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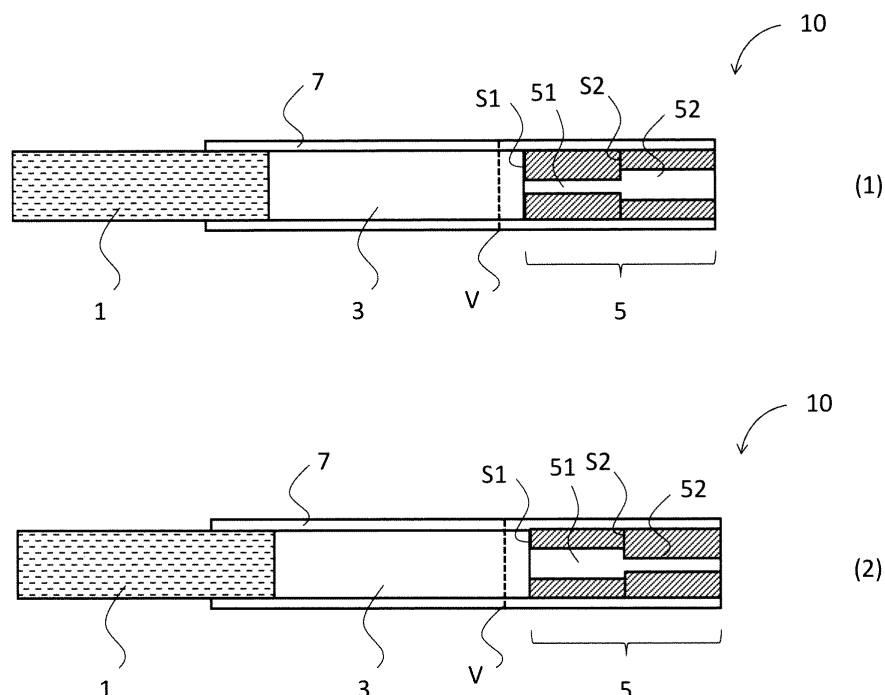
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(54) **NON-COMBUSTION HEATING-TYPE FLAVOR INHALER**

(57) Provided is a non-combustion heating-type flavor inhaler including a tobacco rod, a cooling segment, and a mouthpiece, where the mouthpiece includes connected two center hole filters.

Fig. 1



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Description

TECHNICAL FIELD

5 **[0001]** The present invention relates to a non-combustion heating-type flavor inhaler including a tobacco rod, a cooling segment, and a mouthpiece.

BACKGROUND ART

10 **[0002]** Products used by inserting a non-combustion heating-type flavor inhaler into a device have been marketed in recent years (Patent Literature (PTL) 1, for example). Such a non-combustion heating-type flavor inhaler desirably has a certain diameter or more in view of smooth insertion into a device and sufficient delivery of smoking flavor. Meanwhile, when the diameter of a non-combustion heating-type flavor inhaler becomes larger, the amount of heat provided to the inhaler as well as the contact area with lips increases. Consequently, the temperature near the mouth end rises, and a user may feel uncomfortable about the temperature near the mouth end during use.

CITATION LIST

PATENT LITERATURE

20 **[0003]** PTL 1: WO 2017/198837

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] An object of the present invention is to provide a non-combustion heating-type flavor inhaler that prevents a user from feeling uncomfortable about the temperature near the mouth end during use.

SOLUTION TO PROBLEM

30 **[0005]** The flavor inhaler described in PTL 1 has a mouthpiece including a filter and a paper tube in this order towards the mouth end. However, the present inventors considered that the flavor inhaler described in PTL 1 has room for improvement and thus have completed the present invention. That is, the above-mentioned object is attained by the present invention below.

[1] A non-combustion heating-type flavor inhaler including a tobacco rod, a cooling segment, and a mouthpiece, where the mouthpiece includes connected two center hole filters.

[2] The flavor inhaler according to [1], where the two center hole filters are different in hole diameter.

40 [3] The flavor inhaler according to [2], having $d_1 > d_2$ where d_1 is a hole diameter of a first center hole filter present on the tobacco rod side and d_2 is a hole diameter of a second center hole filter present on the mouth end side.

[4] The flavor inhaler according to [2], having $d_1 < d_2$ where d_1 is a hole diameter of a first center hole filter present on the tobacco rod side and d_2 is a hole diameter of a second center hole filter present on the mouth end side.

45 [5] The flavor inhaler according to any of [1] to [4], where the center hole filters have a hole cross-sectional area of 0.7 to 20 mm².

[6] The flavor inhaler according to any of [2] to [5], where a ratio of the small hole diameter to the large hole diameter is 1:4 to 1:1.5.

[7] The flavor inhaler according to any of [1] to [6], where the center hole filters have a hole diameter of 1.0 to 5.0 mm

50 [8] The flavor inhaler according to any of [1] to [7], where the center hole filters have a hardness of 90% or more as measured by the following method.

Measurement Method

1) Each center hole filter is mounted with its longitudinal direction horizontal on a substrate, and the height D_s is measured.

55 2) The center hole filter is compressed by pressing the side surface using a pressing jig. pressure: 300 g, pressing time: 10 seconds, head diameter of pressing jig: $\phi 12$ mm

3) The height D_d of the center hole filter after pressing is measured.

4) A hardness H (%) is calculated by the following formula.

$$H (\%) = Dd/Ds \times 100$$

[9] The flavor inhaler according to [8], where the hardness is 95% or more.

[10] The flavor inhaler according to any of [1] to [9], where the center hole filters have a thickness of 1 to 3 mm

[11] The flavor inhaler according to any of [1] to [10], having a diameter of 6 to 8 mm

[12] The flavor inhaler according to any of [1] to [10], where the center hole filters have a monofilament fineness of 5 to 12 (denier/filament).

[13] The flavor inhaler according to [12], where the center hole filters have a monofilament fineness of 5 to 8 (denier/filament).

[14] The flavor inhaler according to any of [1] to [13], where the center hole filters have a total fineness of 30,000 to 60,000 (denier/total).

[15] The flavor inhaler according to [14], where the center hole filters have a total fineness of 35,000 to 45,000 (denier/total).

ADVANTAGEOUS EFFECTS OF INVENTION

[0006] According to the present invention, it is possible to provide a non-combustion heating-type flavor inhaler that prevents a user from feeling uncomfortable about the temperature near the mouth end during use.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

Fig. 1 illustrates a non-combustion heating-type flavor inhaler of the present invention.

Fig. 2 illustrates a non-combustion heating-type flavor inhaler system of the present invention.

Fig. 3 illustrates an apparatus for a smoking test.

DESCRIPTION OF EMBODIMENTS

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

1. Non-combustion Heating-type Flavor Inhaler

[0009] A non-combustion heating-type flavor inhaler of the present invention includes a tobacco rod, a cooling segment, and a mouthpiece, where the mouthpiece includes connected two center hole filters. Fig. 1 illustrates an embodiment of the non-combustion heating-type flavor inhaler of the present invention. In the figure, 10 is a non-combustion heating-type flavor inhaler, 1 is a tobacco rod, 3 is a cooling segment, 5 is a mouthpiece, 51 is a first center hole filter, 52 is a second center hole filter, 7 is a tipping paper, and V represents ventilation holes. The flavor inhaler has a diameter of preferably 6 to 8 mm. The diameter is defined as an average diameter of members that constitute the flavor inhaler.

(1) Tobacco Rod

[0010] A tobacco rod is an almost cylindrical member for generating smoking flavor components contained in tobacco raw materials and includes a tobacco filler and a wrapper wrapped therearound. The tobacco filler is not limited, and tobacco shreds or tobacco sheets, for example, may be used therefor. Specifically, tobacco shreds prepared by cutting dry tobacco leaves into a width of 0.8 to 1.2 mm may be packed inside a wrapper. Alternatively, those prepared by uniformly pulverizing dry tobacco leaves into an average particle size of about 20 to 200 μm , forming into sheets, and cutting the sheets into a width of 0.8 to 1.2 mm may be packed inside a wrapper. Moreover, such sheets may be crimped, folded, or spirally rolled without cutting and packed inside a wrapper. Further, such sheets may be cut into strips and packed inside a wrapper concentrically or with the longitudinal direction of the strips aligned parallel to the longitudinal direction of a tobacco rod.

[0011] Various tobacco leaves may be used, and examples include flue-cured, burley, oriental, domestic, regardless of *Nicotiana tabacum* varieties or *Nicotiana rustica* varieties, and mixtures thereof. For such mixtures, the above-mentioned varieties may be used by blending as appropriate for an intended taste. The details of the varieties of tobacco are disclosed in "Tobacco no Jiten (Encyclopedia of Tobacco), Tobacco Academic Studies Center, March 31, 2009."

[0012] The production of the above-mentioned uniform sheets, in other words, the processing of pulverized tobacco

leaves into uniform sheets can be performed by a publicly known method. For example, it is possible to select the following methods: a method of making a sheet by a paper making process; a method of making a cast sheet by uniformly mixing pulverized tobacco leaves with a suitable solvent, such as water, thinly casting the resulting uniform mixture on a metal sheet or a metal sheet belt, and then drying; and a method of making a rolled sheet by uniformly mixing pulverized tobacco leaves with a suitable solvent, such as water, and extruding the resulting uniform mixture into a sheet shape. The details of the types of such uniform sheets are disclosed in "Tobacco no Jiten (Encyclopedia of Tobacco), Tobacco Academic Studies Center, March 31, 2009."

[0013] The tobacco filler may contain moisture, and the content may be 10 to 15 weight% and is preferably 11 to 13 weight% relative to the total amount of the tobacco filler. The use of a tobacco filler having such a moisture content suppresses the formation of stains and makes wrapping during production of tobacco rods satisfactorily feasible.

[0014] The tobacco rod 1 may generate vapor upon heating. To promote aerosol generation, it is preferable to add a polyol, such as glycerol, propylene glycol, or 1,3-butanediol, or another aerosol source to a tobacco filler. The amount of an aerosol source to be added is preferably 5 to 50 weight% and more preferably 10 to 30 weight% relative to the dry weight of a tobacco filler. The length of the tobacco rod 1 is not limited but is preferably 15 to 25 mm. The diameter is also not limited but is preferably 6 to 8 mm.

[0015] The tobacco rod 1 may contain a flavor. Such flavors are not particularly limited, and from a viewpoint of imparting satisfactory smoking flavor, examples include the following: 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-pyrrolyl 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-di-enyl)but-2-en-4-one, 2,3,5-trimethylpyrazine, γ -undecalactone, γ -valerolactone, vanilla extract, vanillin, veratraldehyde, violet leaf absolute, N-ethyl-p-menthane-3-carboxamide (WS-3), and ethyl 2-(p-menthane-3-carboxamido)acetate (WS-5). Among these flavors, menthol is preferable. Moreover, these flavors may be used alone or in combination.

[0016] The filling density of a tobacco filler is not particularly limited but is typically 250 mg/cm³ or more and preferably 320 mg/cm³ or more from a viewpoint of ensuring the characteristics of a non-combustion heating-type flavor inhaler and imparting satisfactory smoking flavor. Meanwhile, the upper limit is typically 800 mg/cm³ or less and preferably 600 mg/cm³ or less.

(2) Cooling Segment

[0017] A cooling segment is a member for promoting aerosol generation, for example, by cooling vapor and/or smoking flavor components generated in the tobacco rod 1. The cooling segment 3 may be a hollow paper tube. Such a paper tube is preferably made of cardboard having stiffness higher than a wrapper and a tipping paper. The paper tube may be provided with ventilation holes V. A plurality of ventilation holes are preferably formed along the circumference of the paper tube. The farthest position, from the mouth side end towards the heating end of the cooling segment, at which

ventilation holes are formed is preferably within the range of 4 mm or less and further preferably within the range of 2 mm or less from the mouth side end of the cooling segment in view of cooling and promoted aerosol generation. Meanwhile, the nearest position at which ventilation holes are formed is preferably 0.5 mm or more and further preferably 1.0 mm or more from the mouth side end of the cooling segment in view of durability of the entire product. In other words, ventilation holes are formed in the range of 0.5 to 4 mm from the mouth side end towards the upstream side of the cooling segment in one embodiment and in the range of 1.0 to 2 mm in another embodiment. In view of working efficiency, such ventilation holes are preferably formed by laser processing of a finished non-combustion heating-type flavor inhaler. Moreover, to enhance heat exchange efficiency, crimped sheets may be packed inside the cooling segment 3. Although the dimensions of the cooling segment 3 are not limited, the length is preferably 15 to 25 mm and the diameter is preferably 5.5 to 7.5 mm

[0018] As in the foregoing, ventilation holes are preferably placed in the circumferential direction on the outer surface of the cooling segment. The number to be placed in the circumferential direction is not limited and may be two or more. The hole diameter is preferably 100 to 1000 μm and more preferably 300 to 800 μm . The hole shape is preferably almost circular or almost elliptic. When a hole is almost elliptic, the major axis corresponds to a hole diameter.

[0019] The cooling segment 3 often has stiffness lower than the tobacco rod 1. When joining such parts different in stiffness by using a tipping paper, defects are less likely to occur by making the diameter of a high-stiffness part smaller than the diameter of a low-stiffness part. Accordingly, when the cooling segment 3 has stiffness higher than the tobacco rod 1, it is preferable to make the diameter smaller than the diameter of the tobacco rod 1. For example, when a tobacco rod has a diameter of 7 mm, a cooling segment and a mouthpiece preferably have a diameter of 6.9 mm

(3) Mouthpiece

[0020] A mouthpiece is a member that forms the mouth end. In the present invention, the mouthpiece 5 includes a first center hole filter 51 and a second center hole filter 52 in this order in the mouth end direction.

(3-1) Center Hole Filters

[0021] As a center hole filter, for example, a filter having a void in its central part may be used. In this case, the hole diameter is preferably 20 to 70% and further preferably 20 to 40% of the filter diameter. Specifically, the hole diameter is preferably 1.0 to 5.0 mm. The preferable lower limit is 1.2 mm or more or 1.5 mm or more, and the preferable upper limit is 4.5 mm or less, less than 4.5 mm, 3.0 mm or less, or 2.5 mm or less. The thickness (wall thickness) of the filter is preferably 1 to 3 mm and more preferably 2 to 3 mm. It is difficult to form a hole of the lower limit or less in hole diameter, and the resulting fluff on the inner wall traps an aerosol, thereby lowering delivery efficiency in some cases. Moreover, a mandrel for forming such a hole of the lower limit or less in hole diameter faces problems with durability and vibrates during production, thereby making the hole shape inconsistent, such as a winding hole. Meanwhile, when the hole diameter exceeds the set values, there are the risk of impairing holding sensation in the mouth since the filter hardness cannot be ensured and further the risk of lowering durability when getting wet with saliva or the like due to the small thickness. Exemplary embodiments include a center hole filter of 7 mm in diameter provided with a hole of 2.0 mm in diameter. Here, the hole cross-sectional area is preferably 0.7 to 20 mm^2 and more preferably 1.6 to 16 mm^2 . Further, a center hole filter having a plurality of holes may be used. In this case, a plurality of holes may be placed equidistantly in the circumferential direction, for example. The total cross-sectional area of a plurality of holes is preferably 0.7 to 20 mm^2 and more preferably 1.6 to 16 mm^2 .

[0022] In the present invention, the mouthpiece includes connected two center hole filters (hereinafter, also referred to as "CH" or "CHs"). A center hole filter present on the heating end side is referred to as a first center hole filter (also referred to as "first CH"), and a center hole filter present on the mouth end side is referred to as a second center hole filter (also referred to as "second CH"). By including connected two CHs, a user does not feel uncomfortable about the temperature near the mouth end during use. Moreover, it is possible to increase the amount of an aerosol source to be delivered and hence to provide a satisfactory flavor. The hole diameter (d1) of the first CH and the hole diameter (d2) of the second CH may be the same or different. Hereinafter, these points will be described.

1) Hole Diameter (d1) of First CH = Hole Diameter (d2) of Second CH (d2)

[0023] In this embodiment, the first CH and the second CH may be seamlessly integrated. In other words, the term "connected" in the present invention encompasses an embodiment in which the first CH and the second CH are seamlessly integrated. The integrated center hole filters may have almost double the length of the first CH or the second CH, for example. In this embodiment, it is possible to lower a vapor temperature and a surface temperature near the mouth end (also referred to as "tip temperature"). The reason is not limited but is presumably as follows. The flow channel of an aerosol abruptly narrows due to the CHs, and the aerosol collides with the cross-section of the CH at the upstream end.

On this occasion, part of the heat diffuses into the wall portion of CH (filter portion) to lower the vapor temperature as well as the tip temperature as a result.

2) Hole Diameter (d1) of First CH < Hole Diameter (d2) of Second CH

[0024] The first CH and the second CH are preferably different in hole diameter since the temperature near the mouth end can be lowered further during use. Fig. 1(1) illustrates the present embodiment. In this embodiment, it is possible to lower the tip temperature further. The reason is not limited but is presumably as follows. The flow channel of an aerosol abruptly narrows due to the CH, and the aerosol collides with the cross-section of the CH at the upstream end (S1 in Fig. 1(1)). On this occasion, part of the heat diffuses into the CH (filter portion) to lower the vapor temperature. Moreover, since the cross-section S1 at the upstream end is generally positioned upstream of the lips of a user, the temperature near the mouth end falls. Further, although a step also exists at the contact portion between the downstream end of the first CH 51 and the upstream end of the second CH 52, the heat does not diffuse in the circumferential direction since the aerosol does not collide with the cross-section S2 of the second CH 52 at the upstream end. Consequently, the temperature near the mouth end is lowered further.

[0025] A ratio of the small diameter to the large diameter is preferably 1:4 to 1:1.5 and more preferably 1:3 to 1:2. The preferable range of the hole diameter is as mentioned above.

3) Hole Diameter (d1) of First CH > Hole Diameter (d2) of Second CH

[0026] Fig. 1 (2) illustrates the present embodiment. In this embodiment, it is possible to lower a vapor temperature further. The reason is not limited but is presumably as follows. A vapor that has passed through the first CH 51 diffuses into the filter portion from the cross-section S2 of the second CH 52 at the end as well as from the inner surface of the second CH 52. In the present embodiment as just mentioned, the area for introducing into the filter portion is large, and heat is exchanged during diffusion within the filter portion. For these reasons, it is considered possible to lower a vapor temperature efficiently. Moreover, since an aerosol collides two times in total with the cross-sections S1 and S2 at the ends to diffuse the heat into the filter, the vapor temperature is lowered further. Meanwhile, since the heat also diffuses in the circumferential direction from the cross-section S2 at the end, the tip temperature slightly rises compared with the embodiment of 2). A ratio of the small diameter to the large diameter and the preferable diameter range in the present embodiment are as described in 2).

[0027] In any embodiment, at least either of the first CH and the second CH preferably has a hole diameter of less than 4.5 mm since a vapor temperature can be lowered.

[0028] In any embodiment, the first CH and the second CH preferably have the same length of about 9 to 16% relative to the entire length of the non-combustion heating-type flavor inhaler 10. In one embodiment, each length is about 5 to 9 mm

[0029] The first CH and the second CH each wrapped in a filter wrapper (filter inner wrapper) may be joined with a filter paper (filter outer wrapper). The diameter of the mouthpiece 5 is not limited but is preferably the same as the diameter of the cooling segment 3.

[0030] The first CH and the second CH preferably have a certain hardness. This is because the CHs are not readily deform and hence reduce the contact area with the lips of a user, thereby making the user feel less the uncomfortable temperature. A hardness in the present invention indicates the resistance of a member to deform as disclosed in paragraphs [0010] to [0014] of Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2016-523565. The hardness can be obtained from a change in diameter before and after applying a load on the side surface of a tobacco rod. Specifically, the hardness is measured as follows.

1) Each CH is mounted with its longitudinal direction horizontal on a substrate, and the height Ds is measured.

2) The CH is compressed by pressing the side surface using a pressing jig.
pressure: 300 g, pressing time: 10 seconds, head diameter of pressing jig: ϕ 12 mm

3) The height Dd of the CH after pressing is measured.

4) A hardness H (%) is calculated by the following formula.

$$H (\%) = Dd/Ds \times 100$$

[0031] The hardness of each CH is preferably 90% or more, more preferably 93% or more, and further preferably 95% or more. The upper limit is not limited but is about 99% or less or 98% or less.

[0032] The monofilament fineness of fibers that constitute each CH is preferably 5 to 12 (denier/filament) and more preferably 5 to 8 (denier/filament). Moreover, the total fineness of the fibers is preferably 30,000 to 60,000 (denier/total)

and more preferably 35,000 to 45,000 (denier/total). Such fibers have a cross-sectional shape of preferably R-shape or Y-shape and more preferably Y-shape in view of costs. Since the amount of an aerosol to be generated is less in a non-combustion heating-type flavor inhaler than in a common combustion-type flavor inhaler, it is preferable to reduce the loss of an aerosol in the CH. When the filling density of fibers is excessively low in the wall portion (thickness portion) of a CH, an aerosol is filtered in such a portion. For this reason, a CH preferably has a relatively high filling density of tow in the wall portion as long as high-speed production is possible. By setting the monofilament fineness and the total fineness within the above-mentioned numerical ranges, it is possible to obtain a CH that has a low filtration ratio and that is suitable for use. Moreover, to enhance the filter hardness, triacetin may be used as a plasticizer. The amount of triacetin to be added is preferably 10 to 20 weight% relative to the tow weight.

(4) Tipping Paper

[0033] A tipping paper 7 refers to a paper used for joining two or more of the tobacco rod 1, the cooling segment 3, and the mouthpiece 5. Meanwhile, a wrapper refers to a paper for wrapping around individual members that constitute the tobacco rod 1, the cooling segment 3, or the mouthpiece 5.

[0034] Exemplary base paper for tipping papers and wrappers includes, but is not limited to, paper formed using cellulose fibers. Such cellulose fibers may be either derived from plants or chemically synthesized, or may be a mixture thereof. Exemplary plant-derived fibers include pulp of flax fibers, wood fibers, or seed fibers, for example. Such pulp may be colored unbleached pulp. However, from a viewpoint of obtaining white clean appearance, it is preferable to use bleached pulp, which is prepared using a bleaching agent, such as an oxidant or a reductant.

[0035] For a typical paper wrapper for cigarettes, a citric acid alkali metal salt or the like is used as a common burning chemical (combustion aid, for example) that can affect the spontaneous combustion rate of the paper wrapper. Since the present invention is directed to a heating-type flavor inhaler, a wrapper need not contain a burning chemical. Moreover, different from common cigarettes, a tobacco filler of the present invention may contain an aerosol source as in the foregoing. In this case, it is preferable to use an oil- and water-resistant paper wrapper as a tipping paper.

[0036] The lower limit of the basis weight of a wrapper is preferably 30 g/m² or more, more preferably 35 g/m² or more, and further preferably 40 g/m² or more. The upper limit is preferably 65 g/m² or less and more preferably 50 g/m² or less. Meanwhile, the lower limit of the basis weight of a tipping paper is preferably 20 g/m² or more, more preferably 25 g/m² or more, and further preferably 30 g/m² or more. The upper limit is preferably 50 g/m² or less, more preferably 45 g/m² or less, and further preferably 40 g/m² or less. The basis weight can be measured by the method specified in JIS P 8124.

[0037] A non-combustion heating-type flavor inhaler of the present invention may include members excluding those described above unless the effects of the invention diminish. Exemplary such members include a supporting member and a filter segment, such as an acetate filter. These members may be disposed at any position but are preferably not disposed in the mouth end. Moreover, a non-combustion heating-type flavor inhaler of the present invention may include a carbon heat source on the upstream side of the tobacco rod, in other words, at the tip of the flavor inhaler. In this embodiment, the tobacco rod is heated by the carbon heat source. However, a non-combustion heating-type flavor inhaler of the present invention is particularly useful for a system in an electric heating mode in which a heating temperature is higher than in a heating mode with a carbon heat source.

4. Manufacturing Method

[0038] Although the manufacturing method is not limited, a non-combustion heating-type flavor inhaler of the present invention can be manufactured by: preparing a tobacco rod 1 and a mouthpiece 5; and wrapping a tipping paper 7 therearound such that a cooling segment 3 is formed between the tobacco rod 1 and the mouthpiece 5. Alternatively, a non-combustion heating-type flavor inhaler of the present invention can also be manufactured by: preparing a tobacco rod 1, a paper tube as a cooling segment 3, and a mouthpiece 5; and wrapping a tipping paper 7 around these three members.

5. Non-combustion Heating-type Flavor Inhaler System

[0039] A non-combustion heating-type flavor inhaler system of the present invention includes a non-combustion heating-type flavor inhaler 10 and a heater 30. Such a heater preferably heats a tobacco rod 1 electrically. The heater preferably includes a heating unit equipped with a power source and so forth. Fig. 2 illustrates an embodiment of the non-combustion heating-type flavor inhaler system of the present invention. In the figure, 100 is a non-combustion heating-type flavor inhaler system, 10 is a non-combustion heating-type flavor inhaler, and 30 is a heating unit equipped with a heater.

[0040] The shape of a heater is not limited, and a heater may be disposed around the tobacco rod 1 or may be inserted

into the tobacco rod 1. Such a heater may be a sheet heater, a plate heater, a tubular heater, or a needle heater, for example. A sheet heater is a flexible sheet-shape heater, and examples include a heater containing a film (thickness of about 20 to 225 μm) of a heat-resistant polymer, such as a polyimide. A plate heater is a rigid plate-shape heater (thickness of about 200 to 500 μm), and examples include a heater having a resistance circuit as a heat generator on a plate substrate. A tubular heater is a hollow or solid tubular heater, and examples include a heater having a resistance circuit as a heat generator on the outer surface. The cross-sectional shape of a tubular heater may be circular, elliptic, polygonal, rounded polygonal, or the like. A tubular heater and a needle heater are suitable for a heating mode from the inside after being inserted into the tobacco rod 1.

EXAMPLES

[Example 1]

[0041] The following members were prepared.

Tobacco rod of 7.1 mm in diameter and 20 mm in length (containing tobacco shreds as a flavor source and glycerol as an aerosol source, from Japan Tobacco Inc.)

First CH of 6.9 mm in diameter, 4.5 mm in hole diameter, and 8 mm in length (8Y-40000)

Second CH of 6.9 mm in diameter, 2.0 mm in hole diameter, and 8 mm in length (8Y-40000)

[0042] A non-combustion heating-type flavor inhaler was manufactured by disposing these members as illustrated in Fig. 1 (2) and wrapping a tipping paper of 24 mm $\times$ 40 mm therearound.

[0043] As a heating device for heating the non-combustion heating-type flavor inhaler, prepared was a heating unit including: a cylindrical heater of 22.5 mm in length and 7.2 mm in diameter; a battery for heating the heater; a control circuit for controlling the heater and the battery, and a housing for holding these members. A non-combustion heating-type flavor inhaler system was obtained by inserting the non-combustion heating-type flavor inhaler into the heater.

[0044] The temperature of the heater was raised to 230°C within 17 seconds, and the temperature was maintained for 23 seconds. Subsequently, a smoking test was performed using an automatic smoking machine (RM 26 from Borgwaldt KC GmbH). Specifically, the test was performed using an apparatus as illustrated in Fig. 3. In Fig. 3, 10 is a non-combustion heating-type flavor inhaler, 30 is a heating unit, 200 is an adaptor, and 300 is an automatic smoking machine. The adaptor 200 holds the non-combustion heating-type flavor inhaler 10 and is connected to the automatic smoking machine 300. K_1 is a thin film thermocouple fixed, by using a polyimide tape, to the surface of the non-combustion heating-type flavor inhaler 10 at a position 5 mm from the mouth end. K_2 is a wire thermocouple fixed to the adaptor 200. The surface temperature of the mouthpiece was measured by K_1 , and a smoke temperature was measured by K_2 . The suction volume was set to 35 mL/2 sec.

[0045] Moreover, the amount of glycerol as an aerosol source delivered and the amount of nicotine as an exemplary flavor component delivered were measured. The machine smoking method and the collecting method for a generated aerosol follow "Routine analytical machine for e-cigarette aerosol generation and collection - definitions and standard" in Coresta Recommended Method No.81. A Cambridge filter that had been disposed in the automatic smoking machine 300 to collect an aerosol was retrieved, and the amount of nicotine was measured by gas chromatography. A Cambridge filter is a flat circular glass fiber filter of about 44 mm in diameter and 1.5 mm in thickness and is well known to and commonly used by a person skilled in the art as a filter that can trap particulate matter. Such a Cambridge filter is available from Cambridge Filter Japan, Ltd. or Borgwaldt KC GmbH (catalogue No. 8020 285 2), for example. Nicotine, as a representative flavor component contained in particulate matter (total particle matter, hereinafter, referred to as "TPM") of a collected aerosol, was analyzed to determine the amount of nicotine in TPM. Nicotine was quantified by a conventional method among those skilled in the art. The result was shown in Table 1.

[Example 2]

[0046] A non-combustion heating-type flavor inhaler was manufactured and evaluated in the same manner as Example 1 except for using a CH of 6.9 mm in diameter, 1.5 mm in hole diameter, and 8 mm in length as a second CH.

[Examples 3 and 4]

[0047] Non-combustion heating-type flavor inhalers as illustrated in Fig. 1 (1) were manufactured by switching the positions of the first CH and the second CH in Examples 1 and 2, respectively, and evaluated in the same manner as Example 1.

[Example 5]

[0048] A CH having double the length of the first CH used in Example 1 was prepared. A non-combustion heating-type flavor inhaler was manufactured and evaluated in the same manner as Example 1 except for replacing the first CH and the second CH in Example 1 by the prepared double-length CH.

[Example 6]

[0049] A CH having double the length of the second CH used in Example 1 was prepared. A non-combustion heating-type flavor inhaler was manufactured and evaluated in the same manner as Example 1 except for replacing the first CH and the second CH in Example 1 by the prepared double-length CH.

[Example 7]

[0050] A CH having double the length of the second CH used in Example 2 was prepared. A non-combustion heating-type flavor inhaler was manufactured and evaluated in the same manner as Example 1 except for replacing the first CH and the second CH in Example 2 by the prepared double-length CH.

[Comparative Example 1]

[0051] An acetate filter of 6.9 mm in diameter and 7 mm in length (5Y-30000) was prepared. A non-combustion heating-type flavor inhaler system was prepared and evaluated in the same manner as Example 1 except for replacing the second CH by the acetate filter (AF).

[0052] These results are shown in Table 1. Moreover, the results of the hardness (the number of samples: 50) measured for each CH by the method described herein were summarized in Table 2.

[Table 1]

		First CH	Second CH (mouth side)	Nicotine	Glycerol	Tip temperature	Vapor temperature
				[mg/cig.]	[mg/cig.]	[°C]	[°C]
Ex.	1	Ø4.5	Ø2.0	0.8	3.5	41.2	55.6
	2	Ø4.5	Ø1.5	0.7	3.4	46.5	53.4
	3	Ø2.0	Ø4.5	0.8	3.8	36.9	60.7
	4	Ø1.5	Ø4.5	0.7	3.2	39.8	55.3
	5	Ø4.5		-		34.8	65.4
	6	Ø2.0		-		34.6	61.7
	7	Ø1.5		-		41.7	60.7
Comp. Ex.	1	Ø4.5	AF	0.3	1.6	48	65

[Table 2]

Hardness	CH 1.0 mm	CH 1.5 mm	CH 2.0 mm	CH 4.5 mm
Average (%)	95.493	95.456	94.967	95.02
Standard deviation	1.2335	1.1317	1.0185	0.653

[0053] From the comparison between the Examples and Comparative Example 1, it is evident that disposing a CH on the mouth side, compared with a case of disposing an AF, can increase the amount of glycerol delivered and hence provide sufficient flavor as well as lower the tip temperature. In particular, it is evident that disposing a CH having a hole diameter of less than 4.5 mm can lower the vapor temperature as well. A larger CH diameter is advantageous to lowering in tip temperature, whereas a smaller CH diameter is advantageous to lowering in vapor temperature. Further, it is also evident that using CHs different in hole diameter can further lower the temperature in the mouth end. Consequently, a user can comfortably use the non-combustion heating-type flavor inhaler system of the present invention.

REFERENCE SIGNS LIST

[0054]

- 5 1 Tobacco rod
 3 Cooling segment
 5 Mouthpiece
- 51 First center hole filter
 10 52 Second center hole filter
- 7 Tipping paper
 V Ventilation holes
- 15 10 Non-combustion heating-type flavor inhaler
 30 Heating unit equipped with heater
 100 Non-combustion heating-type flavor inhaler system
- 200 Adaptor
 20 300 Automatic smoking machine
 K₁ Thin film thermocouple
 K₂ Wire thermocouple

25 **Claims**

1. A non-combustion heating-type flavor inhaler comprising a tobacco rod, a cooling segment, and a mouthpiece, wherein the mouthpiece includes connected two center hole filters.
- 30 2. The flavor inhaler according to Claim 1, wherein the two center hole filters are different in hole diameter.
3. The flavor inhaler according to Claim 2, having $d_1 > d_2$ wherein d_1 is a hole diameter of a first center hole filter present on the tobacco rod side and d_2 is a hole diameter of a second center hole filter present on the mouth end side.
- 35 4. The flavor inhaler according to Claim 2, having $d_1 < d_2$ wherein d_1 is a hole diameter of a first center hole filter present on the tobacco rod side and d_2 is a hole diameter of a second center hole filter present on the mouth end side.
5. The flavor inhaler according to any of Claims 1 to 4, wherein the center hole filters have a hole cross-sectional area of 0.7 to 20 mm².
- 40 6. The flavor inhaler according to any of Claims 2 to 5, wherein a ratio of the small hole diameter to the large hole diameter is 1:4 to 1:1.5.
7. The flavor inhaler according to any of Claims 1 to 6, wherein the center hole filters have a hole diameter of 1.0 to 5.0 mm.
- 45 8. The flavor inhaler according to any of Claims 1 to 7, wherein the center hole filters have a hardness of 90% or more as measured by the following method.
- Measurement Method
- 50 1) Each center hole filter is mounted with its longitudinal direction horizontal on a substrate, and the height D_s is measured.
- 2) The center hole filter is compressed by pressing the side surface using a pressing jig.
 pressure: 300 g, pressing time: 10 seconds, head diameter of pressing jig: $\phi 12$ mm
- 55 3) The height D_d of the center hole filter after pressing is measured.
- 4) A hardness H (%) is calculated by the following formula.

$$H (\%) = Dd/Ds \times 100$$

5 **9.** The flavor inhaler according to Claim 8, wherein the hardness is 95% or more.

10. The flavor inhaler according to any of Claims 1 to 9, wherein the center hole filters have a thickness of 1 to 3 mm

11. The flavor inhaler according to any of Claims 1 to 10, having a diameter of 6 to 8 mm

10 **12.** The flavor inhaler according to any of Claims 1 to 10, wherein the center hole filters have a monofilament fineness of 5 to 12 (denier/filament).

13. The flavor inhaler according to Claim 12, wherein the center hole filters have a monofilament fineness of 5 to 8 (denier/filament).

15 **14.** The flavor inhaler according to any of Claims 1 to 13, wherein the center hole filters have a total fineness of 30,000 to 60,000 (denier/total).

20 **15.** The flavor inhaler according to Claim 14, wherein the center hole filters have a total fineness of 35,000 to 45,000 (denier/total).

Fig. 1

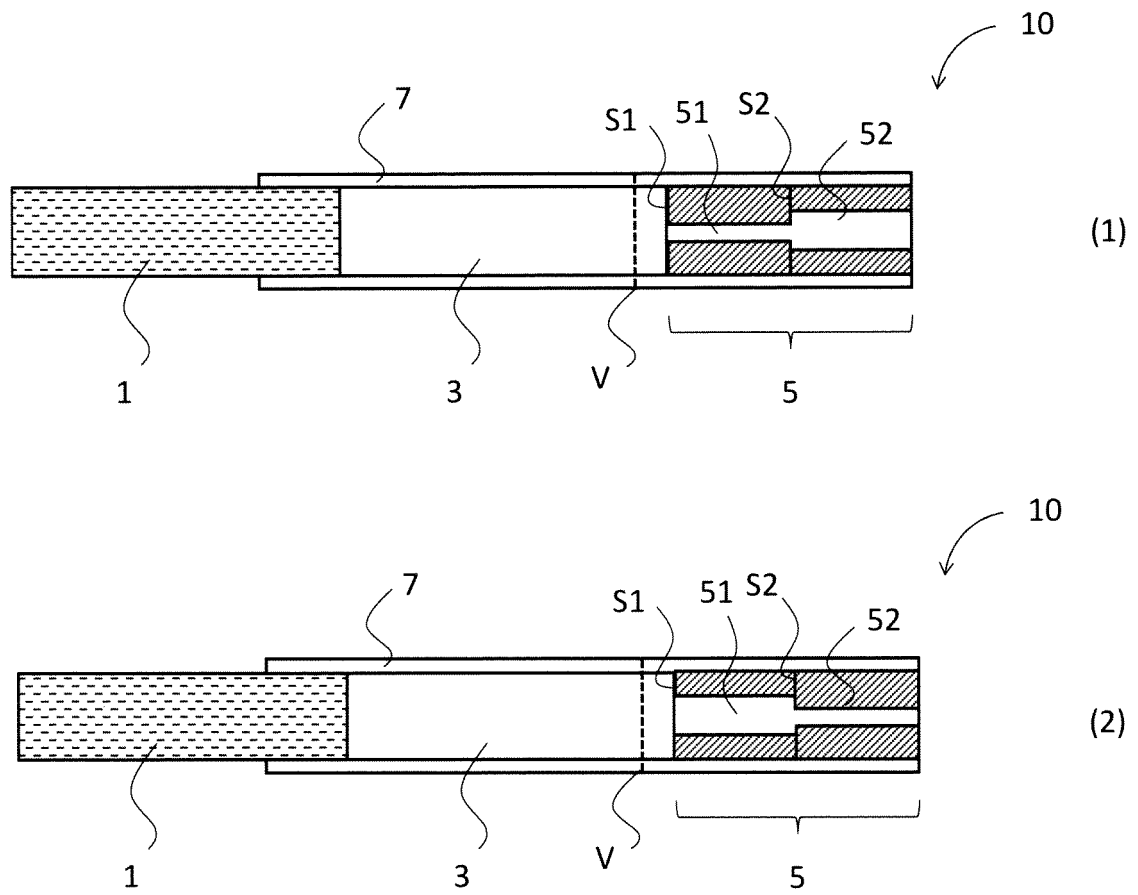


Fig. 2

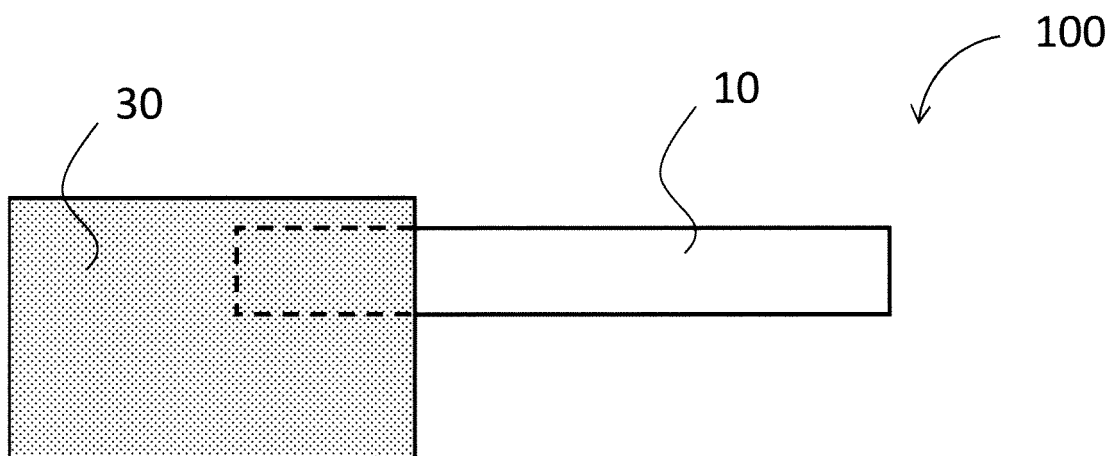
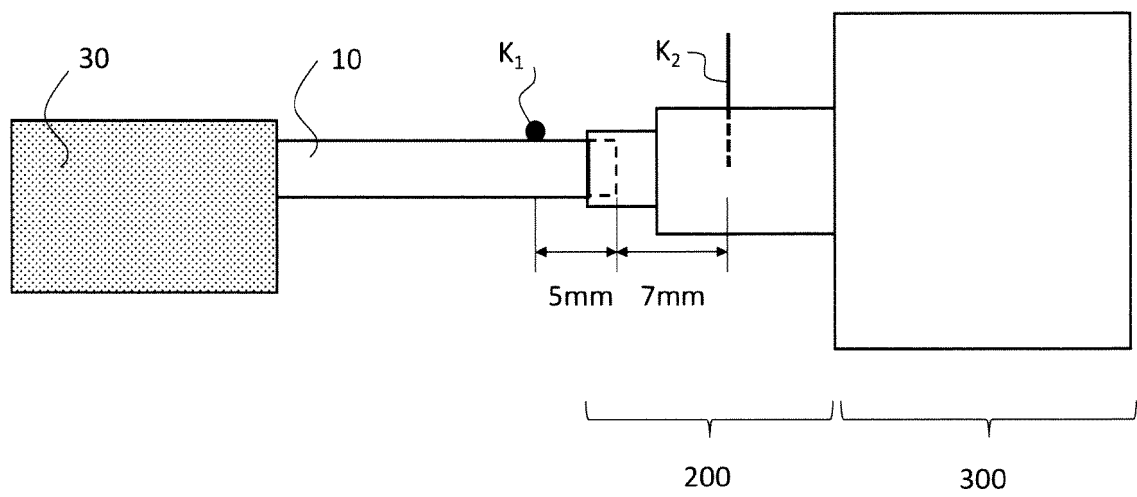


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/040029

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. A24F47/00 (2006.01) i, A24D3/04 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. A24F47/00, A24D3/04

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 1971-2019

Registered utility model specifications of Japan 1996-2019

Published registered utility model applications of Japan 1994-2019

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 2016-195585 A (PT. GUDANG GARAM TBK) 24 November 2016, paragraphs [0093], [0125]-[0127], fig. 1 & EP 3075266 A1, paragraphs [0089], [0120]-[0122], fig. 1 & EP 3075268 A1 & EP 3075269 A2 & EP 3075272 A2 & EP 3075266 A1 & CN 106036983 A	1-15



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search
10 December 2019 (10.12.2019)Date of mailing of the international search report
17 December 2019 (17.12.2019)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/040029

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2016/021021 A1 (JAPAN TOBACCO INC.) 11 February 2016, claim 1, paragraphs [0002]-[0008], [0021]-[0027], [0045]-[0047], [0054], fig. 1-2, 9 & EP 3178333 A1, paragraphs [0002]-[0008], [0021]-[0027], [0045]-[0047], [0054], fig. 1-2, 9 & TW 201605360 A & CN 106572698 A & KR 10-2017-0041797 A	1-15
Y	JP 2015-523857 A (PHILIP MORRIS PRODUCTS S.A.) 20 August 2015, paragraphs [0059], [0108]-[0109], fig. 3 & US 2015/0107611 A1, paragraphs [0058], [0109]-[0110], fig. 3 & WO 2013/178769 A1 & EP 2854577 A1 & CN 104411192 A & KR 10-2015-0027069 A	11-15
Y	JP 2017-135984 A (JAPAN TOBACCO INC.) 10 August 2017, paragraph [0026] & WO 2015/190256 A1 & TW 201601644 A	12-15
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A	JP 2013-510571 A (R.J. REYNOLDS TOBACCO COMPANY) 28 March 2013, paragraphs [0040]-[0041], fig. 5A-5B & US 2011/0108044 A1, paragraphs [0044]-[0045], fig. 5A-5B & WO 2011/060008 A1 & EP 2498630 A1 & CN 102665457 A	1-15

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REFERENCES CITED IN THE DESCRIPTION

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