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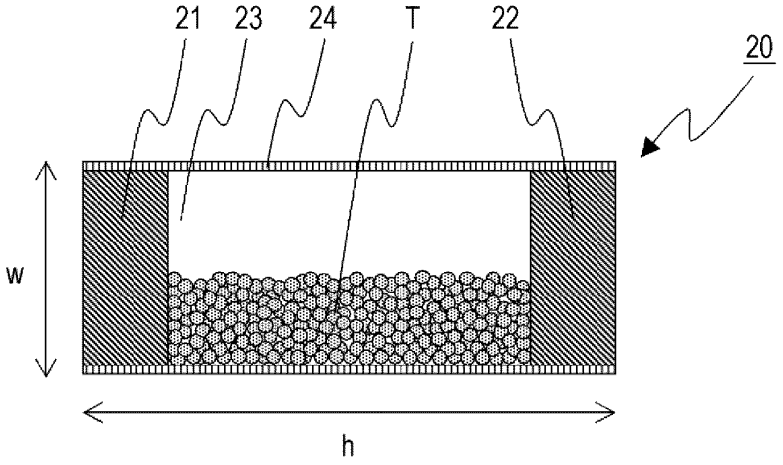
(54) HEAT-NOT-BURN TOBACCO PRODUCT, ELECTRICALLY HEATED TOBACCO PRODUCT, AND HEAT-NOT-BURN TOBACCO MATERIAL

(57) A cylindrical non-combustion-heating-type tobacco having a first filter part, a second filter part, and a wrapping paper that wraps around these filter parts so as to form a space between the first filter part and the second filter part. A granular tobacco material is movably positioned in the space. The total added quantity of glycerin, propylene glycol, triacetin, and 1,3-butanediol per 100 wt% of the tobacco material is 10 wt% or less.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a non-combustion-heating-type tobacco, an electrically heated tobacco product, and a non-combustion-heating-type tobacco material.

Background Art

[0002] A common cigarette (cigarette) is made as follows. A tobacco rod obtained by wrapping dried tobacco leaves shredded to a width of about 1 mm and added with a flavor, a humectant, and adequate moisture with a wrapper mainly made of paper into a cylindrical shape, and a mouthpiece rod obtained by wrapping fiber made of cellulose acetate or the like or crimped paper with a wrapper made of paper into a cylindrical shape are butted end to end and connected with a lining paper.

[0003] When a common cigarette is used, a user lights up the end of the tobacco rod with a lighter or the like and inhales from the mouthpiece end to smoke. A torch at the distal end of the tobacco rod burns at a temperature over 800°C.

[0004] As an alternative to such a common cigarette, a non-combustion-heating-type flavor inhalation article and a non-combustion-heating-type tobacco flavor inhalation system that use electric heating without burning have been developed (Patent Literatures 1 to 7).

[0005] A general non-combustion-heating-type tobacco flavor inhalation system (non-combustion-heating-type tobacco product) is made up of a cylindrical non-combustion-heating-type tobacco flavor inhalation article similar to a common cigarette, and a heating device including a battery, a controller, a heater, and the like. The heater may be of an electric resistance type or an IH type. For an electric resistance-type heater, a contact with the non-combustion-heating-type tobacco flavor inhalation article is configured to heat from outside the cylindrical non-combustion-heating-type tobacco flavor inhalation article or the contact in a needle shape or on a blade is configured to be inserted into a tobacco filling layer from the distal end of the non-combustion-heating-type tobacco flavor inhalation article.

[0006] Various heating temperatures can be set. In comparison with 800°C for a combustible type, most of the articles are heated at lower temperatures (200 to 400°C). To ensure a sense of satisfaction even when heated at low temperatures, that is, in order for the appearance quality and taste and smell of mainstream smoke that arises from tobacco flavor inhalation articles to simulate cigarettes, some tobacco flavor inhalation articles are designed such that aerosol-source material, such as glycerine, PG, and triacetin, is contained in a tobacco filler and, when used, not only a volatile flavor component contained in tobacco and an externally added flavor component but also volatilized aerosol-source material is able to be inhaled. The aerosol-source material is heated by the heater to volatilize once and is cooled when inhaled to move to a mouthpiece part and liquefies into aerosols, with the result that the appearance of mainstream smoke becomes white smoke similar to that of cigarettes.

[0007] The non-combustion-heating-type tobacco generally includes tobacco material made up of a composition including shredded tobacco, aerosol-source material, and the like. When the heated tobacco product is used, the non-combustion-heating-type tobacco is inserted or disposed in the heating device. Then, the heat source of the heating device is caused to generate heat, and the tobacco material in the non-combustion-heating-type tobacco is heated by the generated heat, with the result that a flavor component together with aerosols is delivered to a user

[0008] In a general non-combustion-heating-type tobacco, aerosol-source material is used as described above. During use of the product, a volatile chemical compound is released from the heated aerosol-source material, and the volatile chemical compound is cooled thereafter and condenses to produce aerosols. At this time, the condensed aerosols have relatively large particle diameters, so the aerosols are produced in a state of visually recognizable white tobacco vapor. The visually recognizable tobacco vapor can make a third person around a user discomfort.

[0009] In Patent Literature 8, visually recognizable tobacco vapor is attempted to be reduced by decreasing the heating temperature of the non-combustion-heating-type tobacco from the range of 150 to 220°C to the range of 80 to 140°C to reduce the volatilization volume.

Citation List

Patent Literature

[0010]

PTL 1: Japanese Patent No. 05292410
PTL 2: Japanese Patent No. 05771338
PTL 3: Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2013-507906

PTL 4: International Publication No. 2017/198838
PTL 5: International Publication No. 2017/036951
PTL 6: Japanese Patent No. 05877618
PTL 7: Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2016-506729
PTL 8: International Publication No. 2010/047389

Summary of Invention

Technical Problem

[0011] In Patent Literature 8, to attempt to reduce visually recognizable tobacco vapor, a method of decreasing the heating temperature of a non-combustion-heating-type tobacco from the range of 150 to 220°C to the range of 80 to 140°C is adopted. With this method, it is possible to reduce volatilization of a component that volatilizes at 150 to 220°C; however, it is not possible to reduce volatilization of a component that volatilizes at temperatures lower than 80 to 140°C. In addition, since the heating temperature is decreased, volatilization of a flavor component that volatilizes at temperatures higher than 80 to 140°C is reduced, with the result that a decrease in flavor may occur. Furthermore, there also arises a problem that the types of raw materials used in a non-combustion-heating-type tobacco are limited, that is, the range to select the types of raw materials is narrowed, to take measures against these problems.

[0012] To solve the above problems, the present invention is directed to providing a non-combustion-heating-type tobacco capable of achieving a reduction in tobacco vapor with a new method different from the above-described method of limiting the heating temperature during use, an electrically heated tobacco product using the non-combustion-heating-type tobacco, and a tobacco material for a non-combustion-heating-type tobacco.

Solution to Problem

[0013] The inventors found that it was possible to achieve a reduction in visually recognizable tobacco vapor while retaining flavor by setting the additive amount of aerosol-source material contained in the non-combustion-heating-type tobacco within a specific range or controlling the amount of aerosols in tobacco vapor, and reached the present invention.

[0014] The summary of the present invention is as follows.

[1] A tubular non-combustion-heating-type tobacco including a first filter part, a second filter part, and a wrapping paper wrapping the filter parts such that a space section is formed between the first filter part and the second filter part, wherein

particulate tobacco material is movably disposed in the space section, and
a total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol with respect to 100 wt% of the tobacco material is lower than or equal to 10 wt%.

[2] A tubular non-combustion-heating-type tobacco includes a first filter part, a second filter part, and a wrapping paper wrapping the filter parts such that a space section is formed between the first filter part and the second filter part, wherein

particulate tobacco material is movably disposed in the space section, and
a content of aerosols in tobacco vapor that is generated when the non-combustion-heating-type tobacco is heated at 120°C and each puff is inhaled at 55 ml/2 sec is smaller than or equal to 1000/puff.

[3] The non-combustion-heating-type tobacco according to [1] or [2], wherein the tobacco material is made up of tobacco granules.

[4] The non-combustion-heating-type tobacco according to any one of [1] to [3], wherein the pH of the tobacco material is higher than or equal to 7.0 and lower than or equal to 10.0.

[5] The non-combustion-heating-type tobacco according to any one of [1] to [4], wherein the ratio of a volume of tobacco material to a total volume of the space section is higher than or equal to 30 vol% and lower than or equal to 70 vol%.

[6] The non-combustion-heating-type tobacco according to any one of [1] to [5], wherein an air-flow resistance from the first filter part to the second filter part when the non-combustion-heating-type tobacco is mounted such that one of the first filter part and the second filter part serves as a bottom is higher than or equal to 13 mH_2O and lower than or equal to 32 mmH_2O.

[7] An electrically heated tobacco product comprising

an electric heating device that comprises a heater member, a battery unit serving as an electric power supply of the heater member, and a control unit for controlling the heater member, and
the non-combustion-heating-type tobacco according to any one of [1] to [6], inserted so as to be in contact with the heater member

[8] A tobacco material for a non-combustion-heating-type tobacco, wherein a total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol with respect to 100 wt% of the tobacco material for a non-combustion-heating-type tobacco is lower than or equal to 10 wt%, and the tobacco material is particulate.
[9] The tobacco material for a non-combustion-heating-type tobacco according to [8], wherein the pH of the tobacco material is higher than or equal to 7.0 and lower than or equal to 10.0.

Advantageous Effects of Invention

[0015] According to the present invention, it is possible to provide a non-combustion-heating-type tobacco capable of achieving a reduction in visually recognizable tobacco vapor with a new method different from the above-described method of limiting the heating temperature during use, an electrically heated tobacco product using the non-combustion-heating-type tobacco, and a tobacco material for a non-combustion-heating-type tobacco.

Brief Description of Drawings

[0016]

[Fig. 1] Fig. 1 is a schematic diagram of a non-combustion-heating-type tobacco according to an embodiment of the present invention.
[Fig. 2A] Fig. 2A is a schematic diagram of a mode in which the non-combustion-heating-type tobacco according to the embodiment of the present invention and an additional segment are wrapped with an additional segment joining paper.
[Fig. 2B] Fig. 2B is a schematic diagram of a mode in which the non-combustion-heating-type tobacco according to the embodiment of the present invention and an additional segment are wrapped with an additional segment joining paper.
[Fig. 3] Fig. 3 is a perspective view of a non-combustion-heating-type tobacco product according to the embodiment of the present invention.
[Fig. 4] Fig. 4 is a perspective view of a state where a cap is removed from the non-combustion-heating-type tobacco product according to the embodiment of the present invention.
[Fig. 5] Fig. 5 is a sectional view taken along the line III-III in Fig. 4.
[Fig. 6] Fig. 6 is a partially sectional view of the non-combustion-heating-type tobacco according to the embodiment of the present invention, with which a mouthpiece is engaged.
[Fig. 7] Fig. 7 is a conceptual view showing a test system for measuring the number of particles in tobacco vapor
[Fig. 8] Fig. 8 is a graph showing measured results of the number of particles in tobacco vapor

Description of Embodiments

[0017] Hereinafter, embodiments of the present invention will be described in detail; however, these descriptions are examples (typical examples) of the embodiments of the present invention, and the present invention is not limited to these details as long as within the scope of the present invention.
[0018] In the specification, when numeric values or physical property values are put on both sides of "to", it means that those numeric values or physical property values are included.
[0019] The schematic diagrams and the conceptual view shown in Fig. 1 to Fig. 7 show various members in a scale increased or reduced as needed for illustration and do not show the actual sizes and ratios of the embodiments of the present invention.
[0020] In the specification, "tobacco vapor" means all the components to be delivered into the oral cavity of a user when a non-combustion-heating-type tobacco is used. Tobacco vapor is commonly made up of volatilized tobacco contents, aerosol-source material, a flavor component, and the like, and is a mixture of an aerosol component and the other gas components. In the specification, an aerosol component in tobacco vapor is referred to as "aerosol component in tobacco vapor", and the other gases are referred to as "gas components in tobacco vapor".

< Non-Combustion-Heating-Type Tobacco>

[0021] A first embodiment of a non-combustion-heating-type tobacco according to an embodiment of the present invention (also referred to as "first non-combustion-heating-type tobacco") is a tubular non-combustion-heating-type tobacco that includes a first filter part, a second filter part, and a wrapping paper wrapping the filter parts such that a space section is formed between the first filter part and the second filter part. Particulate tobacco material is movably disposed in the space section. A total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol is lower than or equal to 10 wt% with respect to 100 wt% of the tobacco material.

[0022] A second embodiment of a non-combustion-heating-type tobacco according to an embodiment of the present invention (also referred to as "second non-combustion-heating-type tobacco") is a tubular non-combustion-heating-type tobacco that includes a first filter part, a second filter part, and a wrapping paper wrapping the filter parts such that a space section is formed between the first filter part and the second filter part. Particulate tobacco material is movably disposed in the space section. A content of aerosols in tobacco vapor that is generated when the non-combustion-heating-type tobacco is heated at 120°C and each puff is inhaled at 55 ml/2 sec is smaller than or equal to 1000/puff.

[0023] The above-described first non-combustion-heating-type tobacco and second non-combustion-heating-type tobacco are also collectively referred to as "non-combustion-heating-type tobacco according to the embodiments" or also simply referred to as "non-combustion-heating-type tobacco".

[0024] Fig. 1 shows an example of the non-combustion-heating-type tobacco according to the embodiments. Hereinafter, the non-combustion-heating-type tobacco according to the embodiments will be described with reference to the drawings. The direction of h in Fig. 1 is the long-axis direction of the non-combustion-heating-type tobacco according to the embodiments.

[0025] As shown in Fig. 1, the components of the non-combustion-heating-type tobacco 20 according to the embodiments include a first filter part 21, a second filter part 22, a wrapping paper 24 for forming a tubular shape by wrapping to form a space section 23 between these filter parts, and tobacco material T movably disposed in the space section. The components will be described later. A first filter part and a second filter part are distinguished from each other in the specification and the drawings for the sake of convenience. Unless otherwise specified, these are not distinguished from each other, and any one of the filter parts may be a first filter part or a second filter part.

[0026] In the specification, the phrase "the particulate tobacco material is movably disposed" means that the tobacco material moves in the space section when the non-combustion-heating-type tobacco is moved up and down or right and left. Therefore, particulate tobacco material has flowability.

[0027] Since particulate tobacco material has flowability, a user is able to freely change the arrangement of tobacco material in the space section of the non-combustion-heating-type tobacco by changing the orientation of the non-combustion-heating-type tobacco during use. By changing the arrangement of tobacco material present in the space section of the non-combustion-heating-type tobacco, it is possible to change the air-flow condition during use according to the preference of the user

[0028] The non-combustion-heating-type tobacco preferably has a columnar shape that satisfies a shape of which an aspect ratio defined as follows is higher than or equal to one.

$$\text{Aspect Ratio} = h/w$$

where w is the width of the bottom of the columnar body (in the specification, the width of the bottom of one of the ends of the non-combustion-heating-type tobacco) and h is the height, it is desirable that $h \geq w$. However, in the present embodiment, as described above, it is defined that the long-axis direction is a direction indicated by h. Therefore, even in the case where $w \geq h$, the direction indicated by h is referred to as long-axis direction for the sake of convenience. The shape of the bottom is not limited and may be a polygonal shape, a rounded-corner polygonal shape, a circular shape, an elliptical shape, or the like. The width w is a diameter when the bottom has a circular shape, a longitudinal diameter when the bottom has an elliptical shape, or the diameter of a circumcircle or the longitudinal diameter of a circumellipse when the bottom has a polygonal shape or a rounded-corner polygonal shape. For example, in the mode shown in Fig. 1, since the bottom has a circular shape, the diameter of the circle is able to be determined. The diameter is the width w, and the length in a direction perpendicular to the diameter is the height h. The aspect ratio (h/w) represented by the height h with respect to the width w is preferably higher than or equal to one.

[0029] The length h of the non-combustion-heating-type tobacco in the long-axis direction is not limited and is, for example, commonly greater than or equal to 15 mm and preferably greater than or equal to 20 mm. The length h is commonly less than or equal to 85 mm, preferably less than or equal to 60 mm, and more preferably less than or equal to 40 mm.

[0030] The width w of the bottom of the columnar body of the non-combustion-heating-type tobacco is not limited and is, for example, commonly greater than or equal to 5 mm and preferably greater than or equal to 5.5 mm. The width w

is commonly less than or equal to 10 mm, preferably less than or equal to 9 mm, and more preferably less than or equal to 8 mm.

[0031] As shown in Fig. 1, the space section 12 is a space surrounded by the first filter part 10, the second filter part 11, and the wrapping paper 13.

[0032] The volume of the space section is not limited. The volume of the space section may be set as needed in accordance with a relationship with other members that make up an electrically heated tobacco product other than the non-combustion-heating-type tobacco and a relationship with the amount of tobacco material disposed in the space section. The volume of the space section may be, for example, greater than or equal to 500 mm^3 and less than or equal to 3000 mm^3, or may be greater than or equal to 500 mm^3 and less than or equal to 800 mm^3.

[0033] With reference to the long-axis direction of the non-combustion-heating-type tobacco, the ratio of the length of the space section to the length h of the non-combustion-heating-type tobacco is not limited. From the viewpoint of ensuring the amount of tobacco material within the range in which the advantageous effects of the present invention are exercised and from the viewpoint of achieving easy-inhalation air-flow resistance, the ratio is preferably higher than or equal to 0.1 and lower than or equal to 0.9, and more preferably higher than or equal to 0.4 and lower than or equal to 0.7.

[0034] The air-flow resistance from the first filter part to the second filter part when the non-combustion-heating-type tobacco is mounted such that one of the first filter part and the second filter part serves as a bottom is not limited. From the viewpoint of easy-inhalation, the air-flow resistance is commonly higher than or equal to 10 mmH_2O, preferably higher than or equal to 13 mmH_2O, more preferably higher than or equal to 20 mmH_2O.The air-flow resistance is commonly lower than or equal to 70 mmH_2O, preferably lower than or equal to 32 mmH_2O, and more preferably lower than or equal to 28 mmH_2O.

[0035] The air-flow resistance of the non-combustion-heating-type tobacco according to the embodiment of the present invention is a pressure difference PD (mmH_2O) in the non-combustion-heating-type tobacco when inhalation is performed at a flow rate of 17.5 cm^3/s from the first filter part or the second filter part in a state where one of the first filter part and the second filter part serves as a bottom as described above.

[0036] Examples of means to regulate the air-flow resistance include regulating the amount of tobacco material disposed in the space section, the height of the space section, and the height of the filter part.

[0037] The air-flow resistance in the height direction of the first filter or the second filter part is not limited. From the viewpoint of easy inhalation, the air-flow resistance is commonly lower than or equal to 6 mmH_2O, and preferably lower than or equal to 5 mmH_2O. Although the favorable lower limit range is not limited and is commonly higher than or equal to 1 mmH_2O.

<Tobacco Material>

[0038] The tobacco material in the first non-combustion-heating-type tobacco is referred to as "first tobacco material", and the tobacco material in the second non-combustion-heating-type tobacco is referred to as "second tobacco material".

[0039] A tobacco material for a non-combustion-heating-type tobacco according to another embodiment of the present invention, in which a total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol is lower than or equal to 10 wt% with respect to 100 wt% of the tobacco material for a non-combustion-heating-type tobacco, and the tobacco material is particulate, is referred to as "third tobacco material".

[0040] In the specification, the word "particulate" associated with tobacco material means that the tobacco material in the above-described embodiments does not contain a sheet tobacco material.

[Aerosol-Source Material]

[0041] The first tobacco material and the third tobacco material each are not limited as long as the additive amount of aerosol-source material is lower than or equal to 10 wt% with respect to 100 wt% of the tobacco material. For example, the first tobacco material and the third tobacco material each may be made up of a composition including shredded tobacco or ground tobacco. When the content of aerosol-source material in tobacco material is set to fall within the above range, it is possible to reduce generation of aerosols and reduce generation of visually recognizable tobacco vapor.

[0042] The aerosol-source material in the present invention means glycerine, propylene glycol, triacetin, 1,3-butanediol, and mixtures of them. Since only the above-described material is used as aerosol-source material used in general non-combustion-heating-type tobaccos, the advantageous effects of the present invention are obtained by controlling the additive amount of substance of the above-described type to lower than or equal to a certain value.

[0043] The additive amount of aerosol-source material (the total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol) is not limited as long as the additive amount of aerosol-source material is lower than or equal to 10 wt% with respect to 100 wt% of tobacco material. From the viewpoint of achieving a reduction in visually recognizable tobacco vapor, the additive amount of aerosol-source material is preferably lower than or equal to 8 wt%, more preferably lower than or equal to 5 wt%, further preferably lower than or equal to 3 wt%, and particularly preferably lower than or

equal to 1 wt%, and most preferably 0 wt% (aerosol-source material is not added). In the specification, 0 wt% means that it is lower than or equal to a detection limit.

[0044] Generally, an aerosol-source material is not limited to an additive provided by intended external addition and is slightly contained also in the raw materials of tobacco material other than aerosol-source material, particularly, dried tobacco leaves, so it is actually impossible to completely set the content of aerosol-source material in tobacco material to 0 wt%. Commonly, the content of aerosol-source material in tobacco material in the case where intended external addition of aerosol-source material is not performed is lower than or equal to 1 wt%. Specifically, commonly, in dried tobacco leaves, glycerine is 0.016 to 0.125 wt%, trace amounts of propylene glycol and 1,3-butanediol are contained, triacetylene is commonly not contained, and the total of these contents is lower than or equal to 1 wt%. In other words, the content of aerosol-source material in tobacco material is an amount obtained by adding the amount of intentionally added aerosol-source material to the amount of aerosol-source material contained in the raw materials of tobacco material other than the aerosol-source material, particularly, dried tobacco leaves.

[0045] The additive amount of aerosol-source material of the second tobacco material (the total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol) is not limited. From the viewpoint of achieving a reduction in visually recognizable tobacco vapor, the additive amount of aerosol-source material is commonly lower than or equal to 10 wt%, preferably lower than or equal to 8 wt%, more preferably lower than or equal to 5 wt%, further preferably lower than or equal to 3 wt%, and particularly preferably lower than or equal to 1 wt%, and most preferably 0 wt% (aerosol-source material is not added), with respect to 100 wt% of tobacco material. As in the case of the above-described first tobacco material, the content of aerosol-source material in tobacco material is an amount obtained by adding the amount of intentionally added aerosol-source material to the amount of aerosol-source material contained in the raw materials of tobacco material other than the aerosol-source material, particularly, dried tobacco leaves.

[0046] Other than the elements of the above-described additive amount and contents, the characteristics of aerosol-source material contained in tobacco material in the above-described first and third non-combustion-heating-type tobaccos are able to be similarly applied to the characteristics of aerosol-source material contained in tobacco material in the second non-combustion-heating-type tobacco.

[Form]

[0047] The form of tobacco material is not limited as long as the tobacco material is particulate. Examples of the form of tobacco material include (1) tobacco granules (also referred to as "tobacco material (A)"), and (2) the one made up of a composition including shredded tobacco or ground tobacco (also referred to as "tobacco material (B)"). The tobacco material (A) (granular form) is preferable.

[0048] To implement an intended tobacco flavor, multiple kinds of tobacco leaves need to be blended and disposed in the space section of the non-combustion-heating-type tobacco. The tobacco material (B) tends to cause variations in blend ratio at the time of inserting tobacco material in the space section at high speed. In contrast, in the case of the tobacco material (A), since tobacco leaves are blended at a predetermined blend ratio and then granules are manufactured, there is a low possibility of variations in blend ratio at the time of inserting tobacco material into the space section of the non-combustion-heating-type tobacco at high speed. Breakage at the time of transport of tobacco material is also less likely in the case of the tobacco material (A), so variations in air-flow resistance are smaller when the tobacco material (A) is used. For these reasons, the tobacco material (A) is more preferable than the tobacco material (B).

[0049] The tobacco material may be made up of only the tobacco material (A) or the tobacco material (B), may be made up of a mixture of them, or may be a mixture containing another particulate tobacco material. However, from the viewpoint similar to the above, the tobacco material is preferably made up of only the tobacco material (A). When the tobacco material is made up of a mixture, the mixture ratio may be designed at any ratio.

[0050] Tobacco granules in the specification mean granulated tobacco.

[0051] The ratio of the volume of tobacco material to the overall volume of the space section is not limited and can be set as needed according to the form of the non-combustion-heating-type tobacco or the tobacco material. From the viewpoint of ensuring a suitable air-flow resistance, the ratio of the volume of tobacco material is commonly higher than or equal to 25 vol%, preferably higher than or equal to 30 vol%, more preferably higher than or equal to 40 vol%, and further preferably higher than or equal to 50 vol%. When the ratio is higher than or equal to 30 vol%, a flavor component contained in the tobacco material is sufficiently released to a user. The ratio is commonly lower than or equal to 75 vol%, preferably lower than or equal to 70 vol%, more preferably lower than or equal to 65 vol%, and further preferably lower than or equal to 60 vol%. When the ratio is lower than or equal to 70 vol%, the air-flow resistance does not become excessive, so good inhalation response is ensured, and flowability of tobacco material in the space is ensured.

[0052] The ratio of the weight of tobacco material to the overall volume of the space section is not limited and can be set as needed according to the form of the non-combustion-heating-type tobacco or the tobacco material. From the viewpoint of ensuring a suitable air-flow resistance, the ratio of the weight of tobacco material is commonly higher than or equal to 0.1 g/cm^3 and preferably higher than or equal to 0.3 g/cm^3, and the ratio of the weight of tobacco material

is commonly lower than or equal to 1.5 g/cm^3, preferably lower than or equal to 1.0g/cm^3, and more preferably lower than or equal to 0.6 g/cm^3.

[0053] The particulate tobacco material used in the present embodiment is preferably classified by a screen having the following screen opening. For example, from the viewpoint that easiness of movement and high specific surface area in the space section are easily achieved, and, by extension, easy control of the air-flow resistance and the advantage of excellent flavor are easily obtained, the particulate tobacco material is preferably the one that commonly does not pass through a screen having a screen opening of 149 μm (> 149 μm (greater than 149 μm)) and that passes through a screen having a screen opening of 1680 μm (< 1680 μm (less than 1680 μm)). More preferably, the particulate tobacco material does not pass through a screen having a screen opening of 250 μm (> 250 μm (greater than 250 μm)) and passes through a screen having a screen opening of 840 μm (< 840 μm (less than 840 μm)).

[0054] In the specification, the average particle size of the particulate tobacco material is able to be obtained by measuring the weight of tobacco material obtained by classifying tobacco material by using screen openings of 850 μm, 710 μm, 600 μm, 500 μm, 425 μm, 300 μm, 212 μm, and 106 μm and then performing apportionment by weight. The measurement is able to be performed by using a sieve shaker (for example, AS 200 CONTROL made by Retsch).

[0055] The average particle size of the particulate tobacco material is able to be adjusted by classifying tobacco material used. An object to be measured for the average particle size may be granules added with flavor material or aerosol-source material or may be granules not added with flavor material or aerosol-source material as long as the object is granulated granules. From the viewpoint that a more accurate average particle size is able to be measured, granules not added with flavor material or aerosol-source material are preferably measured. This is because the size of granules is estimated almost not to change depending on addition of flavor material or aerosol-source material.

[0056] The average particle size of the particulate tobacco material according to the embodiment of the present invention is preferably greater than or equal to 400 μm and less than or equal to 700 μm.

[0057] The tobacco material may have a fitting part with a heater member or the like for heating the non-combustion-heating-type tobacco.

[Flavor Developing Agent]

[0058] A flavor developing agent may be added to tobacco material. The flavor developing agent includes at least one of carbonates, hydrogencarbonates, oxides, and hydroxides of alkali metal and/or alkaline earth metal. Preferably, the flavor developing agent is potassium carbonate or sodium carbonate. By adding the flavor developing agent, volatilization of tobacco contents that are mostly amines is ensured, so it is possible to develop sufficient tobacco flavor even with the non-combustion-heating-type tobacco of a type that is heated at a relatively low temperature.

[0059] By adding the flavor developing agent, the pH of tobacco material may be 6.5 to 11.0.

[0060] In the specification, pH is able to be measured by a pH meter (for example, IQ240 made by IQ Scientific Instruments, Inc.). For example, distilled water ten times as heavy as 2 to 10 g of tobacco material in weight ratio is added to the tobacco material, a mixture of water and the tobacco material is shaken at 200 rpm for ten minutes at 22°C and left standing for five minutes, and then the pH of the obtained extract is measured with the pH meter.

[0061] The pH of the tobacco material at the measurement temperature 22°C is not limited. From the viewpoint of ensuring volatilization of tobacco contents that are mostly amines, including nicotine, the pH is commonly higher than or equal to 6.5, preferably higher than or equal to 7.0, and more preferably higher than or equal to 7.5, and the pH is commonly lower than or equal to 11.0 and preferably lower than or equal to 10.0. The pH tends to be determined mainly based on the type and amount of the above-described flavor developing agent and can also change based on another material.

[0062] The pH of the tobacco material used in a common cigarette or non-combustion-heating-type tobacco depends on the type of tobacco used or the type of flavor component added but the pH is about four to six due to contribution of various organic acids contained. In the case of such a small pH, that is, in an acid environment, tobacco contents that are mostly amines are difficult to be volatilized. In terms of this point, in a common cigarette or non-combustion-heating-type tobacco, the heating temperature during use is high, so a desired amount of volatilization of tobacco contents that are mostly amines is ensured. However, when the heating temperature during use is high, not only volatilization of aerosol-source material but also decomposition of another component occurs, with the result that white tobacco vapor is easily produced.

[0063] On the other hand, by setting the pH of the tobacco material within the above-described range, a desired almost amount of volatilization of tobacco contents that are mostly amines is ensured while the heating temperature during use is maintained at a low temperature, that is, reduction of white tobacco vapor is achieved.

[0064] Hereinafter, each of the tobacco material (A) and the tobacco material (B) will be specifically described; however, unless otherwise specified, various conditions and suitable ranges described in each of tobacco materials can also be applied to another tobacco material.

<Tobacco Material (A)>

[0065] The tobacco material (A) is made up of tobacco granules.

[0066] The raw material of the tobacco material (A) is not limited and may include (a) ground tobacco material, (b) moisture, (c) at least one-type flavor developing agent selected from a group consisting of potassium carbonate and sodium hydrogencarbonate, and (d) at least one-type binder selected from a group consisting of pullulan and hydroxypropyl cellulose.

[0067] The ground tobacco material (component (a)) included in the raw material of the tobacco material (A) includes the one obtained by grinding tobacco leaves, ground tobacco sheet, the tobacco material (B) (described later), or the like. The types of tobacco include a burley type, a flue cured type, and an oriental type. The ground tobacco material is preferably ground into an average particle diameter of greater than or equal to 30 μm and less than or equal to 300 μm. The average particle diameter is able to be measured by using a particle counter (for example, Mastersizer made by Spectris).

[0068] The moisture (component (b)) contained in the tobacco material (A) is used to maintain the unity of tobacco granules.

[0069] The raw material mixture of the tobacco material (A) commonly contains moisture higher than or equal to 3 wt% and lower than or equal to 13 wt%. The tobacco material (A) commonly can contain moisture such that the value of drying loss is higher than or equal to 5 wt% and lower than or equal to 17 wt%. A drying loss means a change in weight before and after drying when part of a sample is collected for measurement and the sample is completely dried by evaporating all the moisture in the collected sample (for example, when dried at a certain temperature (105°C) for 15 minutes) and specifically means the percentage (wt%) of a total value of the amount of moisture contained in the sample and the amount of volatile component that volatilizes under the drying condition to a sample weight. In other words, the drying loss (wt%) is expressed by the following expression (1).

$$\text{Drying Loss (wt\%)} = \{(\text{Weight of Sample before Completely Dried}) - (\text{Weight of Sample after Completely Dried})\} \times 100/(\text{Weight of Sample before Completely Dried}) \quad (1)$$

[0070] The above-described type may be used as the flavor developing agent (component (c)) contained in the tobacco material (A). This flavor developing agent adjusts the pH of the tobacco material (A) to the alkali side to thereby facilitate releasing flavor component contained in the tobacco material (A) from tobacco granules and provide flavor that can be satisfied by a user.

[0071] The raw material mixture of the tobacco material (A) can commonly contain the flavor developing agent higher than or equal to 5 wt% and lower than or equal to 20 wt%.

[0072] The binder (component (d)) contained in the tobacco material (A) is used to hold the unity of tobacco granules by binding the tobacco granule component. The binder is made of pullulan, gellan gum, carageenan, agar, guar gum, roast bean gum, hydroxypropyl cellulose (HPC), hydroxypropyl methylcellulose (HPMC), carboxymethyl cellulose (CMC), starch, modified starch, a mixture of them, or a mixture of those.

[0073] The raw material mixture of the tobacco material (A) can commonly contain the binder higher than or equal to 0.5 wt% and lower than or equal to 15 wt%.

[0074] The tobacco material (A) can be made up of the components (a), (b), (c), and (d) and may further contain an additional component.

[0075] The additional component is (e) a volatile flavor (also referred to as "flavor component" or "flavor material", solid or liquid). The volatile flavor may be a selected flavor as a flavor capable of developing a flavor feeling at a low temperature about 100°C. A flavor feeling means that, when the non-combustion-heating-type tobacco is used, it is possible to feel flavor originated from the flavor. The flavor component may be one type selected from among l-menthol, natural plant flavor (for example, cognac oil, orange oil, jasmine oil, spearmint oil, peppermint oil, aniseed oil, coriander oil, lemon oil, chamomile oil, labdanum, cuscus oil, rose oil, and lovage oil), esters (for example, menthyl acetate, isoamyl acetate, linalyl acetate, isoamyl propionate, benzyl butyrate, methyl salicylate, and the like), ketones (for example, menthone, ionone, ethyl maltol, and the like), alcohols (for example, phenylethyl alcohol, anethole, cis-6-nonen-1-ol, eucalyptol, and the like), aldehydes (for example, benzaldehyde, and the like), and lactones (for example, ω-pentadecalactone, and the like). Particularly preferable volatile flavors to be contained in the tobacco material include 1-menthol, anethole, menthyl acetate, eucalyptol, ω-pentadecalactone, and cis-6-nonen-1-ol. Alternatively, the volatile flavors to be contained in the tobacco material may be a mixture of two or more types selected from the above group.

[0076] The volatile flavors to be contained in the tobacco material (A) may be used in a solid state or may be dissolved

or dispersed in an appropriate solvent, for example, ethyl alcohol, benzyl alcohol, or water, and used. Preferably, the volatile flavor may be a flavor of which a dispersed state tends to be formed in a solvent as a result of addition of emulsifier, for example, hydrophobic flavor, oil-soluble flavor, or the like. These flavor components may be used solely or may be used in a mixed state.

[0077] The raw material mixture of the tobacco material (A) can commonly contain the flavor material higher than or equal to 0.5 wt% and lower than or equal to 30 wt%. The flavor material may be added to the components (a), (b), (c), and (d) by being directly kneaded with the components or may be added to the components by being supported on a known host inclusion compound, such as cyclodextrin, to prepare an inclusion compound and kneading the inclusion compound with the above components. Alternatively, after the tobacco material (A) is produced without a flavor material added, the flavor material dissolved in a solvent may be added by spraying. Alternatively, after the tobacco material (A) is produced without a flavor material added, the flavor material dissolved in a solvent may be added by spraying.

[0078] The content of the flavor in the tobacco material (A), obtained from the above-described raw material mixture, is not limited. From the viewpoint of imparting a good flavor, the content of the flavor is commonly higher than or equal to 100 ppm, preferably higher than or equal to 1000 ppm, more preferably higher than or equal to 5000 ppm, and the content of the flavor is commonly lower than or equal to 100000 ppm, preferably lower than or equal to 40000 ppm, and more preferably lower than or equal to 25000 ppm.

[0079] When the tobacco material (A) is made up of the above components (a), (b), (c), (d), and (e), the raw material mixture of the tobacco material (A) can commonly contain the component (a) higher than or equal to about 20 wt% (lower than or equal to about 80 wt%).

[0080] The tobacco material (A) is obtained by mixing the components (a), (c), and (d), and, when desired, the component (e), adding the component (b) to the mixture and kneading the mixture, granulating the obtained kneaded product (into a long columnar shape) with a wet extrusion granulator, and then sizing the granules into a short columnar shape or a spherical shape.

[0081] An extrusion pressure in extrusion granulation is able to be set to a selected value according to the viscosity or the like of the kneaded product. For example, a mode in which the kneaded product is extruded under a pressure of 2 kN or higher at an ambient temperature may be used. By extruding the kneaded product under such a relatively high pressure, the temperature of the kneaded product at the outlet of the extrusion granulator instantaneously rapidly increases from the ambient temperature to, for example, higher than or equal to 90°C and lower than or equal to 100°C, and the moisture and the volatile component, higher than or equal to 2 wt% and lower than or equal to 4 wt%. Therefore, when extrusion granulation is performed in such a mode, water to be blended to produce a kneaded product needs to be increased by the amount of vaporization as compared to a desired moisture in tobacco granules to be obtained.

[0082] Tobacco granules obtained by extrusion granulation may be further dried as needed to adjust moisture. For example, when the drying loss of the tobacco granules obtained by extrusion granulation is measured and the measured drying loss is higher than a desired drying loss (for example, higher than or equal to 5 wt% and lower than or equal to 17 wt%), the tobacco granules may be further dried to obtain the desired drying loss. A drying condition (temperature and time) for obtaining the desired drying loss is able to be set based on a drying condition (temperature and time) needed to reduce the drying loss by a predetermined value.

[0083] The tobacco material (A) may be made up of only the above-described tobacco granules and may further include an additional tobacco material. The additional tobacco material is commonly shreds or fine powder of tobacco leaves. The additional tobacco material may be mixed with tobacco granules and used.

<Tobacco Material (B)>

[0084] The material of shredded tobacco contained in the tobacco material (B) is not limited and may be a known one, such as lamina and a midrib, may be used. For example, the dried tobacco leaves may be the one shredded into a width greater than or equal to 0.5 mm and less than or equal to 2.0 mm. The length of the shredded tobacco leaves falls within the range of greater than or equal to about 0.5 mm and less than or equal to about 10 mm. Alternatively, the dried tobacco leaves may be ground into ground tobacco with an average particle diameter greater than or equal to 20 μm and less than or equal to 200 μm, the one obtained by forming a sheet from the uniformed ground tobacco (hereinafter, also simply referred to as uniform sheet) may be shredded into a width greater than or equal to 0.5 mm and less than or equal to 2.0 mm. The average particle diameter of the ground tobacco is able to be measured by using a particle counter (for example, Mastersizer made by Spectris). The length of the shredded uniform sheet falls within the range greater than or equal to about 0.5 mm and less than or equal to about 10 mm. As for tobacco leaves used to manufacture the shredded tobacco or the uniform sheet, various types of tobacco may be used. Examples of the types of tobacco include a flue cured type, a burley type, an orient type, a local type, other nicotiana-tabacum-series species, nicotiana-rustica-series species, and mixtures of them. The mixtures may be used by appropriately blending the above-described species to attain an intended taste. The details of the species of the tobaccos are disclosed in "Tobacco Dictionary, Tobacco Research Center, 2009.3.31 ". The method of manufacturing a uniform sheet, that is, a method of grinding

tobacco leaves and working the ground tobacco leaves into a uniform sheet, includes a plurality of existing methods. The first one is a method of manufacturing a paper-made sheet by using a paper-making process. The second one is a method of casting a uniformed product onto a metal plate or a metal plate belt with a thin thickness after an appropriate solvent, such as water, is mixed with the ground tobacco leaves to be uniformed and drying the uniformed product to form a cast sheet. The third one is a method of manufacturing a calendared sheet by extruding a product obtained by mixing an appropriate solvent, such as water, with the ground tobacco leaves and kneaded, into a sheet. The type of the uniform sheet is disclosed in detail in "Tobacco Dictionary, Tobacco Research Center, 2009.3.31".

[0085] The moisture content of the tobacco material (B) may be higher than or equal to 10 wt% and lower than or equal to 15 wt% with respect to the total amount of tobacco material and preferably higher than or equal to 11 wt% and lower than or equal to 13 wt%. With such a moisture content, a change in moisture is small during manufacturing and after manufacturing, so process management during manufacturing and quality degradation after manufacturing are small.

[0086] The tobacco material (B) may contain the materials (a) to (e) in the above-described tobacco material (A). The types and contents of these materials and other usage modes may be designed similarly to those of the above-described tobacco material (A).

<Wrapping Paper>

[0087] The configuration of wrapping paper is not limited and may be a general wrapping paper or rolling paper.

[0088] Examples of the wrapping paper include the one containing pulp as a main component. Not only sheet is made from wood pulp, such as soft wood pulp and hard wood pulp, but also pulp may be made by mixing non-wood pulp generally used in rolling paper for a tobacco article, such as flax pulp, cannabis pulp, sisal pulp, and esparto.

[0089] Chemical pulp, ground pulp, chemiground pulp, thermomechanical pulp, or the like obtained by kraft cooking, acid, neutral, alkali sulfite cooking, soda salt cooking, or the like may be used as the type of pulp.

[0090] The length and thickness of fiber of pulp are not limited. Commonly, the length of fiber of pulp is greater than or equal to 0.1 mm and less than or equal to 5 mm, and the thickness of fiber of pulp is greater than or equal to 10 μm and less than or equal to 60 μm.

[0091] During a sheet making process performed by a Fourdrinier paper machine, a cylinder paper machine, a short cylinder combination paper machine, or the like by using the above-described pulp, formation is uniformed to produce wrapping paper Where necessary, a wet strength agent may be added to impart wrapping paper with water resistance or a sizing agent may be added to adjust the printing condition of wrapping paper. Furthermore, a paper internal agent, such as aluminum sulfate, various anionic, cationic, nonionic, or amphoteric yield enhancement agents, a freeness enhancement agent, and a paper strengthening agent, and a paper making additive, such as dye, a pH adjustor, an antifoamer, a pitch control agent, and a slime control agent, may be added.

[0092] The air permeability of wrapping paper is not limited. From the viewpoint of making it easy to suppress exudation of a liquid component in tobacco material from the wrapping paper, the air permeability of wrapping paper is commonly higher than or equal to zero CORESTA Unit and lower than or equal to 50 CORESTA Unit and preferably higher than or equal to zero CORESTA Unit and lower than or equal to 10 CORESTA Unit.

[0093] The air permeability in the specification means the flow rate of air flowed (permeated) per 1 min·1 cm^2 when air is passed from one side (2 cm^2) of paper under a set pressure of 1 kPa.

[0094] A wrapping paper may be a single layer made up of only a paper layer made of the above-described material or may be laminated with an impermeable layer, such as a resin layer made of resin and a metal foil made of metal. A laminated layer may be made up of two layers including a paper layer and an impermeable layer. Preferably, a laminated layer is made up of three layers laminated by sandwiching a single impermeable layer with two paper layers or made up of three or more layers in which an adhesion layer is provided between these layers. The upper limit of the number of layers that make up a wrapping paper is not limited. From the viewpoint of easiness of working at the time of wrapping, the number of layers is preferably less than or equal to seven.

[0095] By providing an impermeable layer, it is easy to suppress exudation of a component in tobacco material from a wrapping paper. When a paper layer is provided as each of a front side layer and a back side layer, adhesion when a wrapping paper is wrapped becomes strong, and peeling is suppressed.

[0096] When the impermeable layer is a resin layer, the type of the resin layer is not limited. Examples of the type of the resin layer include polyethylene, polypropylene, PET, and polylactate.

[0097] A method of providing a resin layer is not limited. Sheet resin may be bonded to paper with a binder, sheet resin may be bonded to paper by using hot melt, or melted resin may be directly applied to paper. Examples of the binder to bond paper with resin include PVA, PVAc, EVA, CMC, HPMC, and HPC.

[0098] When sheet wrapping paper is finally used for wrapping, paper and paper or paper and resin are commonly bonded by using a binder. Examples of the binder to bond paper and paper include vinyl acetate and EVA.

[0099] The basis weight of the wrapping paper in the non-combustion-heating-type tobacco is, for example, commonly

greater than or equal to 110 gsm and preferably greater than or equal to 120 gsm. On the other hand, the basis weight is commonly less than or equal to 180 gsm and preferably less than or equal to 160 gsm.

[0100] From the viewpoint of suppressing peeling of the bonded parts of the wrapping paper of the above-described non-combustion-heating-type tobacco manufactured with the wrapping machine, the thickness of the wrapping paper is preferably less than or equal to 300 μm and more preferably less than or equal to 250 μm. On the other hand, from the viewpoint of the capability of the mouthpiece of the non-combustion-heating-type tobacco product to hold the non-combustion-heating-type tobacco and the viewpoint that stains on the wrapping paper due to a flavor contained in tobacco material are not visually recognized, the thickness of the wrapping paper is preferably greater than or equal to 100 μm and more preferably greater than or equal to 120 μm.

[0101] When the wrapping paper has such a structure that the front side paper layer, the intermediate layer of the air-impermeable layer, and the back side paper layer are laminated in this order, for example, the following conditions can be set to bring the characteristics of the overall wrapping paper into the numeric ranges of the above-described characteristics.

[0102] The intermediate layer may be made up of two or more layers as long as the intermediate layer includes an air-impermeable layer made up of a resin layer, a metal layer, or the like.

[0103] The paper that is the front side paper layer of the wrapping paper has a basis weight preferably greater than or equal to 30 gsm and less than or equal to 100 gsm and more preferably greater than or equal to 40 gsm and less than or equal to 80 gsm.

[0104] The paper that is the front side paper layer of the wrapping paper has a thickness preferably greater than or equal to 30 μm and less than or equal to 100 μm and more preferably greater than or equal to 30 μm and less than or equal to 80 μm.

[0105] The paper that serves as the front side layer of the wrapping paper is not limited as long as the paper satisfies the above-described numeric range. Examples of the paper may include OPN#85 (basis weight: 85 gsm, air permeability: 40 C.U., thickness: 97 μm) and OPN#57 (basis weight: 57 gsm, air permeability: 40 C.U., thickness: 65 μm) produced by Nippon Paper Papylia Co., Ltd.

[0106] The paper that is the back side paper layer of the wrapping paper has a basis weight preferably greater than or equal to 20 gsm and less than or equal to 100 gsm and more preferably greater than or equal to 30 gsm and less than or equal to 60 gsm.

[0107] The paper that is the back side paper layer of the wrapping paper has a thickness preferably greater than or equal to 30 μm and less than or equal to 100 μm and more preferably greater than or equal to 40 μm and less than or equal to 70 μm.

[0108] The intermediate layer that includes the air-impermeable layer has a basis weight preferably greater than or equal to 15 gsm and less than or equal to 100 gsm and more preferably greater than or equal to 20 gsm and less than or equal to 60 gsm.

[0109] The intermediate layer that includes the air-impermeable layer has a thickness preferably greater than or equal to 10 μm and less than or equal to 100 μm and more preferably greater than or equal to 20 μm and less than or equal to 50 μm.

[0110] A paper that serves as the back side layer of the wrapping paper is not limited as long as the paper satisfies the above-described numeric range. Examples of the paper include S52-7000 (basis weight: 52 gsm, air permeability: 7000 C.U., thickness: 110 μm) produced by Nippon Paper Papylia Co., Ltd, P-10000C (basis weight: 24 gsm, air permeability: 10000 C.U., thickness: 60 μm), P-20000C (basis weight: 26.5 gsm, air permeability: 20000 C.U., thickness: 75 μm), and P-30000C (basis weight: 21 gsm, air permeability: 30000 C.U., thickness: 77 μm), produced by the same corporation.

[0111] Examples of the shape of the wrapping paper of the non-combustion-heating-type tobacco include a square shape and a rectangular shape.

[0112] When a wrapping paper is used as a paper for wrapping the filter parts and the tobacco material, the size of the wrapping paper can be changed selectively according to an application. When the tobacco material is wrapped with a wrapping paper into a columnar shape, for example, one end of the wrapping paper in the w direction of Fig. 1 and its opposite-side end are overlapped with about 2 mm to be bonded into a columnar paper core shape. The size of the rectangular wrapping paper is able to be determined by the size of the completed non-combustion-heating-type tobacco.

[0113] Other than the above-described pulp, the paper of the wrapping paper according to the present embodiment may contain a filler. The content of the filler may be higher than or equal to 10 wt% and lower than 60 wt% and preferably higher than or equal to 15 wt% and lower than or equal to 45 wt% with respect to the total weight of the wrapping paper according to the embodiments of the present invention.

[0114] Examples of the filler include calcium carbonate, titanium dioxide, and kaolin. From the viewpoint of enhancing flavor and whiteness, and the like, calcium carbonate is preferably used. By containing a filler, the opacity of paper increases, the whiteness of paper increases, and the smoothness of paper increases.

[0115] A wrapping paper may be coated as needed.

[0116] A coating agent may be added to at least one side of the two front and back sides of the wrapping paper. The coating agent is not limited and is preferably a coating agent capable of forming a film on the surface of paper and reducing the permeability of liquid. Examples of the coating agent include polysaccharides, such as alginic acid and its salt (for example, sodium salt), and pectin, cellulose derivatives, such as ethyl cellulose, methyl cellulose, carboxymethyl cellulose, and nitrocellulose, and starches and their derivatives (for example, ether derivatives, such as carboxymethyl starch, hydroxyalkyl starch, and cationic starch, and ester derivatives, such as starch acetate, starch phosphate, and starch octenyl succinate).

<Filter Part>

[0117] The non-combustion-heating-type tobacco of the present embodiment has the first filter part and the second filter part, however, these are not distinguished from each other, a user is able to selectively choose which filter part is set for the inhalation port side or the heater side according to the form of the electrically heated tobacco product used during use. The following description of the filter part is applied to any of the first filter part and the second filter part unless otherwise specified. The configuration of the first filter part and the configuration of the second filter part may be different within a usable range or the same.

[0118] The filter part is a part that includes a filter (described later) and is not limited as long as the filter part has the function of a general filter. For example, the filter part may be made up of a single segment made of only a filter or may be made up of a plurality of segments made by a combination of a filter and another member.

[0119] The filter part may use a filter part including an additive releasing container (described later)

[0120] The size of the first filter part and the second filter part is not limited and may be set as needed in accordance with the form of the non-combustion-heating-type tobacco to be used during use or the form of the electrically heated tobacco product used during use. For example, the following mode may be used. In the filter part, the length of the non-combustion-heating-type tobacco in the long-axis direction is defined as "height".

[0121] From the viewpoint of ensuring good air-flow resistance, the height per one filter part is commonly greater than or equal to 3 mm, preferably greater than or equal to 4 mm, and is commonly less than or equal to 15 mm and preferably less than or equal to 10 mm.

[0122] When the non-combustion-heating-type tobacco is a columnar body, the filter part is also a columnar body; however, the diameter (width) is theoretically less than the width w of the bottom of the columnar body of the non-combustion-heating-type tobacco, and a value obtained by adding the width of the filter part of the columnar body to a value that is twice as large as the thickness of the above-described wrapping paper is the width w of the bottom of the columnar body of the non-combustion-heating-type tobacco.

[0123] The material of the filter may be obtained by working cellulose acetate tow into a cylindrical shape. Generally, in comparison with a combustible tobacco, the non-combustion-heating-type tobacco according to the embodiments of the present invention preferably has a smaller removal amount of tobacco vapor at the filter part. From such a viewpoint, in the case of the non-combustion-heating-type tobacco with a perimeter of 24.5 mm, the single yarn fineness of cellulose acetate tow is greater than or equal to 5 g/9000 m and less than or equal to 20 g/9000 m, preferably greater than or equal to 5 g/9000 m and less than or equal to 12 g/9000 m, and the overall fineness is greater than or equal to 12000 g/9000 m and less than or equal to 35000 g/9000 m and preferably greater than or equal to 12000 g/9000 m and less than or equal to 28000 g/9000 m. The packing density of fiber is preferably greater than or equal to 0.09 g/cc and less than or equal to 0.12 g/cc. The sectional shape of fiber of cellulose acetate tow may be a Y cross section or may be an R cross section. In the case of a filter filled with cellulose acetate tow, 5 wt% or higher and 10 wt% or lower of triacetin may be added to the weight of cellulose acetate tow to improve filter hardness.

[0124] A method of wrapping cellulose acetate tow with a filter wrapping paper may be used as a method of working cellulose acetate tow into a cylindrical shape. The physical property of the filter wrapping paper is not limited. Examples of the filter wrapping paper may include a high air permeability paper with an air permeability of 1000 C.U. or higher and a low air permeability paper with an air permeability of lower than 100 C.U. A wrapping paper used for a common cigarette filter may be used as the filter wrapping paper. For example, a wrapping paper with a basis weight of 30 to 100 g/m^2 and a thickness of 30 to 100 μm may be used. Such a high air permeability paper is not limited. Examples of the air permeability paper may include LPWS-OLL (air permeability 1300 C.U., basis weight 26.5 gsm, thickness 48 μm), P-10000C (air permeability 10000 C.U., basis weight 24.0 gsm, thickness 60 μm), or plain paper (air permeability 0 C.U., basis weight 24 gsm, thickness 32 μm), produced by Nippon Paper Papylia Co., Ltd.

[0125] Other than the filter made of a tow, such as the above-described acetate tow, a filter filled with paper or nonwoven fabric sheet containing pulp as a main component may be used.

[0126] In manufacturing filter material, regulating air-flow resistance and adding additives (known adsorbent, flavor, flavor holder, and the like) are able to be designed as needed.

[0127] As described above, each of the first filter part and the second filter part may be made up of a single segment or may be made up of a plurality of segments. Even when the first filter part and/or the second filter part is made up of

a plurality of segments, the wrapping paper wraps them to make up a non-combustion-heating-type tobacco.

[0128] When the first filter part and/or the second filter part is made up of a single segment, examples of the mode include a mode in which the filter part is made up of only a filter filled with cellulose acetate tow and a mode in which the filter part is made up of only a filter filled with paper or nonwoven fabric sheet containing pulp as a main component. Examples of the mode further include a mode in which an additive releasing container (described later) is included in each of these filters.

[0129] Examples of a mode in the case where the first filter part and/or the second filter part is made up of a plurality of segments include a mode in which the plurality of segments is made up of a plurality of the same or different filters. In this case, the filter may be the above-described one filled with acetate tow, may be the one filled with paper or nonwoven fabric sheet containing pulp as a main component, or may be the one including an additive releasing container (described later).

[0130] Examples of another mode in which the first and second filter parts each are made up of a plurality of segments include a mode in which each of the first and second filter parts is made up of a filter and another member. The "another member" is not limited. Examples of the "another member" include a paper core formed by working thick paper into a cylindrical shape. For example, if the length of a tobacco filling section (space section) is elongated when the length of the non-combustion-heating-type tobacco in the long-axis direction is intended to be elongated, tobacco material needs to be disposed more than necessary; whereas, if the length of the filter is elongated, the air-flow resistance of the filter part increases, which influences easiness of inhalation. In this case, when a paper core is used, the length of the non-combustion-heating-type tobacco in the long-axis direction is able to be adjusted without receiving the above influence.

[0131] Any one of the first filter part and the second filter part may include a breakable additive releasing container (for example, a capsule) including a breakable outer shell, such as gelatin. In this case, the filter part that includes the additive releasing container is an inhalation port side. When the capsule is broken by the user of the non-combustion-heating-type tobacco before use, during use, or after use, the capsule releases liquid or substance (commonly, flavor material) contained in the capsule. Subsequently, the liquid or the substance is transferred by the smoke of tobacco while the non-combustion-heating-type tobacco is being used, and is transferred to an ambient environment after use.

[0132] The form of the additive releasing container is not limited. Examples of the form of the additive releasing container may include a capsule, such as an easily breakable capsule, and the shape of the capsule is preferably spherical. An additive contained in the additive releasing container may include the above-described selected additive and particularly preferably includes flavor material and activated carbon. One or more kinds of materials that help filtering smoke may be added as an additive. The form of the additive is not limited and is commonly liquid or solid. Using a capsule containing an additive is known in the technical field. An easily breakable capsule and its manufacturing method are known in the technical field.

[0133] Examples of the flavor material include menthol, spearmint, peppermint, fenugreek, and clove. These flavor materials may be used solely or may be used in combination.

<Additional Segment>

[0134] As shown in Fig. 2A and Fig. 2B, the above-described non-combustion-heating-type tobacco 1 may be wrapped with an additional segment joining paper 26 together with an additional segment 25 provided adjacent to the first filter part 21 and/or the second filter part 22. By providing the additional segment 25, a further additional function is able to be imparted to the non-combustion-heating-type tobacco.

[0135] The mode of the additional segment is not limited and may be, for example, a filter or a paper core. By providing a filter as an additional segment, it is possible to increase air-flow resistance. By providing a paper core at the inhalation port-side filter part as an additional segment, from the viewpoint that the distance between an electrically heated tobacco product in which the non-combustion-heating-type tobacco is inserted and the mouth of the user preferably ensures a length to some extent, it is possible to improve easiness to handle during use, such as easiness to hold in the mouth.

[0136] When a filter is provided at the inhalation port-side filter part as an additional segment, an additive releasing container may be provided inside the filter.

[0137] The mode described in the above-described filter part may be applied similarly to the mode of each of the filter, paper core, and additive releasing container, and its advantageous effects are those described in the above-described filter part.

[0138] The additional segment joining paper is not limited as long as the additional segment joining paper is able to join the non-combustion-heating-type tobacco with the additional segment. Examples of the additional segment joining paper include a chip paper.

[0139] The mode of the chip paper is not limited and may be a known chip paper.

[0140] The mode of the chip paper at the time of wrapping is not limited. For example, as shown in Fig. 2A, the chip paper may wrap to cover part of the non-combustion-heating-type tobacco and the entire surface of the additional segment or, as shown in Fig. 2B, the chip paper may wrap to cover part of the non-combustion-heating-type tobacco

and part of the additional segment.

<Mouthpiece>

[0141] A mouthpiece may be engaged with the non-combustion-heating-type tobacco. Even when no mouthpiece is used, it is possible to use the non-combustion-heating-type tobacco. In this case, the non-combustion-heating-type tobacco and the mouth of a user directly contact with each other, so the tobacco, particularly, the inhalation port end filter, tends to get wet. Thus, there are a problem that the air-flow resistance increases and a problem that a feeling deteriorates. To improve these problems, it is desirable to use a mouthpiece.

[0142] In terms of easiness of handling during use, such as easiness of holding in a mouth, the distance between an electrically heated tobacco product in which the non-combustion-heating-type tobacco is inserted and the mouth of the user preferably ensures a length to some extent, so it is preferable to use a mouthpiece in terms of this point.

[0143] The mouthpiece may be directly engaged with the non-combustion-heating-type tobacco or may be indirectly engaged via the above-described additional segment.

[0144] The material of the mouthpiece is not limited, and may be any one of a polymer material, such as resin and rubber, a metal material, and an inorganic material. From the viewpoint of easiness of manufacturing and lightweight, the material of the mouthpiece is preferably resin.

[0145] The shape of the mouthpiece is not limited as long as a flow path s2 through which tobacco vapor to be inhaled by a user flows is ensured. The shape of the mouthpiece may be a cylindrical shape or a polygonal tubular shape. From the viewpoint of improving inhalation easiness, the inhalation port side is preferably narrow. As shown in Fig. 4, the mouthpiece is not uniformly narrowed, and is preferably narrowed such that the shape of a cross section orthogonal to the long-axis direction of the inhalation port end becomes a flat shape so as to be adapted to the shape of the lip of the user. With this configuration, when the user holds the mouthpiece in the mouth, the opening of the lip in the up and down direction reduces, so it is possible to reduce flow of air into the oral cavity through the gap between each end of the lip in the right and left direction and the mouthpiece.

[0146] The shape of the cross section of a hole that directly goes to the long-axis direction of an engaging part with the non-combustion-heating-type tobacco is not limited. If the shape of the cross section of the hole is a circle, the non-combustion-heating-type tobacco to be engaged tends to rotate and is easily removed, so the shape of the cross section of the hole is preferably such a shape that has a protruding part to apply pressure (catch) such that a part to be engaged with the non-combustion-heating-type tobacco deflects. To uniform the force that the mouthpiece applies to the non-combustion-heating-type tobacco, the shape of the hole of the engaging part and the arrangement of the protruding part are preferably symmetric.

[0147] Providing a protruded part (finger hook 311) present at a part where the mouthpiece of Fig. 6 is narrowed is preferable because removal of the mouthpiece is easy.

[0148] The length of the mouthpiece in the long-axis direction is not limited. From the viewpoint of ensuring easiness of inhalation, the length of the mouthpiece in the long-axis direction may be greater than or equal to 20 mm and less than or equal to 50 mm or may be greater than or equal to 25 mm and less than or equal to 30 mm.

[0149] In the non-combustion-heating-type tobacco, the length in the long-axis direction, of the part to be engaged with the mouthpiece, is not limited, and is commonly higher than or equal to 10% and lower than or equal to 30% with respect to the length h of the non-combustion-heating-type tobacco and is preferably about 20%.

[0150] Since the non-combustion-heating-type tobacco is not able to be repeatedly used, the mouthpiece is preferably able to be engaged at the time of the start of use of the non-combustion-heating-type tobacco and removed at the time of the end of use, that is, the mouthpiece is detachable from the non-combustion-heating-type tobacco.

<Electrically Heated Tobacco Product>

[0151] The non-combustion-heating-type tobacco according to the embodiments of the present invention is able to be used as a cartridge to be accommodated in the electrically heated tobacco product as will be described below.

[0152] An electrically heated tobacco product that is another embodiment of the present invention (also simply referred to as "electrically heated tobacco product") includes an electric heating device including a heater member, a battery unit serving as an electric power supply of the heater member, and a control unit for controlling the heater member, and the above-described non-combustion-heating-type tobacco inserted so as to be in contact with the heater member.

[0153] The electrically heated tobacco product is not limited as long as the electrically heated tobacco product satisfies the above-described configuration, and its suitable example will be described below.

[0154] The mode of the embodiment of the electrically heated tobacco product may be a mode in which the outer periphery of the non-combustion-heating-type tobacco is heated as shown in Fig. 3. Hereinafter, the electrically heated tobacco product according to the embodiment of the present invention will be described.

[0155] Hereinafter, the non-combustion-heating-type tobacco according to the embodiment of the present invention

is referred to as "cartridge". Generally, it may be called "consumables".

[0156] An embodiment of the electrically heated tobacco product according to the present invention includes a housing and a mouthpiece. The housing extends in an axial direction and has an opening at a first end in the axial direction. The housing has an accommodation space inside, and the accommodation space communicates with the opening. The non-combustion-heating-type tobacco (cartridge) in which a flavor component is contained is accommodated in the accommodation space of the housing. The mouthpiece includes an engaging part and a holder. The engaging part is engaged with the opening.

[0157] The holder is configured to hold the non-combustion-heating-type tobacco.

[0158] According to the present embodiment, in replacing the non-combustion-heating-type tobacco, when the mouthpiece is removed from the housing, engagement of the engaging part of the mouthpiece with the opening of the housing is released, and the non-combustion-heating-type tobacco held by the holder of the mouthpiece is removed from the housing together with the mouthpiece. Thus, it is not necessary to remove the cartridge separately from the mouthpiece, so replacement of the cartridge is easily performed.

[0159] In the electrically heated tobacco product according to the present embodiment, the mouthpiece is configured to extend toward both sides of the opening in the axial direction in a state of being engaged with the opening. According to this mode, when the mouthpiece is removed from the housing, the part protruding outward from the opening of the housing in the mouthpiece can be held, so work for removing the mouthpiece is easy.

[0160] Fig. 3 is a perspective view of the electrically heated tobacco product ("flavor inhaler" or also simply referred to as "inhaler") according to the present embodiment.

[0161] As shown in Fig. 3, the inhaler 1 that is an example of the electrically heated tobacco product according to the present embodiment is used to taste the flavor of tobacco leaves by inhaling vapor generated by heating tobacco leaves.

[0162] Fig. 4 is a perspective view of a state where a cap 40 is removed from the inhaler 1. As shown in Fig. 3, the cap 40 is disposed so as to cover the mouthpiece 30. The cap 40 has an outer peripheral cap part 41 and an end cap part 42.

[0163] As shown in Fig. 4, the inhaler 1 includes a main unit 10, a cartridge 20, a mouthpiece 30, and the cap 40 (see Fig. 3). The cartridge 20 is made up of a wrapping paper and two filter parts and has elasticity or flexibility.

[0164] The outer shape of the inhaler 1 is formed in a substantially square prism shape with a central axis set to an axis O. The main unit 10, the cartridge 20, the mouthpiece 30, and the cap 40 are disposed so as to be aligned in the axis O. In the following description, in an axis O direction (a direction along the axis O, axial direction), a direction heading from the main unit 10 toward the mouthpiece 30 is referred to as inhalation port side, and a direction heading from the mouthpiece 30 toward the main unit 10 is referred to as anti-inhalation port side. A direction that intersects with the axis O in plan view in the axis O direction is referred to as radial direction. In the radial direction, a direction to approach the axis O is referred to as inner side, and a direction to move away from the axis O is referred to as outer side. A direction to orbit around the axis O is referred to as circumferential direction. In the specification, the "direction" means two orientations, and, when one orientation of the "direction" is indicated, the one orientation is referred to as "side".

[0165] Fig. 5 is a sectional view taken along the line III-III in Fig. 4.

[0166] As shown in Fig. 5, the electric heating device 10 (also referred to as "main unit") includes a housing 11, a power supply unit 15, and a heater 16. The housing 11 has a housing body 110, a mouthpiece support member 120, and a cartridge accommodation member 130.

[0167] The housing body 110 has an outer housing 111 and a bottom cap 116. The outer housing 111 is formed in a substantially square tube shape with the central axis set to the axis O. The outer housing 111 makes up the outer surface of the inhaler 1. The shape of the outer housing 111 may be set as needed as long as the outer housing 111 extends in the axis O direction.

[0168] An inhalation port-side opening 111a extending through in the axis O direction is formed at the inhalation port-side end of the outer housing 111. An anti-inhalation port-side opening 111b extending through in the axis O direction is formed at the anti-inhalation port-side end of the outer housing 111. A switch opening 111c extending through in the radial direction is formed at part of the outer housing 111 in the circumferential direction. A switch 112 is provided at the switch opening 111c.

[0169] Here, in the present embodiment, of the radial direction, a direction connecting the axis O with the switch opening 111c is referred to as front and back direction. In this case, the switch opening 111c side with respect to the axis O is defined as front side, and a side opposite to the switch opening 111c with respect to the axis O is referred to as back side.

[0170] The bottom cap 116 is provided at the anti-inhalation port-side opening 111b of the outer housing 111. The bottom cap 116 is formed in a substantially rectangular shape in plan view when viewed in the axis O direction. The bottom cap 116 closes the anti-inhalation port-side opening 111b of the outer housing 111. The shape of the bottom cap 116 is able to be set as needed as long as the bottom cap 116 closes the anti-inhalation port-side opening 111b of the outer housing 111.

[0171] An inner tubular member 117 is provided inside the housing body 110. The inner tubular member 117 extends in the axis O direction and is formed in a substantially square tube shape. The inner tubular member 117 is made up of

a pair of half members divided along the axis O direction. The overall length (the length along the axis O direction) of the inner tubular member 117 is shorter than the overall length of the outer housing 111. The shape of the inner tubular member 117 is able to be set as needed.

[0172] A partition wall 118 is provided inside the inner tubular member 117 so as to separate a space in which the battery 151 is accommodated from a space in which the heater 16 is accommodated.

[0173] The partition wall 118 has an inhalation port-side partition wall part 118a and a side partition wall part 118b. With this configuration, flow of air heated by the heater 16 into the space that accommodates the battery 151 is reduced. Thus, an increase in the temperature of the battery 151 is suppressed.

[0174] The inhalation port-side partition wall part 118a is disposed on the inhalation port side with respect to the battery 151. The side partition wall part 118b is disposed so as to cover the outer side of the battery 151 in the circumferential direction.

[0175] The mouthpiece support member 120 is provided at the inhalation port-side opening 111a of the outer housing 111.

[0176] A vent hole 111d extending through in the front and back direction is formed at the front side of the outer housing 111. An inflow-side opening 138a is formed at the front side of a bottom 137b of an anti-inhalation port-side end in a bottom member 136 so as to communicate with the vent hole 111d. An outflow-side opening 138b is formed at the bottom (side orthogonal to the axis O direction) of an accommodation recess 137a of the bottom 137. An airflow path 138 is formed such that the inflow-side opening 138a and the outflow-side opening 138b communicate with each other.

[0177] A cartridge support member 140 is disposed in the cartridge accommodation member 130.

[0178] In a state where the cartridge 20 is disposed in the cartridge accommodation space of the cartridge support member 140, at least part of the first filter part 21 protrudes from the cartridge support member 140 toward the inhalation port side and is disposed on the anti-inhalation port side with respect to the mouthpiece opening 125 (the first filter part 21 does not protrude from the mouthpiece opening 125 toward the inhalation port side).

[0179] As shown in Fig. 5, the power supply unit 15 is configured such that the battery 151, the control unit 152, the heater member 16, and the like are mounted in the inner tubular member 117.

[0180] The battery 151 is disposed on the anti-inhalation port side with respect to the inhalation port-side partition wall part 118a inside the inner tubular member 117. The battery 151 is formed in a cylindrical shape with the central axis set to an axis parallel to the axis O. The battery 151 is a rechargeable secondary battery. The battery 151 may be, for example, a lithium ion battery. The shape of the battery 151 is able to be set as needed.

[0181] The control unit 152 is disposed on the front side with respect to the side partition wall part 118b inside the inner tubular member 117. The control unit 152 is disposed between the side partition wall part 118b and the front side of the outer housing 111. The battery 151 and the heater member 16 are electrically connected by a wire (not shown) via the control unit 152.

[0182] The control unit 152 includes a switch element 152a at a location associated with the switch 112 disposed on the front side of the outer housing 111. In response to operation of the switch 112, the control unit 152 controls the battery 151 and the heater member 16.

[0183] The control unit 152 is configured to control current flowing from the battery 151 to the heater member 16. With this configuration, it is possible to control the heating temperature of the space section 23 of the cartridge 20.

[0184] Fig. 6 is a sectional view of the part including the mouthpiece 30 and the cartridge 20, taken along the width direction.

[0185] As shown in Fig. 6, in the engaging circumferential wall 33, an anti-inhalation port-side part 331 is thinner than an inhalation port-side part 332. With this configuration, a step 333 is formed at the boundary between the anti-inhalation port-side part 331 and the inhalation port-side part 332. The step 333 is formed in a substantially annular shape in plan view when viewed in the O direction. As shown in Fig. 5, the inhalation port-side end 20a of the cartridge 20 is in contact with the step 333 of the engaging circumferential wall 33 of the mouthpiece 30. At the connecting part of the inhalation port 31 with the proximal part 32, the opening width widens from the inhalation port side toward the anti-inhalation port side. A space may be formed between the inhalation port-side end 20a of the cartridge 20 and the anti-inhalation port-side face of the inhalation port 31 of the mouthpiece 30. With this configuration, the closed area of the inhalation port-side end 20a of the cartridge 20 reduces, and the air-flow resistance is reduced.

[0186] As shown in Fig. 6, the inhalation port-side end 20a of the cartridge 20 is in contact with the step 333 of the engaging circumferential wall 33 of the mouthpiece 30. At the connecting part of the inhalation port 31 with the proximal part 32, the opening width widens from the inhalation port side toward the anti-inhalation port side. A space may be formed between the inhalation port-side end 20a of the cartridge 20 and the anti-inhalation port-side face of the inhalation port 31 of the mouthpiece 30. With this configuration, the closed area of the inhalation port-side end 20a of the cartridge 20 reduces, and the air-flow resistance is reduced.

[0187] The cartridge 20 includes the first filter part 21, the second filter part 22, the space section 23, and the wrapping paper 24.

[0188] The finger hook 311 is provided on the outer periphery of the inhalation port 31. The finger hook 311 protrudes

outward in the radial direction from the outer periphery of the inhalation port 31. The finger hook 311 is provided all around the outer periphery of the inhalation port 31 in the circumferential direction.

[0189] The flow path s2 extending through in the axis O direction is formed in the mouthpiece 30. Vapor generated from the cartridge 20 is able to flow through the flow path s2.

[0190] The heater member 16 of an electric heating device 10 may be, for example, a sheet heater, a flat heater, or a tubular heater. A sheet heater is a flexible sheet-shaped heater. Examples of the sheet heater include a heater that includes a film (of which the thickness is greater than or equal to about 20 μm and less than or equal to about 225 μm) made of heat-resistant polymer, such as polyimide. A flat heater is a rigid flat heater (of which the thickness is greater than or equal to about 200 μm and less than or equal to about 500 μm). Examples of the flat heater include a heater in which a resistance circuit is provided on a flat substrate and this part is regarded as a heat generating part. A tubular heater is a hollow or solid tubular heater. Examples of the tubular heater include a heater (of which the thickness is greater than or equal to about 200 μm and less than or equal to about 500 μm) that has a resistance circuit on the outer periphery of a tube made of, for example, metal and this part is regarded as a heat generating part.

[0191] Where the length of the long-axis direction of the non-combustion-heating-type tobacco is L mm, the length of the heater member in the long-axis direction is able to fall within the range of L ± 5.0 mm.

[0192] A heating strength, that is, the heating time and heating temperature, on the non-combustion-heating-type tobacco 20 with the heater member 16 is able to be set in advance for each electrically heated tobacco product 1. For example, the heating strength may be set such that, after the non-combustion-heating-type tobacco 20 is inserted in the electric heating device 10, pre-heating is performed for a set time, the non-combustion-heating-type tobacco 20 is heated until the temperature of at least part of the tobacco material in the non-combustion-heating-type tobacco 20 becomes X(°C), and then the temperature is maintained at a set temperature lower than or equal to X(°C).

[0193] The X(°C) is preferably higher than or equal to 80°C and lower than or equal to 200°C from the viewpoint of delivery of the volatile component of tobacco. Specifically, the X(°C) may be set to 80°C, 90°C, 100°C, 110°C, 120°C, 130°C, 140°C, 150°C, 160°C, 170°C, 180°C, 190°C, or 200°C.

[0194] In the electrically heated tobacco product 1, as a result of heating of the heater member 16, vapor containing a flavor component and the like generated from tobacco material disposed in the space section passes through the inhalation port-side filter part and reaches the inside of the oral cavity of a user.

[0195] The relationship between the mouthpiece and the electric heating device during use is not limited. The mouthpiece may be in contact with the outer side of the electric heating device, or may be fitted to a mouthpiece fitting part provided in the electric heating device. From the viewpoint of preventing drop of the mouthpiece during use, the fitting mode is preferable.

[0196] As described above, a mode in which engagement of the non-combustion-heating-type tobacco with the mouthpiece is enhanced by providing the mouthpiece with a protruding part is preferable because the non-combustion-heating-type tobacco and the mouthpiece are removed from the electric heating device at a time in removing the non-combustion-heating-type tobacco from the electric heating device. Specifically, static friction force applied between the mouthpiece and the non-combustion-heating-type tobacco is preferably greater than static friction force applied between the inner wall of the electric heating device and the non-combustion-heating-type tobacco.

[0197] The electrically heated tobacco product may have another component other than the above-described components. Examples of the other component include a temperature sensor and a gas concentration sensor (chemical sensor).

<Measurement of Number of Particles in Tobacco Vapor>

[0198] In the specification, the number of particles in tobacco vapor that is generated by the use of a non-combustion-heating-type tobacco is measured in accordance with a test system shown in Fig. 7. For example, an APS spectrometer model 3321 (made by TSI) of which the measurable particle diameter range is greater than or equal to 0.5 μm and less than or equal to 20 μm and the measurable particle concentration is higher than or equal to 0.001/cc and lower than or equal to 1000/cc is able to be used as a measuring apparatus. After tobacco vapor is derived into the apparatus, the apparatus carries out measurement quickly (for zero to two seconds).

[0199] Specific measurement conditions are as follows. Inhalation is started after a lapse of three minutes from the time point (temperature increase time point) when the temperature of a non-combustion-heating-type tobacco has been increased to 120°C, a single non-count puff (55 ml/2 sec, performed at a similar flow rate in the subsequent puffs) is taken. A puff is taken at the time point (measurement start time point) after a lapse of three minutes and 30 seconds from the temperature increase time point, the number of particles in tobacco vapor is measured, to measure the number of particles in tobacco vapor (first puff), then a puff and measurement of the number of particles in tobacco vapor are carried out every 30 seconds from the start time point and to complete at the fifth puff and measurement of the number of particles in tobacco vapor (fifth puff). Of the five measured results of the number concentration of particles, the maximum value is determined as the number of particles in tobacco vapor Commonly, with an increase in the number

of puffs, the number of particles in tobacco vapor reduces, so the result of measurement at the first puff is the number of particles in tobacco vapor.

[0200] In the present invention, the number of particles to be counted by the above-described measurement is assumed as the number of particles of all the aerosols that all can contribute to visible smoke.

[0201] The content of aerosols in tobacco vapor in each of the above-described first tobacco material and the third tobacco material is not limited. From the viewpoint of achieving a reduction in visually recognizable tobacco vapor, the content of aerosols is commonly smaller than or equal to 1000/puff, preferably smaller than or equal to 500/puff, more preferably smaller than or equal to 200/puff, and particularly preferably 160/puff.

[0202] The content of aerosols in tobacco vapor in the above-described second tobacco material is not limited as long as the content of aerosols is smaller than or equal to 1000/puff, preferably smaller than or equal to 500/puff, more preferably smaller than or equal to 200/puff, and particularly preferably 160/puff.

EXAMPLES

[0203] The present invention will be further specifically described by way of Examples. The present invention is not limited to the description of the following Examples as long as within the scope of the present invention.

<Experiment I; Visibility Evaluation of Tobacco Vapor>

<Preparation of Non-Combustion-Heating-type Tobacco>

[Raw Materials of Tobacco Material]

[0204]

- Ground tobacco material 1; flue cured type, average particle diameter 70 μm (measured by the particle counter (Mastersizer made by Spectris))
- Ground tobacco material 2; burley type, average particle diameter 70 μm (measured by the particle counter (Mastersizer made by Spectris))
- Water
- Flavor developing agent; potassium carbonate
- Binder; hydroxypropyl cellulose (HPC)
- Flavor material; l-menthol
- Aerosol-source material; glycerine

[Wrapping Paper]

[0205] Of the outermost two layers of a wrapping paper, paper OPN#85 (produced by Nippon Paper Papylia Co., Ltd, air permeability: 40 C.U., basis weight: 85 gsm, thickness: 97 μm) was prepared as the layer (the front side layer of the wrapping paper) that was the outer peripheral side of the non-combustion-heating-type tobacco, and paper P-10000C (produced by Nippon Paper Papylia Co., Ltd, air permeability: 10000 C.U., basis weight: 24.0 gsm, thickness: 60 μm) was prepared as the layer (the back side layer of the wrapping paper) on the side opposite to the front side layer. A laminate layer (produced by Nippon Paper Papylia Co., Ltd, thickness: 20 μm) that was a film made of polyethylene resin was prepared as the intermediate layer (air-impermeable layer) of the wrapping paper. These were cut into a rectangular shape of which the length of one side that becomes the long-axis direction of the non-combustion-heating-type tobacco was 20 mm and the length of another side orthogonal to the one side was 29.5 mm.

[0206] A wrapping paper 1 (basis weight: 124.7 gsm, thickness: 157 μm) was obtained by stacking the cut three layers and pressurizing the stacked layers while applying heat (laminating). to the stacked layers. As a result that the paper layer is compressed during lamination and part of the paper layer is embedded in the thermoplastic resin layer (here, laminate layer), the obtained wrapping paper is thinner than the total thickness of the thicknesses of the layers before lamination.

[Filter Part]

[0207]

· A cylindrical filter blank was prepared from cellulose acetate tow with a single yarn fineness of 12 g/9000 m and a total yarn fineness of 28000 g/9000 m as a raw material by using a filter production machine (FRA3SE) made by

Sanjo Machine Works, Ltd. Subsequently, a filter blank with a filter wrapping paper with a perimeter of 24.5 mm and a height of 80 mm was prepared by wrapping the filter blank with the filter wrapping paper (name: LPWS-OLL, air permeability: 1300 C.U., basis weight: 26.5 gsm, thickness: 48 μm, produced by Nippon Paper Papylia Co., Ltd.). Subsequently, the filter blank with the filter wrapping paper was cut into a height of 4 mm to prepare a cylindrical filter with an air-flow resistance in the height direction of 3.7 mmH_2O.

[EXAMPLE 1]

[0208] The ground tobacco material 1 and tobacco material 2, the flavor developing agent, and the binder were prepared as raw materials and mixed, kneaded with addition of water, and the obtained kneaded product was granulated by a wet extrusion granulator (made by Dalton Corporation; mesh size ϕ0.9mm, temperature of a kneaded product at the extrusion outlet 50 to 60°C).

[0209] The contents of the components in the raw materials were 50.00 wt% of tobacco material 1, 12.50 wt% of tobacco material 2, 25.00 wt% of water, 7.50 wt% of flavor developing agent, and 5.00 wt% of binder. The kneaded product was dried with a drier until 12.50 wt% of water, and then classified by a grinding classifier (made by Freund-Turbo Corporation; mesh size upstream ϕ710 mm, downstream ϕ250 mm). In accordance with the conditions described in the above-described method of measuring the particle size of the particulate tobacco material, the average particle size of the obtained granules was 530 μm.

[0210] After that, the flavor material was added with a pipet such that the content of the flavor material in the tobacco granules was 9.09 wt%, and rotationally agitated for 24 hours or longer in a vial container under an environment of 22°C to be uniformly dispersed. The pH of the obtained tobacco granules was 9.5 (measurement temperature 22°C).

[0211] The contents of the components in the obtained tobacco granules were 53.03 wt% of tobacco material 1, 13.26 wt% of tobacco material 2, 11.36 wt% of water, 7.95 wt% of flavor developing agent, 5.30 wt% of binder, and 9.09 wt% of flavor material.

[0212] The tobacco granules were disposed between two filters, and these were wrapped with the wrapping paper 1 to obtain the cylindrical non-combustion-heating-type tobacco. Vinyl acetate was used as a binder at the time of bonding the first paper layer and the third paper layer of the wrapping paper into a cylindrical shape. In the non-combustion-heating-type tobacco, the diameter of the bottom was 7.8 mm, the height in the long-axis direction was 20 mm, and the volume ratio (packing fraction) of tobacco material to the overall volume of the space section was 45 vol%. The air-flow resistance of the non-combustion-heating-type tobacco in the long-axis direction was 18 mmH_2O (flow rate; 35 CC/2 sec).

[EXAMPLE 2]

[0213] Except that glycerine was added as a raw material such that the content of aerosol-source material of Example 1 was 10 wt%, a non-combustion-heating-type tobacco was obtained as in the case of Example 1. The average particle size of tobacco granules before addition of flavor material and glycerine, measured by a method similar to that of Example 1, was 530 μm.

[0214] The contents of the components in the obtained tobacco granules were 47.73 wt% of tobacco material 1, 11.93 wt% of tobacco material 2, 10.23 wt% of water, 7.16 wt% of flavor developing agent, 4.77 wt% of binder, 8.18 wt% of flavor material, and 10 wt% of aerosol-source material.

[0215] The pH of the tobacco granules was 9.5 (measurement temperature 22°C).

[COMPARATIVE EXAMPLE 1]

[0216] Except that glycerine was added as a raw material such that the content of aerosol-source material of Example 1 was 30 wt%, a non-combustion-heating-type tobacco was obtained as in the case of Example 1. The average particle size of tobacco granules before addition of flavor material and glycerine, measured by a method similar to that of Example 1, was 530 μm.

[0217] The contents of the components in the obtained tobacco granules were 37.12 wt% of tobacco material 1, 9.28 wt% of tobacco material 2, 7.95 wt% of water, 5.57 wt% of flavor developing agent, 3.71 wt% of binder, 6.36 wt% of flavor material, and 30 wt% of aerosol-source material.

[0218] The pH of the tobacco granules was 9.5 (measurement temperature 22°C).

<Visibility Evaluation Test for Tobacco Vapor>

[0219] By using the non-combustion-heating-type tobaccos of Example 1, Example 2, and Comparative Example 1, a visibility evaluation test for tobacco vapor generated during use was performed by five panelists.

[0220] The non-combustion-heating-type tobacco was inserted in the electric heating device shown in Fig. 3. Inhalation

was started after a lapse of three minutes from the time point (temperature increase time point) when the heater temperature was increased to 180°C or 190°C in accordance with Table 1, and a single non-count puff was taken. A puff (55 to 110 ml/2 sec that is the flow rate at the time when a general user uses, and subsequent puffs were taken at a similar flow rate) was taken at the time point (evaluation start time point) after a lapse of three minutes and 30 seconds from the temperature increase time point, and tobacco vapor generated from the oral cavity of each panelist was checked. In addition, a puff and checking of tobacco vapor were repeated every 30 seconds from the start time point. The test was completed at the fifth puff and checking of the visibility of tobacco vapor. Finally, the visibility of tobacco vapor was evaluated in accordance with the following evaluation criteria. The evaluation results are shown in Table 1.

(Evaluation Criteria)

[0221]

0: No tobacco vapor is visible.
1: Tobacco vapor is slightly visible.
2: Tobacco vapor is clearly visible.

[Table 1]

	Heater Temperature (°C)	Glycerine Concentration (Weight %)	Panelist					
			1	2	3	4	5	Total
Example 1	180	0	0	0	0	0	0	0
Example 2	180	10	0	0	0	1	1	2
Comparative Example 1	180	30	0	0	1	1	1	3
Example 1	190	0	0	0	0	0	0	0
Example 2	190	10	1	1	0	1	0	3
Comparative Example 1	190	30	0	1	2	1	2	6

[0222] It is apparent from Table 1 that, at any of the heater temperatures 180°C and 190°C, a value obtained by adding up the tobacco vapor visibility evaluation values of all the panelists is relatively low in Examples 1 and 2 of which the additive amount of glycerine (aerosol-source material) in tobacco material, added to the tobacco material, is lower than or equal to 10 wt% as compared to Comparative Example 1 of which the concentration is 30 wt%.

[0223] It is also apparent that, in Example 1 of which the additive amount of glycerine (aerosol-source material) added to tobacco material was zero wt%, no tobacco vapor was visually recognized at all at any of the heater temperatures 180°C and 190°C.

<Experiment II; Measurement of Number of Particles in Tobacco Vapor>

[0224] By using the non-combustion-heating-type tobacco of Example 1, the number concentration of particles in tobacco vapor was measured in accordance with the test system shown in Fig. 7. An APS spectrometer model 3321 (made by TSI) of which the measurable particle diameter range was greater than or equal to 0.5 μm and less than or equal to 20 μm and the measurable particle concentration was higher than or equal to 0.001/cc and lower than or equal to 1000/cc was used as a measuring apparatus. After tobacco vapor was derived into the apparatus, the apparatus carried out measurement quickly (for zero to two seconds), and the number concentration of particles was calculated by volume frequency distribution (volume percentage).

[0225] Specifically, inhalation was started after a lapse of three minutes from the time point (temperature increase time point) when the temperature of a non-combustion-heating-type tobacco had been increased to 120°C, a single non-count puff (55 ml/2 sec, performed at a similar flow rate in the subsequent puffs) was taken. A puff was taken at the time point (measurement start time point) after a lapse of three minutes and 30 seconds from the temperature increase time point, the number concentration of particles in tobacco vapor was measured. In addition, a puff and measurement of the number concentration of particles in tobacco vapor were repeated every 30 seconds from the start time point to complete at the fifth puff and measurement of the number concentration of particles in tobacco vapor.

[0226] The measured results obtained as a result of three-time measurements are shown in Fig. 8. The results of the calculated average value of each puff for these measured results are shown in Table 2.

[Table 2]

Particle Diameter	Number of Puffs				
	1	2	3	4	5
Below 0.5 μm	5.67	3.67	2.00	2.00	1.33
0.5 μm or Above and Below 1 μm	20.33	11.33	8.67	7.67	4.67
1 μm or Above and Below 2.5 μm	65.67	96.00	93.33	77.33	73.33
2.5 μm or Above and Below 5 μm	1.00	0.00	1.00	1.00	0.00
5 μm or Above and Below 10 μm	0.00	0.00	0.00	0.00	0.00
10 μm or Above and 20 μm or Less	0.00	0.00	0.00	0.00	0.00
Total	92.67	111.00	105.00	88.00	79.33

[0227] It is apparent from Table 2 and Fig. 8 that the content of particles in tobacco vapor with a particle diameter greater than or equal to 0.5 μm and less than or equal to 20 μm was smaller than or equal to 160/puff at most and the content of particles greater than or equal to 5 μm and less than or equal to 20 μm was not observed. Thus, it is apparent that the content of aerosols in tobacco vapor is smaller than or equal to 160/puff. It is also apparent that most of particles in tobacco vapor had a particle diameter greater than or equal to 1 μm and less than 2.5 μm.

[0228] In Example 1, no aerosol-source material was externally added, so the generated aerosols presumably came from an aerosol developing component originally contained (inherent) in the raw materials of tobacco material.

[0229] It is apparent that the average of the total number of particles obtained through the measurement of five puffs is about 100/puff. The results obtained by calculating the number per volume (cc) from these are shown in Table 3. The number concentration of "cigarette" in Table 3 cited the values described in the prior art literature (Katayama et al.: Measurement of Property Change in Cigarette Main-Stream Smoke Using Laser Light Scattering Method, J. Aerosol Res., 20(4), 345-351 (2005)).

[Table 3]

	Number Concentration (Count/cc)
Example 1	2.0×10^{-1} (*)
Cigarette	1.0×10^{10}
(*) The average number of particles is 100/puff and the inhalation flow rate in the apparatus is 500 cc/s, so Particle Number Concentration = 100/puff ÷ 500 cc/s = 0.2·s/cc·puff= 0.2/cc	

[0230] It is apparent from Table 3 that the number concentration of particles in tobacco vapor in Example 1 using the non-combustion-heating-type tobacco that belongs to the present embodiments was extremely smaller than the number concentration of particles in tobacco vapor of the cigarette.

[0231] It is apparent from the above Experiments I and II that, by using the non-combustion-heating-type tobacco according to the present embodiments, it is possible to achieve a reduction in visually recognizable tobacco vapor with a method different from a method of limiting the heating temperature during use.

Reference Signs List

[0232]

1 non-combustion-heating-type tobacco (inhaler)
10 electric heating device (main unit)
11 housing
15 power supply unit
16 heater member
20 cartridge
21 first filter part
22 second filter part

23	space section
24	wrapping paper
25	additional segment
26	additional segment joining paper
T	tobacco material
30	mouthpiece (pull-out jig)
31	inhalation port
32	proximal part
33	engaging circumferential wall
40	cap
110	housing body
111	outer housing
111a	inhalation port-side opening
117	inner tubular member
120	mouthpiece support member
125	mouthpiece opening (opening)
130	cartridge accommodation member
140	cartridge support member
151	battery
152	control unit
311	finger hook
s2	flow path

Claims

1. A tubular non-combustion-heating-type tobacco comprising a first filter part, a second filter part, and a wrapping paper wrapping the filter parts such that a space section is formed between the first filter part and the second filter part, wherein

   particulate tobacco material is movably disposed in the space section, and
   a total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol with respect to 100 wt% of the tobacco material is lower than or equal to 10 wt%.

2. A tubular non-combustion-heating-type tobacco comprising a first filter part, a second filter part, and a wrapping paper wrapping the filter parts such that a space section is formed between the first filter part and the second filter part, wherein

   particulate tobacco material is movably disposed in the space section, and
   a content of aerosols in tobacco vapor that is generated when the non-combustion-heating-type tobacco is heated at 120°C and each puff is inhaled at 55 ml/2 sec is smaller than or equal to 1000/puff.

3. The non-combustion-heating-type tobacco according to claim 1 or 2, wherein the tobacco material is made up of tobacco granules.

4. The non-combustion-heating-type tobacco according to any one of claims 1 to 3, wherein the pH of the tobacco material is higher than or equal to 7.0 and lower than or equal to 10.0.

5. The non-combustion-heating-type tobacco according to any one of claims 1 to 4, wherein the ratio of a volume of tobacco material to a total volume of the space section is higher than or equal to 30 vol% and lower than or equal to 70 vol%.

6. The non-combustion-heating-type tobacco according to any one of claims 1 to 5, wherein an air-flow resistance from the first filter part to the second filter part when the non-combustion-heating-type tobacco is mounted such that one of the first filter part and the second filter part serves as a bottom is higher than or equal to 13 mmH2O and lower than or equal to 32 mmH_2O.

7. An electrically heated tobacco product comprising

an electric heating device that comprises a heater member, a battery unit serving as an electric power supply of the heater member, and a control unit for controlling the heater member, and
the non-combustion-heating-type tobacco according to any one of claims 1 to 6, inserted so as to be in contact with the heater member.

8. A tobacco material for a non-combustion-heating-type tobacco, wherein a total additive amount of glycerine, propylene glycol, triacetin, and 1,3-butanediol with respect to 100 wt% of the tobacco material for a non-combustion-heating-type tobacco is lower than or equal to 10 wt%, and the tobacco material is particulate.

9. The tobacco material for a non-combustion-heating-type tobacco according to claim 8, wherein the pH of the tobacco material is higher than or equal to 7.0 and lower than or equal to 10.0.

FIG. 1

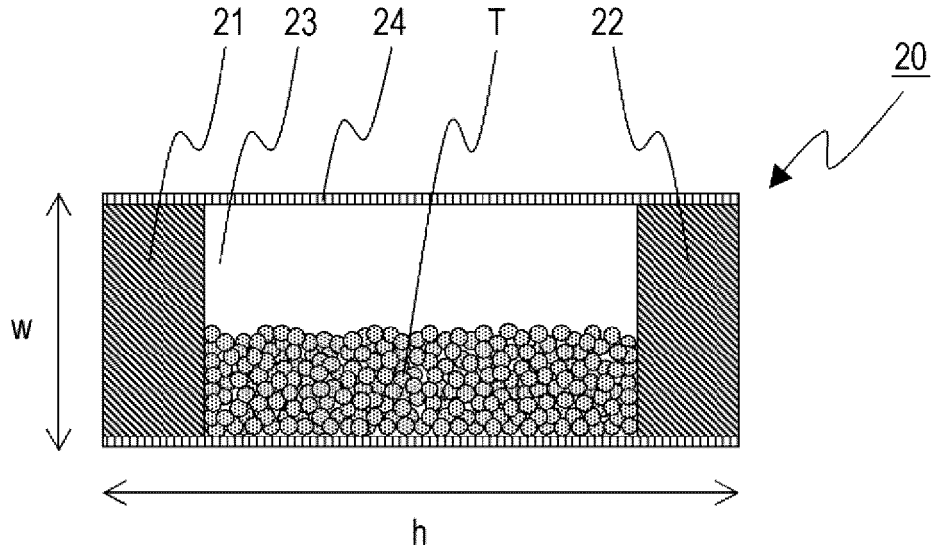


FIG. 2A

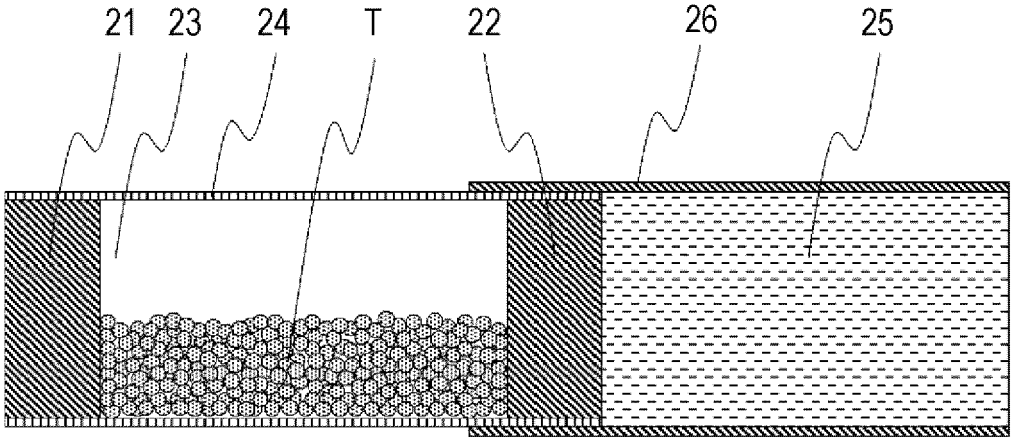


FIG. 2B

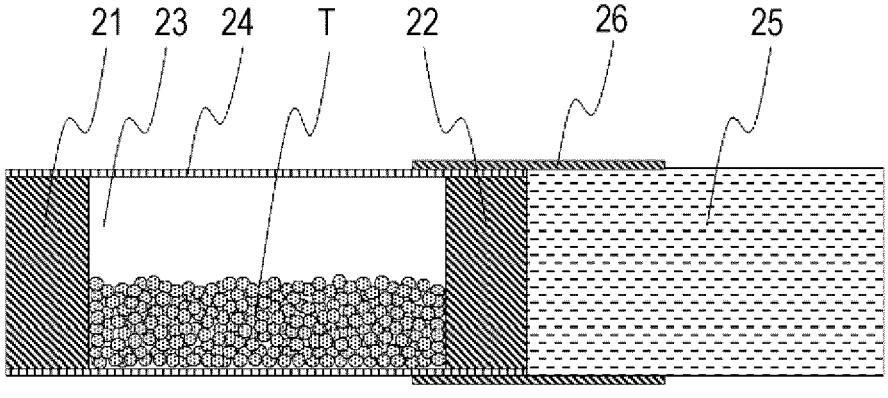


FIG. 3

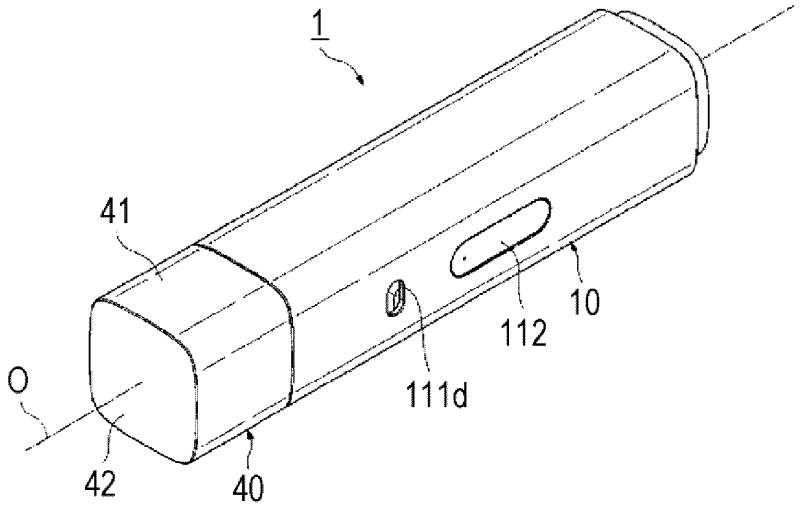


FIG. 4

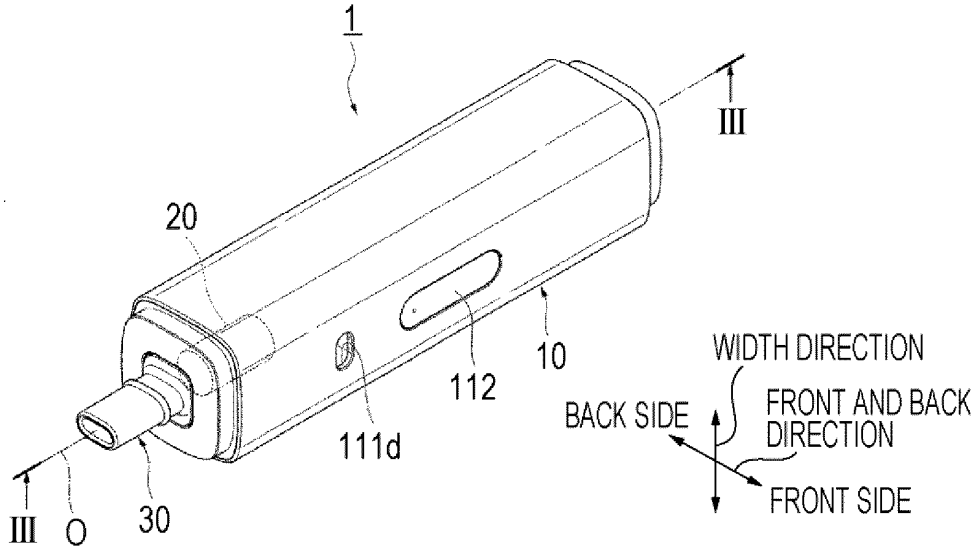


FIG. 5

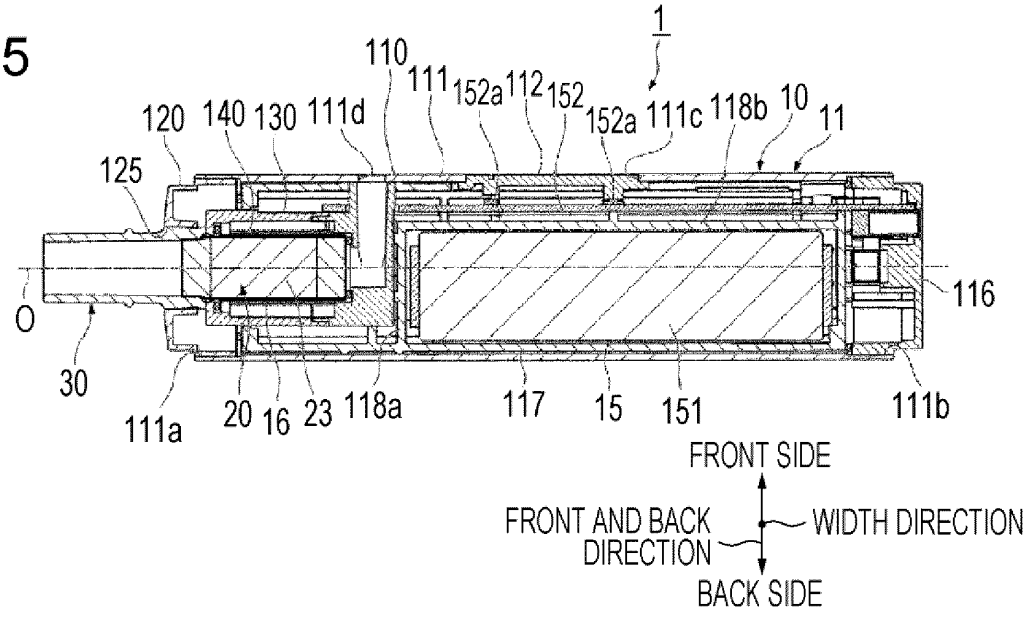


FIG. 6

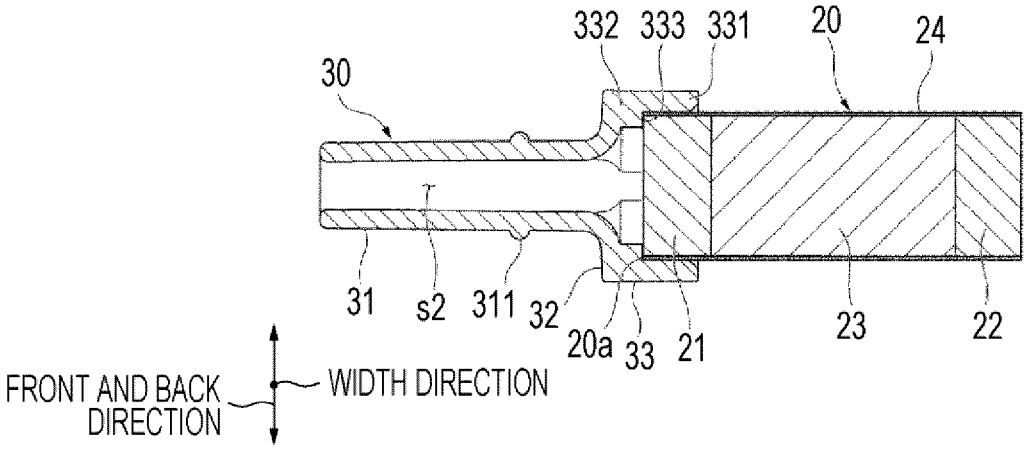

332
333
331
20
24
30
31
s2
311
32
20a
33
21
23
22
FRONT AND BACK DIRECTION
WIDTH DIRECTION

FIG. 7

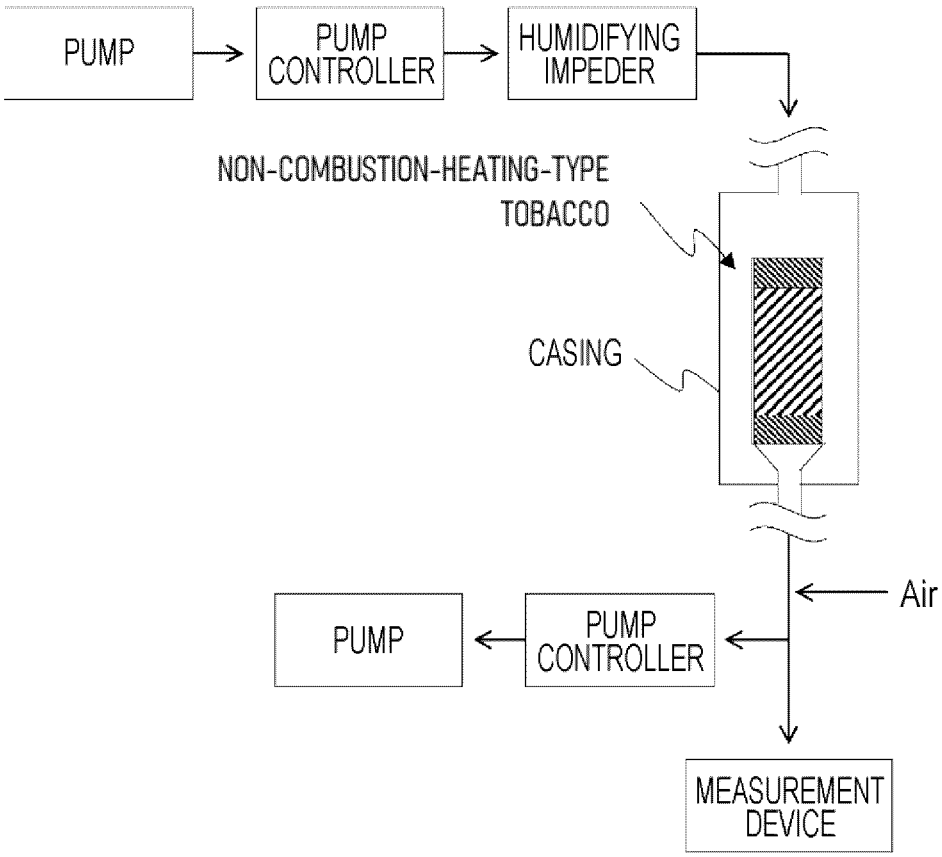
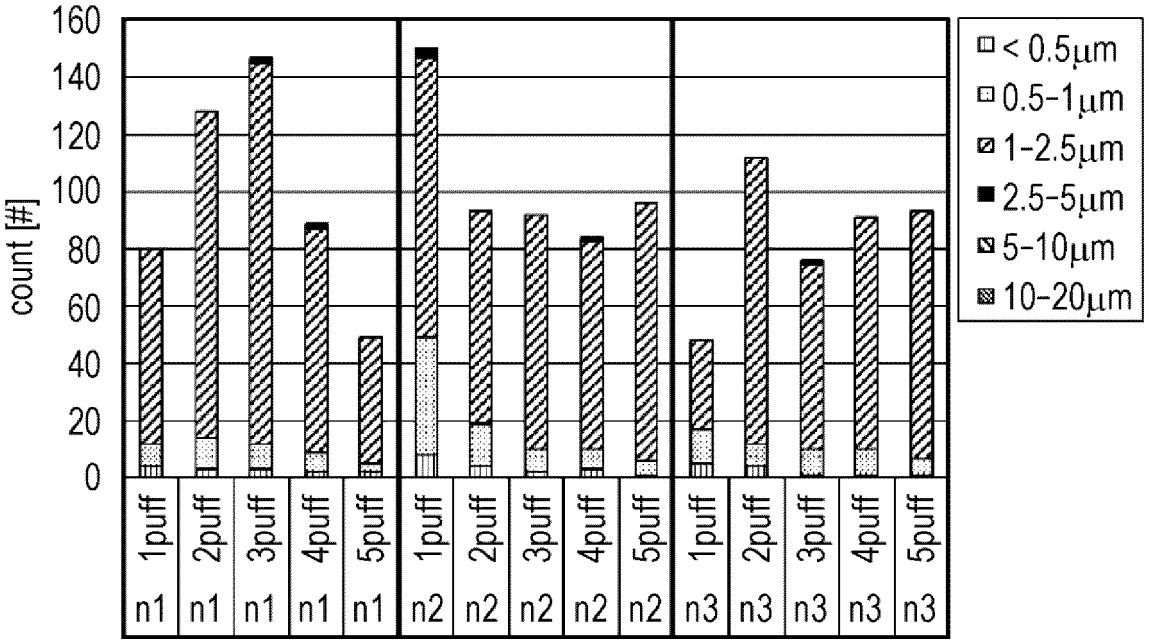

PUMP
PUMP CONTROLLER
HUMIDIFYING IMPEDER
NON-COMBUSTION-HEATING-TYPE TOBACCO
CASING
Air
PUMP
PUMP CONTROLLER
MEASUREMENT DEVICE

FIG. 8


160
140
120
100
80
60
40
20
0
count [#]
< 0.5μm
0.5-1μm
1-2.5μm
2.5-5μm
5-10μm
10-20μm
1puff
2puff
3puff
4puff
5puff
n1
n2
n3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/016286

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. A24F47/00(2020.01)i, A24F40/20(2020.01)i, A24F40/42(2020.01)i
FI: A24F40/20, A24F40/42, A24F47/00

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)
Int. Cl. A24F47/00, A24F40/20, A24F40/42

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	1971-2021
Registered utility model specifications of Japan	1996-2021
Published registered utility model applications of Japan	1994-2021

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.
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A	JP 2019-500008 A (PHILIP MORRIS PRODUCTS S.A.) 10 January 2019, fig. 8, 9	1-9
A	JP 2018-537953 A (PHILIP MORRIS PRODUCTS S.A.) 27 December 2018, fig. 1, 11-13	1-9
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☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13.05.2021	15.06.2021
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/016286

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2020/025434 A1 (NICOVENTURES TRADING LIMITED) 06 February 2020, fig. 1	1-9
A	US 10295173 B1 (MOST, Matthew Isaac) 21 May 2019, fig. 1	1-9
A	JP 2018-532377 A (PHILIP MORRIS PRODUCTS S.A.) 08 November 2018, paragraph [0013]	1-9
A	CN 110393307 A (SHENZHEN ZINWI BIOTECHNOLOGY CO., LTD.) 01 November 2019, abstract	1-9

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/016286

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US 2019/0166903 A1	06.06.2019	(Family: none)	
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US 10295173 B1	21.05.2019	(Family: none)	
JP 2018-532377 A	08.11.2018	US 2017/0079322 A1 paragraph [0013] WO 2017/046400 A1 CN 108024567 A KR 10-2018-0055807 A	
CN 110393307 A	01.11.2019	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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- **KATAYAMA et al.** Measurement of Property Change in Cigarette Main-Stream Smoke Using Laser Light Scattering Method. *J. Aerosol Res.,* 2005, vol. 20 (4), 345-351 **[0229]**