Table 1 above, compared to the control (liquid paper filter), the liquid lyocell filter had an effect of shortening a filter conditioning period. Further, it can be seen that the lyocell filter had an effect of holding a higher glycerin content than the paper filter when glycerin was added per filter weight.

[0054] Also, in the case of the liquid paper filter, an increase in the resistance to draw was 110 mmH₂O (an increase rate of 92%) when glycerin was added in an amount of 0.29 mg/mg as compared to when glycerin was added in an amount of 0 mg/mg. On the other hand, in the case of the liquid lyocell filter, even when the amount of added glycerin was 0.37 mg/mg which was greater than in the liquid paper filter, an increase in the resistance to draw was only 59 mmH₂O (an increase rate of 24%) as compared to when the amount of added glycerin was 0 mg/mg. Thus, it can be confirmed that, compared to the liquid paper filter, the liquid lyocell filter can implement more uniform resistance to draw even when a moisturizer is added.

(3) Experimental Example 2: Sensory Evaluation according to Application of Liquid Lyocell Filter

[0055] The inventors of the present disclosure created an internal panel of ten KT&G R&D members to carry out a sensory evaluation on a tobacco smoke taste intensity, vapor production, irritation, an off-flavor, draw effort, and an

overall tobacco taste for smoking articles produced using the liquid paper filter including 5 mg of moisturizer per filter length (mm) (control) and the liquid lyocell filter produced according to the above production example (Example 1) (based on a scale of 7 points) (Table 2).

[0056] For the control and Example 1, experiments were conducted to compare cases in which the amount of glycerin added per tow weight was similar as much as possible (0.29 mg/mg vs. 0.37 mg/mg).

Table 2

Evaluation score	Tobacco smoke taste intensity	Vapor production	Irritation	Off-flavor	Effort to draw smoke	Overall tobacco taste
Liquid paper filter (control)	4.1	4.0	3.8	3.7	3.2	3.5
Liquid lyocell filter (Example 1)	3.8	3.8	3.5	3.0	3.5	3.8

[0057] As shown in Table 2 above, it can be confirmed that, compared to the smoking article produced using the liquid paper filter of the control, the smoking article produced using the liquid lyocell filter of Example 1 showed a similar level of vapor production but had less irritation or off-flavor and had a better overall tobacco taste. Thus, it can be seen that the liquid lyocell filter is more suitable than the conventional liquid paper filter, in terms of functioning as a cigarette filter containing a moisturizer.

[0058] The embodiments have been described above using only some drawings, but those of ordinary skill in the art may apply various technical modifications and changes based on the above. For example, appropriate results may be achieved even when operations described herein are performed in a different order from the method described herein, and/or components such as a system, a structure, a device, and a circuit described herein are coupled or combined in different forms from the method described herein or replaced or substituted with other components or their equivalents.

[0059] Therefore, other implementations, other embodiments, and those equivalent to the claims below fall within the scope of the claims.

Claims

1. A cigarette filter comprising:

lyocell tow including a bundle of lyocell fibers;
a moisturizer; and
a binder.

2. The cigarette filter of claim 1, wherein the moisturizer includes one or more of propylene glycol (PG) and glycerin.

3. The cigarette filter of claim 1, wherein the moisturizer and the binder are dispersed in the lyocell tow by a brush type or spray type method.

4. The cigarette filter of claim 1, wherein:

the binder includes one or more selected from the group consisting of hydroxypropyl methylcellulose (HPMC), hydroxypropyl cellulose (HPC), ethyl cellulose (EC), methyl cellulose (MC), carboxymethyl cellulose (CMC), polyvinylpyrrolidone (PVP), polyvinyl alcohol (PVA), ethylene vinyl acetate (EVA), polyvinyl acetate (PVAc), starch, dextrin, and a polyester-based binder; and
the polyester-based binder includes one or more selected from the group consisting of a C5-C12 alkylene, C5-C12 arylene, and C5-C12 hetero-arylene.

5. The cigarette filter of claim 1, further comprising one or more emulsifiers among a fatty acid carboxyl-based compound, a sorbitan ester-based compound, a sorbate-based compound, and an ethoxy-based compound.

6. The cigarette filter of claim 1, further comprising triethyl citrate.
7. The cigarette filter of claim 6, wherein a content of the triethyl citrate is 3 wt% to 7 wt% with respect to a weight of the lyocell tow constituting the cigarette filter.
8. The cigarette filter of claim 1, wherein a content of the moisturizer is 1 mg to 5 mg per length (mm) of the cigarette filter.
9. The cigarette filter of claim 1, wherein a content of the moisturizer is 0.1 mg to 0.5 mg per weight (mg) of the lyocell tow.
10. A smoking article comprising:
 - a tobacco medium portion;
 - a filter portion; and
 - a wrapper,wherein the filter portion includes lyocell tow including lyocell fibers, a moisturizer, and a binder, the moisturizer includes one or more of propylene glycol (PG) and glycerin, and the moisturizer and the binder are dispersed in the lyocell tow by a brush type or spray type method.
11. The smoking article of claim 10, wherein:
 - the filter portion is divided into two or more segments; and
 - one or more of the two or more segments include the lyocell tow including a bundle of the lyocell fibers, the moisturizer, and the binder.
12. The smoking article of claim 10, wherein the smoking article is a non-combustion heating type smoking article.
13. A method of producing a cigarette filter, the method comprising:
 - preparing lyocell tow including a bundle of lyocell fibers (S 1);
 - mixing a moisturizer and a binder to prepare a mixed solution (S2); and
 - dispersing the mixed solution in the lyocell tow (S3),wherein the moisturizer includes one or more of propylene glycol (PG) and glycerin, the binder includes one or more selected from the group consisting of hydroxypropyl methylcellulose (HPMC), hydroxypropyl cellulose (HPC), ethyl cellulose (EC), methyl cellulose (MC), carboxymethyl cellulose (CMC), polyvinylpyrrolidone (PVP), polyvinyl alcohol (PVA), ethylene vinyl acetate (EVA), polyvinyl acetate (PVAc), starch, dextrin, and a polyester-based binder, the polyester-based binder includes one or more selected from the group consisting of a C5-C12 alkylene, C5-C12 arylene, and C5-C12 hetero-arylene, and the operation (S3) includes dispersing the mixed solution in the lyocell tow by a brush type or spray type method.
14. The method of claim 13, wherein one or more emulsifiers among a fatty acid carboxyl-based compound, a sorbitan ester-based compound, a sorbate-based compound, and an ethoxy-based compound and triethyl citrate are additionally mixed in the mixed solution of the operation (S2).

FIG. 1

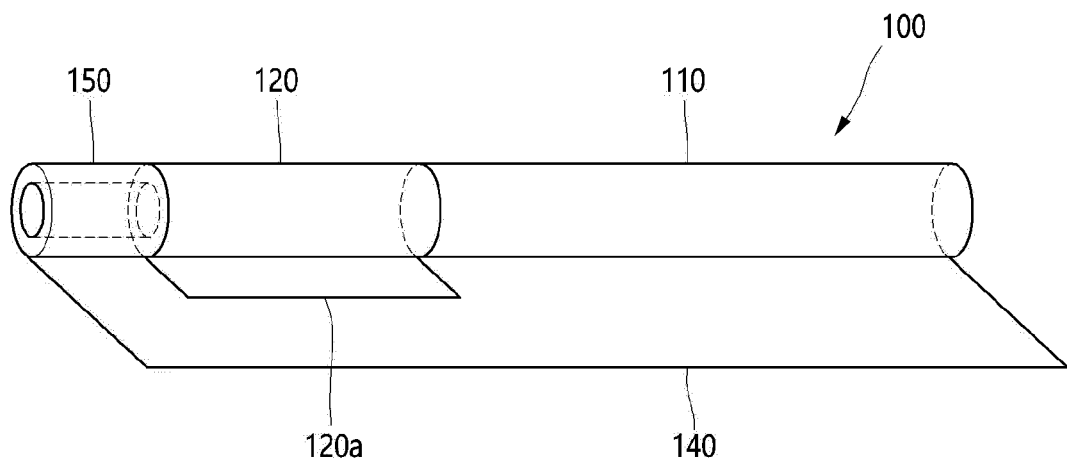
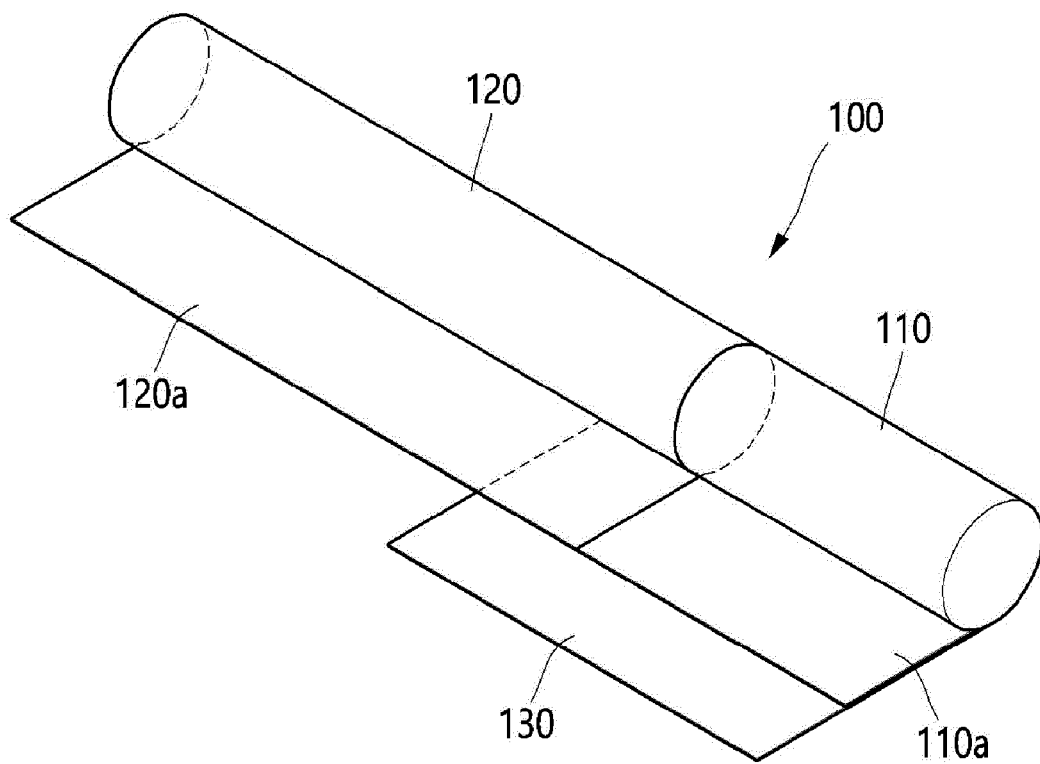


FIG. 2



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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A24D 1/04(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 3/06(2006.01); A24D 3/02(2006.01); A24D 3/04(2006.01); A24D 3/08(2006.01); A24F 47/00(2006.01)

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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: 담배(cigarette), 필터(filter), 라이오셀(lyocell), 섬유(fiber), 토우(tow), 보습제 (moisturizer), 바인더(binder)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2016-0048738 A (KT & G CORPORATION et al.) 04 May 2016 (2016-05-04) See paragraphs [0032]-[0034]; claims 1, 3, 7 and 15; and figure 3.	1-14
Y	KR 10-2014-0039461 A (KT & G CORPORATION) 02 April 2014 (2014-04-02) See paragraph [0053]; and claims 1, 4, 5 and 10.	1-14
Y	KR 10-2019-0048385 A (KT & G CORPORATION) 09 May 2019 (2019-05-09) See claims 1, 4, 6 and 7.	5-7,14
A	KR 10-2021-0078343 A (KT & G CORPORATION) 28 June 2021 (2021-06-28) See entire document.	1-14
A	WO 2020-202254 A1 (JAPAN TOBACCO INC.) 08 October 2020 (2020-10-08) See entire document.	1-14

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

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* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“D” document cited by the applicant in the international application

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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

“&” document member of the same patent family

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Date of the actual completion of the international search

18 April 2023

Date of mailing of the international search report

19 April 2023

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2023/000823

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
KR 10-2016-0048738 A	04 May 2016	KR 10-2015-0116612 A	16 October 2015
		WO 2015-156608 A1	15 October 2015
KR 10-2014-0039461 A	02 April 2014	KR 10-1406395 B1	13 June 2014
KR 10-2019-0048385 A	09 May 2019	KR 10-2029981 B1	08 October 2019
KR 10-2021-0078343 A	28 June 2021	CN 113993398 A	28 January 2022
		EP 3905905 A1	10 November 2021
		JP 2022-525870 A	20 May 2022
		KR 10-2385868 B1	12 April 2022
		US 2022-0132913 A1	05 May 2022
		WO 2021-125613 A1	24 June 2021
WO 2020-202254 A1	08 October 2020	CN 113645861 A	12 November 2021
		EP 3949771 A1	09 February 2022
		EP 3949771 A4	23 November 2022
		JP 7123240 B2	22 August 2022
		TW 202034799 A	01 October 2020
		WO 2020-202254 A1	25 November 2021

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