(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 449 906 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
23.10.2024 Bulletin 2024/43

(21) Application number: **21967998.2**

(22) Date of filing: **13.12.2021**

(51) International Patent Classification (IPC):
A24F 40/20 *(2020.01)*

(52) Cooperative Patent Classification (CPC):
A24B 15/12; A24B 3/14; A24B 15/14; A24B 15/167; A24B 15/18; A24B 15/403; A24B 15/406; A24D 1/20; A24F 40/20; A24F 47/00

(86) International application number:
PCT/JP2021/045742

(87) International publication number:
WO 2023/112075 (22.06.2023 Gazette 2023/25)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(54) **FLAVOR MOLDED BODY FOR NON-COMBUSTION HEATING TYPE FLAVOR INHALER, METHOD FOR PRODUCING SAME AND NON-COMBUSTION HEATING TYPE FLAVOR INHALER**

(57) Provided is a flavor molded body for a non-combustion heating type flavor inhaler, the flavor molded body having less surface stickiness. A method for producing the flavor molded body for a non-combustion heating type flavor inhaler comprises: a step of mixing a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, a material having a melting point of 30-200°C, and an alcohol having 2 to 7 carbon atoms, to form a mixture; a step of compressively molding the mixture to form a compression molded product; a step of heating the compression molded product to at least the melting point of the material; and a step of impregnating the heated compression molded product with an aerosol source.

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Description

TECHNICAL FIELD

[0001] The present invention relates to a flavor molded body for a non-combustion heating type flavor inhaler, a method for producing the same, and a non-combustion heating type flavor inhaler.

BACKGROUND ART

[0002] With combustion type flavor inhalers (cigarettes), flavor is tasted by combusting a tobacco filling that contains leaf tobacco. As an alternative to the combustion type flavor inhalers, non-combustion heating type flavor inhalers have been proposed, with which flavor is tasted by heating a flavor source that contains a tobacco material rather than combusting it. The heating temperature of non-combustion heating type flavor inhalers is lower than the combustion temperature of combustion type flavor inhalers; for example, it is approximately 400°C or below. Since the heating temperature of non-combustion heating type flavor inhalers is low as such, non-combustion heating type flavor inhalers are used with a flavor source to which an aerosol source, such as glycerine, has been added so that smoke production will be increased. The aerosol source vaporizes upon heating, generating an aerosol. The aerosol is supplied to the user together with a flavor component, such as a tobacco component, allowing the user to taste a sufficient level of flavor. In PTL 1, for example, a flavor source for non-combustion heating type flavor inhalers is disclosed.

CITATION LIST

PATENT LITERATURE

[0003] PTL 1: Japanese Unexamined Patent Application Publication No. 63-148975

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] When a flavor source for a non-combustion heating type flavor inhaler is, for example, in powder form, the ease of handling is poor because the flavor source needs to be loaded into a pot or wrapping paper before use. To address this, the inventors explored the approach of compressively molding the flavor source into a flavor molded body and, additionally, increasing the amount of aerosol source contained in the flavor molded body to further increase smoke production. This, however, resulted in the findings that as the amount of aerosol source in the flavor molded body is increased, the aerosol source becomes exposed on the surface of the flavor molded body, and the surface stickiness of the flavor molded body increases. For improved ease of handling, there is a need for the development of a flavor molded body for non-combustion heating type flavor inhalers that has less surface stickiness even when the amount of aerosol source is large.

[0005] An object of the present invention is to provide a flavor molded body for a non-combustion heating type flavor inhaler, the flavor molded body having less surface stickiness, and a non-combustion heating type flavor inhaler including this flavor molded body.

SOLUTION TO PROBLEM

[0006] The present invention includes the following embodiments.

[1] A method for producing a flavor molded body for a non-combustion heating type flavor inhaler, the method including:

a step of mixing a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, a material having a melting point of 30-200°C, and an alcohol having 2 to 7 carbon atoms to form a mixture;
a step of compressively molding the mixture to form a compression molded product;
a step of heating the compression molded product to at least the melting point of the material; and
a step of impregnating the heated compression molded product with an aerosol source.

[2] The method according to [1], wherein the material is at least one material selected from the group consisting of a saccharide, a fat, a fatty acid, and an aliphatic hydrocarbon.
[3] The method according to [1] or [2], wherein the material is a saccharide.

[4] The method according to [2] or [3], wherein the saccharide is at least one saccharide selected from the group consisting of glucose, sucrose, fructose, mannose, xylose, galactose, ribose, arabinose, erythrose, erythrulose, trehalose, xylitol, rhamnose, sorbitol, agarose, amylose, starch, and chitosan.
[5] The method according to any of [1] to [4], wherein the material is in powder form, granule form, or chip form.
[6] The method according to any of [1] to [5], wherein the aerosol source is at least one selected from the group consisting of glycerine, 1,3-propanediol, propylene glycol, and 1,3-butanediol.
[7] The method according to any of [1] to [6], wherein the alcohol having 2 to 7 carbon atoms is ethanol.
[8] The method according to any of [1] to [7], wherein an amount of the aerosol source contained in the flavor molded body is 15% by mass or more.
[9] The method according to any of [1] to [8], wherein the flavor molded body has a tablet shape.
[10] A flavor molded body for a non-combustion heating type flavor inhaler, the flavor molded body containing a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, an aerosol source, and a material having a melting point of 30-200°C, wherein:

the flavor molded body has a porous structure formed by the tobacco powder raw material and the material;
the aerosol source is held within pores in the porous structure; and
an amount of the aerosol source contained in the flavor molded body is 15% by mass or more.

[11] The flavor molded body according to [10], wherein the material is at least one material selected from the group consisting of a saccharide, a fat, a fatty acid, and an aliphatic hydrocarbon.
[12] The flavor molded body according to [10] or [11], wherein the material is a saccharide.
[13] The flavor molded body according to [11] or [12], wherein the saccharide is at least one saccharide selected from the group consisting of glucose, sucrose, fructose, mannose, xylose, galactose, ribose, arabinose, erythrose, erythrulose, trehalose, xylitol, rhamnose, sorbitol, agarose, amylose, starch, and chitosan.
[14] The flavor molded body according to any of [10] to [13], wherein the aerosol source is at least one selected from the group consisting of glycerine, 1,3-propanediol, propylene glycol, and 1,3-butanediol.
[15] The flavor molded body according to any of [10] to [14], wherein the flavor molded body has a tablet shape.
[16] A non-combustion heating type flavor inhaler including:

a flavor source container that accommodates the flavor molded body according to any of [10] to [15];
a power supply unit that includes a power supply; and
a heater that is supplied with electric power from the power supply and heats the flavor molded body inside the flavor source container.

ADVANTAGEOUS EFFECTS OF INVENTION

[0007] According to the present invention, there can be provided a flavor molded body for a non-combustion heating type flavor inhaler, the flavor molded body having less surface stickiness, and a non-combustion heating type flavor inhaler including this flavor molded body.

BRIEF DESCRIPTION OF DRAWINGS

[0008]

[Fig. 1] Fig. 1 is schematic diagram illustrating an example of a non-combustion heating type flavor inhaler according to this embodiment.
[Fig. 2] Fig. 2 is a micrograph in which a cross-section of the flavor molded body of Example 3 was imaged.
[Fig. 3] Fig. 3 is a micrograph in which a cross-section of the flavor molded body of Example 4 was imaged.
[Fig. 4] Fig. 4 is a micrograph in which a cross-section of the flavor molded body of Comparative Example 1 was imaged.

[Method for Producing a Flavor Molded Body for a Non-Combustion Heating Type Flavor Inhaler]

[0009] A method according to this embodiment for producing a flavor molded body for a non-combustion heating type flavor inhaler (Hereinafter also referred to as "a flavor molded body.") includes the following steps. A step of mixing a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, a material having a melting point of 30-200°C (Hereinafter also referred to as "a low-melting-point material."), and an alcohol having 2 to 7 carbon atoms to form a mixture (Hereinafter also referred to as "the raw-material mixing step."); a step of compressively molding the mixture

to form a compression molded product (Hereinafter also referred to as "the compression molding step."); a step of heating the compression molded product to at least the melting point of the material (Hereinafter also referred to as "the heating step."); and a step of impregnating the heated compression molded product with an aerosol source (Hereinafter also referred to as "the aerosol-source impregnation step.").

[0010] In the method according to this embodiment, a flavor molded body that has sufficient strength is obtained despite the exclusion of common binders, owing to the addition of an alcohol having 2 to 7 carbon atoms in the raw-material mixing step. The inventors presume that a resin composition derived from the tobacco powder raw material migrates to the surface of the tobacco powder raw material, and the tobacco powder raw material and other components are bound together by this resin composition, allowing a flavor molded body having sufficient strength to be obtained. The inventors also presume that the addition of the alcohol causes some hydroxyl groups in cellulose contained in the tobacco powder raw material to undergo dehydration and condense with nearby celluloses, thereby allowing a flavor molded body having sufficient strength to be obtained. As can be seen from these, the method according to this embodiment does not involve the use of a common binder during molding, and ethanol used is mostly removed through the heating step. As a result, a flavor molded body having sufficient strength can be obtained, without its flavor being affected.

[0011] In the method according to this embodiment, furthermore, a low-melting-point material, which has a melting point of 30-200°C, is added in the raw-material mixing step. The low-melting-point material melts in the heating step, and a significant portion of it is absorbed by the tobacco powder raw material. The portions of the compression molded product in which the low-melting-point material has been present, therefore, become voids, resulting in the formation of a porous structure in the compression molded product. After that, in the aerosol-source impregnation step, the aerosol source is accommodated within pores in the compression molded product. The resulting flavor molded body, therefore, can hold a large amount of aerosol source and achieves reduced surface stickiness at the same time.

[0012] In particular, when a saccharide is used as the low-melting-point material, the saccharide is capable of imparting a pleasant aroma during the heating of the non-combustion heating type flavor inhaler. As the saccharide is heated once in the heating step, furthermore, caramel compounds and Maillard reaction products are generated. These caramel compounds and Maillard reaction products have vapor pressure and are readily released when they are heated again in the non-combustion heating type flavor inhaler. Because no reaction energy is required compared with when the saccharide is heated in the non-combustion heating type flavor inhaler without first heating, therefore, a flavor component derived from the saccharide is released accordingly earlier, allowing the flavor during the initial stage of use to be good.

[0013] Each step in the method according to this embodiment will now be described. The method according to this embodiment, however, may include extra steps beyond the raw-material mixing step, the compression molding step, the heating step, and the aerosol-source impregnation step. Examples of extra steps include a step of removing at least part of the alcohol from the mixture (Hereinafter also referred to as "an alcohol removal step.") and a coating step. It should be noted that the alcohol removal step, as long as it takes place after the raw-material mixing step, may be performed during the compression molding step or may be performed separately after the compression molding step and before the heating step.

(Raw-Material Mixing Step)

[0014] In this step, a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, a material having a melting point of 30-200°C (low-melting-point material), and an alcohol having 2 to 7 carbon atoms are mixed to form a mixture. In this step, extra materials beyond the tobacco powder raw material, the low-melting-point material, and the alcohol may be additionally mixed. Examples of extra materials include a volatile flavor component, cellulose powder, tea powder, *Lamiaceae* plant powder, and *Apiaceae* plant powder. As stated later herein, the volatile flavor component may be introduced together with the aerosol source in the aerosol-source impregnation step.

<Tobacco Powder Raw Material>

[0015] An example of a tobacco powder raw material is leaf tobacco or the veins, stems, roots, or flowers of tobacco, for example, processed into powder, for instance by shredding. The type of leaf tobacco is not particularly limited; the leaf tobacco can be, for example, the flue-cured cultivar, the barley cultivar, a local cultivar, or the Oriental leaves or their fermented leaves. One of such tobacco powder raw materials may be used alone, or two or more may be used in combination.

[0016] The mean particle diameter of the tobacco powder raw material is no greater than 300 μm. By virtue of this mean particle diameter being no greater than 300 μm, a flavor molded body having sufficient strength is obtained. The mean particle diameter is preferably 5-100 μm, more preferably 10-80 μm, even more preferably 20-50 μm. It is of note that the mean particle diameter is measured using light scattering.

<Low-Melting-Point Material>

[0017] The melting point of the low-melting-point material is 30-200°C, preferably 50-180°C, more preferably 70-170°C. By virtue of this melting point being 30°C or above, the sticking, for example, of the material during the production process can be prevented. By virtue of this melting point being 200°C or below, furthermore, the low-melting-point material can be melted by heating at a low temperature, and thus thermal degradation of other ingredients contained in the compression molded product can be prevented. In this embodiment, the melting point is measured by, for example, DSC.

[0018] Examples of low-melting-point materials, having a melting point of 30-200°C, include saccharides, fats, fatty acids, and aliphatic hydrocarbons. One of such materials may be used alone, or two or more may be used in combination. Of these, for use as the low-melting-point material, saccharides are particularly preferred because, as mentioned above, they are capable of imparting a pleasant aroma and help achieve a good flavor during the initial stage of use in particular. The saccharides can be monosaccharides or disaccharides.

[0019] Examples of saccharides having a melting point of 30-200°C include glucose, sucrose, fructose, mannose, xylose, galactose, ribose, arabinose, erythrose, erythrulose, trehalose, xylitol, rhamnose, sorbitol, agarose, amylose, starch, and chitosan. One of such saccharides may be used alone, or two or more may be used in combination. Of these, for use as a saccharide, glucose, sucrose, or fructose is particularly preferred from the viewpoint of the flowability of crystals and the flavor generated.

[0020] Examples of fats having a melting point of 30-200°C include animal fats and hydrogenated vegetable fats. One of such fats may be used alone, or two or more may be used in combination.

[0021] As for fatty acids having a melting point of 30-200°C, fatty acids with 10 to 30 carbon atoms having a melting point of 30-200°C are preferred. Examples of such fatty acids include decanoic acid, dodecanoic acid, tetradecanoic acid, hexadecanoic acid, octadecanoic acid, eicosanoic acid, docosanoic acid, tetracosanoic acid, hexacosanoic acid, octacosanoic acid, triacontanoic acid, and their isomers. One of such fatty acids may be used alone, or two or more may be used in combination.

[0022] As for aliphatic hydrocarbons having a melting point of 30-200°C, aliphatic hydrocarbons with 18 to 30 carbon atoms having a melting point of 30-200°C are preferred. Examples of such aliphatic hydrocarbons include octadecane, nonadecane, icosane, heneicosane, tetracosane, triacontane, and their isomers. One of such aliphatic hydrocarbons may be used alone, or two or more may be used in combination.

[0023] The form of the low-melting-point material is not particularly limited. It is, however, preferred that the material be in powder form, granule form, or chip form because this allows a good porous structure to be formed in the compression molded product during the heating step. It is to be noted that the low-melting-point material may be in a state in which it has solidified in a definite shape in a pure crystal state, such as needle crystals.

[0024] The amount of the low-melting-point material added is preferably 1-60 parts by mass, more preferably 3-50 parts by mass, even more preferably 5-40 parts by mass per 100 parts by mass of the tobacco powder raw material. When this amount is 1 part by mass or more, a porous structure can be sufficiently formed in the compression molded product during the heating step. When this amount is 60 parts by mass or less, furthermore, sufficient strength of the flavor molded body can be ensured.

<Alcohol>

[0025] The number of carbon atoms in the alcohol used in this step is from 2 to 7, preferably from 2 to 5, more preferably 2 or 3. For use as this alcohol, ethanol, 2-propanol, and benzyl alcohol are preferred because they allow a flavor molded body having higher strength to be obtained, and ethanol is more preferred. One of such alcohols may be used alone, or two or more may be used in combination.

[0026] The amount of the alcohol added is preferably 1-20 parts by mass, more preferably 3-17 parts by mass, even more preferably 5-15 parts by mass per 100 parts by mass of the tobacco powder raw material. When this amount is 1 part by mass or more, sufficient strength of the flavor molded body can be ensured. When this amount is 20 parts by mass or less, furthermore, compression molding can be easily performed in the compression molding step.

<Volatile Flavor Component>

[0027] Examples of volatile flavor components include phenethyl acetate, ethyl hexanoate, isoamyl acetate, benzyl acetate, ethyl octanoate, ethyl oleate, phenethyl alcohol, acetanisole, benzaldehyde, benzyl alcohol, menthol, carvone, cinnamic acid, cinnamaldehyde, cinnamyl alcohol, vanillin, ethyl vanillin, citronellol, 2,5-dimethylpyrazine, limonene, furaneol, cyclotene, decanoic acid, ethyl isovalerate, valeric acid, palmitic acid, ethyl salicylate, geraniol, guaiacol, β ionone, linalool, linalyl acetate, nerolidol, piperonal, sotolone, α-terpineol, megastigmatrienone, damascenone, and neophytadiene, although not particularly limited. One of such volatile flavor components may be used alone, or two or more may be used in combination.

[0028] When a volatile flavor component is added, the amount of the volatile flavor component added is not particularly limited. For example, however, it can be 1-20 parts by mass per 100 parts by mass of the tobacco powder raw material.

[0029] The method for mixing the ingredients such as the tobacco powder raw material, the low-melting-point material, and the alcohol to form a mixture is not particularly limited. For example, however, the ingredients can be mixed using a common mixer, such as a V-blender.

(Compression Molding Step)

[0030] In this step, the mixture obtained in the raw-material mixing step is compressively molded to form a compression molded product. The compression molding machine used for the compression molding is not particularly limited, but an example is a rotary tableting machine. The conditions for the compression molding are not particularly limited, but for example, it is preferred to mold the mixture with a compression pressure of 2 kN or more. The shape of the compression molded product is not particularly limited, but for example, the product can be in a tablet shape. As mentioned above, an alcohol removal step may be performed simultaneously in this step. For example, at least part of the alcohol may be removed, for example by natural drying, during the compression molding.

(Alcohol Removal Step)

[0031] This step is an optional step, and at least part of the alcohol is removed from the mixture. As mentioned above, the alcohol removal step may be performed during the compression molding step, with the mixture as the subject, or may be performed separately after the compression molding step, with the compression molded product obtained therein as the subject. The removal of the alcohol can be conducted simultaneously with the melting of the low-melting-point material in the heating step, which is described later herein. By conducting an alcohol removal step in advance before the heating step, however, it is possible to encourage the removal of the alcohol and form a porous structure in the compression molded product during the heating step more easily.

[0032] In this step, it is preferred to remove at least part of the alcohol at 10-40°C. By removing at least part of the alcohol at 10°C or above, sufficient removal of the alcohol can be achieved. By removing at least part of the alcohol at 40°C or below, furthermore, the impact of the heating on the flavor can be limited. The temperature during the removal of at least part of the alcohol is preferably 20-40°C, more preferably 30-40°C. When at least part of the alcohol is removed at 10-40°C, the at least part of the alcohol can be removed by, for example, drying the mixture or molded product for 30-180 minutes at 10-40°C. The removal of at least part of the alcohol can be conducted with, for example, an electric oven, hot-air drying, a tunnel dryer, or natural drying. The removal of the alcohol, furthermore, is performed preferably in an open setting, rather than inside a tightly closed space.

(Heating Step)

[0033] In this step, the compression molded product obtained in the compression molding step is heated to at least the melting point of the low-melting-point material. Because the compression molded product is heated to at least the melting point of the low-melting-point material, the low-melting-point material contained in the compression molded product melts, and a significant portion of it is absorbed by the tobacco powder raw material. The portions of the compression molded product in which the low-melting-point material has been present, therefore, become voids, resulting in the formation of a porous structure in the compression molded product. As a result of the heating, furthermore, the alcohol contained in the compression molded product is removed.

[0034] The heating temperature in the heating step is not particularly limited as long as it is at least the melting point of the low-melting-point material. Preferably, however, it is higher than the melting point by 10°C or more, more preferably higher than the melting point by 20°C or more. From the viewpoint of reducing the impact of the heating on the flavor, furthermore, it is preferred that the heating temperature be 200°C or below. The duration of heating in the heating step can be, for example, 2-20 minutes, although it partly depends on the heating temperature.

[0035] The heating method in the heating step is not particularly limited. It is, however, preferred that it be a method that is performed by applying heat from the outside of the compression molded product. As a result of the application of heat from the outside of the compression molded product, the surface of the compression molded product is exposed to higher temperatures than the inside, and some hydroxyl groups in cellulose contained in the tobacco powder raw material located on the surface of the compression molded product undergo a dehydration reaction. Through this, the surface of the compression molded product becomes more hydrophobic than the inside, and thus the hydrophilic aerosol source, such as glycerine, becomes more compatible with the inside of the compression molded product than with the surface. The aerosol source, therefore, is likely to penetrate the inside of the compression molded product rather than remaining on the surface of the compression molded product, allowing for a further reduction of the surface stickiness of the resulting flavor molded body. The method for applying heat from the outside of the compression molded product is not particularly limited,

but an example is the method of heating the molded product with, for instance, a hot-air oven, infrared oven, or superheated steam oven.

[0036] It is preferred that 90% by mass or more of the alcohol contained in the compression molded product be removed through the heating step. It is more preferred that 95% by mass or more be removed, it is even more preferred that 99% by mass or more be removed, and it is particularly preferred that all alcohol be removed.

(Aerosol-Source Impregnation Step)

[0037] This step involves impregnating the heated compression molded product, heated through the heating step, with an aerosol source. As a result of the impregnation of the compression molded product with an aerosol source, the aerosol source penetrates into pores in the porous structure formed in the compression molded product, resulting in the holding of the aerosol source in the pores. By virtue of this, a flavor molded body having less surface stickiness is obtained.

[0038] The aerosol source can be an aerosol source in liquid state, and glycerine, 1,3-propanediol, propylene glycol, and 1,3-butanediol are preferred. One of these aerosol sources may be used, or two or more may be used in combination.

[0039] The temperature during the impregnation of the compression molded product with the aerosol source is not particularly limited. From the viewpoint of allowing the aerosol source to be accommodated in the pores more readily, however, it is preferred that the temperature be 30-60°C. The duration for which the compression molded product is impregnated with the aerosol source, furthermore, is not particularly limited, but for example, it can be 1-72 hours.

[0040] Before the impregnation of the compression molded product with the aerosol source, a volatile flavor component as described above may be added to the aerosol source so that the volatile flavor component will also be introduced, together with the aerosol source, during this step. This is preferred because in this case the volatile flavor component is also held within the pores in the porous structure in addition to the aerosol source.

[0041] The amount of the aerosol source contained in the resulting flavor molded body is preferably 15% by mass or more, more preferably 17-40% by mass, even more preferably 19-30% by mass. When this amount is 15% by mass or more, sufficient smoke production is attained when the flavor molded body is used with a non-combustion heating type flavor inhaler. It should be noted that for the flavor molded body according to this embodiment, the surface stickiness of the flavor molded body is sufficiently reduced even when the amount of the aerosol source is relatively large at 15% by mass or more.

[0042] The shape of the flavor molded body according to this embodiment is not particularly limited, but for example, the flavor molded body can be in a tablet shape, sheet-shaped, cylindrical, rod-shaped, spherical, hollow, or porous. From the viewpoint of ease during use and the maintenance of strength, it is preferred that the flavor molded body be in a tablet shape. When the flavor molded body is in a tablet shape, its size can be, for example, diameter: 5-15 mm and height: 5-10 mm.

[Flavor Molded Body for a Non-Combustion Heating Type Flavor Inhaler]

[0043] A flavor molded body according to this embodiment for a non-combustion heating type flavor inhaler contains a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, an aerosol source, and a material having a melting point of 30-200°C. In this configuration, the flavor molded body has a porous structure formed by the tobacco powder raw material and the material. In other words, the wall portion of the porous structure is formed by a tobacco powder raw material and a low-melting-point material. The aerosol source, furthermore, is held within pores in the porous structure. Moreover, the amount of the aerosol source contained in the flavor molded body is 15% by mass or more.

[0044] For the flavor molded body according to this embodiment, the flavor molded body has a porous structure formed by a tobacco powder raw material and a low-melting-point material, and the aerosol source is held within pores in the porous structure. Despite the relatively large amount of the aerosol source at 15% by mass or more, therefore, the aerosol source is stably held within the pores and does not migrate to the surface of the flavor molded body, resulting in reduced surface stickiness of the flavor molded body. Because the amount of the aerosol source is 15% by mass or more, furthermore, sufficient smoke production is attained when the flavor molded body according to this embodiment is used with a non-combustion heating type flavor inhaler. For the production of the flavor molded body according to this embodiment, the above-described method according to this embodiment for producing a flavor molded body is suitable. The tobacco powder raw material, low-melting-point material, and aerosol source contained in the flavor molded body according to this embodiment, therefore, can be as in the above-described method according to this embodiment for producing a flavor molded body.

[Non-Combustion Heating Type Flavor Inhaler]

[0045] A non-combustion heating type flavor inhaler according to this embodiment includes a flavor source container that accommodates a flavor molded body according to this embodiment, a power supply unit that includes a power supply,

and a heater that is supplied with electric power from the power supply and heats the flavor molded body inside the flavor source container. The non-combustion heating type flavor inhaler according to this embodiment achieves sufficient smoke production during use because it includes a flavor molded body according to this embodiment. The flavor molded body, furthermore, is superior in the ease of handling because it has low surface stickiness. An example of a non-combustion heating type flavor inhaler according to this embodiment will now be presented, but non-combustion heating type flavor inhalers according to this embodiment are not limited to it.

[0046] An example of a non-combustion heating type flavor inhaler according to this embodiment is illustrated in Fig. 1. The non-combustion heating type flavor inhaler 1 illustrated in Fig. 1 includes a flavor source container 3 that allows a flavor molded body 2 according to this embodiment to be placed inside it, a power supply 4, a heater 5 that is supplied with electric power from the power supply 4 and heats the flavor molded body 2, a controller 6 that performs temperature control for the heater 5, and a mouthpiece 7. Inside the flavor source container 3, the flavor molded body 2 is secured by a raw-material position adjuster 8. The flavor molded body 2 according to this embodiment, having low stickiness and being in a solid state that is easy to handle, does not need to be loaded into a pot or wrapping paper but can be, for example, placed and secured as it is inside the flavor source container 3 as described here. As electric power is supplied from the power supply 4 to the heater 5 in response to instructions from the controller 6, the heater 5 is heated. The heat from the heater 5 is transmitted to the flavor molded body 2 through a metal plate 9, leading to the heating of the flavor molded body 2. As a result of the heating of the flavor molded body 2, an aerosol accompanied by a flavor component is generated. As the user inhales it through the mouthpiece 7, the aerosol and the flavor component are supplied to the user. The heating temperature is preferably 150-400°C, more preferably 200-350°C. It should be noted that the heating temperature indicates the temperature of the heating element. EXAMPLES

[0047] Specific examples of this embodiment will now be described. The present invention, however, is not limited to them.

[Example 1]

[0048] To 100 parts by mass of a tobacco powder raw material having a mean particle diameter of 30 μm (leaf tobacco, Brazilian flue-cured), 20 parts by mass of glucose (manufactured by Fujifilm wako chemical corporation; melting point, 146°C; particle size, approximately 0.2 mm) and 10 parts by mass of ethanol were added. After gentle mixing with a spatula, the mixture was shaken for 30 minutes. The resulting mixture was molded into a tablet shape using a compression molding machine (trade name: TDP 0; manufactured by LFA Machines oxford Ltd) with a compression pressure of 3 kN. The resulting compression molded product was dried at 40°C for 3 hours so that the ethanol contained in the compression molded product would be removed. Then the compression molded product was heated in an oven at 190°C for 20 minutes, and its mass after heating (Hereinafter designated as "mass A.") was measured. The heated compression molded product was immersed in glycerine and left for one night in a 60°C environment. Then the glycerine was removed using a cell strainer, and the mass of the resulting flavor molded body (Hereinafter designated as "mass B.") was measured. From the difference between mass B and mass A, the amount of glycerine contained in the flavor molded body was calculated. As a result, the amount of glycerine contained in the flavor molded body was 23.1% by mass. The surface of the resulting flavor molded body, furthermore, had low stickiness. The results are presented in Table 1.

[Example 2]

[0049] A flavor molded body was prepared in the same manner as in Example 1, except that sucrose (manufactured by Fujifilm wako chemical corporation; melting point, 186°C; particle size, approximately 2 mm) was used as the low-melting-point material instead of glucose. The results are presented in Table 1.

[Example 3]

[0050] A flavor molded body was prepared in the same manner as in Example 1, except that the amount of glucose added was changed to 10 parts by mass per 100 parts by mass of the tobacco powder raw material. The results are presented in Table 1. A micrograph in which a cross-section of this flavor molded body was imaged, furthermore, is presented in Fig. 2.

[Example 4]

[0051] A flavor molded body was prepared in the same manner as in Example 1, except that the amount of glucose added was changed to 30 parts by mass per 100 parts by mass of the tobacco powder raw material. The results are presented in Table 1. A micrograph in which a cross-section of this flavor molded body was imaged, furthermore, is presented in Fig. 3.

[Comparative Example 1]

[0052] A flavor molded body was prepared in the same manner as in Example 1, except that no glucose was added. The results are presented in Table 1. A micrograph in which a cross-section of this flavor molded body was imaged, furthermore, is presented in Fig. 4.

[Table 1]

	Raw materials				Flavor molded body	
	Tobacco powder raw material (parts by mass)	Low-melting-point material		Ethanol (parts by mass)	Glycerine content (% by mass)	Surface stickiness
		Species	Amount added (parts by mass)			
Example 1	100	Glucose	20	10	23.1	Low
Example 2	100	Sucrose	20	10	22.4	Low
Example 3	100	Glucose	10	10	22.7	Low
Example 4	100	Glucose	30	10	19.4	Low
Comparative Example 1	100	-	-	10	15.6	High

[0053] As shown in Table 1, the flavor molded bodies of Examples 1 to 4, which were flavor molded bodies according to this embodiment, had low surface stickiness. By contrast, the flavor molded body of Comparative Example 1, which was prepared without the addition of a low-melting-point material, had great stickiness on its surface, resulting in poor ease of handling. As shown in Figs. 2 to 4, furthermore, it was observed that whereas the flavor molded bodies of Examples 3 and 4, which were flavor molded bodies according to this embodiment, had a porous structure derived from the low-melting-point material (glucose) formed in them, the flavor molded body of Comparative Example 1 had no porous structure formed in it. The inventors presume that because glycerine was held within pores in the porous structure, the flavor molded bodies of Examples 1 to 4 had low surface stickiness even when the glycerine content was relatively high at 15% by mass.

[Example 5]

(Preparation of a Flavor Molded Body)

[0054] To 100 parts by mass of a tobacco powder raw material having a mean particle diameter of 30 μm (leaf tobacco, Brazilian flue-cured), 10 parts by mass of glucose (manufactured by Fujifilm wako chemical corporation; melting point, 146°C; particle size, approximately 0.2 mm) and 10 parts by mass of ethanol were added. After gentle mixing with a spatula, the mixture was shaken for 30 minutes. The resulting mixture was molded into a tablet shape using a compression molding machine (trade name: TDP 0; manufactured by LFA Machines oxford Ltd) with a compression pressure of 3 kN. The resulting compression molded product was dried at 40°C for 3 hours so that the ethanol contained in the compression molded product would be removed. Then the compression molded product was heated in an oven at 160°C for 3 minutes, and its mass after heating (Hereinafter designated as "mass A.") was measured. The heated compression molded product was immersed in glycerine and left for one night in a 60°C environment. Then the glycerine was removed using a cell strainer, and the mass of the resulting flavor molded body (Hereinafter designated as "mass B.") was measured. From the difference between mass B and mass A, the amount of glycerine contained in the flavor molded body was calculated, with the result that the amount of glycerine contained in the flavor molded body was 23% by mass. The surface of the resulting flavor molded body, furthermore, had low stickiness.

(Sensory Evaluation in the Initial Stage of Use with a Non-Combustion Heating Type Flavor Inhaler)

[0055] The raw material chamber of a PAX (trade name, manufactured by PAX Labs, Inc.), an external heating type flavor inhaler, was loaded with 150 mg of the prepared flavor molded body. By turning on the PAX, the flavor molded body was heated from the outside by heat transfer. Four expert evaluation panelists inhaled an aerosol generated by the heating and performed a functional evaluation by providing open-ended comments for 1 to 3 puffs, 4 to 6 puffs, 7 to 10 puffs, and the entire series of puffs. The results are presented in Table 2. It should be noted that the four expert evaluation panelists had been adequately trained in the sensory evaluation of non-combustion heating type flavor inhalers. It has also been

confirmed that the evaluation thresholds were equal and standardized across the expert evaluation panelists.

[Comparative Example 2]

(Preparation of a Flavor Molded Body)

[0056] To 100 parts by mass of a tobacco powder raw material having a mean particle diameter of 30 μm (leaf tobacco, Brazilian flue-cured), 10 parts by mass of glycerine and 10 parts by mass of ethanol were added. After gentle mixing with a spatula, the mixture was shaken for 30 minutes. The resulting mixture was molded into a tablet shape using a compression molding machine (trade name: TDP 0; manufactured by LFA Machines oxford Ltd) with a compression pressure of 3 kN. The resulting compression molded product was dried at 40°C for 3 hours so that the ethanol contained in the compression molded product would be removed. In this manner, a flavor molded body was prepared. The amount of glycerine contained in the flavor molded body was 9.1% by mass. The surface of the resulting flavor molded body had great stickiness, resulting in poor ease of handling.

(Sensory Evaluation in the Initial Stage of Use with a Non-Combustion Heating Type Flavor Inhaler)

[0057] The prepared flavor molded body was used with a non-combustion heating type flavor inhaler and subjected to sensory evaluation in the same manner as in Example 5. The results are presented in Table 2.

[Comparative Example 3]

(Preparation of a Flavor Molded Body)

[0058] To 100 parts by mass of a tobacco powder raw material having a mean particle diameter of 30 μm (leaf tobacco, Brazilian flue-cured), 10 parts by mass of glucose (manufactured by Fujifilm wako chemical corporation; melting point, 146°C; particle size, approximately 0.2 mm), 10 parts by mass of glycerine, and 10 parts by mass of ethanol were added. After gentle mixing with a spatula, the mixture was shaken for 30 minutes. The resulting mixture was molded into a tablet shape using a compression molding machine (trade name: TDP 0; manufactured by LFA Machines oxford Ltd) with a compression pressure of 3 kN. The resulting compression molded product was dried at 40°C for 3 hours so that the ethanol contained in the compression molded product would be removed. In this manner, a flavor molded body was prepared. The amount of glycerine contained in the flavor molded body was 8.3% by mass. The surface of the resulting flavor molded body had great stickiness, resulting in poor ease of handling.

(Sensory Evaluation in the Initial Stage of Use with a Non-Combustion Heating Type Flavor Inhaler)

[0059] The prepared flavor molded body was used with a non-combustion heating type flavor inhaler and subjected to sensory evaluation in the same manner as in Example 5. The results are presented in Table 2.

[Table 2]

	1-3 puffs	4-6 puffs	7-10 puffs	Overall evaluation
Example 5	A raw material-derived orange scent, with some rawness. Perceived smoke production is low.	The orange scent changed to a deep orange-like one. Some rawness. Feels rough to the throat.	The flavor is subtle. The smoke seems to have diminished.	Gives the impression of being somewhat raw. Lacks a sensation of being cooked.

(continued)

	1-3 puffs	4-6 puffs	7-10 puffs	Overall evaluation
Comparative Example 2	A raw material-derived orange scent, with some rawness. Perceived smoke production is low.	The orange scent changed to a deep orange-like one. Rawness remains. Perceived smoke production has increased. A faint caramel-like scent is felt. Irritating.	A brown scent, with a slightly dark impression. The diminishment of smoke is felt. Some burnt sweet odor is felt.	Smoke generation is slow. Perceived smoke production is low in early puffs.
Comparative Example 3	A burnt sweet scent is felt. The overall note of scent is brown. Much smoke produced. Somewhat irritating.	The burnt sweet odor has intensified. The note of scent is brown. Smoke production is felt strongly. A strong impact is noticed.	The note of scent turned slightly brown. Smoke production is still strongly felt. The burnt sweet odor remains sufficiently noticeable. The irritation has slightly decreased.	A burnt sweet odor is felt even in early puffs. Smoke production is felt strongly throughout.

[0060] As shown in Table 2, with the flavor molded body of Example 5, which was a flavor molded body according to this embodiment, a glucose-derived flavor component was released earlier, and flavor in the initial stage of use was good, compared with the flavor molded bodies of Comparative Examples 2 and 3.

REFERENCE SIGNS LIST

[0061]

1 non-combustion heating type flavor inhaler
2 flavor molded body
3 flavor source container
4 power supply
5 heater
6 controller
7 mouthpiece
8 raw-material position adjuster
9 metal plate

Claims

1. A method for producing a flavor molded body for a non-combustion heating type flavor inhaler, the method comprising:

a step of mixing a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, a material having a melting point of 30-200°C, and an alcohol having 2 to 7 carbon atoms to form a mixture;
a step of compressively molding the mixture to form a compression molded product;
a step of heating the compression molded product to at least the melting point of the material; and
a step of impregnating the heated compression molded product with an aerosol source.

2. The method according to claim 1, wherein the material is at least one material selected from the group consisting of a saccharide, a fat, a fatty acid, and an aliphatic hydrocarbon.

3. The method according to claim 1 or 2, wherein the material is a saccharide.

4. The method according to claim 2 or 3, wherein the saccharide is at least one saccharide selected from the group consisting of glucose, sucrose, fructose, mannose, xylose, galactose, ribose, arabinose, erythrose, erythrulose, trehalose, xylitol, rhamnose, sorbitol, agarose, amylose, starch, and chitosan.

5. The method according to any one of claims 1 to 4, wherein the material is in powder form, granule form, or chip form.

6. The method according to any one of claims 1 to 5, wherein the aerosol source is at least one selected from the group consisting of glycerine, 1,3-propanediol, propylene glycol, and 1,3-butanediol.

7. The method according to any one of claims 1 to 6, wherein the alcohol having 2 to 7 carbon atoms is ethanol.

8. The method according to any one of claims 1 to 7, wherein an amount of the aerosol source contained in the flavor molded body is 15% by mass or more.

9. The method according to any one of claims 1 to 8, wherein the flavor molded body has a tablet shape.

10. A flavor molded body for a non-combustion heating type flavor inhaler, the flavor molded body comprising a tobacco powder raw material having a mean particle diameter of no greater than 300 μm, an aerosol source, and a material having a melting point of 30-200°C, wherein:

    the flavor molded body has a porous structure formed by the tobacco powder raw material and the material;
    the aerosol source is held within pores in the porous structure; and
    an amount of the aerosol source contained in the flavor molded body is 15% by mass or more.

11. The flavor molded body according to claim 10, wherein the material is at least one material selected from the group consisting of a saccharide, a fat, a fatty acid, and an aliphatic hydrocarbon.

12. The flavor molded body according to claim 10 or 11, wherein the material is a saccharide.

13. The flavor molded body according to claim 11 or 12, wherein the saccharide is at least one saccharide selected from the group consisting of glucose, sucrose, fructose, mannose, xylose, galactose, ribose, arabinose, erythrose, erythrulose, trehalose, xylitol, rhamnose, sorbitol, agarose, amylose, starch, and chitosan.

14. The flavor molded body according to any one of claims 10 to 13, wherein the aerosol source is at least one selected from the group consisting of glycerine, 1,3-propanediol, propylene glycol, and 1,3-butanediol.

15. The flavor molded body according to any one of claims 10 to 14, wherein the flavor molded body has a tablet shape.

16. A non-combustion heating type flavor inhaler comprising:

    a flavor source container that accommodates the flavor molded body according to any one of claims 10 to 15;
    a power supply unit that includes a power supply; and
    a heater that is supplied with electric power from the power supply and heats the flavor molded body inside the flavor source container.

Fig. 1

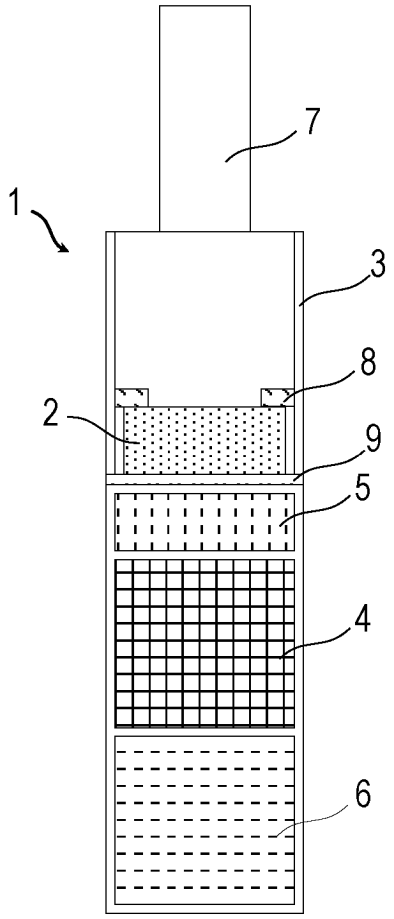


Fig. 2

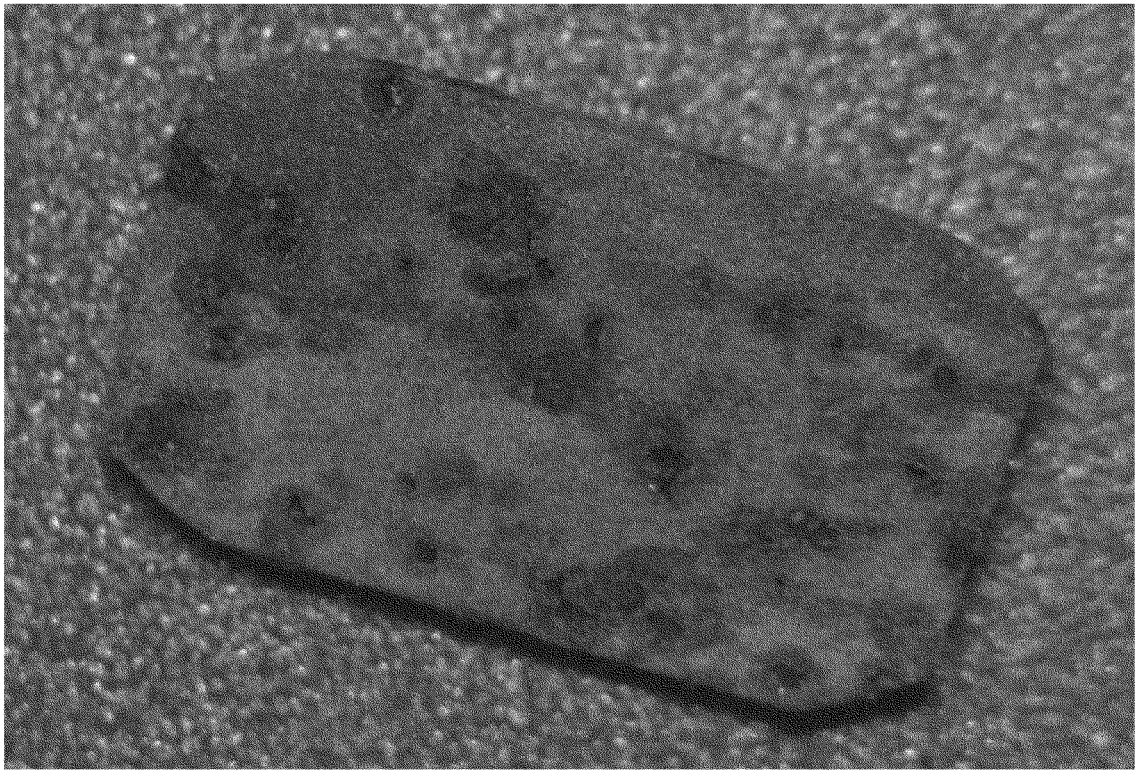


Fig. 3

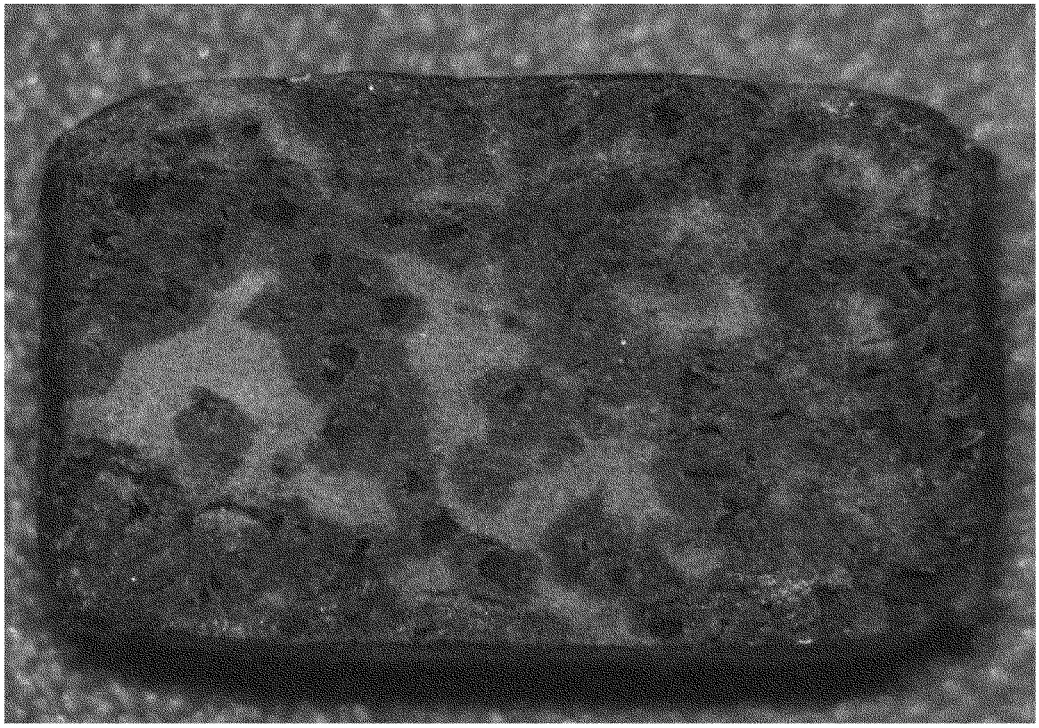
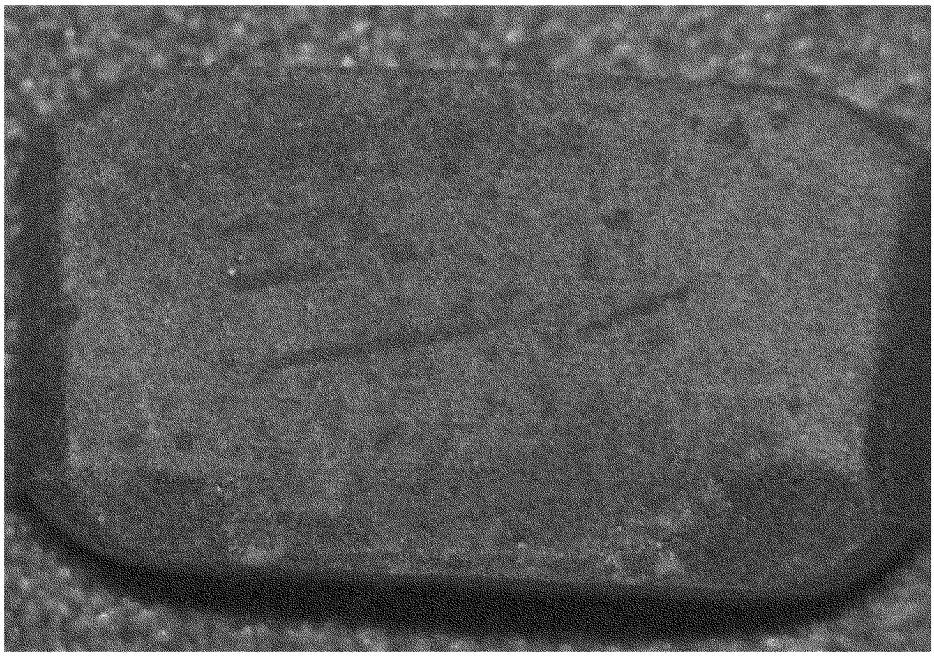


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/045742

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/20(2020.01)i
FI: 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)

A24F40/00 - 47/00

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

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2017/141406 A1 (JAPAN TOBACCO INC) 24 August 2017 (2017-08-24) entire text, all drawings	1-15
A	JP 2021-113 A (BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED) 07 January 2021 (2021-01-07) entire text, all drawings	1-15
X	JP 6915142 B1 (JAPAN TOBACCO INC) 04 August 2021 (2021-08-04) in particular, see paragraphs [0013]-[0014], [0076], fig. 3	16

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

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Date of the actual completion of the international search	Date of mailing of the international search report
18 January 2022	**08 February 2022**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/045742

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2017/141406 A1	24 August 2017	US 2018/0325163 A1 entire text, all drawings EP 3398459 A1 CN 108697163 A KR 10-2018-0114113 A	
JP 2021-113 A	07 January 2021	US 2018/0360099 A1 entire text, all drawings WO 2017/097840 A1 KR 10-2018-0069092 A CN 108366614 A	
JP 6915142 B1	04 August 2021	(Family: none)	

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 63148975 A **[0003]**