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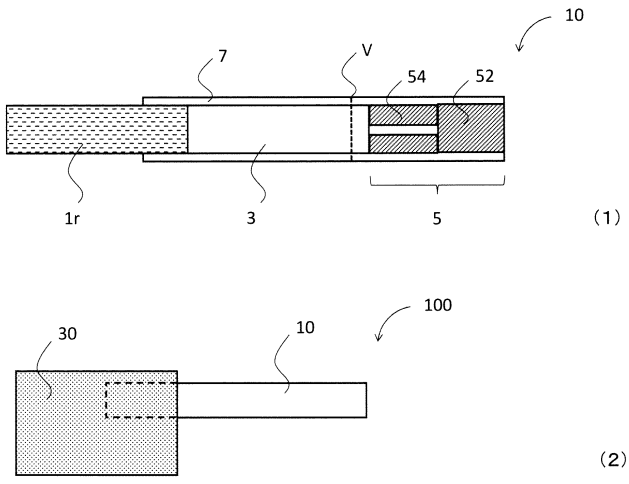
(54) TOBACCO MASTER BATCH FOR NON-COMBUSTION-TYPE FLAVOR INHALER, AND TOBACCO MATERIAL CONTAINING SAME

(57) A tobacco masterbatch for a non-combustion-type flavor inhaler, contains, by bone dry weight, 80 to 130 mg/g of a carboxylic acid as a component (A) and 6.5 to 10 weight% of nicotine as a component (B).

Fig. 1



EP 4 042 885 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a tobacco masterbatch for a non-combustion-type flavor inhaler and to a tobacco material containing the tobacco masterbatch.

BACKGROUND ART

[0002] Various non-combustion-type flavor inhalers have now been marketed (Patent Literature (PTL) 1, for example). Meanwhile, smoking flavor comparable to conventional combustion-type flavor inhalers is required for such non-combustion-type flavor inhalers.

CITATION LIST

PATENT LITERATURE

[0003] PTL 1: WO 2018/216430

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] In view of the above, an object of the present invention is to provide a tobacco masterbatch for a non-combustion-type flavor inhaler excellent in smoking flavor and a tobacco material containing the tobacco masterbatch.

SOLUTION TO PROBLEM

[0005] The present inventors have found that the above-mentioned object can be attained by leaf tobacco containing specific amounts of a carboxylic acid and nicotine. In other words, the above-mentioned object is attained by the present invention below.

(1) A tobacco masterbatch for a non-combustion-type flavor inhaler, containing, by bone dry weight, 80 to 130 mg/g of a carboxylic acid as a component (A) and 6.5 to 10 weight% of nicotine as a component (B).
(2) The tobacco masterbatch according to (1), further containing 20 to 40 mg/g of an amino acid as a component (C).
(3) The tobacco masterbatch according to (1) or (2), where the component (A) is selected from the group consisting of citric acid, malic acid, succinic acid, formic acid, acetic acid, and combinations thereof.
(4) The tobacco masterbatch according to any of (1) to (3), where the component (C) is selected from the group consisting of alanine, asparagine, aspartic acid, glutamic acid, proline, serine, and combinations thereof.
(5) A tobacco material for a non-combustion-type flavor inhaler, containing the tobacco masterbatch according to (1) to (4) above and one or more other materials.
(6) The tobacco material according to (5), containing 5 to 80 weight% of the tobacco masterbatch in the material.
(7) The tobacco material according to any of (4) to (6), where the other materials include a material that contains the component (A) or the component (B) in an amount less than the tobacco masterbatch.
(8) A tobacco rod including the tobacco material according to any of (5) to (7) above and a wrapper wrapped therearound.
(9) A capsule filled with the tobacco material according to any of (5) to (7) above, where the capsule is sealed such that gas can pass therethrough.

ADVANTAGEOUS EFFECTS OF INVENTION

[0006] According to the present invention, it is possible to provide a tobacco masterbatch for a non-combustion-type flavor inhaler excellent in smoking flavor and a tobacco material containing the tobacco masterbatch.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

Fig. 1 illustrates an embodiment of a non-combustion-type flavor inhaler.
Fig. 2 illustrates another embodiment of a non-combustion-type flavor inhaler.

DESCRIPTION OF EMBODIMENTS

[0008] Hereinafter, the present invention will be described in detail. In the present invention, the expression of "X to Y" includes the lower and the upper limits of X and Y.

1. Tobacco Masterbatch

[0009] A tobacco masterbatch is a flavor generating material that contains a relatively high concentration of flavor component and that is used by mixing with one or more other materials to dilute the component. A tobacco masterbatch of the present invention contains, by bone dry weight in the tobacco masterbatch, 80 to 130 mg/g of a carboxylic acid as a component (A) and 6.5 to 10 weight% of nicotine as a component (B).

[0010] A carboxylic acid as the component (A) provides to a user a mild taste while retaining smoking flavor. Meanwhile, an excessive amount of the component (A) results in an unpleasant taste. In this view, the upper limit of the component (A) is preferably 120 mg/g or less and more preferably 110 mg/g or less, and the lower limit is preferably 95 mg/g or more and more preferably 100 mg/g or more. Exemplary carboxylic acids include citric acid, malic acid, succinic acid, formic acid, acetic acid, and combinations thereof. The carboxylic acid as the component (A) does not include an amino acid.

[0011] A tobacco masterbatch of the present invention is generally used as a tobacco material after mixing with one or more other materials, and hence the amount of nicotine of the tobacco material is smaller during use. However, such a tobacco material provides excellent smoking flavor compared with leaf tobacco containing the same amount of nicotine. The reason is unclear but is presumably due to uneven distribution of nicotine in the tobacco material or so-called masterbatch effect. The amount of the component (B) is thus adjusted appropriately according to the concentration after dilution, and the upper limit is preferably 9 weight% or less, and the lower limit is preferably 8 weight% or more.

[0012] A tobacco masterbatch of the present invention may further contain 20 to 40 mg/g of an amino acid as a component (C). An amino acid primarily provides a sweet taste to a user. In this view, the upper limit of the component (C) is preferably 35 mg/g or less, and the lower limit is preferably 25 mg/g or more. Exemplary amino acids include alanine, asparagine, aspartic acid, glutamic acid, proline, serine, and combinations thereof.

[0013] The contents of the above-mentioned components based on bone dry weight can be calculated, for example, from the moisture content of a masterbatch and the amounts of the components obtained through analysis or can be determined directly by analyzing a masterbatch in the bone dry state. In view of working efficiency, the former method is preferable. In one embodiment, such a method for the component (B), for example, can be carried out as follows.

1) A weighed masterbatch is placed in a rotary rack-type dryer (rotary dryer) and dried at 80°C ± 1°C for three hours to measure the moisture content W (weight%) from the weight loss.
2) A weighed masterbatch (undried) is analyzed by a publicly known method to determine the content Bw (weight%) of the component (B) in the undried masterbatch.
3) The content Bd (weight%) of the component (B) based on bone dry weight is determined by the following formula.

$$Bd\ (\text{weight\%}) = Bw/(1 - W)$$

[0014] A tobacco masterbatch of the present invention can be prepared by mixing the respective components provided. For example, a material (e.g., conventional leaf tobacco) lower in the contents of the respective components than a tobacco masterbatch is prepared and then added with desirable amounts of the respective components to yield a tobacco masterbatch. Alternatively, leaf tobacco having the above-described component contents can be used as a tobacco masterbatch without further processing. Such leaf tobacco can be grown by a method of, for example, applying a fertilizer in a particular period such that the amount of nitrogen reaches a specific level, harvesting and removing unwanted leaves early, or making the period from topping to harvesting longer than usual. In one embodiment, leaf tobacco having the above-described component contents can be grown by applying a fertilizer around the time of topping such that the amount of nitrogen reaches a specific level, performing topping one to two leaves deeper than typical positions to harvest and remove unwanted leaves early, and extending the period from topping to harvesting for one to two weeks longer than usual. Further, leaf tobacco that has been grown by known techniques and that is higher in the contents of the components (A), (B), and (C) than other leaf tobacco may also be used.

2. Tobacco Material

[0015] A tobacco material of the present invention is obtained by mixing the above-mentioned tobacco masterbatch with one or more other materials. Such other materials are not limited provided that the component (A) or (B) is contained in an amount less than the tobacco masterbatch but are preferably materials containing the component (B) in an amount less than the tobacco masterbatch. Exemplary such materials include tobacco shreds, tobacco dust, tobacco veins, tobacco stems, tobacco sheets, cellulose, and other fillers commonly used in the field concerned. These materials are used alone or in combination. The mixing ratio of a tobacco masterbatch and other materials is not limited, but the lower limit of the tobacco masterbatch concentration in a tobacco material is preferably 5 weight% or more, more preferably 8 weight% or more, and further preferably 10 weight% or more. Meanwhile, the preferable upper limit is 80 weight% or less, 65 weight% or less, 50 weight% or less, 40 weight% or less, 30 weight% or less, or 20 weight% or less.

[0016] Various leaf tobacco may be used as other materials, and examples include flue-cured, burley, oriental, domestic, regardless of *Nicotiana tabacum* varieties or *Nicotiana rustica* varieties, and mixtures thereof. For such mixtures, the above-mentioned varieties may be used by blending as appropriate for an intended taste. The details of the varieties of tobacco are disclosed in "Tobacco no Jiten (Encyclopedia of Tobacco), Tobacco Academic Studies Center, March 31, 2009."

[0017] A tobacco material may generate vapor or an aerosol upon heating. The heating temperature is not limited but is about 30°C to 350°C. To promote aerosol generation, it is preferable to add a polyol, such as glycerol, propylene glycol, or 1,3-butanediol, or another aerosol source to a tobacco filler. The amount of an aerosol source to be added is preferably 5 to 50 weight% and more preferably 10 to 30 weight% relative to the dry weight of a tobacco material.

[0018] Further, a tobacco material may be a material that comes into contact with vapor or an aerosol generated upstream thereof (direction opposite to the mouth end) and thus can impart flavor components, such as components (A) and (B), to the vapor and so forth.

[0019] The shape of a tobacco material is not limited, and examples include granules of 0.3 to 1.2 mm in average particle size, shreds of 0.8 to 1.2 mm in width, sheets, and such sheets cut into the width of 0.8 to 1.2 mm.

[0020] A tobacco material of the present invention produces excellent smoking flavor as well as exhibits excellent delivery characteristics or uniform delivery from the start to the end of use. The reason is not limited but is presumably due to so-called masterbatch effect in which tobacco masterbatch components (A) to (C) are unevenly distributed and present in a tobacco material.

[0021] Exemplary embodiments of preferable tobacco materials will be described hereinafter.

1) Tobacco Material Granules

[0022] Tobacco material granules are granules containing a tobacco masterbatch and one or more other materials. Such granules produce smoking flavor similar to conventional combustion-type flavor inhalers and thus can improve inhalation sensation.

2) Blends of Tobacco Material Granules and Other Granules

[0023] Such blends are prepared by mixing individually provided granules. By selecting the blending ratio or the types of other granules, it is possible to adjust the strength of smoking flavor, to impart different smoking flavor characteristics, or to adjust the amount of an aerosol to be generated.

3) Tobacco Material Sheets

[0024] A tobacco material sheet is a sheet containing a tobacco masterbatch and one or more other materials. The sheet produces smoking flavor similar to conventional combustion-type flavor inhalers and thus can improve inhalation sensation.

4) Blends of Tobacco Material Sheets and Other Sheets

[0025] Such blends are prepared by mixing individually provided sheets. By selecting the blending ratio and/or the types of other sheets, it is possible to adjust the strength of smoking flavor, to impart different smoking flavor characteristics, or to adjust the amount of an aerosol to be generated.

5) Blends pf Tobacco Material Shreds and Other Shreds

[0026] Shreds of a tobacco masterbatch provide intense inhalation sensation. To impart different smoking flavor

characteristics, tobacco masterbatch shreds may be blended with shreds containing no tobacco masterbatch.

6) Blends of Tobacco Material Sheets and Shreds

[0027] By blending tobacco material sheets with shreds containing a tobacco masterbatch, shreds containing no tobacco masterbatch, or both thereof, it is possible to adjust the strength of smoking flavor or to impart different smoking flavor characteristics.

7) Blends of Tobacco Material Shreds and Sheets

[0028] By blending tobacco material shreds with sheets containing a tobacco masterbatch, sheets containing no tobacco masterbatch, or both thereof, it is possible to adjust the strength of smoking flavor or to impart different smoking flavor characteristics.

8) Tobacco Materials Added with Tobacco Dust

[0029] Tobacco materials added with tobacco dust are tobacco materials prepared by finely pulverizing a tobacco masterbatch into the size of 30 μm or less, suspending the resulting dust in a dispersion medium (water or glycerol), and spraying the resulting slurry on sheets or shreds containing no tobacco masterbatch. Such tobacco materials can adjust the strength of smoking flavor or impart different smoking flavor characteristics.

3. Non-combustion-type Flavor Inhaler

[0030] A tobacco masterbatch and a tobacco material of the present invention are useful as flavor sources for a non-combustion-type flavor inhaler. Such a non-combustion-type flavor inhaler includes a tobacco rod, a cooling segment, and a mouthpiece.

(1) First Embodiment

[0031] Fig. 1 illustrates the first embodiment of a non-combustion-type flavor inhaler of the present invention. In the figure, 10 is a non-combustion-type flavor inhaler, 1r is a tobacco rod, 3 is a cooling segment, 5 is a mouthpiece, 52 is a filter, 54 is a center hole filter, 7 is a tipping paper, and V represents ventilation holes. The embodiment illustrated in Fig. 1 is also referred to as a non-combustion direct-heating flavor inhaler since a tobacco material is heated.

1) Tobacco Rod

[0032] A tobacco rod is an almost cylindrical member for generating a smoking flavor component contained in tobacco raw materials. Such a tobacco rod includes a tobacco material of the present invention and a wrapper wrapped therearound. The shape of a tobacco material packed inside a wrapper is not limited, and examples include sheets, such sheets cut into the width of 0.8 to 1.2 mm, and shreds of 0.8 to 1.2 mm in width. Such sheets may be crimped, folded, or spirally rolled without cutting and packed inside a wrapper to form a tobacco rod. Further, such sheets may be cut into strips and packed inside a wrapper concentrically or with the longitudinal direction of the strips aligned parallel to the longitudinal direction of a tobacco rod, thereby forming a tobacco rod.

[0033] The filling density of a tobacco material is not particularly limited but is typically 250 mg/cm^3 or more and preferably 320 mg/cm^3 or more from a viewpoint of ensuring the characteristics of a non-combustion-type flavor inhaler and imparting satisfactory smoking flavor. Meanwhile, the upper limit is typically 800 mg/cm^3 or less and preferably 600 mg/cm^3 or less. The length of the tobacco rod 1r is not limited but is preferably 15 to 25 mm. The diameter is also not limited but is preferably 6 to 8 mm.

2) Cooling Segment

[0034] A cooling segment is a member for promoting aerosol generation, for example, by cooling vapor and/or a smoking flavor component generated in the tobacco rod 1r. The cooling segment 3 may be a hollow paper tube. Such a paper tube is preferably made of cardboard having stiffness higher than a wrapper and a tipping paper. The paper tube may be provided with ventilation holes V. A plurality of ventilation holes are preferably formed along the circumference of the paper tube. Moreover, to enhance heat exchange efficiency, crimped sheets may be packed inside the cooling segment 3. Although the dimensions of the cooling segment 3 are not limited, the length is preferably 15 to 25 mm and the diameter is preferably 5.5 to 7.5 mm .

3) Mouthpiece

[0035] A mouthpiece is a member that forms the mouth end. In one embodiment, the mouthpiece 5 includes a filter 52 and a center hole filter 54. As the filter 52 and the center hole filter 54, publicly known filters may be used.

4) Heater

[0036] A heater preferably heats the tobacco rod 1r electrically. Such a heater preferably includes a heating unit equipped with a power source and so forth. The combination of a heater and a non-combustion-type flavor inhaler of the first embodiment is also referred to as a non-combustion-type flavor inhaler system. Fig. 1 (2) illustrates an embodiment of such a system. In the figure, 100 is a non-combustion-type flavor inhaler system, 10 is a non-combustion-type flavor inhaler, and 30 is a heating unit equipped with a heater.

[0037] The shape of a heater is not limited, and a heater may be disposed around the tobacco rod 1r or may be inserted into the tobacco rod 1r. Such a heater may be a sheet heater, a plate heater, a tubular heater, or a needle heater, for example. A sheet heater is a flexible sheet-shape heater, and examples include a heater containing a film (thickness of about 20 to 225 μm) of a heat-resistant polymer, such as a polyimide. A plate heater is a rigid plate-shape heater (thickness of about 200 to 500 μm), and examples include a heater having a resistance circuit as a heat generator on a plate substrate. A tubular heater is a hollow or solid tubular heater, and examples include a heater having a resistance circuit as a heat generator on the outer surface. The cross-sectional shape of a tubular heater may be circular, elliptic, polygonal, rounded polygonal, or the like. A tubular heater and a needle heater are suitable for a heating mode from the inside after being inserted into the tobacco rod 1r.

(2) Second Embodiment

[0038] Fig. 2 (1) illustrates the second embodiment of a non-combustion-type flavor inhaler of the present invention. In the figure, 10 is a non-combustion-type flavor inhaler, 1c is a tobacco capsule, 2 is an atomization section, 4 is an aerosol source, 5 is a mouthpiece, 6 is a housing, and 8 is a power source. The embodiment illustrated in Fig. 2 is also referred to as a non-combustion indirect-heating flavor inhaler since a tobacco material is heated indirectly. The inhaler is an article that generates an aerosol from an aerosol source placed upstream of a tobacco material and allows a flavor component from the tobacco material to be supported on the aerosol, thereby generating a flavor.

1) Tobacco Capsule

[0039] A tobacco capsule includes a tobacco material of the present invention and a container filled therewith. The container is sealed such that gas can pass through the inside from/to the outside. Such a container may be made of a publicly known material, such as a polymer. The container is sealed such that an aerosol generated from the aerosol source 6 is introduced into the container and passes therethrough towards the mouth end. For this purpose, the container is preferably provided with openings at the both ends in the longitudinal direction. The shape of a tobacco material to be packed inside the container is not limited but is preferably granular.

2) Aerosol Source

[0040] An aerosol source may be formed by allowing the above-described aerosol source to be supported on a porous body, such as a fiber filler. The length of an aerosol source is not limited but is preferably 10 to 25 mm.

3) Atomization Section

[0041] It is preferable that the atomization section 2 can electrically heat the aerosol source 4 to about 200°C to 300°C. An aerosol generated through the heating is introduced into the tobacco capsule 1c, passes therethrough while keeping a tobacco material in an atmosphere of 30°C to 40°C and carrying a flavor component, and is inhaled by a user. In this embodiment as well, the combination of a non-combustion-type flavor inhaler and a power source is referred to as a non-combustion-type flavor inhaler system. The atomization section 4 may be a coil, for example, and can generate an aerosol by electricity supplied from the power source 8 as illustrated in Fig. 2 (2). A system like this is disclosed in WO 2016/075749, for example.

4) Mouthpiece

[0042] The mouthpiece 7 may include a filter.

5) Housing

[0043] The housing 6 may be made of a publicly known material and is preferably made of a polymer, for example.

[0044] Further, a tobacco material of the present invention can also be used for an ultrasonic vibration-mode flavor inhaler as the application of the present embodiment. Such an ultrasonic vibration-mode flavor inhaler is a flavor inhaler in the mode of generating an aerosol by applying vibrations to an aerosol source using an ultrasonic oscillator as the atomization section.

EXAMPLES

[Example 1]

[0045] For growing a burley variety, a fertilizer was applied at 6 to 15 kg/10 a as the amount of nitrogen during the period between one week before and after topping. The topping was carried out one to two leaves deeper than typical positions to harvest and remove unwanted leaves as leaf tobacco for a masterbatch. Subsequently, leaves were harvested after extending the period from topping to harvesting for one to two weeks longer than usual. The harvested leaves were air-cured to yield leaf tobacco for a masterbatch. The leaf tobacco was analyzed under the following conditions to determine the contents of the respective components.

< Analysis Conditions >

1) Method for Measuring Nicotine Component in Leaf Tobacco

[0046] The moisture content W (weight%) of the leaf tobacco was determined from the weight loss after placing 2.0 g of the leaf tobacco in a rotary rack-type dryer (rotary dryer) and drying at 80°C ± 1°C for three hours. Meanwhile, 0.5 g of the leaf tobacco was added with 10 mL of distilled water, 20 mL of hexane, and 5 mL of 8 mol/L of sodium hydroxide solution and subjected to extraction by shaking for 60 minutes. After extraction, the resulting supernatant (hexane phase) was introduced into a gas chromatograph (GC/FID) to quantify the amount of nicotine in the leaf tobacco, thereby obtaining the content Bw (weight%). From these values, the content Bd (weight%) of the nicotine component in the leaf tobacco based on bone dry weight was calculated by the following formula.

$$Bd\ (weight\%) = Bw/(1 - W)$$

2) Method for Measuring Carboxylic Acid Component in Leaf Tobacco

[0047] The leaf tobacco of 1 g was added with 20 mL of distilled water and subjected to extraction by shaking for 20 minutes. After extraction, centrifugation (3 minutes, 3200 rpm) was performed. The resulting supernatant was introduced into a high performance liquid chromatograph (HPLC) to quantify the amount of a carboxylic acid in the leaf tobacco. From this value and the moisture content, the content of a carboxylic acid component in the leaf tobacco based on dry weight was determined by the same method as in the foregoing.

3) Method for Measuring Amino Acid Component in Leaf Tobacco

[0048] The leaf tobacco of 0.2 g was added with 20 mL of 80% methanol aqueous solution and subjected to extraction through ultrasonic vibrations for 30 minutes. After extraction, centrifugation (5 minutes, 3000 rpm) was performed. The resulting supernatant was introduced into a high performance liquid chromatograph (HPLC) to quantify the amount of an amino acid in the leaf tobacco. From this value and the moisture content, the content of an amino acid component in the leaf tobacco based on dry weight was determined by the same method as in the foregoing.

[Example 2]

[0049] Tobacco leaves were harvested in the same manner as Example 1. The harvested leaves were air-cured to yield leaf tobacco for a masterbatch. The leaf tobacco was analyzed under the above-mentioned conditions to determine the contents of the respective components.

[Comparative Examples]

[0050] Each leaf tobacco shown in Table 1 was prepared and analyzed by the same method as Example 1 to determine the contents of the respective components.

[Table 1]

		Carboxylic acid component A	Nicotine component B	Amino acid component C
		mg/g	weight%	mg/g
Ex. 1		102.54	8.90	30.03
Ex. 2		95.98	8.14	24.37
Comp. Ex. 2	Brazilian burley	78.18	3.14	14.91
Comp. Ex. 3	American burley	78.28	3.34	22.61

REFERENCE SIGNS LIST

[0051]

1r Tobacco rod
3 Cooling segment
5 Mouthpiece
52 Filter
54 Center hole filter
7 Tipping paper
V Ventilation holes

10 Non-combustion-type flavor inhaler
30 Heating unit equipped with heater
100 Non-combustion-type flavor inhaler system
1c Tobacco capsule
2 Atomization section
4 Aerosol source
6 Housing
8 Power source

Claims

1. A tobacco masterbatch for a non-combustion-type flavor inhaler, comprising, by bone dry weight,

80 to 130 mg/g of a carboxylic acid as a component (A) and
6.5 to 10 weight% of nicotine as a component (B).

2. The tobacco masterbatch according to Claim 1, further comprising 20 to 40 mg/g of an amino acid as a component (C).

3. The tobacco masterbatch according to Claim 1 or 2, wherein the component (A) is selected from the group consisting of citric acid, malic acid, succinic acid, formic acid, acetic acid, and combinations thereof.

4. The tobacco masterbatch according to any of Claims 1 to 3, wherein the component (C) is selected from the group consisting of alanine, asparagine, aspartic acid, glutamic acid, proline, serine, and combinations thereof.

5. A tobacco material for a non-combustion-type flavor inhaler, comprising the tobacco masterbatch according to any of Claims 1 to 4 and one or more other materials.

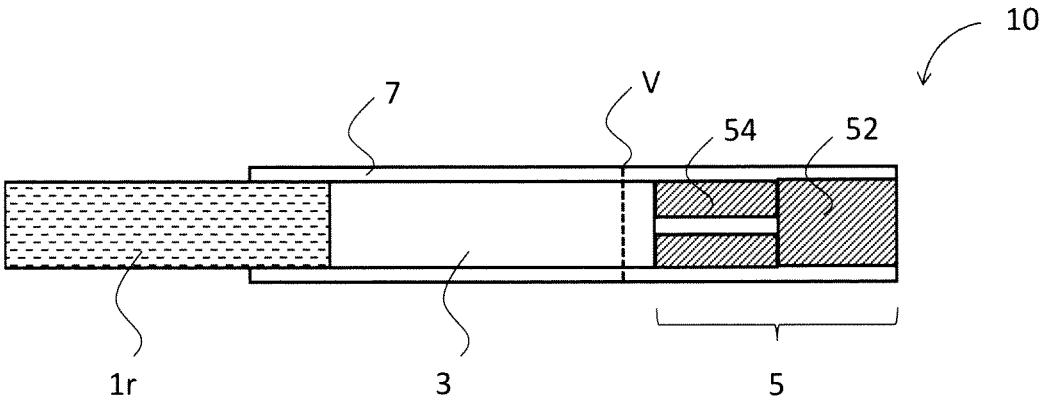
6. The tobacco material according to Claim 5, comprising 5 to 80 weight% of the tobacco masterbatch in the material.

7. The tobacco material according to any of Claims 4 to 6, wherein the other materials include a material that contains the component (A) or the component (B) in an amount less than the tobacco masterbatch.

8. A tobacco rod comprising the tobacco material according to any of Claims 5 to 7 and a wrapper wrapped therearound.

9. A capsule filled with the tobacco material according to any of Claims 5 to 7, wherein the capsule is sealed such that gas can pass therethrough.

Fig. 1



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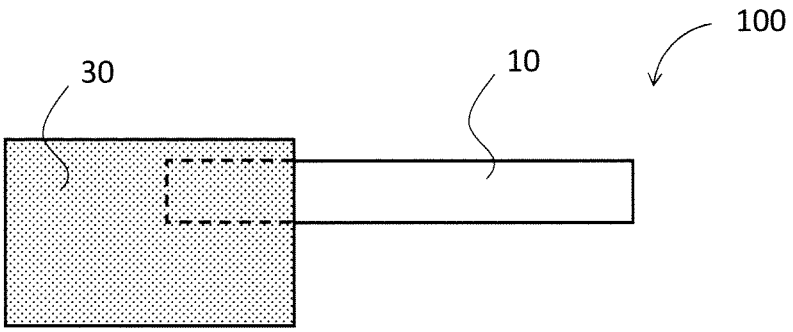
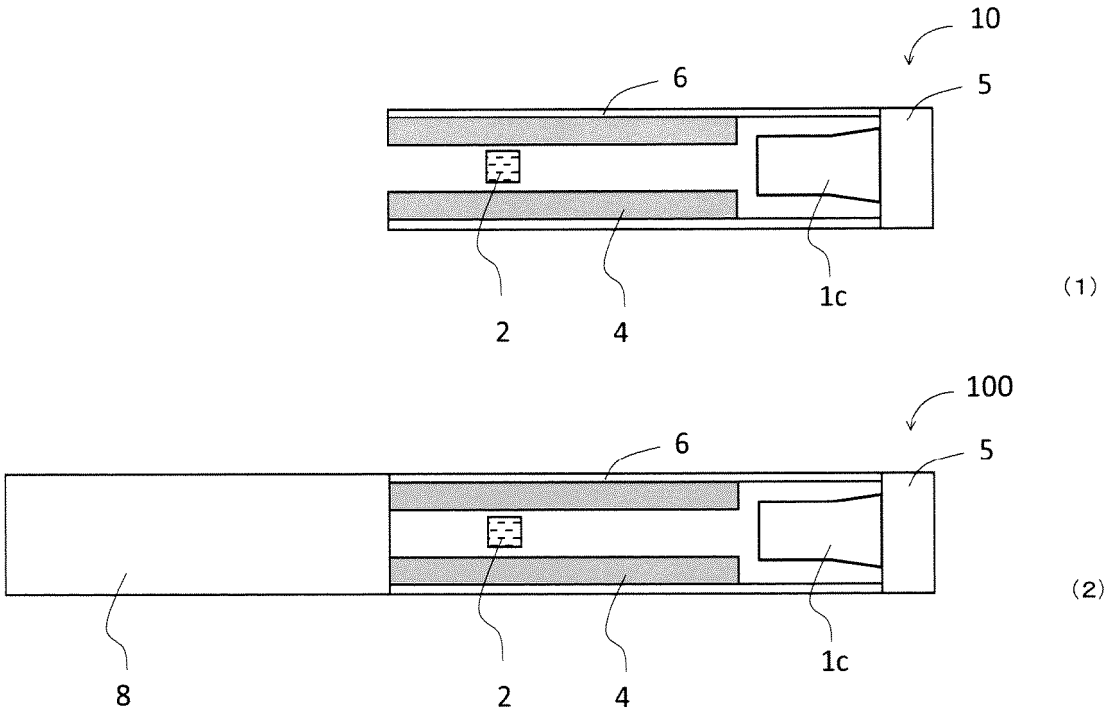


(2)

Fig. 2



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/038289

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. A24B15/16(2020.01)i, A24F47/00(2020.01)i, A24F40/20(2020.01)i
FI: A24B15/16, A24F47/00, A24F40/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int. Cl. A24B15/16, A24F47/00, A24F40/20

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	1971-2020
Registered utility model specifications of Japan	1996-2020
Published registered utility model applications of Japan	1994-2020

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.
A	WO 2016/063551 A1 (JAPAN TOBACCO INC.) 28 April 2016, paragraph [0012]	1-9
A	JP 64-16576 A (IMPERIAL TOBACCO LTD.) 20 January 1989, entire text, all drawings	1-9
A	WO 2010/110227 A1 (JAPAN TOBACCO INC.) 30 September 2010, entire text, all drawings	1-9

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09.11.2020	24.11.2020

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2020/038289

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
WO 2016/063551 A1	28.04.2016	US 2017/0224010 A1 paragraphs [0048], [0049] EP 3199040 A1 TW 201615104 A	
JP 64-16576 A	20.01.1989	US 5046514 A entire text, all drawings EP 0286256 A2	
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Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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