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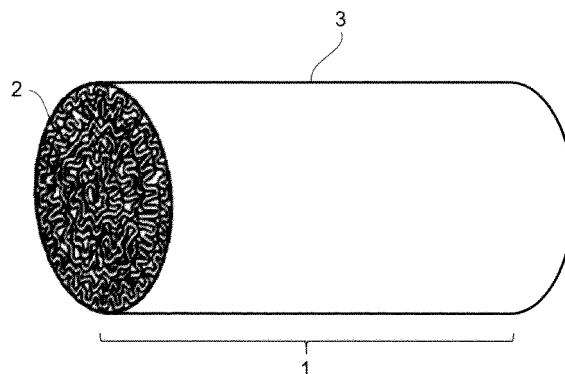
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(54) **FILTER SEGMENT FOR NON-COMBUSTION HEATING TYPE FLAVOR INHALER, NON-COMBUSTION HEATING TYPE FLAVOR INHALER, AND NON-COMBUSTION HEATING TYPE FLAVOR INHALATION SYSTEM**

(57) Provided is a filter segment for a non-combustion heating-type flavor inhaler in which the filter segment can increase the proportion of an aerosol relative to flavor

components. The filter segment for a non-combustion heating-type flavor inhaler is filled with a sheet, where the filter segment contains an acid.

Fig. 1



Description

TECHNICAL FIELD

5 **[0001]** The present invention relates to a filter segment for a non-combustion heating-type flavor inhaler, a non-combustion heating-type flavor inhaler, and a non-combustion heating-type flavor inhalation system.

BACKGROUND ART

10 **[0002]** As a substitute for a combustion-type flavor inhaler, a non-combustion heating-type flavor inhaler that utilizes heating instead of burning has been developed in recent years. Such a non-combustion heating-type flavor inhaler is provided with a tobacco-containing segment that includes a tobacco filler containing tobacco and an aerosol former for generating an aerosol upon heating. Moreover, such a non-combustion heating-type flavor inhaler may further include, for example, a filter segment and/or a cooling segment for cooling a vaporized aerosol former and thereby generating
15 an aerosol (Patent Literature (PTL) 1 to 3). In a non-combustion heating-type flavor inhaler, an aerosol is also inhaled together with flavor components, such as nicotine, during use.

CITATION LIST

20 PATENT LITERATURE

[0003]

PTL 1: Japanese Patent No. 5877618
25 PTL 2: Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2018-530318
PTL 3: WO 2019/123048

SUMMARY OF INVENTION

30 TECHNICAL PROBLEM

[0004] For the purpose of enhancing smoky feeling and cigarette-like feeling that a user has, the present inventors lowered the resistance to draw in a filter segment and thus reduced the filtration of flavor components and an aerosol in order to increase the amounts of the aerosol and flavor components supplied to a user. Consequently, it was found
35 that although the amounts of an aerosol and flavor components supplied to a user increase, a user feels irritation in some cases due to lowering in the proportion of an aerosol relative to flavor components (aerosol/flavor components).

[0005] In view of the above, an object of the present invention is to provide a filter segment for a non-combustion heating-type flavor inhaler in which the filter segment can increase the proportion of an aerosol relative to flavor components and to provide a non-combustion heating-type flavor inhaler and a non-combustion heating-type flavor inhalation
40 system including such a filter segment.

SOLUTION TO PROBLEM

[0006] A filter segment for a non-combustion heating-type flavor inhaler according to the present invention is a filter
45 segment for a non-combustion heating-type flavor inhaler, being filled with a sheet, where the filter segment contains an acid.

[0007] A non-combustion heating-type flavor inhaler according to the present invention includes a tobacco-containing segment and the filter segment for a non-combustion heating-type flavor inhaler.

[0008] A non-combustion heating-type flavor inhalation system according to the present invention includes the non-
50 combustion heating-type flavor inhaler and a heating device for heating the tobacco-containing segment.

ADVANTAGEOUS EFFECTS OF INVENTION

[0009] According to the present invention, it is possible to provide a filter segment for a non-combustion heating-type
55 flavor inhaler in which the filter segment can increase the proportion of an aerosol relative to flavor components and to provide a non-combustion heating-type flavor inhaler and a non-combustion heating-type flavor inhalation system including such a filter segment.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

Fig. 1 is a schematic view of an exemplary filter segment for a non-combustion heating-type flavor inhaler according to the present embodiment.

Fig. 2 is a cross-sectional view of an exemplary non-combustion heating-type flavor inhaler according to a first embodiment of the present invention.

Fig. 3 is a cross-sectional view of an exemplary non-combustion heating-type flavor inhaler according to a second embodiment of the present invention.

Fig. 4 schematically illustrates an exemplary non-combustion heating-type flavor inhalation system according to the present embodiment in (a) the state before inserting a non-combustion heating-type flavor inhaler into a heating device and in (b) the state of heating the non-combustion heating-type flavor inhaler inserted into the heating device.

DESCRIPTION OF EMBODIMENTS

[Filter Segment for Non-combustion Heating-type Flavor Inhaler]

[0011] A filter segment for a non-combustion heating-type flavor inhaler (hereinafter, also referred to as a filter segment) according to the present embodiment is a filter segment filled with a sheet, where the filter segment contains an acid. By incorporating an acid into the filter segment, when an aerosol and flavor components pass through the filter segment, base components, such as nicotine, included in the flavor components interact with the acid and are thus trapped selectively in the filter segment. Since flavor components are trapped selectively in the filter segment, it is possible to increase the ratio of an aerosol to flavor components when supplied to a user, thereby suppressing irritation. Such flavor components preferably include base components and more preferably include alkaloids, such as nicotine.

[0012] In particular, it is preferable that a sheet packed within the filter segment contains an acid inside the sheet. For example, an acid may exist inside a sheet, such as paper. By incorporating an acid inside a sheet like this, it is possible to place a sufficient amount of acid within the filter segment in a stable manner, to enhance contact efficiency between the acid and the above-mentioned base components, and to trap flavor components further efficiently in the sheet. Besides a sheet, an acid may also be contained, for example, in a tubular wrapper for wrapping around a sheet or in an adhesive, such as glue, used for bonding both ends of such a wrapper when formed into a tubular shape. Here, the filter segment according to the present embodiment may be disposed downstream (mouth side) of a tobacco-containing segment including tobacco and an aerosol former.

(Sheets)

[0013] In the present embodiment, the sheet is not particularly limited but is preferably a sheet that can incorporate an acid inside. For example, the sheet is preferably porous since an acid can be retained within pores. In particular, even when an acid is liquid at room temperature as described hereinafter, it is possible to retain the liquid acid within pores and thus to suppress leakage of the acid outside the sheet. Examples of such a sheet include wet-laid nonwoven fabrics and dry-laid nonwoven fabrics formed using naturally occurring or synthetic short fibers as the main raw material, and specific examples include paper and nonwoven fabrics. Moreover, other examples include films having a microporous structure, such as polymer foam films, and specific examples include polyolefin foam films and polyurethane foam films. Among these, the sheet is preferably paper in view of affinity with an acid and excellent retainability of the acid. Examples of paper include glassine, paraffin paper, coated paper, and impregnated paper. Here, the sheet itself may or may not exhibit air permeability. However, from a viewpoint of preventing the increase in removal ratio of an aerosol, the sheet is preferably air impermeable or exhibit low air permeability.

[0014] The sheet has a thickness of preferably 20 to 120 μm and more preferably 30 to 80 μm . When the sheet has a thickness of 30 μm or more, it is possible to retain a sufficient amount of acid inside the sheet. Meanwhile, when the sheet has a thickness of 80 μm or less, it is possible to ensure satisfactory resistance to draw in the filter segment.

[0015] When the sheet is paper, the basis weight of the paper is preferably 20 to 120 g/m^2 and more preferably 30 to 80 g/m^2 . When the basis weight is 30 g/m^2 or more, it is possible to retain a sufficient amount of acid inside the paper. Meanwhile, when the basis weight is 80 g/m^2 or less, it is possible to ensure satisfactory air permeability in the filter segment.

[0016] In the case in which the sheet is packed within the filter segment, the packing mode is not particularly limited. As described hereinafter, for example, the sheet may be provided with a plurality of folds (also referred to as crimps or crepe) in the axial direction of the filter segment, gathered while being corrugated along the folds, and disposed within a wrapper of the filter segment. In this case, the intervals between the folds are not particularly limited but may be 0.5

to 2 mm, for example.

(Acids)

[0017] An acid used in the present embodiment is not particularly limited but may be an edible acid or an organic acid, for example. In particular, the acid is preferably liquid at 15°C to 25°C, in other words, at room temperature. This is because an acid that is liquid at room temperature can be applied as it is without dissolving in a solvent, such as water, to a sheet or a wrapper. Moreover, since an acid in the liquid state is retained inside the sheet or wrapper, the acid is distributed uniformly inside the sheet or wrapper, thereby enhancing contact efficiency between the acid and flavor components. Consequently, it is possible to efficiently trap flavor components in the sheet or wrapper.

[0018] Specific examples of an acid include stearic acid, isostearic acid, linoleic acid, oleic acid, palmitic acid, myristic acid, dodecanoic acid, capric acid, benzoic acid, isobutyric acid, propionic acid, adipic acid, acetic acid, vanillylmandelic acid, maleic acid, glutaric acid, fumaric acid, succinic acid, lactic acid, glycolic acid, and glutamic acid. Among these, exemplary acids that are liquid at 15°C to 25°C include isostearic acid, linoleic acid, oleic acid, isobutyric acid, propionic acid, acetic acid, and lactic acid. These acids may be used alone or in combination. Among these, lactic acid is preferable as an acid in view of the low cost and small effects on flavor due to the low odor.

[0019] When an acid is contained inside the sheet, the amount of acid contained in the sheet is preferably 1 to 20 mass%, more preferably 2 to 15 mass%, and further preferably 4 to 12 mass% relative to the mass of the sheet. When the amount of acid is 1 mass% or more, it is possible to trap flavor components sufficiently in the sheet. Meanwhile, when the amount of acid is 20 mass% or less, it is possible to suppress bleeding of the acid outside the sheet.

[0020] In the case in which an acid exists inside a sheet or wrapper, a method of incorporating the acid inside the sheet or wrapper is not particularly limited. Exemplary such methods include a method of applying a liquid acid to the surface of a porous sheet or wrapper through coating, spraying, or the like; a method of immersing a porous sheet or wrapper in a liquid acid; a method of impregnating particulate carriers, such as particulate activated carbon, with a liquid acid and then adding to a sheet; and a method of impregnating activated carbon fibers with a liquid acid and then incorporating the resulting activated carbon fibers into a sheet.

(Configuration of Filter Segment)

[0021] The filter segment according to the present embodiment may be a tubular member filled with a sheet and may contain an acid. Fig. 1 illustrates an exemplary filter segment according to the present embodiment. The filter segment 1 illustrated in Fig. 1 includes a sheet 2 containing an acid inside and a tubular wrapper 3 wrapped around the sheet 2. The sheet 2 having a plurality of folds in the axial direction of the filter segment 1, in other words, the horizontal direction in Fig. 1 is gathered while being corrugated along the folds and packed within the wrapper 3. Grooves formed through the gathering extend in the axial direction of the filter segment 1. When the sheet 2 is packed like this within the filter segment 1, it is possible to increase the surface area of the sheet 2 while maintaining the passage of an aerosol and flavor components in the axial direction of the filter segment 1 and thus to trap the flavor components efficiently and selectively in the sheet 2.

[0022] The filter segment has the resistance to draw per segment of preferably 2.5 mmH₂O/mm or less, more preferably 0.1 to 2.0 mmH₂O/mm, further preferably 0.2 to 1.5 mmH₂O/mm, and particularly preferably 0.2 to 0.5 mmH₂O/mm. When the resistance to draw is 2.5 mmH₂O/mm or less, it is possible to increase the amounts of an aerosol and flavor components to be supplied to a user. Although the proportion of an aerosol relative to flavor components (aerosol/flavor components) consequently decreases as mentioned above, the filter segment according to the present embodiment, which contains an acid, can suppress lowering in the proportion. The resistance to draw can be changed appropriately by the material, filling density, or the like of a sheet to be packed in the filter segment. The resistance to draw is a value measured by a draw resistance measuring instrument (trade name: SODIMAX from Sodim SAS).

[0023] The filling density of the sheet within the filter segment is preferably 1 mg/mm³ or less, more preferably 0.3 to 0.8 mg/mm³, and further preferably 0.4 to 0.7 mg/mm³. When the filling density is 1 mg/mm³ or less, the resistance to draw tends to be 2.5 mmH₂O or less.

[0024] The shape of the filter segment is not particularly limited but may be columnar, for example. When the filter segment is columnar, the perimeter length of the filter segment is preferably 16 to 25 mm, more preferably 20 to 24 mm, and further preferably 21 to 23 mm. Moreover, the length of the filter segment in the axial direction is preferably 4 to 30 mm, more preferably 5 to 15 mm, and further preferably 5 to 12 mm. The cross-sectional shape of the filter segment is not particularly limited but may be circular, elliptic, or polygonal, for example.

[Non-combustion Heating-type Flavor Inhaler]

[0025] A non-combustion heating-type flavor inhaler (hereinafter, also referred to as a flavor inhaler) according to the

present embodiment may include a tobacco-containing segment and the filter segment for a non-combustion heating-type flavor inhaler according to the present embodiment. Since the flavor inhaler according to the present embodiment includes the filter segment according to the present embodiment, it is possible to increase the proportion of an aerosol relative to flavor components. The filter segment according to the present embodiment may be disposed downstream (mouth side) of the tobacco-containing segment. The flavor inhaler according to the present embodiment may also include other segments in addition to the tobacco-containing segment and the filter segment according to the present embodiment.

[0026] The flavor inhaler according to the present embodiment preferably further includes a cooling segment between the tobacco-containing segment and the filter segment according to the present embodiment from a viewpoint of delivering a sufficient amount of aerosol. In the cooling segment, an aerosol former and flavor components volatilized by heating the tobacco-containing segment are cooled and liquefied partially (aerosol formation). Here, the cooling segment preferably includes a single free-flow channel, in other words, one channel in the axial direction, rather than a plurality of channels, from a viewpoint of preventing excessive removal of flavor components and an aerosol former. For example, such a cooling segment may be a tubular member having a perforation on the peripheral surface. Meanwhile, the cooling segment preferably includes a plurality of free-flow channels, in other words, a plurality of channels in the axial direction from a viewpoint of increasing the contact area and thereby enhancing the cooling effect on flavor components and an aerosol former in a short segment length.

(First Embodiment)

[0027] Fig. 2 illustrates an exemplary flavor inhaler according to a first embodiment of the present invention. The flavor inhaler 4 illustrated in Fig. 2 includes a tobacco-containing segment 5 and a mouthpiece segment 8. The mouthpiece segment 8 includes a first cooling segment 6, a filter segment 1 according to the present embodiment, and a first center hole segment 7. During use, the tobacco-containing segment 5 is heated and inhalation takes place at the end of the first center hole segment 7. Here, the position of the filter segment 1 is not limited to the position illustrated in Fig. 2, and the positions of the filter segment 1 and the first center hole segment 7 may be switched, for example. Moreover, the first center hole segment 7 may be omitted in the flavor inhaler 4 illustrated in Fig. 2.

[0028] The tobacco-containing segment 5 includes a tobacco filler 9 containing tobacco and an aerosol former and a tubular first wrapper 10 that covers the tobacco filler 9. The tobacco filler 9 may further contain a volatile flavor component, water, and so forth. The size of tobacco used as a filler or a preparation method therefor is not particularly limited. For example, dry tobacco leaves shredded into a width of 0.8 to 1.2 mm may be used. When shredded into such a width, the resulting shreds have a length of about 5 to 20 mm. Moreover, those prepared by uniformly pulverizing dry tobacco leaves into an average particle size of about 20 to 200 μm , forming into sheets, and shredding the sheets into a width of 0.8 to 1.2 mm may also be used. When shredded into such a width, the resulting shreds have a length of about 5 to 20 mm. Further, the above-mentioned formed sheets may be gathered without shredding and used as a filler.

[0029] In either case of using dry tobacco leaves as shreds or as sheets formed after uniform pulverization, various types of tobacco may be employed for a tobacco filler. Flue-cured, burley, oriental, and domestic, regardless of *Nicotiana tabacum* varieties or *Nicotiana rustica* varieties, may be blended as appropriate for an intended taste and used. The details of the varieties of tobacco are disclosed in "Tobacco no Jiten (Encyclopedia of Tobacco), Tobacco Academic Studies Center, March 31, 2009."

[0030] There exist a plurality of conventional methods for pulverizing tobacco and forming into uniform sheets. Such sheets include: first, a sheet made by a papermaking process; second, a cast sheet made by uniformly mixing pulverized tobacco with a suitable solvent, such as water, thinly casting the resulting uniform mixture on a metal plate or a metal plate belt, and drying; and third, a rolled sheet formed by extruding a uniform mixture of pulverized tobacco with a suitable solvent, such as water, into a sheet shape. The details of the types of uniform sheets are disclosed in "Tobacco no Jiten (Encyclopedia of Tobacco), Tobacco Academic Studies Center, March 31, 2009."

[0031] The filling density of the tobacco filler 9 is not particularly limited but is typically 250 mg/cm^3 or more, preferably 320 mg/cm^3 or more and typically 520 mg/cm^3 or less, preferably 420 mg/cm^3 or less from a viewpoint of ensuring the performance of the flavor inhaler 4 and imparting satisfactory smoking flavor. Specifically, in the case of the tobacco-containing segment 5 of 22 mm in circumference and 20 mm in length, the content range of the tobacco filler 9 is 200 to 400 mg, for example, and preferably 250 to 320 mg per tobacco-containing segment 5.

[0032] An aerosol former is a material that can generate an aerosol upon heating. Examples include, but are not particularly limited to, glycerol, propylene glycol (PG), 1,3-butanediol, and triethyl citrate (TEC). These aerosol formers may be used alone or in combination. The amount of aerosol former contained in the tobacco filler 9 may be, for example, 10 to 30 mass% relative to 100 mass% of the tobacco filler 9.

[0033] The volatile flavor component is not particularly limited and examples include, from a viewpoint of imparting satisfactory smoking flavor, acetanisole, acetophenone, acetylpyrazine, 2-acetylthiazole, alfalfa extract, amyl alcohol, amyl butyrate, trans-anethole, star anise oil, apple juice, Peru balsam oil, beeswax absolute, benzaldehyde, benzoin

resinoid, benzyl alcohol, benzyl benzoate, benzyl phenylacetate, benzyl propionate, 2,3-butanedione, 2-butanol, butyl butyrate, butyric acid, caramel, cardamom oil, carob absolute, β -carotene, carrot juice, L-carvone, β -caryophyllene, cassia bark oil, cedarwood oil, celery seed oil, chamomile oil, cinnamaldehyde, cinnamic acid, cinnamyl alcohol, cinnamyl cinnamate, citronella oil, DL-citronellol, clary sage extract, cocoa, coffee, cognac oil, coriander oil, cuminaldehyde, davana oil, δ -decalactone, γ -decalactone, decanoic acid, dill oil, 3,4-dimethyl-1,2-cyclopentanedione, 4,5-dimethyl-3-hydroxy-2,5-dihydrofuran-2-one, 3,7-dimethyl-6-octenoic acid, 2,3-dimethylpyrazine, 2,5-dimethylpyrazine, 2,6-dimethylpyrazine, ethyl 2-methylbutyrate, ethyl acetate, ethyl butyrate, ethyl hexanoate, ethyl isovalerate, ethyl lactate, ethyl laurate, ethyl levulinate, ethyl maltol, ethyl octanoate, ethyl oleate, ethyl palmitate, ethyl phenylacetate, ethyl propionate, ethyl stearate, ethyl valerate, ethyl vanillin, ethyl vanillin glucoside, 2-ethyl-3-(5 or 6)-dimethylpyrazine, 5-ethyl-3-hydroxy-4-methyl-2(5H)-furanone, 2-ethyl-3-methylpyrazine, eucalyptol, fenugreek absolute, genet absolute, gentian root infusion, geraniol, geranyl acetate, grape juice, guaiacol, guava extract, γ -heptalactone, γ -hexalactone, hexanoic acid, cis-3-hexen-1-ol, hexyl acetate, hexyl alcohol, hexyl phenylacetate, honey, 4-hydroxy-3-pentenoic acid γ -lactone, 4-hydroxy-4-(3-hydroxy-1-butenyl)-3,5,5-trimethyl-2-cyclohexen-1-one, 4-(p-hydroxyphenyl)-2-butanone, 4-hydroxyundecanoic acid sodium salt, immortelle absolute, β -ionone, isoamyl acetate, isoamyl butyrate, isoamyl phenylacetate, isobutyl acetate, isobutyl phenylacetate, jasmine absolute, kola nut tincture, labdanum oil, terpeneless lemon oil, licorice extract, linalool, linalyl acetate, lovage root oil, maltol, maple syrup, menthol, menthone, L-menthyl acetate, p-methoxybenzaldehyde, methyl 2-pyrrolidyl ketone, methyl anthranilate, methyl phenylacetate, methyl salicylate, 4'-methylacetophenone, methyl cyclopentenolone, 3-methylvaleric acid, mimosa absolute, molasses, myristic acid, nerol, nerolidol, γ -nonalactone, nutmeg oil, δ -octalactone, octanal, octanoic acid, orange flower oil, orange oil, oris root oil, palmitic acid, ω -pentadecalactone, peppermint oil, petitgrain Paraguay oil, phenethyl alcohol, phenethyl phenylacetate, phenylacetic acid, piperonal, plum extract, propenylguaethol, propyl acetate, 3-propylidenephthalide, prune juice, pyruvic acid, raisin extract, rose oil, rum, sage oil, sandalwood oil, spearmint oil, styrax absolute, marigold oil, tea distillate, α -terpineol, terpinyl acetate, 5,6,7,8-tetrahydroquinoxaline, 1,5,5,9-tetramethyl-13-oxatricyclo[8.3.0.0.(4.9)]tridecane, 2,3,5,6-tetramethylpyrazine, thyme oil, tomato extract, 2-tridecanone, triethyl citrate, 4-(2,6,6-trimethylcyclohex-1-enyl)but-2-en-4-one, 2,6,6-trimethylcyclohex-2-ene-1,4-dione, 4-(2,6,6-trimethylcyclohexa-1,3-dienyl)but-2-en-4-one, 2,3,5-trimethylpyrazine, γ -undecalactone, γ -valerolactone, vanilla extract, vanillin, veratraldehyde, violet leaf absolute, and extracts of tobacco plants (tobacco leaf, tobacco stem, tobacco flower, tobacco root, and tobacco seed). Among these, menthol is particularly preferable. These volatile flavor components may be used alone or in combination.

[0034] A method of packing the tobacco filler 9 within the first wrapper 10 is not particularly limited. For example, the tobacco filler 9 may be wrapped in the first wrapper 10, or the tubular first wrapper 10 may be filled with the tobacco filler 9. When the shape of tobacco has a longitudinal direction as in a rectangle, tobacco may be packed with the longitudinal direction randomly aligned within the first wrapper 10 or may be packed with the longitudinal direction aligned with the axial direction or the direction perpendicular to the axial direction of the tobacco-containing segment 5. An aerosol former and tobacco components contained in the tobacco filler 9 are vaporized by heating the tobacco-containing segment 5 and moved to the mouthpiece segment 8 through inhalation.

[0035] The first cooling segment 6 comprises a first tubular member 11. The first tubular member 11 may be a cylindrically processed paper tube of cardboard, for example. The first tubular member 11 and a mouthpiece lining paper 16 described hereinafter are provided with a perforation 12 passing therethrough. Due to the presence of the perforation 12, external air is introduced inside the first cooling segment 6 during inhalation. Consequently, volatile components vaporized by heating the tobacco-containing segment 5 come into contact with external air and liquefy due to the lowering temperature, thereby forming an aerosol. The size (diameter) of the perforation 12 is not particularly limited but may be 0.5 to 1.5 mm, for example. The number of the perforation 12 is also not particularly limited and may be one or two or more. For example, a plurality of perforations 12 may be provided on the perimeter of the first cooling segment 6.

[0036] The first center hole segment 7 comprises a filling layer 13 having a hollow portion and an inner plug wrapper 14 that covers the filling layer 13. The filling layer 13 may be, for example, a rod formed by hardening highly densely packed cellulose acetate fibers added with 6 to 20 mass%, based on the mass of cellulose acetate, of a plasticizer including triacetin. The diameter of the hollow portion may be 1.0 to 5.0 mm. Since the filling layer 13 has a high filling density of fibers, air and an aerosol flow only through the hollow portion and hardly flow within the filling layer 13 during inhalation. Consequently, it is possible to reduce the filtration of an aerosol in the first center hole segment 7. Although a hollow portion is provided in the filling layer 13 in Fig. 2, such a hollow portion need not be provided in the present embodiment. In other words, a segment of a common acetate filter may be disposed in place of the first center hole segment.

[0037] The filter segment 1 and the first center hole segment 7 are joined with an outer plug wrapper 15. The outer plug wrapper 15 may be a cylindrical paper, for example. Moreover, the tobacco-containing segment 5, the first cooling segment 6, and the connected filter segment 1 and the first center hole segment 7 are joined with the mouthpiece lining paper 16. These three segments may be joined, for example, by applying a glue, such as a vinyl acetate-based glue, to the inner surface of the mouthpiece lining paper 16 and wrapping the lining paper around these segments.

[0038] The length of the flavor inhaler 4 according to the present embodiment in the axial direction, in other words,

the horizontal direction in Fig. 2 is not particularly limited but is preferably 40 to 90 mm, more preferably 50 to 75 mm, and further preferably 50 to 60 mm. Moreover, the perimeter length of the flavor inhaler 4 according to the present embodiment is preferably 16 to 25 mm, more preferably 20 to 24 mm, and further preferably 21 to 23 mm. In an exemplary embodiment, the length of the tobacco-containing segment 5 is 20 mm, the length of the first cooling segment 6 is 20 mm, the length of the filter segment 1 is 8 mm, and the length of the first center hole segment 7 is 7 mm. The length of these individual segments may be changed appropriately depending on manufacturing feasibility, required quality, and so forth.

(Second Embodiment)

[0039] Fig. 3 illustrates an exemplary flavor inhaler according to a second embodiment of the present invention. The flavor inhaler 4 illustrated in Fig. 3 includes a tobacco-containing segment 5, a second center hole segment 17, a second cooling segment 18, and a filter segment 1 according to the present embodiment. The second center hole segment 17 in the present embodiment also acts to prevent the displacement of a tobacco filler packed in the tobacco-containing segment 5 toward the second cooling segment 18 on the downstream side. In the present embodiment, the tobacco-containing segment 5 may be the same as the tobacco-containing segment in the first embodiment. The second center hole segment 17 in the present embodiment may be, for example, a second tubular member 19 having a hollow portion of 1.5 to 5 mm in diameter. The second cooling segment 18 in the present embodiment may be a segment in which a film 20 of a polymer, such as polylactic acid, after crimping followed by gathering is disposed within a second wrapper 21. The tobacco-containing segment 5, the second center hole segment 17, the second cooling segment 18, and the filter segment 1 are joined with a mouthpiece lining paper 16. The second cooling segment 18 may be changed to the filter segment 1 according to the present embodiment, and a segment of a common acetate filter may be provided downstream thereof.

[0040] The length of the flavor inhaler 4 according to the present embodiment in the axial direction, in other words, the horizontal direction in Fig. 3 is not particularly limited but is preferably 40 to 65 mm and more preferably 45 to 60 mm. Moreover, the perimeter length of the flavor inhaler 4 according to the present embodiment is preferably 16 to 25 mm and more preferably 18 to 23 mm. In an exemplary embodiment, the length of the tobacco-containing segment 5 is 12 mm, the length of the second center hole segment 17 is 8 mm, the length of the second cooling segment 18 is 18 mm, and the length of the filter segment 1 is 7 mm. The length of these individual segments may be changed appropriately depending on manufacturing feasibility, required quality, and so forth.

[Non-combustion Heating-type Flavor Inhalation System]

[0041] A non-combustion heating-type flavor inhalation system (hereinafter, also referred to as flavor inhalation system) according to the present embodiment may include the flavor inhaler according to the present embodiment and a heating device for heating the tobacco-containing segment. Since the flavor inhalation system includes the flavor inhaler according to the present embodiment, it is possible to increase the proportion of an aerosol relative to flavor components. The flavor inhalation system according to the present embodiment is not particularly limited provided that the flavor inhaler according to the present embodiment and the heating device are included and may include other constituents.

[0042] Fig. 4 illustrates an exemplary flavor inhalation system according to the present embodiment. The flavor inhalation system illustrated in Fig. 4 includes a flavor inhaler 4 according to the present embodiment and a heating device 22 for heating a tobacco-containing segment of the flavor inhaler 4 from the outside. Fig. 4 (a) illustrates the state before inserting the flavor inhaler 4 into the heating device 22, and Fig. 4 (b) illustrates the state of heating the flavor inhaler 4 inserted into the heating device 22. The heating device 22 illustrated in Fig. 4 includes a body 23, a heater 24, a metal tube 25, a battery unit 26, and a control unit 27. The body 23 has a tubular recess 28, and the heater 24 and the metal tube 25 are arranged on the inner side surface of the recess 28 at a position corresponding to the tobacco-containing segment of the flavor inhaler 4 inserted into the recess 28. The heater 24 may be an electric resistance heater, and heating by the heater 24 is performed by supplying power from the battery unit 26 in accordance with instructions from the control unit 27, which controls temperature. Heat generated by the heater 24 is transferred to the tobacco-containing segment of the flavor inhaler 4 through the metal tube 25 having a high thermal conductivity. In the schematic view of Fig. 4 (b), a gap exists between the outer perimeter of the flavor inhaler 4 and the inner perimeter of the metal tube 25. However, such a gap between the outer perimeter of the flavor inhaler 4 and the inner perimeter of the metal tube 25 is actually and desirably absent for the purpose of efficient heat transfer. Although the heating device 22 heats the tobacco-containing segment of the flavor inhaler 4 from the outside, the heating device may be a heating device for heating from the inside.

[0043] The heating temperature by the heating device is not particularly limited but is preferably 400°C or lower, more preferably 150°C or higher and 400°C or lower, and further preferably 200°C or higher and 350°C or lower. Herein, the heating temperature means the temperature of the heater in the heating device.

EXAMPLES

[0044] Hereinafter, the present embodiment will be described further specifically by means of working examples. However, the present embodiment is by no means limited by these examples.

[Example 1]

(Preparation of Filter Segment)

[0045] Glassine (trade name: extra thick white glassine, 8 mm × 180 mm, basis weight: 40 g/m², thickness: 40 μm) was provided with straight line folds at intervals of 1 mm in the transverse direction. The resulting glassine was spray-coated with lactic acid. The content of lactic acid in the glassine was 8 mg (12.2 mass%). A cylindrical filter segment of 21.4 mm in perimeter length and 8 mm in length in the axial direction was prepared by gathering the glassine while corrugating along the folds and then packing within a paper wrapper. The filling density of the glassine within the filter segment was 0.62 mg/mm³. The resistance to draw of the filter segment was 0.37 mmH₂O/mm. Here, the resistance to draw was measured by a draw resistance measuring instrument (trade name: SODIMAX from Sodim SAS).

(Preparation of Flavor Inhaler)

[0046] A commercial flavor inhaler (tobacco stick for Ploom S (trade name) from Japan Tobacco Inc.) was prepared. The flavor inhaler has the same configuration as the flavor inhaler 4 illustrated in Fig. 2 except for a center hole segment disposed in place of the filter segment 1. In other words, the flavor inhaler includes two center hole segments disposed on the mouth end side, where the center hole segment on the tobacco-containing segment side has a hollow portion of 4.5 mm in diameter and the center hole segment on the mouth end side has a hollow portion of 1.5 mm in diameter.

[0047] In the present Example, a flavor inhaler having the configuration illustrated in Fig. 2 was prepared by replacing, in the commercial flavor inhaler, the center hole segment on the tobacco-containing segment side by the filter segment prepared by the above-described method. In the prepared flavor inhaler, the length of the tobacco-containing segment 5 was 20 mm, the length of the first cooling segment 6 was 20 mm, the length of the filter segment 1 was 8 mm, and the length of the first center hole segment 7 was 7 mm. The tobacco-containing segment 5 contained tobacco and glycerol as an aerosol former.

(Evaluation)

[0048] To evaluate the amounts of an aerosol and flavor components supplied to a user during use as well as the proportion of an aerosol relative to flavor components, the amounts of nicotine, as a representative component of flavor components, and glycerol supplied were measured. Specifically, evaluation was made by the following method.

[0049] A glass fiber filter (trade name: Cambridge filter 44 mm from Borgwaldt KC GmbH) was placed at a position immediately following the mouth end of the prepared flavor inhaler. The tobacco-containing segment of the flavor inhaler was heated at 240°C by using a heating device (trade name: Ploom S from Japan Tobacco Inc.) designed for the above-mentioned commercial flavor inhaler, and inhalation was performed under conditions of 8 puffs in total at 55 mL/puff for 2 seconds (30 second interval for each puff, i.e. 2 seconds for inhaling and 28 seconds for waiting) with reference to the HCl (Health Canada Intense) regime. The amounts of glycerol and nicotine trapped by the glass fiber filter were quantified for each puff. Specifically, the trapped components were subjected to shaking extraction using 10 mL of isopropanol (IPA) as an extraction solvent under conditions of 200 rpm for 20 minutes. The obtained extract was analyzed by GC under the following conditions to quantify the amounts of glycerol and nicotine for each puff.

Inlet temperature: 240°C

[0050] Oven temperature: retention at 150°C for 1.3 min, subsequent temperature rising at 70°C/min to 240°C, retention for 5 min

Column: DB-WAX 10 m × 0.18 mm × 0.18 μm (trade name) from Agilent Technologies, Inc.
Detector: FID

[0051] Table 1 shows the amount of glycerol, the amount of nicotine, and the proportion of the amount of glycerol relative to the amount of nicotine (G/Ni) in 8 puffs in total. In Table 1, segment A indicates the segment positioned second from the mouth end, and segment B indicates the segment positioned closest to the mouth end.

[Comparative Example 1]

[0052] A filter segment was prepared in the same manner as Example 1 except that glassine was not coated with lactic acid. A flavor inhaler was produced using the prepared filter segment and evaluated in the same manner as Example 1. The results are shown in Table 1.

[Comparative Example 2]

[0053] The commercial flavor inhaler as it is without replacing the center hole segment by the filter segment as in Example 1 was evaluated in the same manner as Example 1. The results are shown in Table 1.

[Reference Example 1]

[0054] The two center hole segments of the commercial flavor inhaler in Example 1 were replaced by a filter segment filled with cellulose acetate fibers, and the resulting flavor inhaler was evaluated in the same manner as Example 1. The results are shown in Table 1.

[Table 1]

	Segment A			Segment B		Glycerol (G) (mg/ stick)	Nicotine (Ni) (mg/ stick)	G/Ni
	Structure	Filler	Resistance to draw (mmH ₂ O/mm)	Structure	Filler			
Ex. 1	filter segment	lactic acid- containing glassine	0.37	center hole segment	-	2.12	0.34	6.32
Comp. Ex. 1	filter segment	glassine	0.36	center hole segment	-	2.25	0.46	4.95
Comp. Ex. 2	center hole segment	-	0	center hole segment	-	2.45	0.51	4.83
Ref. Ex. 1	filter segment	cellulose acetate fiber	3.6	filter segment	cellulose acetate fiber	1.75	0.24	7.33

[0055] As shown in Table 1, Example 1 exhibited a high G/Ni value since the flavor inhaler includes a filter segment containing an acid. In contrast, Comparative Examples 1 and 2 had G/Ni values lower than Example 1 since the flavor inhalers do not include such a filter segment. Meanwhile, the flavor inhaler of Reference Example 1 exhibited a high G/Ni value but the amounts of glycerol and nicotine smaller than Example 1 due to the high resistance to draw. In comparison, Example 1 was better balanced in terms of the amount of glycerol, the amount of nicotine, and the G/Ni value.

REFERENCE SIGNS LIST

[0056]

- 1 Filter segment
- 2 Sheet
- 3 Wrapper
- 4 Flavor inhaler
- 5 Tobacco-containing segment
- 6 First cooling segment
- 7 First center hole segment
- 8 Mouthpiece segment
- 9 Tobacco filler

- 10 First wrapper
- 11 First tubular member
- 12 Perforation
- 13 Filling layer
- 5 14 Inner plug wrapper
- 15 Outer plug wrapper
- 16 Mouthpiece lining paper
- 17 Second center hole segment
- 18 Second cooling segment
- 10 19 Second tubular member
- 20 Film
- 21 Second wrapper
- 22 Heating device
- 23 Body
- 15 24 Heater
- 25 Metal tube
- 26 Battery unit
- 27 Control unit

Claims

1. A filter segment for a non-combustion heating-type flavor inhaler, being filled with a sheet, wherein the filter segment contains an acid.
2. The filter segment for a non-combustion heating-type flavor inhaler according to Claim 1, wherein the sheet contains the acid inside the sheet.
3. The filter segment for a non-combustion heating-type flavor inhaler according to Claim 2, wherein the sheet contains the acid in an amount of 1 to 20 mass% relative to the mass of the sheet.
4. The filter segment for a non-combustion heating-type flavor inhaler according to any one of Claims 1 to 3, having a resistance to draw of 2.5 mmH₂O/mm or less.
5. The filter segment for a non-combustion heating-type flavor inhaler according to any one of Claims 1 to 4, wherein the sheet is porous.
6. The filter segment for a non-combustion heating-type flavor inhaler according to any one of Claims 1 to 5, wherein the sheet is a wet-laid nonwoven fabric or a dry-laid nonwoven fabric.
7. The filter segment for a non-combustion heating-type flavor inhaler according to Claim 6, wherein the sheet is paper.
8. The filter segment for a non-combustion heating-type flavor inhaler according to any one of Claims 1 to 7, wherein the acid is liquid at 15°C to 25°C.
9. The filter segment for a non-combustion heating-type flavor inhaler according to any one of Claims 1 to 8, wherein the acid is an organic acid.
10. The filter segment for a non-combustion heating-type flavor inhaler according to Claim 9, wherein the acid is lactic acid.
11. A non-combustion heating-type flavor inhaler comprising
 - a tobacco-containing segment and
 - the filter segment for a non-combustion heating-type flavor inhaler according to any one of Claims 1 to 10.
12. The non-combustion heating-type flavor inhaler according to Claim 11 further comprising a cooling segment between the tobacco-containing segment and the filter segment for a non-combustion heating-type flavor inhaler.

13. The non-combustion heating-type flavor inhaler according to Claim 12, wherein the cooling segment includes a single free-flow channel.

5 14. The non-combustion heating-type flavor inhaler according to Claim 13, wherein the cooling segment is a tubular member having a perforation.

15. The non-combustion heating-type flavor inhaler according to any one of Claims 11 to 14, wherein the tobacco-containing segment includes tobacco and an aerosol former.

10 16. The non-combustion heating-type flavor inhaler according to Claim 15, wherein the aerosol former is at least one selected from the group consisting of glycerol, propylene glycol, 1,3-butanediol, and triethyl citrate.

17. A non-combustion heating-type flavor inhalation system comprising

15 the non-combustion heating-type flavor inhaler according to any one of Claims 11 to 16 and a heating device for heating the tobacco-containing segment.

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Fig. 1

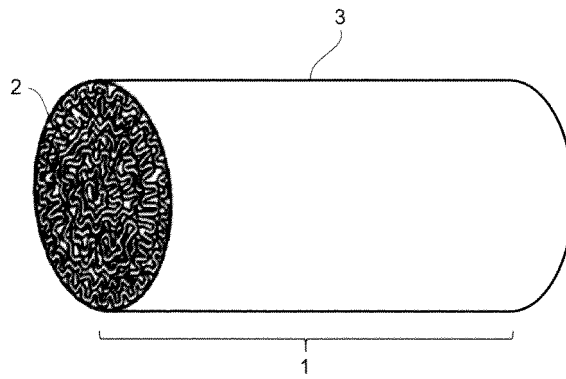


Fig. 2

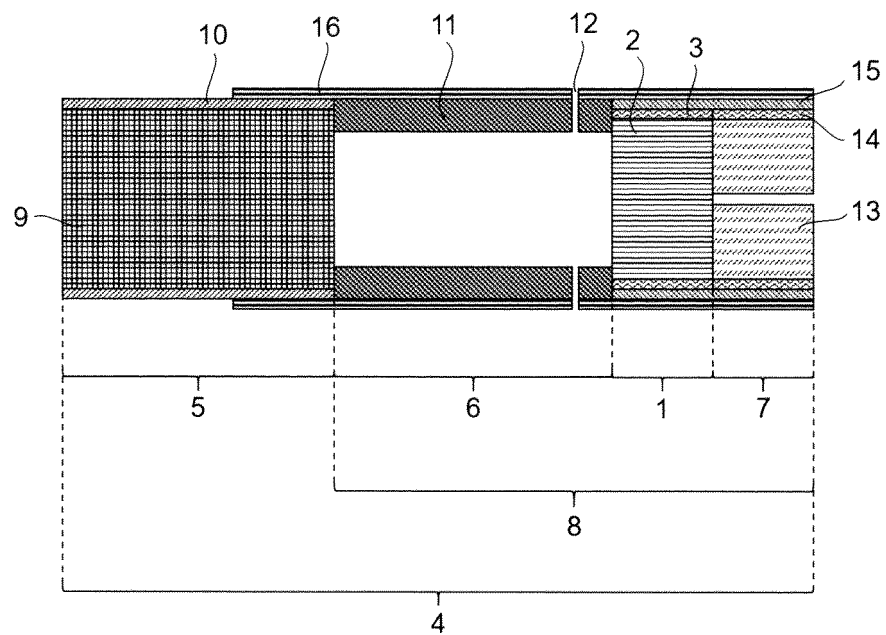


Fig. 3

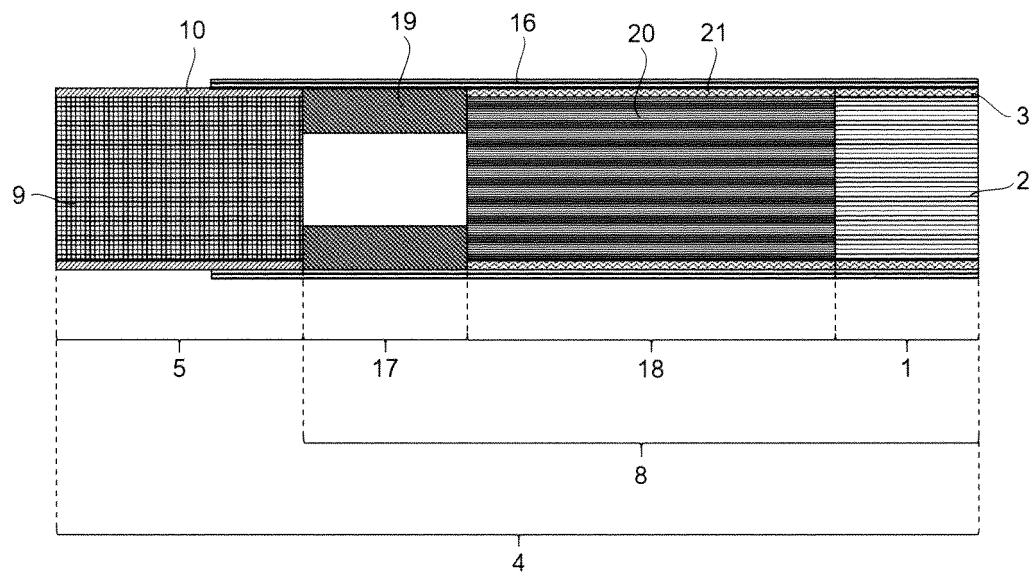
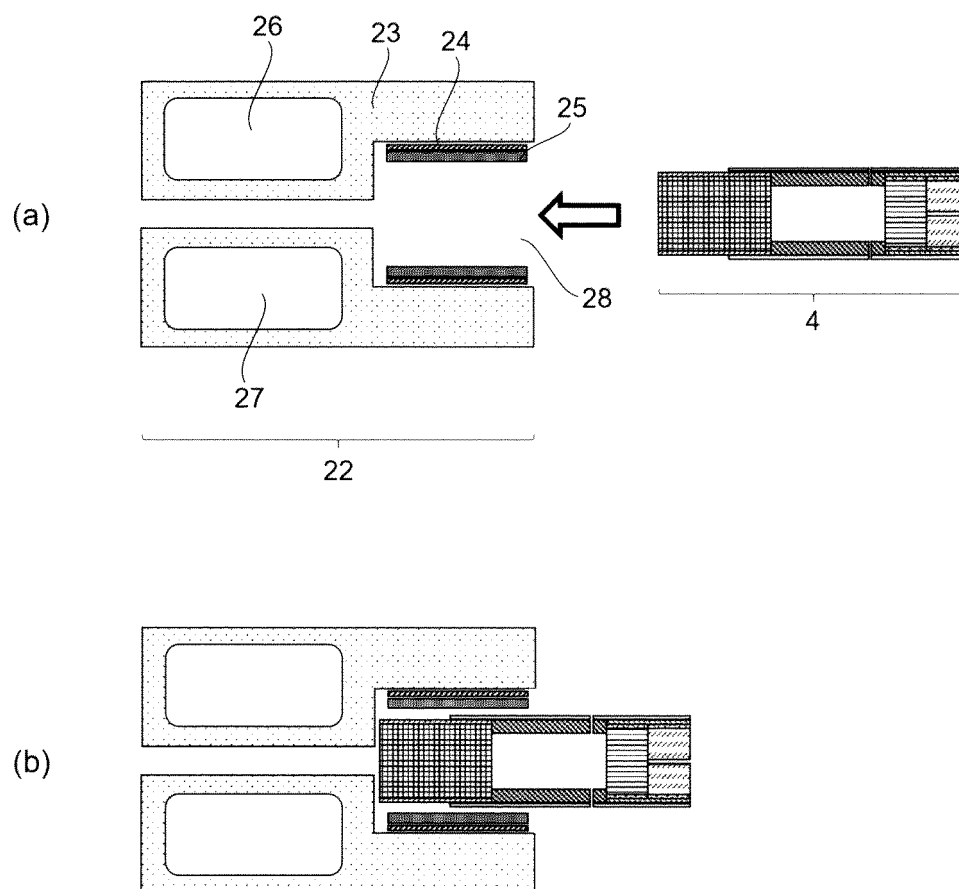


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/000991

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. A24D3/14 (2006.01) i, A24F47/00 (2020.01) i
 FI: A24F47/00, A24D3/14

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. A24D3/14, A24F47/00

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 1971-2020
 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.
Y	JP 2018-530318 A (PHILIP MORRIS PRODUCTS S.A.) 18 October 2018, paragraphs [0068]-[0073], [0080], [0081], fig. 1	1-17
Y	JP 2010-94025 A (JAPAN TOBACCO INC.) 30 April 2010, paragraphs [0004], [0007], [0023]-[0028], fig. 1-5	1-17
Y	JP 05-023159 A (KIKKOMAN CORP.) 02 February 1993, paragraphs [0003]-[0009]	1-17



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search
16.03.2020

Date of mailing of the international search report
24.03.2020

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 Tokyo 100-8915, Japan

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INTERNATIONAL SEARCH REPORT
Information on patent family membersInternational application No.
PCT/JP2020/000991

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
JP 2018-530318 A	18.10.2018	US 2019/0021392 A1 paragraphs [0067]- [0072], [0079], [0080], fig. 1 WO 2017/037209 A1 EP 3344073 A1 CN 107920586 A KR 10-2018-0050342 A WO 2008/093736 A1 (Family: none)	
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JP 05-023159 A	02.02.1993		

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

REFERENCES CITED IN THE DESCRIPTION

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- JP 5877618 B [0003]
- WO 2019123048 A [0003]