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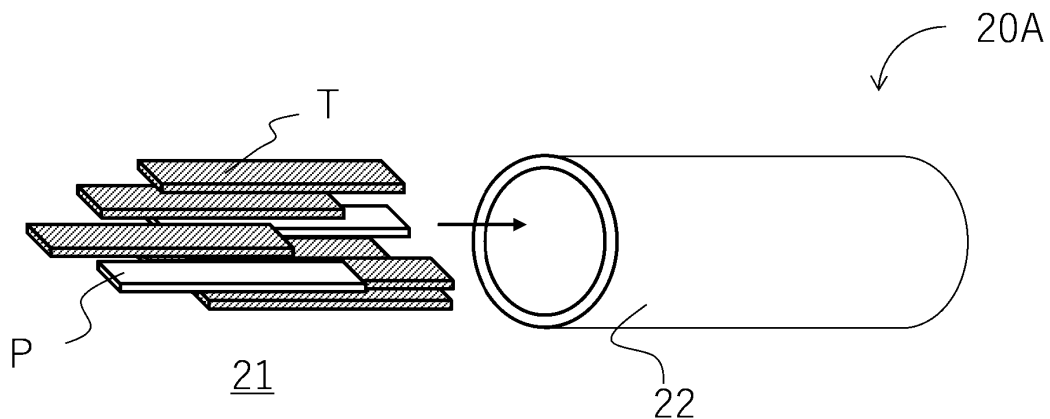
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(54) **PAPER-CONTAINING TOBACCO SEGMENT**

(57) Provided is a heated tobacco segment comprising, as packing, tobacco material and paper in which the total content of lignin and hemicellulose is 0.1-10 wt%.

Fig. 1A



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Description

TECHNICAL FIELD

5 **[0001]** The present invention relates to a tobacco segment containing paper as a filler.

BACKGROUND ART

10 **[0002]** A non-combustion heating-type flavor inhalation article includes a tobacco segment filled with a tobacco material and generates a smoke flavor by heating the tobacco segment. Hitherto, there have been proposed a non-combustion heating-type flavor inhalation article filled with a tobacco material including a first sheet containing a tobacco material and a second sheet containing a non-tobacco flavoring agent (Patent Literature 1), a non-combustion heating-type flavor inhalation article filled with a tobacco material containing crimped paper (Patent Literature 2), a smoking article containing a cellulose filler (Patent Literature 3), and so forth.

CITATION LIST

PATENT LITERATURE

20 **[0003]**

PTL 1: Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2015-517818

PTL 2: Japanese Patent No. 6683698

PTL 3: U.S. Patent Application Publication No. 2020/0359674

SUMMARY OF INVENTION

TECHNICAL PROBLEM

30 **[0004]** In non-combustion heating-type flavor inhalation articles, if the smoke flavor can be easily adjusted, it is possible to cope with various tastes of users. In conventional combustion-type tobaccos, the smoke flavor has been diluted by introducing air through a perforation adjacent to a filter or an inhalation port. However, in a non-combustion heating-type flavor inhalation article in which a tobacco-containing segment is heated to a relatively low temperature to generate an aerosol, when air is introduced through the perforation adjacent to the filter or inhalation port, the aerosol reaggregates, thereby disadvantageously failing to achieve sufficient delivery. Although the smoke flavor can also be adjusted by the methods described in the above patent documents, there is still room for improvement. Accordingly, there is a need for a novel means for adjusting the smoke flavor in a non-combustion heating-type flavor inhalation article. In view of such circumstances, it is an object of the present invention to provide a non-combustion heating-type flavor inhalation article that exhibits a diluted smoke flavor.

SOLUTION TO PROBLEM

45 **[0005]** The inventors have found that the above problems can be solved by using paper. That is, the above problems can be solved by the present invention described below.

(1) A tobacco segment to be heated contains, as fillers:

a tobacco material, and

paper,

50 in which the total amount of lignin and hemicellulose contained in the paper is 0.1% to 10% by weight.

(2) A tobacco segment to be heated contains, as fillers:

a tobacco material, and

55 paper containing an aerosol-source material.

(3) In the tobacco segment described in (1), the total amount of the lignin and hemicellulose contained is 9.0% or less by weight.

(4) In the tobacco segment described in (1) or (3), the amount of the paper contained is 5% to 70% by weight based on the dry weight of the tobacco material.

(5) In the tobacco segment described in (4), the amount of the paper contained is 15% to 40% by weight based on the dry weight of the tobacco material.

(6) In the tobacco segment described in any one of (1) to (5), the paper has a density of 0.05 to 0.8 (g/cm³).

(7) In the tobacco segment described in (2) or (6), the amount of the paper is 5% to 75% by weight based on the dry weight of the tobacco material.

(8) In the tobacco segment described in any one of (1) and (3) to (6), the paper contains an aerosol-source material.

(9) A non-combustion heating-type flavor inhalation article includes the tobacco segment described in any one of (1) to (8).

(10) A method for producing a tobacco segment described in any one of (1) to (8) includes: mixing the paper with the tobacco material.

ADVANTAGEOUS EFFECTS OF INVENTION

[0006] According to the present invention, it is possible to provide a non-combustion heating-type flavor inhalation article that exhibits a diluted smoke flavor.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

[Fig. 1A] Fig. 1A is a view illustrating an embodiment of a tobacco segment.

[Fig. 1B] Fig. 1B is a view illustrating an embodiment of a tobacco segment.

[Fig. 1C] Fig. 1C is a view illustrating an embodiment of a tobacco segment.

[Fig. 1D] Fig. 1D is a view illustrating an embodiment of a tobacco segment.

[Fig. 1E] Fig. 1E is a view illustrating an embodiment of a tobacco segment.

[Fig. 2] Fig. 2 is a view illustrating an embodiment of a non-combustion heating-type flavor inhalation article.

[Fig. 3] Fig. 3 is a view illustrating another embodiment of a non-combustion heating-type flavor inhalation article.

DESCRIPTION OF EMBODIMENTS

[0008] The present invention will be described in detail below. In the present invention, "X to Y" includes X and Y that are the end values thereof.

1. Tobacco Segment to be Heated

[0009] A tobacco segment is a substantially cylindrical member for generating an inhaling flavor component contained in a tobacco material. The tobacco segment to be heated is a tobacco segment for generating an inhaling flavor component when heated. An overview of the tobacco segment is illustrated in Fig. 1A. A tobacco segment 20A includes a tobacco filler 21 and a wrapper 22 wrapped around the filler 21. The tobacco filler 21 includes a tobacco material T and paper P. In this figure, the tobacco material T and the paper P are in strand form. The strand may be obtained by cutting a sheet of a laminate of the tobacco material T in the form of a sheet in and the paper P.

[0010] Fig. 1B illustrates an embodiment in which a sheet-like tobacco filler 21 is spirally packed in the wrapper 22. The sheet-like tobacco filler 21 may be a sheet in which the tobacco material T in the form of a sheet and the paper P, or may be a sheet obtained by bonding side surfaces of the tobacco material T in the form of a sheet and the paper P to each other or bonding portions near the side surfaces to each other.

[0011] Fig. 1C illustrates an embodiment in which the sheet-like tobacco filler 21 is folded and packed in the wrapper 22. The sheet-like tobacco filler 21 may be a sheet in which the tobacco material T in the form of a sheet and the paper P, or may be a sheet obtained by bonding side surfaces of the tobacco material T in the form of a sheet and the paper P to each other or bonding portions near the side surfaces to each other.

[0012] Fig. 1D illustrates an embodiment in which the shredded tobacco filler 21 is filled in the wrapper 22. This figure illustrates an embodiment in which the shredded tobacco material T and shredded paper P are prepared and filled. The shreds may be obtained by shredding a laminated sheet of the tobacco material T in the form of a sheet and the paper P.

[0013] Fig. 1E illustrates an embodiment in which the sheet-like tobacco filler 21 is compressed and rounded from the longitudinal and transverse directions and then filled into the wrapper 22. The sheet-like tobacco filler 21 may be a sheet in which the tobacco material T in the form of a sheet and the paper P, or may be a sheet obtained by bonding side surfaces of the tobacco material T in the form of a sheet and the paper P to each other or bonding portions near the

side surfaces to each other.

(1) Paper

5 (1-1) First Embodiment

[0014] A tobacco segment to be heated contains, as fillers, a tobacco material and paper in which the total amount of lignin and hemicellulose contained is 0.1% to 10% by weight. The fillers are fillers for tobacco segments. Lignin is a high-molecular-weight phenol compound contained in, for example, wood. Hemicellulose is an insoluble polysaccharide contained in the cell wall. When the total amount is within this range, an offensive odor (such as a fiber odor) during smoking can be reduced. That is, in this embodiment, the effect of diluting the smoke flavor can be provided without significantly impairing the original smoke flavor. From this point of view, the upper limit of the total amount of lignin and hemicellulose is contained preferably 9.0% or less by weight.

[0015] Although lignin and hemicellulose are measured by known methods, they are preferably measured by the following method in the present invention.

[Quantification of Hemicellulose]

[0016]

- 1) The paper is subjected to a solvent extraction with water as a solvent and the residue is separated. The residue is subjected to cryogenic grinding with, for example, liquid nitrogen, thereby preparing sample A.
- 2) The sample A is allowed to react with an enzyme, and then the reaction product is recovered.
- 3) The reaction product is hydrolyzed, and the absorbance of the hydrolysate is measured at a wavelength of 490 nm to quantify hemicellulose.

[0017] In Step 1), for example, a Thermo Scientific™ Dionex™ ASE™ Accelerated Solvent Extractor System (Model: ASE-350) can be used.

[0018] Step 2) can be specifically performed as described below.

[0019] In a screw bottle, 50 mg of the sample A is placed, followed by the addition of 8.5 ml of ultrapure water (ML-Q water) and 0.5 ml of a pancreatin solution. The mixture is shaken at 40°C and 125 rpm for 16 hours. The pancreatin solution is the supernatant obtained by adding 8 g of pancreatin to 100 ml of 0.1 M phosphate buffer with a pH of 6.4, stirring the mixture for 1 hour, and centrifuging the mixture at 8,000 rpm for 30 minutes. The sample liquid is then transferred to a 15-ml centrifuge tube using ML-Q water and centrifuged at 8,000 rpm for 15 minutes to remove the supernatant. This washing is repeated three times. After washing, 10 ml of an aqueous solution of 5% sulfuric acid is added thereto, and hydrolysis is performed at 100°C for 2.5 hours. After the completion of the hydrolysis reaction, the sample is allowed to cool to room temperature. The precipitate is then filtered off, and the filtrate is collected in a 250-ml volumetric flask. After thoroughly washing the residue on the filter paper with ML-Q water, the volume is adjusted to 250 ml. This solution is used as a sample for hemicellulose measurement. Then 500 µl of the sample is transferred to a 20-ml test tube, and 500 µl of an aqueous solution of 5% phenol and 2.5 ml of concentrated sulfuric acid are added thereto. The mixture is vigorously stirred for 10 seconds. The sample is allowed to stand at room temperature for 20 minutes or more. The absorbance is measured at a wavelength of 490 nm with a spectrophotometer to quantify hemicellulose.

45 [Quantification of Lignin]

[0020]

- i) The sample A is prepared.
- ii) The sample A is refluxed in an aqueous acid solution, and the sample after the reflux treatment is separated by filtration.
- iii) The filtered sample is dried and then weighed to determine the amount of lignin.

[0021] Steps ii) and iii) can be specifically performed as described below.

[0022] In a screw bottle, 100 mg of the sample A is placed, followed by the addition of 4 ml of 72% sulfuric acid. The sample is completely immersed in sulfuric acid and then shaken at 30°C and 200 rpm for 4 hours. Next, 157.2 ml of ultrapure water (ML-Q water) is added in such a manner that the sulfuric acid concentration after dilution is 4%. The mixture is transferred to a recovery flask and heated to reflux in an oil bath at 110°C for 2 hours. After cooling to room

temperature, filtration is performed. The resulting sample is dried with a rotary dryer and weighed.

[0023] The density of the paper used in this embodiment is preferably 0.05 to 0.8 (g/cm³), more preferably 0.1 to 0.6 (g/cm³). The density is measured by a known method and is preferably determined from the following formula.

$$\text{Density (g/cm}^3\text{)} = \text{weight (g)}/\text{area (cm}^2\text{)}/\text{thickness (cm)}$$

[0024] The amount of paper used in this embodiment is preferably 5% to 70% by weight, more preferably 10% to 50% by weight, still more preferably 15% to 40% by weight, based on the dry weight of the tobacco material. When the amount of paper contained is within this range, the smoke flavor can be diluted to an appropriate level without impairing the original smoke flavor. The dry weight is the weight of the residue when the tobacco material is dried at 100°C for 5 hours in one embodiment.

[0025] The paper used in the present embodiment is not limited as long as the total amount of lignin and hemicellulose contained is within the above range, and for example, tobacco paper such as a wrapper, and printing paper such as high-quality printing paper and medium-quality printing paper can be used. However, from the viewpoint of inhibiting the generation of an offensive odor, non-coated paper or slightly coated paper is preferred. The paper used in the present embodiment may contain or need not contain an aerosol-source material described below. The amount may be in the range described in a second embodiment, or may be in a range other than this.

(1-2) Second Embodiment

[0026] As the second embodiment, the tobacco segment to be heated includes, as fillers, a tobacco material, and paper containing an aerosol-source material. The aerosol-source material is a material that is vaporized by heating and cooled to generate an aerosol or generates an aerosol by atomization. In this embodiment, the use of the paper containing the aerosol-source material can provide the effect of diluting the smoke flavor without reducing the amount of smoke. As the aerosol-source material, known materials can be used. Examples thereof include polyhydric alcohols, such as glycerin, vegetable glycerine, and propylene glycol (PG), triethyl citrate (TEC), and triacetin. The amount of aerosol-source material is preferably 3% to 20% by weight, more preferably 5% to 15% by weight, based on the dry mass of the paper. An amount of aerosol-source material of more than the upper limit may result in, for example, staining on the tobacco segment. An amount of less than the lower limit may result in a reduction in smoke sensation. The aerosol-source material can be added to the paper by, for example, impregnation or spraying.

[0027] The amount of paper containing aerosol-source material is preferably 5% to 75% by weight, more preferably 10% to 50% by weight, still more preferably 15% to 40% by weight, based on the dry weight of the tobacco material.

[0028] The paper used in this embodiment is not limited, and may be the paper described in the first embodiment. The density of the paper before addition of the aerosol-source material used in the present embodiment may be in the range described in the first embodiment, or may be in a range other than this. The amount of lignin and hemicellulose contained in the paper used in the present embodiment is not limited, and may be in the range described in the first embodiment, or may be in a range other than this.

(1-3) Shape and so Forth

[0029] In any of the embodiments, the shape of the paper is not limited as long as the paper is easily mixed with the tobacco material. In one embodiment, the paper is in the form of a sheet, shred, or strand. In a preferred embodiment, the paper and the tobacco material have the same shape. In a most preferred embodiment, the paper and the tobacco material have shredded shape.

[0030] In addition, the paper may contain a flavoring agent, such as menthol, which is commonly used in the art.

(2) Tobacco Material

[0031] The tobacco material is a material derived from a plant of the genus *Nicotiana*. Specific examples of the tobacco material include shredded tobacco, fine tobacco powders, tobacco midribs, tobacco stems, tobacco sheets, and strands, which are typically used in the art. These may be used alone or in combination. Among these, shredded tobacco and cut pieces of tobacco sheets are preferred from the viewpoints of, for example, excellent mixing properties with paper, no increase in airflow resistance, easy contribution to smoke flavor, and high shape uniformity.

[0032] As leaf tobaccos, those belonging to the genus *Nicotiana*, such as *tabacum* and *rustica*, can be suitably used. Although the variety and the like are not limited, one or more of these leaf tobaccos can be mixed and used. As the mixture, a mixture obtained by appropriately blending the above-mentioned varieties so as to have a desired taste can be used.

(3) Production Method

[0033] The tobacco segment can be produced by any method, for example, by mixing the tobacco material with the paper and wrapping the mixture with a wrapper. As the wrapper, those usually used in the art can be used.

2. Non-Combustion Heating-Type Flavor Inhalation Article

[0034] In the present invention, the term "flavor inhalation article" refers to an article for a user to inhale a smoke flavor. Among the flavor inhalation articles, those containing tobaccos or components derived from tobaccos are referred to as "tobacco flavor inhalation articles". Tobacco flavor inhalation articles are roughly classified into "combustion-type tobacco flavor inhalation articles" (also referred to simply as "smoking articles") that generate smoke flavors by combustion, and "non-combustion-type tobacco flavor inhalation articles" that generate smoke flavors without combustion. Non-combustion-type tobacco flavor inhalation articles are roughly classified into "non-combustion heating-type tobacco flavor inhalation articles" that generate smoke flavors by heating, and "non-combustion non-heating-type tobacco flavor inhalation articles" that generate smoke flavors without heating. The tobacco segment containing the paper of the present invention is suitable for a non-combustion heating-type tobacco flavor inhalation article.

[0035] Fig. 2 is a view illustrating an embodiment of a non-combustion heating-type tobacco flavor inhalation article. As illustrated in the figure, a non-combustion heating-type tobacco flavor inhalation article 20 includes a tobacco segment 20A, a tubular cooling portion 20B having perforations on the circumference, and a filter portion 20C. The non-combustion heating-type tobacco flavor inhalation article 20 may include other members. The length of the non-combustion heating-type tobacco flavor inhalation article 20 in the axial direction is preferably, but not necessarily, 40 to 90 mm, more preferably 50 to 75 mm, still more preferably 50 to 60 mm. The circumference of the non-combustion heating-type tobacco flavor inhalation article 20 is preferably 16 to 25 mm, more preferably 20 to 24 mm, still more preferably 21 to 23 mm. In an embodiment, for example, the tobacco segment 20A has a length of 20 mm, the cooling portion 20B has a length of 20 mm, and the filter portion 20C has a length of 7 mm. The lengths of these individual members can be appropriately changed in accordance with manufacturing suitability, required quality, and so forth. While Fig. 2 illustrates an embodiment in which a first segment 25 is disposed, only a second segment 26 may be disposed downstream of the cooling portion 20B without disposing the first segment 25.

1) Tobacco Segment 20A

[0036] The tobacco filler 21 in the tobacco segment 20A contains the tobacco material and paper. A method for filling the tobacco filler 21 in the wrapper 22 is not particularly limited. For example, the tobacco filler 21 may be wrapped in the wrapper 22, or the tobacco filler 21 may be filled in the tubular wrapper 22. When the tobacco and paper have a shape, such as a rectangular shape, having a longitudinal direction, they may be filled in such a manner that their longitudinal directions are unspecified directions in the wrapper 22, or may be filled so as to be aligned in the axial direction of the tobacco segment 20A or in a direction perpendicular to the axial direction. As the wrapper 22, the above-mentioned paper may be used. When the tobacco segment 20A is heated, the tobacco components, the aerosol-source material, and water contained in the tobacco filler 21 are vaporized and subjected to inhalation.

2) Cooling Portion 20B

[0037] The cooling portion 20B is preferably formed of a tubular member. The tubular member may be, for example, a cardboard tube 23 formed by processing cardboard into a tubular shape. The cooling portion 20B may also be formed by a thin sheet of material that is crimped and then pleated, gathered, or folded to form channels. As such a material, for example, a sheet material selected from the group consisting of polyethylene, polypropylene, poly(vinyl chloride), poly(ethylene terephthalate), poly(lactic acid), cellulose acetate, and aluminum foil can be used. The total surface area of the cooling portion 20B is appropriately adjusted in consideration of cooling efficiency, and can be, for example, 300 to 1,000 mm²/mm. The cooling portion 20B is preferably provided with perforations 24. The presence of the perforations 24 allows outside air to be introduced into the cooling portion 20B during inhalation. Thus, the vaporized aerosol component produced by heating the tobacco segment 21A comes into contact with the outside air to reduce its temperature, thus liquefying to form an aerosol. The diameter of (length across) each of the perforations 24 is not particularly limited, and may be, for example, 0.5 to 1.5 mm. The number of the perforations 24 is not particularly limited. One perforation or two or more perforations may be used. For example, the multiple perforations 24 may be provided on the circumference of the cooling portion 20B.

[0038] The cooling portion 20B can have a rod shape with a length of, for example, 7 to 28 mm in the axial direction. For example, the length of the cooling portion 20B in the axial direction can be 18 mm. The cooling portion 20B has a substantially circular cross-sectional shape in the axial direction, and can have a diameter of 5 to 10 mm. For example,

the cooling portion can have a diameter of about 7 mm.

3) Filter Portion 20C

[0039] The filter portion 20C may include, but is not particularly limited to, a single filling layer or multiple filling layers. The outside of the filling layer may be wrapped with one or more sheets of wrapping paper. The airflow resistance of the filter portion 20C can be appropriately changed in accordance with, for example, the amount and material of a filter filler filled in the filter portion 20C. For example, when the filter filler is formed of cellulose acetate fibers, the airflow resistance can be increased by increasing the amount of cellulose acetate fibers filled in the filter portion 20C. When the filter filler is formed of cellulose acetate fibers, the cellulose acetate fibers may have a bulk density of 0.13 to 0.18 g/cm³. The airflow resistance is a value measured with an airflow resistance measuring device (trade name: SODIMAX, available from SODIM).

[0040] The circumference of the filter portion 20C is preferably, but not necessarily, 16 to 25 mm, more preferably 20 to 24 mm, still more preferably 21 to 23 mm. The length of the filter portion 20C in the axial direction (horizontal direction in Fig. 2) can be selected from 4 to 10 mm, and is selected in such a manner that the airflow resistance is 15 to 60 mmHzO/segment. The length of the filter portion 20C in the axial direction is preferably 5 to 9 mm, more preferably 6 to 8 mm. The cross-sectional shape of the filter portion 20C is not particularly limited, and can be, for example, circular, elliptical, polygonal, or the like. To the filter portion 20C, flavoring agent-containing breakable capsules or flavoring agent beads may be added, or a flavoring agent may be directly added.

[0041] The filter portion 20C may include a center-hole portion as the first segment 25. The center-hole portion includes a first filling layer 25a having one or multiple hollow portions and an inner plug wrapper (inner wrapping paper) 25b covering the filling layer. The center-hole portion has the function of increasing the strength of a mouthpiece portion. The center-hole portion need not include the inner plug wrapper 25b, and the shape of the center-hole portion may be maintained by thermoforming. The filter portion 20C may include the second segment 26. The second segment 26 includes a second filling layer 26a and an inner plug wrapper (inner wrapping paper) 26b covering the filling layer. The second filling layer 26a can be, for example, a rod, having an inside diameter of $\phi 5.0$ to $\phi 1.0$ mm, formed by hardening densely packed cellulose acetate fibers to which 6% to 20% by weight of a plasticizer containing triacetin based on the weight of the cellulose acetate is added. The second filling layer has a high fiber filling density, so that air or aerosol flows only in the hollow portion during inhalation, and hardly flows in the second filling layer. Since the second filling layer inside the center-hole portion is a fiber-filled layer, the feeling of touch from the outside during use is less likely to cause the user to feel uncomfortable.

[0042] The first filling layer 25a and the second filling layer 26a are connected by an outer plug wrapper (outer wrapping paper) 27. The outer plug wrapper 27 can be, for example, a tubular sheet of paper. The tobacco segment 20A, the cooling portion 20B, and the connected first filling layer 25a and second filling layer 26a are connected by a mouthpiece lining paper 28. These can be connected, for example, by applying an adhesive, such as a vinyl acetate adhesive, to the inner surface of the mouthpiece lining paper 28 and winding the three members therewith. These members may be connected in multiple steps with multiple sheets of lining paper.

[0043] The combination of a non-combustion heating-type tobacco flavor inhalation article and a heating device for generating an aerosol is in particular also referred to as a non-combustion heating-type tobacco flavor inhalation system. An example of the system is illustrated in Fig. 3. In the figure, the non-combustion heating-type tobacco flavor inhalation system includes the non-combustion heating-type tobacco flavor inhalation article 20 and a heating device 10 for heating the tobacco segment 20A from the outside.

[0044] The heating device 10 includes a body 11, a heater 12, a metal tube 13, a battery unit 14, and a control unit 15. The body 11 has a tubular recessed portion 16. The heater 12 and the metal tube 13 are arranged at positions corresponding to the tobacco segment 20A to be inserted into the recessed portion 16. The heater 12 can be an electrical resistance heater. Electric power is supplied from the battery unit 14 by instructions from the control unit 15 for controlling the temperature to perform the heating of the heater 12. The heat generated from the heater 12 is conducted to the tobacco segment 20A through the metal tube 13 having high thermal conductivity. While the figure illustrates an embodiment in which the heating device 10 heats the tobacco segment 20A from the outside, the segment may be heated from the inside. The heating temperature with the heating device 10 is preferably, but not particularly limited to, 400°C or lower, more preferably 150°C to 400°C, still more preferably 200°C to 350°C. The heating temperature refers to the temperature of the heater of the heating device 10.

EXAMPLES

[Comparative Example 1]

[0045] A tobacco sheet produced by a known papermaking method was provided. The tobacco sheet was filled in a

wrapper to form a tobacco segment, and a non-combustion heating-type flavor inhalation article illustrated in Fig. 2 was prepared. The article was subjected to a smoking test by 10 well-trained panelists (average age: 40).

[Example 1 and Comparative Example 2]

[0046] Paper sheets (materials 1 to 7) each having a total amount of lignin and hemicellulose of 0.1 % to 10% by weight and paper sheets (materials 8 to 10) each having a total amount of lignin and hemicellulose of more than 10% by weight were provided. The same tobacco sheet as that provided in Comparative Example 1 and the paper sheets were shredded into pieces each having a width of 0.3 to 2.0 mm and a length of 3 to 50 mm. The shredded pieces of the paper sheets and the shredded pieces of the tobacco sheet were mixed in a ratio by weight of 80:20. Non-combustion heating-type flavor inhalation articles were prepared in the same manner as in Comparative Example 1 and subjected to a smoking test. Based on the results of Comparative Example 1, the smoke flavor and the amount of smoke were evaluated according to the following criteria.

- 1: Markedly reduced
- 2: Reduced
- 3: Unchanged (reference)
- 4: Increased
- 5: Markedly increased

[0047] The fiber odor was evaluated according to the following criteria.

- 1: None (reference)
- 2: Very low
- 3: Low
- 4: Moderate
- 5: Strong

[Table 1]

	Comparative Example 1	Example 1								Comparative Example 2			
	Ref	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6	Material 7	Material 8	Material 9	Material 10		
Total amount of lignin and hemicellulose contained (% by weight)	-	0.15	3.1	5.2	7.3	8	8.5	9.7	11.2	12.5	15.8		
Basis weight (g/m ²)		37.5	75.0		95.0	33.0	80.2	70.3					
Thickness (mm)		0.585	0.537		0.618	0.050	0.589	0.431					
Density (g/cm ³)		0.06	0.14	0.69	0.15	0.66	0.14	0.16					
Sensory evaluation (average)													
Smoke flavor	3.0	2.9	2.6	2.4	2.4	2.4	2.2	2.0	1.5	1.3	1.1		
Amount of smoke	3.0	2.8	2.6	2.5	2.6	2.6	2.4	2.0	1.7	1.4	1.2		
Fiber odor	1.0	1.2	1.3	1.4	1.4	1.4	1.6	2.5	3.5	4.2	4.7		

[Example 2 and Comparative Example 3]

[0048] Non-combustion heating-type flavor inhalation articles were prepared in the same manner as in Example 1, except that the tobacco sheet and the material 5 were blended in the amounts given in Table 2, and a smoking test was performed.

[Table 2]

	Comparative Example 1	Example 2				Comparative Example 3			
		Level 1	Level 1.5	Level 2	Level 2.5	Level 3	Level 4	Level 5	Level 6
Tobacco:material 5 (ratio by weight)	-	95:5	85:15	80:20	60:40	50:50	25:75	20:80	5:95
Total amount of lignin and hemicellulose contained (mg)	-	1.02	3.05	4.06	8.31	10.16	15.24	16.26	19.3
Sensory evaluation (average)									
Smoke flavor	3.0	2.9	2.6	2.4	2.3	2.1	1.4	1.2	1.0
Amount of smoke	3.0	3.0	2.8	2.6	2.5	2.2	1.5	1.2	1.0
Fiber odor	1.0	1.2	1.3	1.4	1.7	2.3	3.7	4.5	5.0

[Example 3]

[0049] The tobacco sheet and material 5 were blended in the amounts given in Table 3. To material 5, 10% by weight of glycerine was added as an aerosol-source material based on the dry weight. Non-combustion heating-type flavor inhalation articles were prepared in the same manner as in Example 1, except that these blends were used, and a smoking test was performed.

[Table 3]

	Comparative Example 1	Example 3					
		Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Tobacco:material 5 (ratio by weight)	-	95:5	80:20	50:50	25:75	20:80	5:95
Total amount of lignin and hemicellulose contained (mg)	-	1.02	4.06	10.16	15.24	16.26	19.3
Sensory evaluation (average)							
Smoke flavor	3.0	2.9	2.5	2.4	2.0	1.3	1.1
Amount of smoke	3.0	3.0	2.8	2.6	2.5	2.0	1.7
Fiber odor	1.0	1.3	1.5	2.2	2.9	4.1	4.8

[Quantification of Hemicellulose]

[0050]

1) The paper was subjected to a solvent extraction (solvent: water) with a Thermo Scientific™ Dionex™ ASE™ Accelerated Solvent Extractor System (Model: ASE-350), thereby separating the residue. The residue was subjected to cryogenic grinding with, for example, liquid nitrogen, thereby preparing sample A.

2) In a screw bottle, 50 mg of the sample A was placed, followed by the addition of 8.5 ml of ultrapure water (ML-Q water) and 0.5 ml of a pancreatin solution. The mixture was shaken at 40°C and 125 rpm for 16 hours. The sample liquid was then transferred to a 15-ml centrifuge tube using ML-Q water and centrifuged at 8,000 rpm for 15 minutes to remove the supernatant. This washing is repeated three times. After washing, 10 ml of an aqueous solution of

5% sulfuric acid was added thereto, and hydrolysis is performed at 100°C for 2.5 hours. After the completion of the hydrolysis reaction, the sample was allowed to cool to room temperature. The precipitate was then filtered off, and the filtrate was collected in a 250-ml volumetric flask. After thoroughly washing the residue on the filter paper with ML-Q water, the volume was adjusted to 250 ml. This solution was used as a sample for hemicellulose measurement.

3) Then 500 μ l of the sample was transferred to a 20-ml test tube, and 500 μ l of an aqueous solution of 5% phenol and 2.5 ml of concentrated sulfuric acid were added thereto. The mixture was vigorously stirred for 10 seconds. The sample was allowed to stand at room temperature for 20 minutes or more. The absorbance was measured at a wavelength of 490 nm with a spectrophotometer to quantify hemicellulose.

[Quantification of Lignin]

[0051]

i) The sample A was prepared.

ii) In a screw bottle, 100 mg of the sample A was placed, followed by the addition of 4 ml of 72% sulfuric acid. The sample was completely immersed in sulfuric acid and then shaken at 30°C and 200 rpm for 4 hours. Next, 157.2 ml of ultrapure water (ML-Q water) was added in such a manner that the sulfuric acid concentration after dilution was 4%. The mixture was transferred to a recovery flask and heated to reflux in an oil bath at 110°C for 2 hours.

iii) After the mixture that had been subjected to reflux treatment was allowed to cool to room temperature, filtration was performed. The resulting sample was dried with a rotary dryer and weighed to determine the amount of lignin.

[0052] It is clear that the tobacco segment of the present invention can moderately dilute the smoke flavor.

REFERENCE SIGNS LIST

[0053]

T tobacco material

P paper

10 heating device

11 body

12 heater

13 metal tube

14 battery unit

15 control unit

16 recessed portion

17 air vent

20 non-combustion heating-type flavor inhalation article

20A tobacco segment

20B cooling portion

20C filter portion

21 tobacco filler

22 wrapping paper

23 cardboard tube

24 perforation

25 first segment

25a first filling layer

25b inner plug wrapper

26 second segment

26a second filling layer

26b inner plug wrapper

27 outer plug wrapper

28 lining paper

Claims

1. A tobacco segment to be heated, comprising, as fillers:

a tobacco material; and
paper,
wherein a total amount of lignin and hemicellulose contained in the paper is 0.1% to 10% by weight.

2. A tobacco segment to be heated, comprising, as fillers:

a tobacco material; and
paper containing an aerosol-source material.

3. The tobacco segment according to claim 1, wherein the total amount of lignin and hemicellulose contained in the paper is 9.0% or less by weight.

4. The tobacco segment according to claim 1 or 3, wherein an amount of the paper contained is 5% to 70% by weight based on a dry weight of the tobacco material.

5. The tobacco segment according to claim 4, wherein the amount of the paper contained is 15% to 40% by weight based on the dry weight of the tobacco material.

6. The tobacco segment according to any one of claims 1 to 5, wherein the paper has a density of 0.05 to 0.8 (g/cm³).

7. The tobacco segment according to claim 2 or 6, wherein an amount of the paper is 5% to 75% by weight based on the dry weight of the tobacco material.

8. The tobacco segment according to any one of claims 1 and 3 to 6, wherein the paper contains an aerosol-source material.

9. A non-combustion heating-type flavor inhalation article, comprising the tobacco segment according to any one of claims 1 to 8.

10. A method for producing a tobacco segment according to any one of claims 1 to 8, comprising:
mixing the paper with the tobacco material.

Fig. 1A

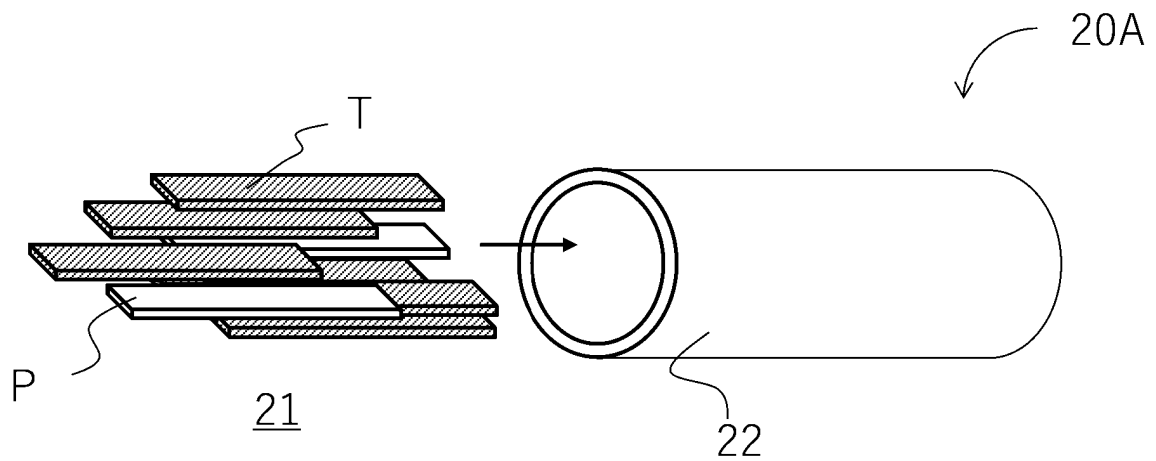


Fig. 1B

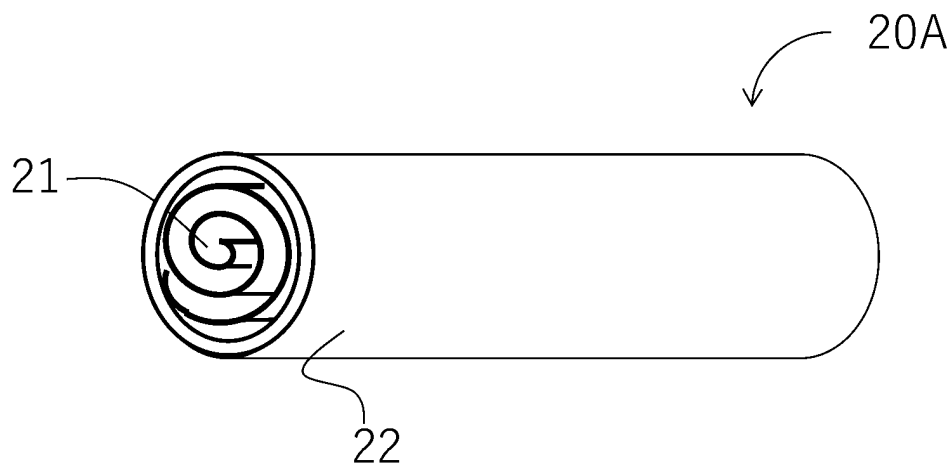


Fig. 1C

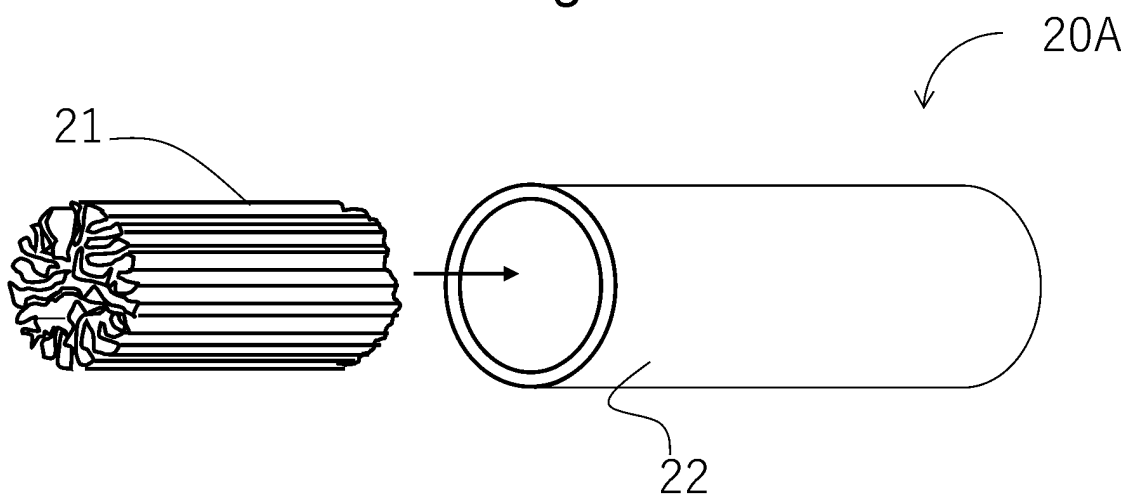


Fig. 1D

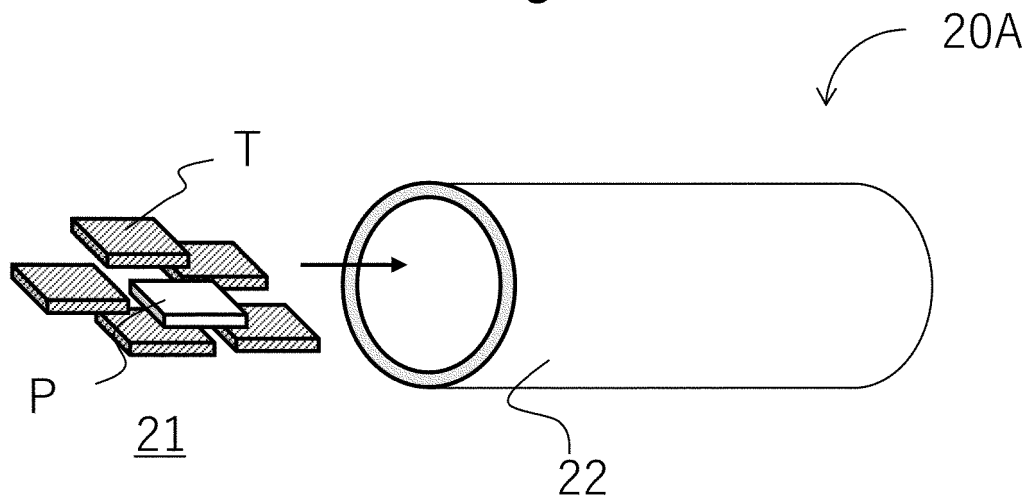


Fig. 1E

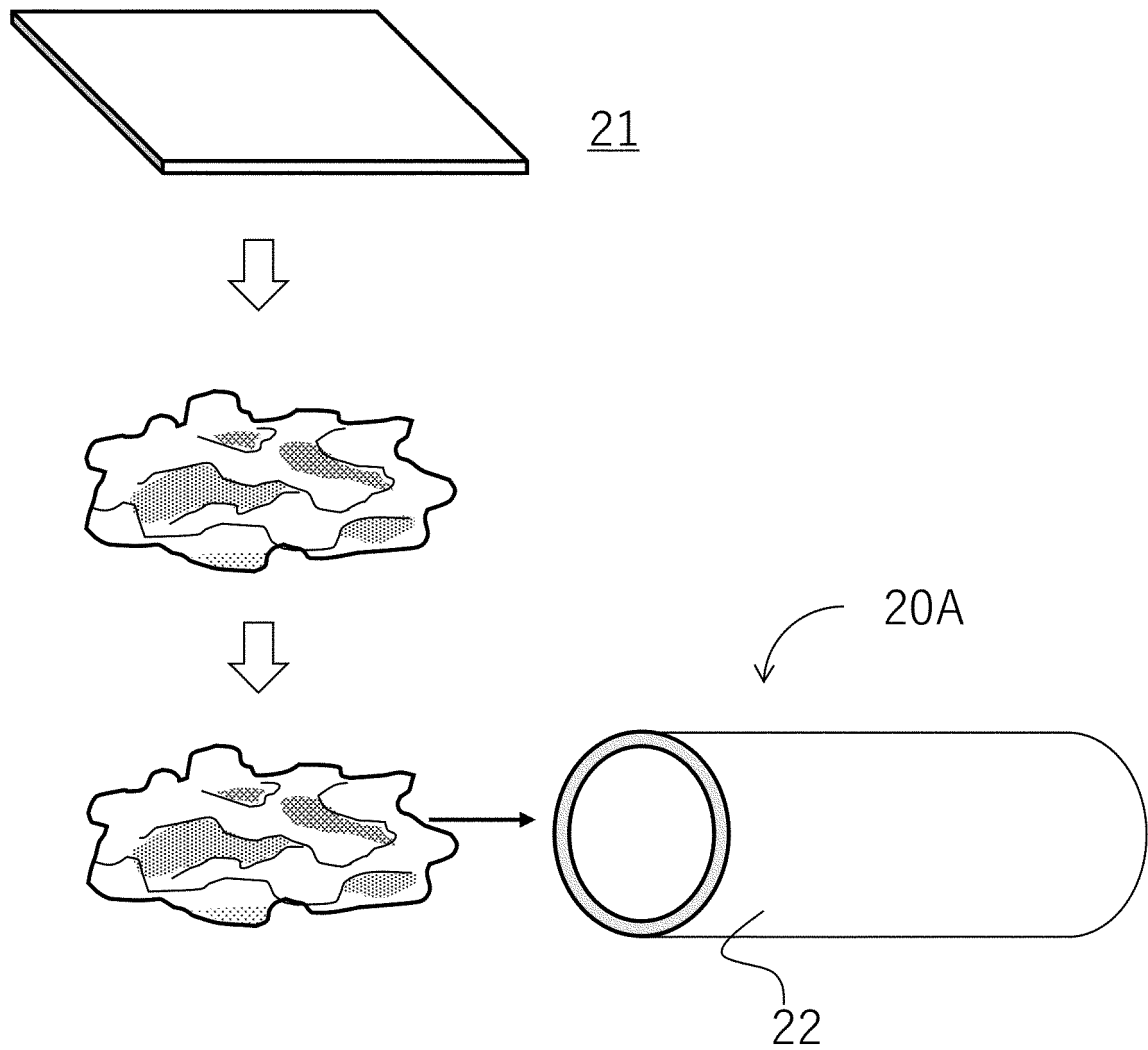


Fig. 2

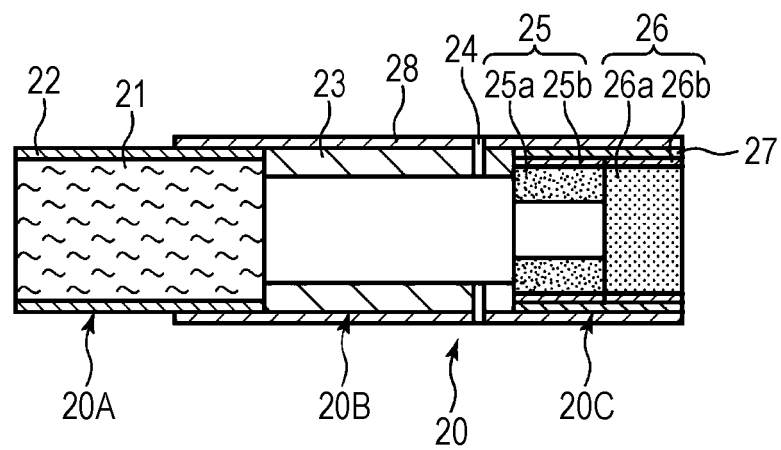
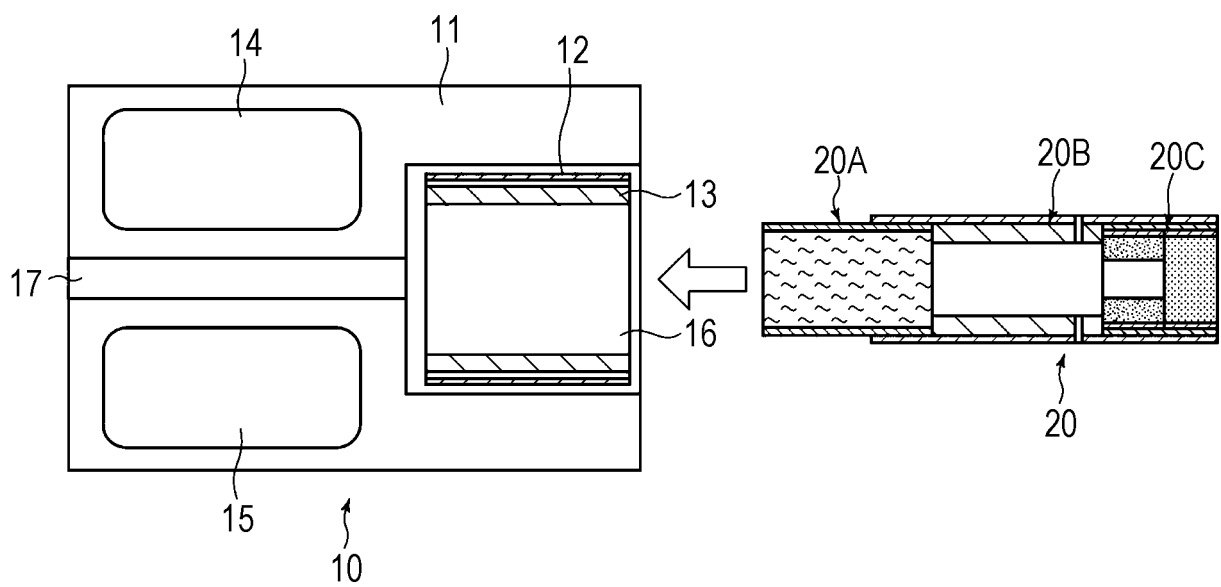


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/013937

A. CLASSIFICATION OF SUBJECT MATTER

D21H 17/23(2006.01)i; **A24B 15/16**(2020.01)i; **A24D 1/20**(2020.01)i

FI: A24B15/16; D21H17/23; A24D1/20

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)

A24B1/00-15/42; A24D1/00-3/18; D21H17/23

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2022

Registered utility model specifications of Japan 1996-2022

Published registered utility model applications of Japan 1994-2022

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2021-507684 A (PHILIP MORRIS PRODUCTS SA) 25 February 2021 (2021-02-25) paragraphs [0069]-[0070], [0110]-[0112], fig. 1	2, 6-10
A		1, 3-5
A	JP 3201449 U (BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED) 10 December 2015 (2015-12-10) entire text, all drawings	1-10
A	JP 2015-514882 A (R. J. REYNOLDS TOBACCO COMPANY) 21 May 2015 (2015-05-21) entire text, all drawings	1-10
A	JP 2020-535837 A (SWM LUXEMBOURG SARL) 10 December 2020 (2020-12-10) entire text, all drawings	1-10

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

* Special categories of cited documents:

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

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“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

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“&” document member of the same patent family

Date of the actual completion of the international search

23 May 2022

Date of mailing of the international search report

07 June 2022

Name and mailing address of the ISA/JP

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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2022/013937

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2021-507684 A	25 February 2021	US 2021/0000158 A1 paragraphs [0069]-[0070], [0112]-[0114], fig. 1 WO 2019/122015 A1 EP 3727044 A1 CN 111386051 A KR 10-2020-0097696 A	
JP 3201449 U	10 December 2015	US 2014/0020699 A1 entire text, all drawings WO 2012/110819 A1 EP 2675302 A1 CN 103347408 A KR 10-2014-0004754 A	
JP 2015-514882 A	21 May 2015	US 2013/0276801 A1 entire text, all drawings WO 2013/158957 A1 EP 2838382 A1 CN 104582511 A	
JP 2020-535837 A	10 December 2020	US 2020/0297023 A1 entire text, all drawings WO 2019/068930 A1 EP 3691477 A1 CN 111182799 A KR 10-2020-0064997 A	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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- US 20200359674 [0003]