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(54) **FLAVOR COMPONENT-CARRYING MEMBER AND TOBACCO PRODUCT**

(57) A flavor component-carrying member which is obtained by applying a flavor component composition to a base member, the flavor component composition containing a flavor component and a polysaccharide selected from the group consisting of carrageenan, gellan gum, and a combination of gellan gum and tamarind gum, wherein the flavor component-carrying member is a tobacco constituent member which is disposed at a position

such that when the whole of the flavor component-carrying member or the flavor component composition part of the flavor component-carrying member is incorporated into a tobacco product, the whole of the flavor component-carrying member or the flavor component composition part of the flavor component-carrying member is in contact with saliva in oral cavity of a user, or with mouth or oral cavity of the user.

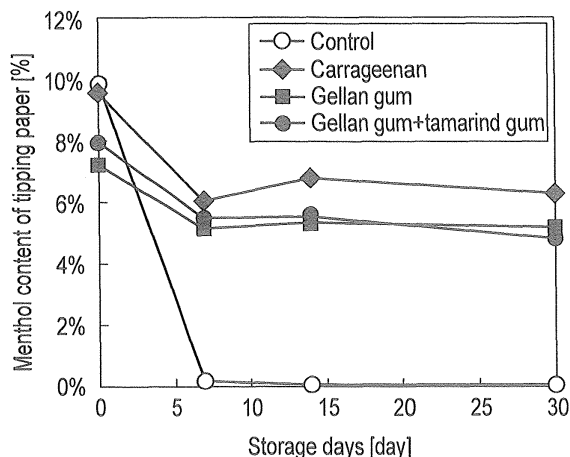


FIG. 1

Description

Technical Field

5 **[0001]** The present invention relates to a flavor component-carrying member to directly exert an effect of a flavor component on a mouth or oral cavity, and a tobacco product produced using the same.

Background Art

10 **[0002]** It has been widely recognized that a flavor component such as menthol gives a refreshing feeling, when its effect is exerted directly on a mouth.

[0003] Patent Document 1 reports that in order to directly exert an effect of a flavor component on a mouth when smoking a cigarette, the flavor component is added to a tipping paper. Patent Document 2 reports that in an oral tobacco product which is directly put in a mouth to use it, a flavor component is blended in a pouch together with a tobacco component. Patent Document 3 reports that a flavor component is encapsulated, and the capsule is blended in an oral tobacco product.

[0004] The volatile flavor component such as menthol, however, has a problem that the flavor component is dissipated during long-term storage and the effect of the flavor component does not last. For example, in cigarettes, if menthol is applied to a tipping paper, which is directly brought into contact with the mouth of a smoker, almost all of the menthol component is dissipated during the storage period before the cigarette is smoked, and thus it cannot be expected to maintain the refreshing feeling effect. It is also recognized that the concentration of the menthol component applied to the tipping paper becomes high in a pack during the storage period before the cigarette is smoked, owing to the volatilization thereof, and this affects cut tobacco to cause a harmful effect of generating spots on a cigarette paper. Similarly in an oral tobacco product such as snuff or chewing tobacco, which is directly put in a mouth to use it, if the menthol component is directly applied to the cut tobacco or pouch, the menthol component is dissipated during the storage period of the product, because of the same phenomenon as above, and thus it cannot be expected to maintain the refreshing feeling effect.

Prior Art Document

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Patent Document

[0005]

35 Patent Document 1: Jpn. Pat. Appln. Kokai Publication No. 2009-148233
 Patent Document 2: U.S. Patent No. 5,387,416
 Patent Document 3: Jpn. PCT National Publication No. 2009-508523

Summary of Invention

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Technical Problem

[0006] In view of the background art described above, the present invention aims at providing a flavor component-carrying member having high flavor component stability, whereby a flavor component effect can be stably provided to users even if the product is used after long-term storage.

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Solution to Problem

[0007] The present inventors have found that, when a slurry containing a specific polysaccharide and a flavor component is applied to a base member (preferably a surface thereof) such as a tipping paper or a substrate for a flavor filler of oral tobacco product, a high flavor component stability can be obtained, thus completing the present invention.

[0008] According to a first aspect of the present invention, there is provided a flavor component-carrying member which is obtained by applying a flavor component composition to a base member, the flavor component composition containing a flavor component and a polysaccharide selected from the group consisting of carrageenan, gellan gum, and a combination of gellan gum and tamarind gum, wherein the flavor component-carrying member is a tobacco constituent member which is disposed at a position such that when the whole of the flavor component-carrying member or the flavor component composition part of the flavor component-carrying member is incorporated into a tobacco product, the whole of the flavor component-carrying member

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or the flavor component composition part of the flavor component-carrying member is in contact with saliva in oral cavity of a user, or with mouth or oral cavity of the user.

[0009] According to a specific embodiment, the base member is a tipping paper of a cigarette. According to another specific embodiment, the base member is a substrate for preparing a flavor filler of an oral tobacco product, or a tobacco filler or a pouch of the oral tobacco product.

[0010] According to a second aspect of the present invention, there is provide a tobacco product which comprises the whole of a flavor component-carrying member of the present invention, or a flavor component composition part of the flavor component-carrying member of the present invention.

Effects of Invention

[0011] The flavor component-carrying member of the present invention has a high flavor-retaining property after storage, and thus the tobacco product produced using the same can stably provide the effect of the flavor component to users even if they use the products which are stored for a long period of time.

Brief Description of Drawings

[0012]

FIG. 1 is a graph showing a post-storage flavor-retaining property of menthol in a tipping paper whose surface is applied with a menthol-containing composition.

FIG. 2 is a graph showing a releasing property of menthol in a tipping paper whose surface is applied with a menthol-containing composition.

FIG. 3 is a graph showing a post-storage flavor-retaining property of menthol in a flavor filler prepared using a menthol-containing composition.

FIG. 4 is a graph showing a releasing property of menthol in a flavor filler prepared using a menthol-containing composition.

FIG. 5A is a graph showing a change in a viscosity followed by a fall in temperature of a carrageenan-containing liquid.

FIG. 5B is a graph showing a change in a viscosity followed by a rise in temperature of the carrageenan-containing liquid.

FIG. 6A is a graph showing a change in a viscosity followed by a fall in temperature of a gellan gum-containing liquid.

FIG. 6B is a graph showing a change in a viscosity followed by a rise in temperature of the gellan gum-containing liquid.

FIG. 7A is a graph showing a change in a viscosity followed by a fall in temperature of a liquid containing gellan gum and tamarind gum.

FIG. 7B is a graph showing a change in a viscosity followed by a rise in temperature of the liquid containing gellan gum and tamarind gum.

Description of Embodiments

[0013] The present invention will be explained below. The following explanations are intended to describe the present invention in detail, and are not intended to limit the present invention.

[0014] The flavor component-carrying member of the present invention is obtained by applying a flavor component composition to its surface, the flavor component composition containing a flavor component and a polysaccharide selected from the group consisting of carrageenan, gellan gum, and a combination of gellan gum and tamarind gum.

[0015] A flavor component used in the present invention is not limited so long as it is a flavor component used in tobacco articles such as a cigarette or an oral tobacco product. Any type of flavor component can be used. Examples of the flavor component mainly include menthol; leaf tobacco extract; natural plant flavors (for example, cinnamon, sage, herb, chamomile, kudzu (Puerarialobata), sweet hydrangea leaf, clove, lavender, cardamom, caryophyllus, nutmeg, bergamot, geranium, honey essence, rose oil, lemon, orange, cassia bark, caraway, jasmine, ginger, coriander, vanilla extract, spearmint, peppermint, cassia, coffee, celery, cascarilla, sandalwood, cocoa, ylang-ylang, fennel, anise, licorice, St. John's bread, prune extract, and peach extract) ; saccharides (for example, glucose, fructose, isomerized saccharide, caramel, honey, and molasses); cocoas (for example, powder and extract); esters (for example, isoamyl acetate, linalyl acetate, isoamyl propionate, and linalyl butyrate); ketones (for example, menthon, ionone, damascenone, and ethyl maltol); alcohols (for example, geraniol, linalool, anethole, and eugenol); aldehydes (for example, vanillin, benzaldehyde, and anisaldehyde); lactones (for example, γ -undecalactone and γ -nonalactone); animal flavors (for example, musk, ambergris, civet, and castoreum) ; and hydrocarbons (for example, limonene and pinene). A flavor component which is easily dispersed in a solvent by addition of an emulsifier, such as a hydrophobic flavor component and oil-soluble flavor component, can be preferably used. Such a flavor component may be used alone or in combination.

[0016] Hereinafter, the present invention will be explained with an example where menthol is used as a flavor component.

1. Menthol-Containing Composition

[0017] In one embodiment, a flavor component-carrying member of the present invention is obtained by applying a composition containing menthol and a polysaccharide selected from the group consisting of carrageenan, gellan gum, and a combination of gellan gum and tamarind gum (hereinafter referred to as a "menthol-containing composition") to a base member. The flavor component-carrying member of the present invention is preferably obtained by applying the composition to a surface of the base member.

[0018] The menthol-containing composition used in the present invention is in the state of a slurry having fluidity at a heating temperature (for example, 60 to 90°C) before it is dried.

[0019] The composition of the menthol-containing composition (slurry) can be as follows: for example, 200 to 500 grams of the polysaccharide, 1000 to 2500 grams of menthol, and 80 to 200 ml of a 2 to 10% by weight emulsifier solution, per 10 liters of water. The menthol-containing composition has typically a water content of 70 to 95% by weight, preferably 80 to 90% by weight. In the menthol-containing composition, a ratio (weight ratio) of the polysaccharide to menthol can be from 1: 1 to 1:10.

[0020] In the present invention, the polysaccharide has a property such that it is capable of fixing micelles of a flavor component such as menthol to coat the flavor component with it, by causing gelation of the aqueous polysaccharide solution by cooling. As the polysaccharide having the property, a polysaccharide selected from the group consisting of carrageenan, gellan gum, and a combination of gellan gum and tamarind gum can be used. In the present invention, when carrageenan is used as the polysaccharide, another polysaccharide such as gellan gum or the tamarind gum may be included in the menthol-containing composition in an amount smaller than that of the carrageenan. Similarly, when gellan gum is used as the polysaccharide, another polysaccharide such as carrageenan may be included in the menthol-containing composition in an amount smaller than that of the gellan gum.

[0021] In the present invention, l-menthol can be used as menthol.

[0022] In the present invention, a naturally derived emulsifier such as lecithin, specifically Sun Lecithin A-1 (Taiyo Kagaku Co., Ltd.), can be used as the emulsifier.

[0023] In the present invention, the menthol-containing composition (slurry) can be prepared by a method comprising: a step (i) of mixing the polysaccharide with water and heating the mixture to prepare an aqueous solution of the polysaccharide; and a step (ii) of adding menthol and the emulsifier to the aqueous solution, and kneading and emulsifying the mixture.

[0024] The step (i) can be specifically performed by adding the polysaccharide to water little by little while being stirred, thereby dissolving the polysaccharide. The heating temperature in this step can be from 60 to 90°C, preferably from 75 to 85°C. The step (ii) can be performed by a known emulsification technique using a homogenizer, because the menthol-containing composition (slurry) has a viscosity of about 10,000 mPas or less (a sol state) at the above heating temperature, by which the emulsification is not inhibited.

2. Application of Menthol-Containing Composition to Base Member

[0025] In the present invention, the menthol-containing composition is applied to the base member, whereby the flavor component-carrying member of the present invention is prepared. The menthol-containing composition is preferably applied to a surface of the base member.

[0026] Specifically, the flavor component-carrying member of the present invention is a tobacco constituent member which is disposed at a position such that when the whole of the flavor component-carrying member is incorporated into a tobacco product, the whole of the flavor component-carrying member can directly exert an effect of the flavor component composition on a mouth or oral cavity of a user. Alternatively, the flavor component-carrying member of the present invention is a tobacco constituent member which is disposed at a position such that when the flavor component composition part of the flavor component-carrying member (specifically, a dry formed film of the flavor component composition) is incorporated into a tobacco product, the flavor component composition part of the flavor component-carrying member can directly exert an effect of the flavor component composition on a mouth or oral cavity of a user.

[0027] In other words, the flavor component-carrying member of the present invention is a tobacco constituent member which is disposed at a position such that when the whole of the flavor component-carrying member is incorporated into a tobacco product, the whole of the flavor component-carrying member is in contact with saliva in the oral cavity of a user, or with the mouth or oral cavity of the user. Alternatively, the flavor component-carrying member of the present invention is a tobacco constituent member which is disposed at a position such that when the flavor component composition part of the flavor component-carrying member (specifically, a dry formed film of the flavor component composition) is incorporated into a tobacco product, the flavor component composition part of the flavor component-carrying member

is in contact with saliva in the oral cavity of a user, or with the mouth or oral cavity of the user.

[0028] For example, when the tobacco product is a cigarette, the base member can be a tipping paper. When the tobacco product is an oral tobacco product such as snuff or chewing tobacco, the base member can be a substrate for preparing a flavor filler, a tobacco filler, or a pouch wrapping the various fillers. The substrate for preparing the flavor filler is a known substrate which is typically used for preparing the flavor filler filled in the oral tobacco product, and include, for example, a polyethylene terephthalate (PET) film.

[0029] In the present specification, the "flavor filler" refers to a formed product of the flavor component included in the pouch of the oral tobacco product. Especially, the "flavor filler" refers to a flavor component composition part obtained by detaching the substrate from the flavor component-carrying member of the present invention which is obtained by applying the flavor component composition to the substrate. The "tobacco filler" refers to a tobacco material such as cut tobacco or tobacco fine powder included in the pouch of the oral tobacco product. The "filler" refers to any material included in the pouch of the oral tobacco product.

[0030] A method of applying the menthol-containing composition to the base member is not particularly limited so long as the menthol-containing composition can be uniformly applied to the base member. The menthol-containing composition (slurry) may be added to or coated on the surface of the base member, the menthol-containing composition (slurry) may be sprayed on the surface of the base member, or the base member may be immersed in the menthol-containing composition (slurry).

[0031] When the menthol-containing composition slurry (in the state of a sol at about 60 to 80°C) is applied to a tipping paper, the menthol-containing composition (slurry) can be added by extrusion onto the tipping paper using a slit feeder, or the composition can be coated on the tipping paper using a film applicator. Alternatively, the application of the menthol-containing composition (slurry) to the tipping paper may be performed by immersing the tipping paper in the menthol-containing composition slurry, or spraying the menthol-containing composition slurry on the tipping paper using a nozzle spray.

[0032] When the menthol-containing composition slurry (in the state of a sol at about 60 to 80°C) is applied to the pouch for the oral tobacco product, the menthol-containing composition (slurry) can be added by extrusion to the surface of the pouch using a slit feeder, or the composition can be coated on the surface of the pouch using a film applicator. Alternatively, the spraying or immersing can be performed according to the same manner as used in the application to the tipping paper.

[0033] When the menthol-containing composition slurry (in the state of a sol at about 60 to 80°C) is applied to the substrate for the flavor filler of the oral tobacco product, the menthol-containing composition (slurry) can be added by extrusion onto the substrate using a slit feeder, or the composition can be coated on the substrate using a film applicator. Alternatively, the spraying or immersing can be performed according to the same manner as used in the application to the tipping paper.

[0034] When the menthol-containing composition slurry (in the state of a sol at about 60 to 80°C) is applied to the tobacco filler for the oral tobacco product, the menthol-containing composition (slurry) can be added directly to the surface of the tobacco filler using a transfer pump, or the composition can be sprayed on the tobacco filler using a nozzle spray. Alternatively, the application of the menthol-containing composition (slurry) to the tobacco filler may be performed by immersing the tobacco filler in the menthol-containing composition slurry.

[0035] In a case of the tipping paper, the menthol-containing composition (slurry) can be applied in an amount of 15 to 40 parts by weight, based on 100 parts by weight of the tipping paper, preferably 20 to 30 parts by weight. In a case of the substrate for the flavor filler of the oral tobacco product, the menthol-containing composition (slurry) can be applied so that the thickness thereof is from 1.0 mm to several mm on the substrate. In a case of the tobacco filler, the menthol-containing composition (slurry) can be applied in an amount of 5 to 40 parts by weight, based on 100 parts by weight of the tobacco filler, preferably 15 to 25 parts by weight.

[0036] Before drying the base member to which the menthol-containing composition slurry has been applied, it is preferable to once cool the base member so that the slurry becomes a temperature enabling sufficient gelation of the slurry (40°C or lower) and avoiding breaking of emulsion due to freezing (0°C or higher). Specifically, it is preferable to once cool the base member so that the slurry becomes a temperature of 0 to 40°C, preferably 0 to 30°C, and more preferably 15 to 25°C. Here, the menthol-containing composition slurry, before it is cooled, has a temperature of 60 to 90°C, preferably 75 to 85°C, and is in the state of a sol. Such preliminary cooling can be performed by blowing air or applying cold air (for example, 10°C) generated in a spot cooler (for example, Suiden SS-25DD-1) to the base member (to which the menthol-containing composition slurry has been applied) for 2 to 3 minutes. Alternatively, the preliminary cooling may be performed by bringing the base member (to which the menthol-containing composition slurry has been applied) into contact with a tube through which a cooling medium (for example, 10°C) generated in a cold or warm water generator (a chiller, for example, PCU-1600R, Apiste Corporation) is passed, for 1 to 2 minutes. Alternatively, the preliminary cooling may be performed by allowing the base member (to which the menthol-containing composition slurry has been applied) to stand at room temperature.

[0037] Once the aqueous solution of polysaccharide used in the present invention is cooled to cause gelation, the

obtained gel has a property of being capable of maintaining the gel state without easily returning to a sol state even if the temperature is raised afterward to reach the gel transition temperature (see Examples described below). Utilizing the property described above, the menthol-containing composition slurry is preliminarily cooled before it is dried. As a result, the polysaccharide contained in the menthol-containing composition (which has been preliminarily cooled but has not been dried yet) is hard to solate even if the temperature is raised at the time of drying, and the menthol coated with the polysaccharide is particularly difficult to volatilize. Therefore, in the present invention, owing to the preliminary cooling, it is possible to expose the menthol-containing composition to heat in the subsequent drying step, whereby a short time drying can be realized.

[0038] The base member (to which the menthol-containing composition has been applied) can be heat-dried by any type of heat-drying method such as hot air drying or infrared heat drying.

[0039] The menthol-containing composition which has been applied to the surface of the base member can be dried so that a sample temperature is kept at 100°C or lower, preferably 70 to 100°C in the entire drying step. In order to keep the sample temperature at 100°C or lower, a drying temperature of 100°C to 130°C is preferably employed. In order to keep the sample temperature at 70 to 100°C, a drying temperature of 100°C to 130°C is preferably employed. Here, the "sample temperature" refers to a surface temperature of the menthol-containing composition in the drying step, and the "drying temperature" refers to a temperature in the dryer. The temperature in the dryer is equal to the hot air temperature, in a case of the hot air drying.

[0040] Preferably, the drying includes drying at a drying temperature of 100°C or higher (preferably from 100°C to 130°C) for one fourth or more of the total drying time. The drying can be performed for 20 minutes or less of the total drying time until the water content of the flavor component-carrying member reaches less than 10%. Preferably, the drying at a drying temperature of 100°C or higher is performed in the initial drying stage, and after that the drying at a drying temperature equal to or less than the initial drying temperature (preferably 70°C or higher and less than 100°C) is performed.

[0041] The drying temperature is set so that the sample temperature is kept at 100°C or lower at all times in the entire drying step, and the drying temperature may be constant over the entire drying step or may be varied during the drying step. When the drying temperature is varied, the drying is preferably performed by an initial drying at a high drying temperature of 100°C or higher and a subsequent latter drying at a low drying temperature of lower than 100°C. In the present specification, the "initial drying" refers to a drying using a high temperature of 100°C or higher in the first stage of the drying step, and the "latter drying" refers to a drying subsequent to the initial drying, using a low temperature of lower than 100°C. When the initial drying at a high temperature is performed in combination with the latter drying at a low temperature, the sample temperature does not become too high, the sample temperature is kept at 100°C or lower at all times in the entire drying step, and the drying time can be advantageously shortened.

[0042] More preferably, the drying can be performed by the initial drying at a drying temperature of 100°C or higher for one fourth or more of the total drying time; and then the latter drying at a drying temperature of lower than 100°C for one fourth or more of the total drying time. The drying can be performed for 20 minutes or less of the total drying time until the water content of the flavor component-carrying member reaches a predetermined value (specifically, until the water content reaches about 10% by weight or less in the case of the flavor component-carrying member obtained by applying the menthol-containing composition to a tipping paper, and until the water content of the film itself reaches lower than 10% by weight in the case of the dry formed film of the menthol-containing composition which is used as a filler of an oral tobacco product).

[0043] As described above, when the initial drying at a high temperature is performed in combination with the latter drying at a low temperature, the flavor component-carrying member of the present invention has a particularly high menthol content after the preparation, and can keep the menthol content at a particularly high level even after the storage.

[0044] When the hot air drying is performed, the initial drying can be performed, for example, at a hot air temperature of 100°C or higher and 130°C or lower for 4 to 6 minutes, and the latter drying can be performed, for example, at a hot air temperature of 70°C or higher and less than 100°C for 4 to 6 minutes. The air flow can be set, for example, at 3 to 20 m/second. The total drying time is 20 minutes or less, preferably from 10 to 18 minutes.

[0045] The conditions (temperature, time, and air flow) in the initial drying and the latter drying can be appropriately set, for example, within the above range.

[0046] The drying temperature in the initial drying may be constant or may be varied so that the temperature is sequentially dropped between 100°C and 130°C. The drying temperature in the latter drying may also be constant, or may be varied so that the temperature is sequentially dropped between 70°C and less than 100°C. For example, a dryer used in the Examples described below has three drying chambers, and a sample is conveyed in the order of the first, second, and third chambers by a belt conveyor. Thus, the first and second chambers may be used for the initial drying at the same or different temperatures (100°C or higher) and the third chamber may be used for the latter drying (lower than 100°C). Alternatively, the first chamber may be used for the initial drying (100°C or higher) and the second and third chambers may be used for the latter drying at the same or different temperatures (lower than 100°C).

[0047] The drying is performed preferably until the water content of the flavor component-carrying member reaches

a predetermined value (specifically, until the water content reaches about 10% by weight or less in the case of the flavor component-carrying member obtained by applying the menthol-containing composition to a tipping paper, and until the water content of the film itself reaches lower than 10% by weight in the case of the dry formed film of the menthol-containing composition which is used as a filler of an oral tobacco product). The water content herein refers to a value

obtained by a measurement method described in the Examples below.

[0048] The whole of the flavor component-carrying member of the present invention may be used as a tobacco constituent member, or only the flavor component composition part, which is obtained by detaching the base member from the flavor component-carrying member, may be used as a tobacco constituent member.

3. Tobacco Product

[0049] The present invention provides a tobacco product comprising the flavor component-carrying member of the present invention. The tobacco product of the present invention has the same structure as that of an ordinary tobacco product except that the flavor component-carrying member of the present invention is used instead of a constituent member of the ordinary tobacco product.

[0050] Alternatively, the present invention provides a tobacco product comprising, as a flavor filler, the flavor component composition part of the flavor component-carrying member of the present invention (specifically, cut pieces of dry formed film of the flavor component composition). The tobacco product of the present invention has the same structure as that of an ordinary tobacco product except that the flavor component composition part of the flavor component-carrying member of the present invention is used instead of a part of a filler of the ordinary tobacco product.

[0051] In a specific embodiment, the tobacco product of the present invention is, for example, a cigarette comprising the tipping paper of the present invention to which the flavor component composition has been applied. In a specific embodiment, the tobacco product of the present invention is also, for example, an oral tobacco product comprising small pieces of the flavor component composition part in a pouch as a flavor filler, where the flavor component composition part is obtained by detaching the substrate from the flavor component-carrying member of the present invention which is obtained by applying the flavor component composition to the substrate. In a specific embodiment, the tobacco product of the present invention is also an oral tobacco product comprising a pouch of the present invention to which the flavor component composition has been applied. In a specific embodiment, the tobacco product of the present invention is also an oral tobacco product comprising, in a pouch, a tobacco filler (cut tobacco, tobacco fine powder, or the like) of the present invention to which the flavor component composition has been applied. The oral tobacco product refers to a product which is inserted into the oral cavity to enjoy a taste and flavor derived from cut tobacco, and may include, for example, snus and moist snuff.

[0052] It is possible to blend the flavor filler derived from the flavor component-carrying member of the present invention, which is obtained by applying the flavor component composition to the substrate, in a content of 5 to 30% by weight of the entire filler, when the entire filler included in one oral tobacco product is defined as 100% by weight. Specifically, in the oral tobacco product, the pouch has usually a weight of 0.3 to 1.0 g, and it is possible to blend the flavor component composition part (specifically, cut pieces of the dry formed film) derived from the flavor component-carrying member of the present invention in an amount of 0.05 to 0.2 g per pouch. If the amount described above is expressed based on 100 parts by weight of the entire pouch, it is possible to blend it in an amount of 5 to 30 parts by weight, preferably 8 to 20 parts by weight.

[0053] It is possible to blend the flavor component-carrying member of the present invention, which is obtained by applying the flavor component composition to the tobacco filler (cut tobacco, tobacco fine powder, or the like), in a content of 1 to 30% by weight of the entire filler, when the entire filler included in one oral tobacco product is defined as 100% by weight.

Examples

[0054] The present invention will be explained by means of the Examples below.

[1] Preparation of Menthol-Containing Compositions (Slurry) 1 to 3

[0055]

Composition of Menthol-Containing Composition (Slurry) 1 (Carrageenan was used as a polysaccharide.)

Water 10 liters

Carrageenan (CS-530/San-Ei Gen F.F.I., Inc.) 500 grams

Lecithin (Sun Lecithin A-1/Taiyo Kagaku Co., Ltd.) 200 milliliters (5% aqueous solution)

Menthol (Takasago International Corporation) 2500 grams

Composition of Menthol-Containing Composition (Slurry) 2 (Gellan gum was used as a polysaccharide.)

Water 10 liters

Gellan Gum (KELCOGEL/San-Ei Gen F.F.I., Inc.) 300 grams

Lecithin (Sun Lecithin A-1/Taiyo Kagaku Co., Ltd.) 120 milliliters (5% aqueous solution)

Menthol (Takasago International Corporation) 1500 grams

Composition of Menthol-Containing Composition (Slurry) 3 (Gellan gum and tamarind gum are used as a polysaccharide.)

Water 10 liters

Gellan Gum (KELCOGEL/San-Ei Gen F.F.I., Inc.) 150 grams

Tamarind Gum (VIS TOP D-2032/San-Ei Gen F.F.I., Inc.) 150 grams

Lecithin (Sun Lecithin A-1/Taiyo Kagaku Co., Ltd.) 120 milliliters (5% aqueous solution)

Menthol (Takasago International Corporation) 1500 grams

[0056] The menthol-containing compositions (slurry) 1 to 3 having the above composition were prepared as follows:

[0057] Water (10 L) was kept at 80°C, and the polysaccharide (carrageenan (500 g) in the case of the menthol-containing composition 1, gellan gum (300 g) in the case of the menthol-containing composition 2, or gellan gum (150 g) and tamarind gum (150 g) in the case of the menthol-containing composition 3) was dissolved in the water little by little so as not to form lumps (the time required was about 20 minutes), while the mixture was stirred using a mixer (PRIMIX T.K. AUTO MIXER Model 40/equipped with a solution stirring rotor/2000 rpm). After that, menthol (2500 g in the case of the menthol-containing composition 1, and 1500 g in the cases of the menthol-containing compositions 2 and 3) was added.

[0058] The stirring mixer was changed to a homogenizer (PRIMIX T.K. AUTO MIXER Model 40/equipped with a rotor stator head/4000 rpm) and the mixture was emulsified for 10 minutes. Then, lecithin (200 mL of 5% aqueous solution in the case of the menthol-containing composition 1, and 120 mL of 5% aqueous solution in the cases of the menthol-containing compositions 2 and 3) was added thereto, and the emulsification was continued for 10 minutes to obtain a menthol-containing composition (slurry).

[0059] The obtained menthol-containing compositions 1 to 3 were used in the experiments described below.

[2] Preparation of Flavor Component-Carrying Member

[2-1] Preparation of Flavor Component-Carrying Tipping Paper

[0060] The menthol-containing composition (slurry) (in the state of a sol at about 60°C) was applied to a tipping paper (tipping paper for producing Mild Seven Super Lights (Japan Tobacco Inc.) as uniformly as possible. Specifically, the tipping paper was coated with the menthol-containing composition (slurry) to a thickness of 0.1 mm using a film applicator. In this experiment, the menthol-containing composition (slurry) was coated in an amount of 140 parts by weight based on 100 parts by weight of the tipping paper.

[0061] The tipping paper coated with the menthol-containing composition (slurry) was once cooled by blowing cold air having a temperature of 10°C (cold air generator: Suiden SS-25DD-1) until the temperature of the menthol-containing composition coated on the tipping paper reached 20°C or lower (product temperature-measuring device: PT-7LD manufactured by Optex Co., Ltd.).

[0062] After that, the tipping paper was dried through a belt conveyor type hot air dryer (hot air temperature conditions: 110°C, 2.5 minutes → 100°C, 5 minutes → 80°C, 2.5 minutes) until the water content of the tipping paper coated with the menthol-containing composition reached about 10% by weight or less (see "Measurement of Water Content" described blow), whereby a "flavor component-carrying tipping paper of the present invention" was prepared.

[0063] The tipping paper to which the menthol-containing composition 1 has been applied, is referred to as the "flavor component-carrying tipping paper 1 of the present invention". The tipping paper to which the menthol-containing composition 2 has been applied, is referred to as the "flavor component-carrying tipping paper 2 of the present invention". The tipping paper to which the menthol-containing composition 3 has been applied, is referred to as the "flavor component-carrying tipping paper 3 of the present invention". The flavor component-carrying tipping papers 1 to 3 of the present invention all had water contents of 6% by weight to 8% by weight.

[0064] On the other hand, a control sample for the tipping paper was obtained by applying a usual flavor application method (used in cut tobacco) to the tipping paper. In the control sample, the flavor component (menthol) was applied to the tipping paper by spraying an ethanol solution containing the flavor component on the tipping paper. The flavor composition was applied so that the tipping paper had a menthol amount of 10% by weight per weight of the tipping paper.

[2-2] Preparation of Flavor Component-Carrying Member, and Preparation of Flavor Filler

[0065] In order to prepare a flavor filler used in snus, which is an oral tobacco product, a flavor component-carrying member was first prepared.

[0066] The menthol-containing composition (slurry) (in the state of a sol at about 60°C) was extended on a substrate as uniformly as possible. Specifically, the menthol-containing composition (slurry) was casted on a polyethylene terephthalate (PET) film (Futamura Chemical Co., Ltd., FE 2001) using a film applicator (thickness of coating: wet 1.0 mm), whereby the menthol-containing composition slurry was extended on the PET substrate.

[0067] The menthol-containing composition slurry extended on the substrate was once cooled by blowing cold air having a temperature of 10°C (cold air generator: Suiden SS-25DD-1) until the temperature of the menthol-containing composition (slurry) reached 20°C or lower (product temperature-measuring device: PT-7LD manufactured by Optex Co., Ltd.).

[0068] After that, the menthol-containing composition slurry extended on the substrate was dried through a belt conveyor type hot air dryer (hot air temperature conditions: 110°C, 2.5 minutes → 100°C, 5 minutes → 80°C, 2.5 minutes) until the water content of the menthol-containing composition reached about 10% by weight (see "Measurement of Water Content" described below), whereby a dry formed film of the menthol-containing composition was produced on the substrate. The film was separated from the PET substrate, and cut into a size of 2 mm x 3 mm x 0.1 mm (thickness) to prepare a "flavor filler of the present invention".

[0069] The flavor filler derived from the flavor component-carrying member obtained by applying the menthol-containing composition 1 to the substrate is referred to as "flavor filler 1 of the present invention". The flavor filler derived from the flavor component-carrying member obtained by applying the menthol-containing composition 2 to the substrate is referred to as "flavor filler 2 of the present invention". The flavor filler derived from the flavor component-carrying member obtained by applying the menthol-containing composition 3 to the substrate is referred to as "flavor filler 3 of the present invention". The dry formed films of the menthol-containing compositions 1 to 3 all had a water content of 6% by weight to 8% by weight.

[0070] On the other hand, a control sample for the flavor filler was obtained by applying a usual flavor application method (used in cut tobacco) to the filler (tobacco fine powder). In the control sample, the flavor component (menthol) was applied to the filler (tobacco fine powder) by spraying an ethanol solution containing the flavor component on the filler. The flavor composition was applied so that the filler had a menthol amount of 10% by weight per weight of the filler.

[3] Measurement of Water Content

[0071] In order to acquire a dryness state of the menthol-containing composition slurry applied to the base member, a water content was measured according to the following method.

[3-1] Preparation of Solution for Measuring Water Content

[0072] An amount of 0.1 g of the prepared flavor component-carrying member or flavor filler was weighed, to which 10 mL of methanol (a new reagent of special grade or higher grade was dispensed through a dispenser without exposure to the air in order to exclude an influence caused by absorption of water in the air) was added in a 50 mL airtight container (which had been stored in a desiccator). The resulting mixture was shaken in a shaker (SHAKER SRR-2 manufactured by AS ONE) for 40 minutes (linear reciprocating shaking (reciprocating), 3 cm-amplitude, 200 revolutions per minute). It was allowed to stand overnight, and then the mixture was shaken again for 40 minutes (the same conditions as above: 200 rpm). The supernatant obtained after allowing it to stand (it was exposed to as little air as possible) was filled in a vial, which was used as a solution for measuring a water content.

[3-2] GC-TCD Water Content Measurement

[0073] The obtained solution for measuring a water content was subjected to a GC-TCD as described below, and quantified according to a calibration curve method.

GC-TCD: 6890 Gas Chromatograph manufactured by Hewlett Packard
 Column: HP Polapack Q (packed column)
 Carrier Gas: He
 Constant Flow mode 20.0 mL/minute
 Injection: 1.0 μ L
 Inlet: EPC purge packed column inlet
 Heater: 230°C
 Inlet Gas: He

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Total flow: 21.1 mL/minute

Oven: 160°C (hold 4.5 minutes) → (60°C/minute) → 220°C (hold 4.0 minutes)

Detector: TCD detector

Reference Gas (He) flow rate: 20 mL/minute

Make up gas (He) 3.0 mL/minute

Signal rate: 5 Hz

Concentration of calibration curve solution: six points of 0, 1, 3, 5, 10 and 20 [mg-H₂O/10 mL]

[4] Measurement of Menthol Content

[0074] In order to examine the post-storage flavor-retaining property of the flavor component and the releasing property of the flavor component, a menthol content of the prepared flavor component-carrying member or the flavor filler was measured.

[4-1] Preparation of Solution for Measuring Menthol Content

[0075] An amount of 0.1 g of the prepared flavor component-carrying member or flavor filler was weighed, to which 10 mL of methanol (a reagent of special grade or higher grade) was added in a 50 mL airtight container (a screw tube). The resulting mixture was shaken in a shaker (SHAKER SRR-2 manufactured by AS ONE) for 40 minutes (linear reciprocating shake (reciprocating), 3 cm-amplitude, 200 revolutions per minute). It was allowed to stand overnight, and then the mixture was shaken again for 40 minutes (the same conditions as above: 200 rpm). The supernatant obtained after allowing it to stand was diluted at an appropriate dilution degree suitable for a GC measurement (here, x10 dilution with methanol), which was used as a solution for measuring menthol to be subjected to the GC-FID measurement.

[4-2] GC-FID Menthol Content Measurement

[0076] The obtained solution for measuring menthol was subjected to a GC-FID as described below, and quantified according to a calibration curve method.

GC-FID: 6890N Gas chromatograph manufactured by Agilent Technologies, Inc.

Column: DB-WAX 30 m x 530 μm x 1 μm [Max 220°C]

Carrier Gas: He

Constant Pressure mode 5.5 psi (velocity: 50 cm/second)

Injection: 1.0 μL

Inlet: Splitless mode 250°C 5.5 psi

Oven: 80°C → (10°C/minute) → 170°C (hold 6.0 minutes)

Detector: FID detector 250°C (H₂: 40 mL/minute-air: 450 mL/minute)

Signal rate: 20 Hz

Concentration of calibration curve solution: eight points of 0, 0.01, 0.05, 0.1, 0.3, 0.5, 0.7 and 1.0 [mg-menthol/mL]

[5] Acceleration Test

[0077] The prepared flavor component-carrying member or flavor filler was put in a thermostat set at a temperature of 50°C (DX 600 manufactured by Yamato Scientific Co., Ltd.), which was stored over one week, two weeks or one month (30 days). A menthol content was measured at every time point as described above, and the post-storage flavor-retaining property of menthol was evaluated based on the change of the menthol content.

[0078] On the other hand, the prepared flavor component-carrying member or flavor filler was stored in a thermostat set at a temperature of 50°C over one week, and after that it was further stored in a thermohygrostat set at a temperature of 30°C and a humidity of 98% or more for 7 days (total 14 days) or 23 days (total 30 days). A menthol content was measured at every time point as described above, and the releasing property of menthol was evaluated based on the change of the menthol content.

[6] Production of Tobacco Product and Sensory Evaluation

[6-1] Cigarette

[0079] A cigarette was produced using the flavor component-carrying member of the present invention.

[0080] The cigarette was produced by using a tobacco rod and a filter of a Mild Seven Super Lights product (Japan

Tobacco Inc.) and connecting them with the flavor component-carrying tipping paper of the present invention.

[0081] The sensory evaluation of the cigarette was performed by holding a sample cigarette (which was not lit) in the mouth and experiencing the flavor and taste by a person in charge, who was assumed to be a general consumer, in the same manner as found in common smoking behavior.

[6-2] Snus

[0082] Using the flavor filler derived from the flavor component-carrying member of the present invention (see the item [2-2] described above), snus was produced.

[0083] The snus was produced by blending the flavor filler (size of 2 mm x 3 mm x 0.1 mm (thickness)) derived from the flavor component-carrying member of the present invention with another filler (tobacco fine powder) in an amount of 10% by weight, and filling the mixture in a pouch (cellulose-based non-woven fabric; size of 15 mm x 30 mm).

[0084] The whole filler obtained by blending the flavor filler of the present invention with the other filler had a water content of about 12% by weight, which is equal to those of usual fillers.

[0085] The sensory evaluation of the snus was performed by holding the snus in the mouth and experiencing the flavor and taste by a person in charge, who was assumed to be a general consumer, in the same manner as is usual.

[7] Results (Tipping Paper)

[0086] With respect to the tipping paper, the following results were obtained using the experimental methods described above.

[7-1] Post-storage Flavor-Retaining Property of Menthol

[0087] Using the "flavor component-carrying tipping papers 1 to 3 of the present invention" and the "control sample of tipping paper" prepared as described above, the post-storage flavor-retaining property of menthol was evaluated. The results are shown in FIG. 1.

[0088] The tipping paper was allowed to stand for a predetermined period (0 days, 7 days, 14 days, or 30 days) in an acceleration environment. The menthol content of the tipping paper was measured according to the GC-FID measurement as described above.

[0089] In FIG. 1, the results of the flavor component-carrying tipping paper 1 of the present invention, the results of the flavor component-carrying tipping paper 2 of the present invention, the results of the flavor component-carrying tipping paper 3 of the present invention, and the results of the control sample are respectively shown as "Carrageenan", "Gellan gum", "Gellan gum + tamarind gum" and "Control". The menthol content (% by weight) is obtained from a formula: {measured value of menthol content (mg)/weight of tipping paper (mg)} x 100.

[0090] The control sample had a menthol content of about 10% by weight at a time point when the storage was started (day 0). When the control sample was stored in a thermostat set at a temperature of 50°C, the menthol content was remarkably reduced with the lapse of time and it reached almost 0 after one week had elapsed.

[0091] In contrast, the flavor component-carrying cigarettes 1 to 3 of the present invention had menthol contents of about 7.2 to 9.6% by weight at a time point when the storage was started (day 0), and they showed comparatively high menthol contents even after the storage at 50°C in the acceleration environment; i.e., the good flavor-retaining property was observed.

[7-2] Releasing Property of Menthol

[0092] Using the "flavor component-carrying tipping papers 1 to 3 of the present invention" and the "control sample of tipping paper", the releasing property of menthol was evaluated. The results are shown in FIG. 2.

[0093] The tipping paper was, as described above, allowed to stand in an acceleration environment by storing it in a thermostat set at a temperature of 50°C over one week, and after that further storing it in a thermohygrostat set at a temperature of 30°C and a humidity of 98% or more for 7 days (total 14 days) or 23 days (total 30 days). The menthol content of the tipping paper was measured according to the GC-FID measurement as described above.

[0094] In FIG. 2, the measurement results are shown by solid lines, and the results in FIG. 1 are also shown by dotted lines for reference. In FIG. 2, the results of the flavor component-carrying tipping paper 1 of the present invention, the results of the flavor component-carrying tipping paper 2 of the present invention, and the results of the flavor component-carrying tipping paper 3 of the present invention are respectively shown as "Carrageenan", "Gellan gum" and "Gellan gum + tamarind gum". The menthol content (% by weight) is obtained from a formula: {measured value of menthol content (mg)/weight of tipping paper (mg)} x 100.

[0095] The flavor component-carrying tipping papers 1 to 3 of the present invention released almost all of the menthol

when they were put in an environment having a humidity of 98% or more. In the environment having a humidity of 98% or more, dew condensation occurred in the flavor component-carrying tipping papers 1 to 3 of the present invention, which reflects a state in which the tipping paper was brought into contact with saliva. The experimental results, accordingly, show that the tipping paper of the present invention has a property of being capable of quickly releasing the flavor component when the flavor component-carrying tipping paper is held in the mouth and brought into contact with saliva.

[7-3] Sensory Evaluation

[0096] Using cigarettes comprising the "flavor component-carrying tipping papers 1 to 3 of the present invention" or the "control sample of tipping paper", the sensory evaluation was performed.

[0097] The tipping paper was, as described above, allowed to stand for a predetermined period (0 days, 7 days, 14 days, or 30 days) in a constant temperature environment at 50°C, and using the resulting tipping paper, a cigarette was produced. The sensory evaluation was performed to find out whether or not the refreshing feeling, caused by the menthol, could be felt by holding each cigarette in the mouth. The results are shown in Table 1.

[Table 1]

Tipping paper	Refreshing feeling immediately after production of cigarette	Refreshing feeling after 7 days	Refreshing feeling after 14 days	Refreshing feeling after 30 days
Control	Strongly felt	Not felt	Not felt	Not felt
Flavor component-carrying tipping paper 1 of present invention	Felt	Felt	Felt	Felt
Flavour component-carrying tipping paper 2 of present invention	Felt	Felt	Felt	Felt
Flavor component-carrying tipping paper 3 of present invention	Felt	Felt	Felt	Felt

[0098] The cigarette comprising the tipping paper of the control sample (the number of storage days of 0) had a high added menthol amount of 10% by weight per weight of the tipping paper, and thus a very strong refreshing feeling (cold sensation) was felt immediately after the cigarette was held in the mouth. However, the refreshing feeling was hardly felt in the cigarette comprising the tipping paper of the control sample when the 7-day-stored control tipping paper was used.

[0099] On the other hand, the cigarette comprising the flavor component-carrying tipping paper of the present invention (the number of storage days of 0) had a similar amount of added menthol as that of the control sample, but the refreshing feeling was not felt so strong as in a case in which the control tipping paper was used, and was felt to a moderate degree. Further, regarding the cigarette comprising the flavor component-carrying tipping paper of the present invention, the refreshing feeling could be felt even if the 30-day-stored tipping paper of the present invention was used.

[0100] The results above show that the cigarette comprising the flavor component-carrying tipping paper of the present invention has the high flavor-retaining property after storage, and thus can provide the effects caused by the flavor component to users even if they smoke it after a long-term storage.

[8] Results (Filler for Snus)

[0101] With respect to the filter for snus, the following results were obtained using the experimental method described above.

[8-1] Post-storage Flavor-Retaining Property of Menthol

[0102] Using the "flavor fillers 1 to 3 of the present invention" and the "control sample of flavor filler" prepared as described above, the post-storage flavor-retaining property of menthol was evaluated. The results are shown in FIG. 3.

[0103] The flavor filler was allowed to stand for a predetermined period (0 days, 7 days, 14 days, or 30 days) in an acceleration environment. The menthol content of the flavor filler was measured according to the GC-FID measurement

as described above.

[0104] In FIG. 3, the results of the flavor filler 1 of the present invention, the results of the flavor filler 2 of the present invention, the results of the flavor filler 3 of the present invention, and the results of the control sample are respectively shown as "Carrageenan", "Gellangum", "Gellan gum + tamarind gum" and "Control". The menthol content (% by weight) is obtained from a formula: {measured value of menthol content (mg)/weight of filler (mg)} x 100.

[0105] The control sample had a menthol content of about 10% by weight at a time point when the storage was started (day 0). When the control sample was stored in a thermostat set at a temperature of 50°C, the menthol content was remarkably reduced with the lapse of time and it reached almost 0 after one week had elapsed.

[0106] In contrast, the flavor fillers 1 to 3 of the present invention had menthol contents of about 70 to 80% by weight at a time point when the storage was started (day 0), and they showed high menthol contents even after the storage at 50°C in the acceleration environment, the menthol content being kept at about 65% by weight even after the 30-day storage; i.e., the good flavor-retaining property was observed.

[8-2] Releasing Property of Menthol

[0107] Using the "flavor fillers 1 to 3 of the present invention" and the "control sample of flavor filler", the releasing property of menthol was evaluated. The results are shown in FIG. 4.

[0108] The flavor filler was, as described above, allowed to stand in an acceleration environment by storing it in a thermostat set at a temperature of 50°C over one week, and after that further storing it in a thermohygrostat set at a temperature of 30°C and a humidity of 98% or more for 7 days (total 14 days) or 23 days (total 30 days). The menthol content of the flavor filler was measured according to the GC-FID measurement as described above.

[0109] In FIG. 4, the measurement results are shown by solid lines, and the results in FIG. 3 are also shown by dotted lines for reference. In FIG. 4, the results of the flavor filler 1 of the present invention, the results of the flavor filler 2 of the present invention, and the results of the flavor filler 3 of the present invention are respectively shown as "Carrageenan", "Gellan gum" and "Gellan gum + tamarind gum". The menthol content (% by weight) is obtained from a formula:

$$\{\text{measured value of menthol content (mg)/weight of filler (mg)}\}$$

$$\times 100.$$

[0110] The flavor fillers 1 to 3 of the present invention released almost all of the menthol when they were put in an environment having a humidity of 98% or more. In the environment having a humidity of 98% or more, dew condensation occurred in the flavor fillers 1 to 3 of the present invention, which reflects a state in which the filler was brought into contact with saliva. The experimental results, accordingly, show that the flavor filler of the present invention has a property of being capable of quickly releasing the flavor component when the flavor filler is brought into contact with saliva via a pouch in the mouth.

[8-3] Sensory Evaluation

[0111] Using the snus comprising the "flavor fillers 1 to 3 of the present invention" or the snus comprising the "control sample of flavor filler", the sensory evaluation was performed.

[0112] The flavor filler was, as described above, allowed to stand for a predetermined period (0 days, 7 days, 14 days, or 30 days) in a constant temperature environment at 50°C, and using the resulting flavor filler, snus was produced. The sensory evaluation was performed to find out whether or not the refreshing feeling, caused by the menthol, could be felt by holding the snus in the oral cavity. The results are shown in Table 2.

[Table 2]

Filler	Refreshing feeling immediately after production of snus	Refreshing feeling after 7 days	Refreshing feeling after 14 days	Refreshing feeling after 30 days
Control	Felt	Weakly felt	Not felt	Not felt
Flavor filler 1 of present invention	Felt	Felt	Felt	Felt
Flavor filler 2 of present invention	Felt	Felt	Felt	Felt

(continued)

Filler	Refreshing feeling immediately after production of snus	Refreshing feeling after 7 days	Refreshing feeling after 14 days	Refreshing feeling after 30 days
Flavor filler 3 of present invention	Felt	Felt	Felt	Felt

[0113] Regarding the snus comprising the flavor filler of the control sample (the number of storage days of 0), the refreshing feeling (cold sensation) could be felt immediately after the snus was put in the oral cavity. Regarding the snus comprising the flavor filler of the control sample, however, the refreshing feeling was only weakly felt when the 7-day-stored control filler was used, and the refreshing feeling was hardly felt when the 14-day-stored control filler was used.

[0114] On the other hand, regarding the snus comprising the flavor filler of the present invention (the number of storage days of 0), the refreshing feeling was felt to a moderate degree. Further, regarding the snus comprising the flavor filler of the present invention, the refreshing feeling could be felt even if the 30-day-stored flavor filler of the present invention was used.

[0115] The results above show that the snus comprising the flavor filler of the present invention has the high flavor-retaining property after storage, and thus can provide the effects caused by the flavor component to users even if it is used after a long-term storage.

[9] Temperature-Responsive Sol-Gel Transition Property of Polysaccharide-Containing Liquid

[0116] In this experiment, the temperature-responsive sol-gel transition property was examined for the following polysaccharide-containing liquid (slurry) (1) to (3).

[9-1] Preparation of Polysaccharide-Containing Liquid

(1) Carrageenan-Containing Liquid

[0117]

Water 0.1 liters

κ-Carrageenan (CARRAGEENAN CS-530/San-Ei Gen F.F.I., Inc.) 5 grams

(2) Gellan Gum-Containing Liquid

[0118]

Water 0.1 liters

Gellan Gum (KELCOGEL/San-Ei Gen F.F.I., Inc.) 5 grams

[0119] The Carrageenan-containing liquid and the gellan gum-containing liquid were prepared as described below.

[0120] The water (0.1 L) was kept at 70°C, and the polysaccharide (5 g) was dissolved in the water little by little so as not to form lumps, while the mixture was stirred using a high performance mixer DMM, manufactured by Atec Japan Ltd to prepare the polysaccharide-containing liquid (slurry).

(3) Liquid Containing Gellan Gum and Tamarind Gum

[0121]

Water 10 liters

Gellan Gum (KELCOGEL/San-Ei Gen F.F.I., Inc.) 250 grams

Tamarind Gum (VIS TOP D-2032/San-Ei Gen F.F.I., Inc.) 250 grams

5% Aqueous Lecithin Solution (Sun Lecithin A-1/Taiyo Kagaku Co., Ltd.) 200 milliliters

Menthol (Takasago International Corporation) 2500 grams

[0122] The liquid containing gellan gum and tamarind gum was prepared as described below.

[0123] While 10 liters (100 parts by weight) of water (which was heated to and kept at 80°C) was stirred in a mixer (PRIMIX T. K. AUTO MIXER Model 40/equipped with a solution-stirring rotor/2000 rpm), 500 grams (5 parts by weight) of the two polysaccharides, gellan gum and tamarind gum, in the mixture ratio (weight ratio) described above, were dissolved in the water little by little so as not to form lumps (the time required was about 20 minutes). While the temperature was kept the same, 2500 grams (25 parts by weight) of l-menthol was added thereto. The stirring mixer was changed to a homogenizer (PRIMIX T. K. AUTO MIXER Model 40/equipped with a rotor stator head/4000 rpm) and the mixture was emulsified for 10 minutes. Then, 200 milliliters (2 parts by weight) of the 5% aqueous lecithin solution was added thereto, and the mixture was stirred. Menthol was dispersed in a mixed polysaccharide aqueous solution containing gellan gum and tamarind gum.

[9-2] Results

[0124] The temperature of the polysaccharide-containing liquid (70°C) was dropped to 25°C for about 900 seconds (0.05°C/seconds). After that, the temperature was raised to 70°C for about 900 seconds. How the viscosity (fluidity) of the polysaccharide-containing liquid changed by the temperature variation described above was measured using a rheometer (RheoStress 1 manufactured by Thermo-Haake Ltd.).

[0125] The results of the carrageenan-containing liquid are shown in FIGS. 5A and 5B, the results of the gellan gum-containing liquid are shown in FIGS. 6A and 6B, and the results of the liquid containing gellan gum and tamarind gum are shown in FIGS. 7A and 7B.

[0126] As shown in FIG. 5A, when the temperature of the carrageenan-containing liquid was dropped to 25°C, the viscosity was low until the temperature reached about 50°C, which is the sol-gel transition temperature, but the viscosity was rapidly increased at temperatures lower than the transition temperature (gelation). When the temperature of the obtained gel was raised, the gel did not easily return to sol even if the gel was heated to a temperature higher than the transition temperature, as shown in FIG. 5B. Thus, the gel state could be maintained.

[0127] As shown in FIG. 6A, when the temperature of the gellan gum-containing liquid was dropped to 25°C, the viscosity was low until the temperature reached about 50°C (the fluidity was high), but the viscosity was rapidly increased at 40°C or lower (gelation phenomenon). When the temperature of the obtained gel was raised, the gel did not easily return to sol even if the gel was heated to a temperature higher than the gelation temperature (40°C), as shown in FIG. 6B. Thus, the gel state could be maintained until the temperature became quite high.

[0128] As shown in FIG. 7A, when the temperature of the liquid containing gellan gum and tamarind gum was dropped to 25°C, the viscosity was low until the temperature reached about 40°C, but the viscosity was rapidly increased at 35°C or lower (gelation phenomenon). When the temperature of the obtained gel was raised, the gel did not easily return to sol even if the gel was heated to a temperature higher than the gelation temperature (35°C), as shown in FIG. 7B. Thus, the gel state could be maintained until the temperature became quite high.

[0129] From those results, it is found that when the slurry containing the polysaccharide described above was once cooled to cause gelation, the gel does not easily return to sol even if the temperature is raised after that, and the gel state can be maintained. Utilizing such a property of the polysaccharide in the present invention, the raw material slurry is subjected to the preliminary cooling before it is dried. As a result, it is difficult to cause the solution of the polysaccharide contained in the raw material slurry which has been subjected to the preliminary cooling, even if the temperature of the slurry is raised at the time of drying, and thus it is difficult to volatilize the menthol coated with such a polysaccharide.

Claims

1. A flavor component-carrying member which is obtained by applying a flavor component composition to a base member, the flavor component composition containing a flavor component and a polysaccharide selected from the group consisting of carrageenan, gellan gum, and a combination of gellan gum and tamarind gum, wherein the flavor component-carrying member is a tobacco constituent member which is disposed at a position such that when the whole of the flavor component-carrying member or the flavor component composition part of the flavor component-carrying member is incorporated into a tobacco product, the whole of the flavor component-carrying member or the flavor component composition part of the flavor component-carrying member is in contact with saliva in oral cavity of a user, or with mouth or oral cavity of the user.
2. The flavor component-carrying member according to claim 1, wherein the flavor component-carrying member is obtained by: applying a flavor component composition in a sol state to a base member, the flavor component composition containing a flavor, water, and a polysaccharide selected from the group consisting of carrageenan, gellan gum, and a combination of gellan gum and tamarind gum; then cooling the flavor component composition-applied base member to a temperature of 0 to 40°C to cause gelation of the flavor component composition; and

then heat-drying the flavor component composition-applied cigarette constituent member.

- 5 3. The flavor component-carrying member according to claim 2, wherein the heat-drying is performed so that the surface temperature of the flavor component composition is kept at 70 to 100°C.

- 10 4. The flavor component-carrying member according to any one of claims 1 to 3, wherein the base member is a tipping paper.

- 15 5. The flavor component-carrying member according to any one of claims 1 to 3, wherein the base member is a substrate for preparing a flavor filler of an oral tobacco product

- 20 6. The flavor component-carrying member according to any one of claims 1 to 3, wherein the base member is a pouch of an oral tobacco product or a tobacco filler of an oral tobacco product.

- 25 7. A tobacco product which comprises:

the flavor component-carrying member according to any one of claims 1 to 4 and 6, or
the flavor component composition part of the flavor component-carrying member according to claim 5.

- 30 8. A cigarette which comprises the flavor component-carrying member according to any one of claims 1 to 4.

- 35 9. An oral tobacco product which comprises:

the flavor component-carrying member according to any one of claims 1 to 3 and 6, or
the flavor component composition part of the flavor component-carrying member according to claim 5.

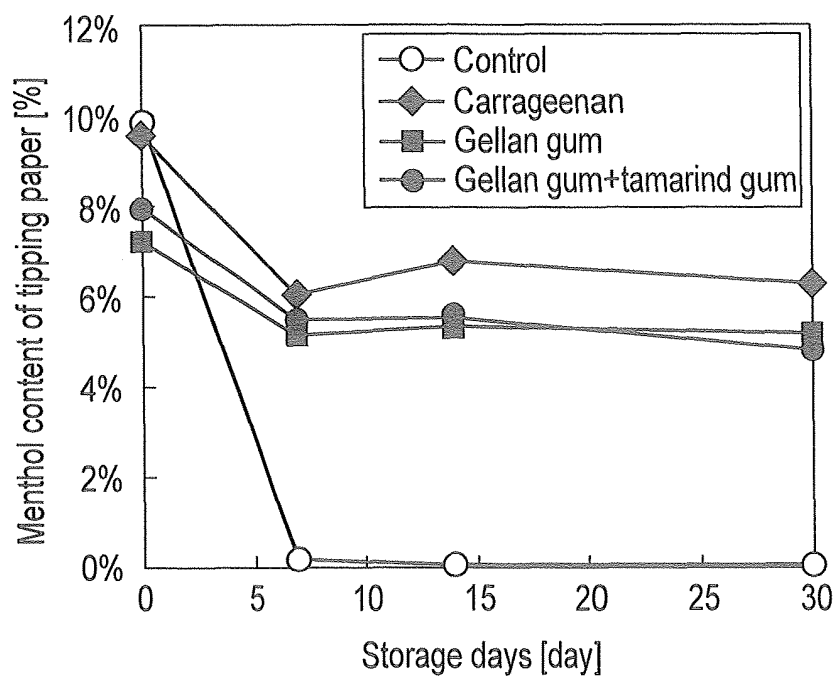


FIG. 1

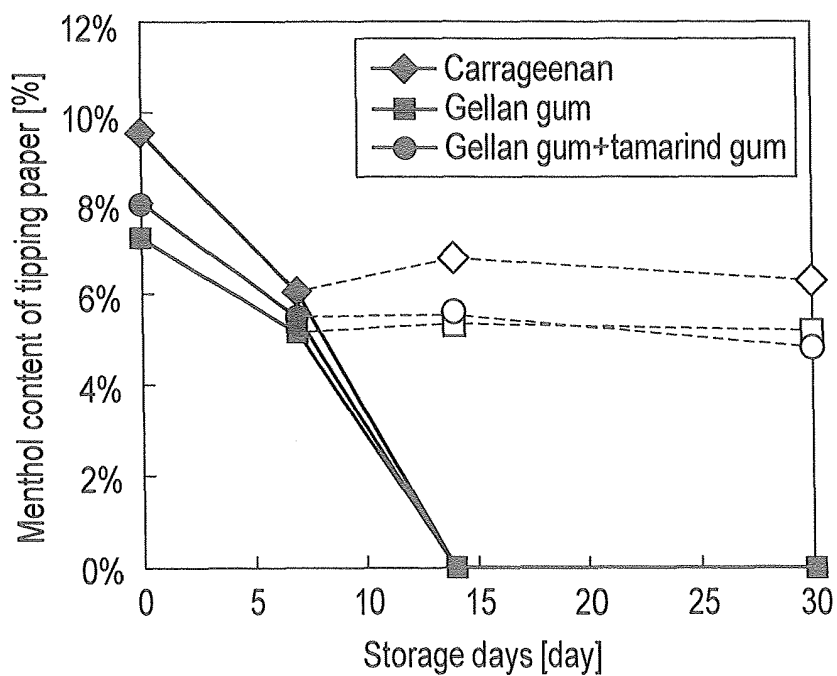


FIG. 2

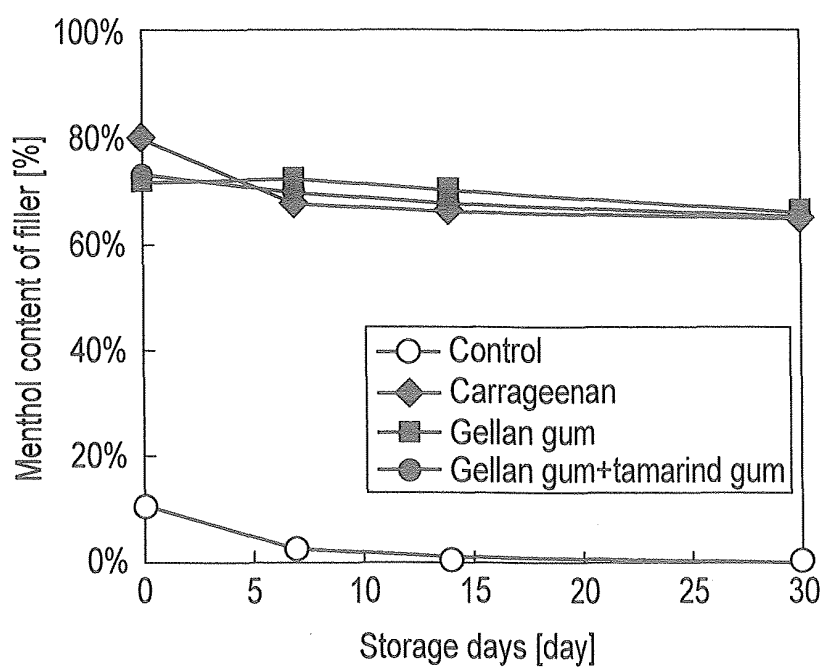


FIG. 3

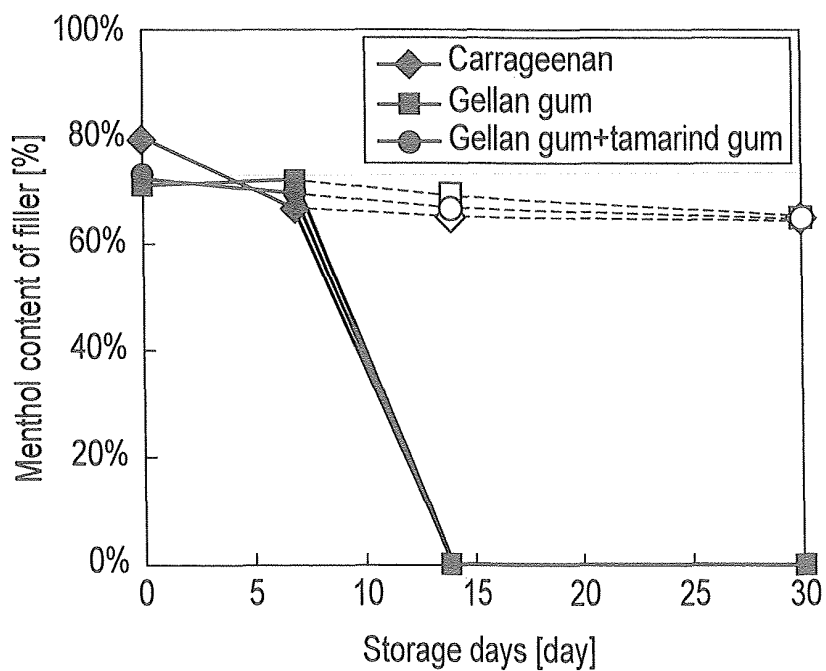


FIG. 4

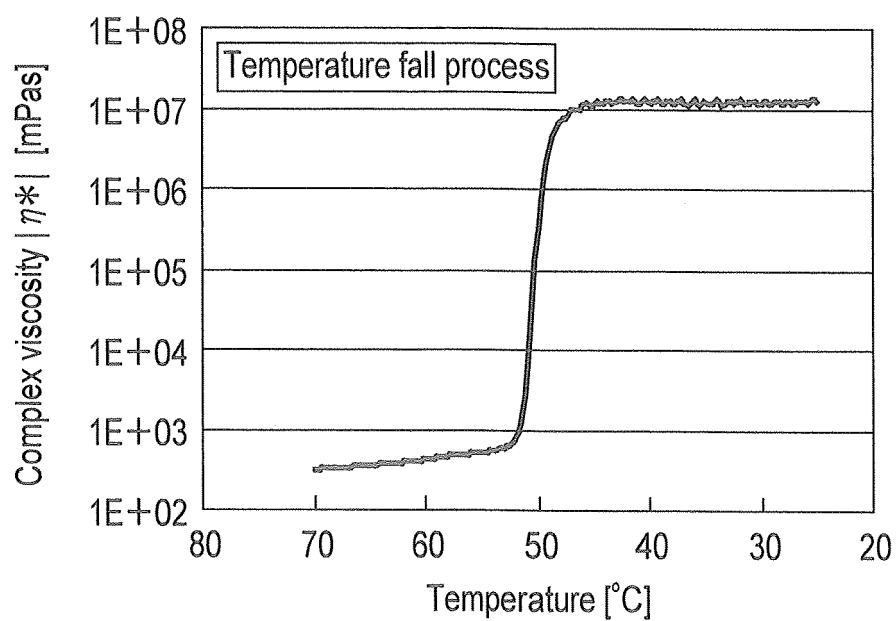


FIG. 5A

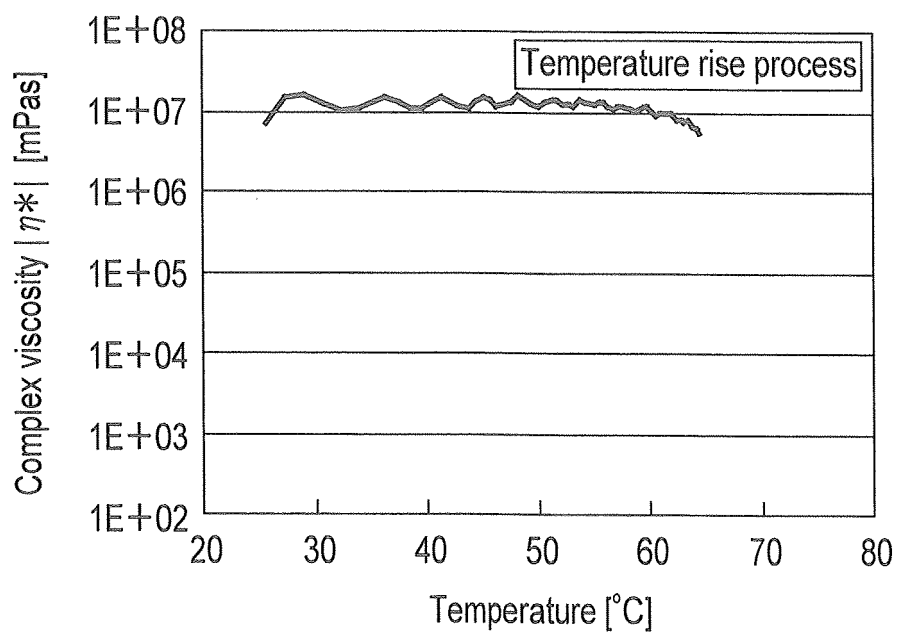


FIG. 5B

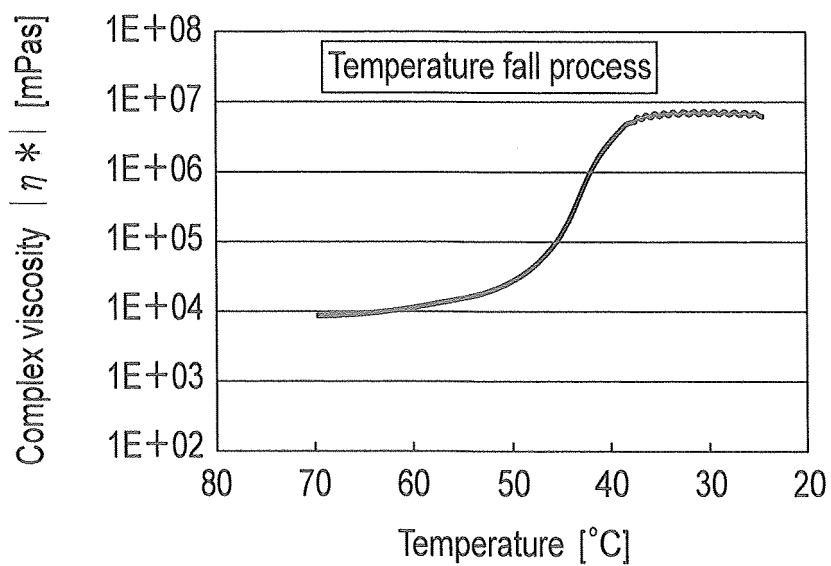


FIG. 6A

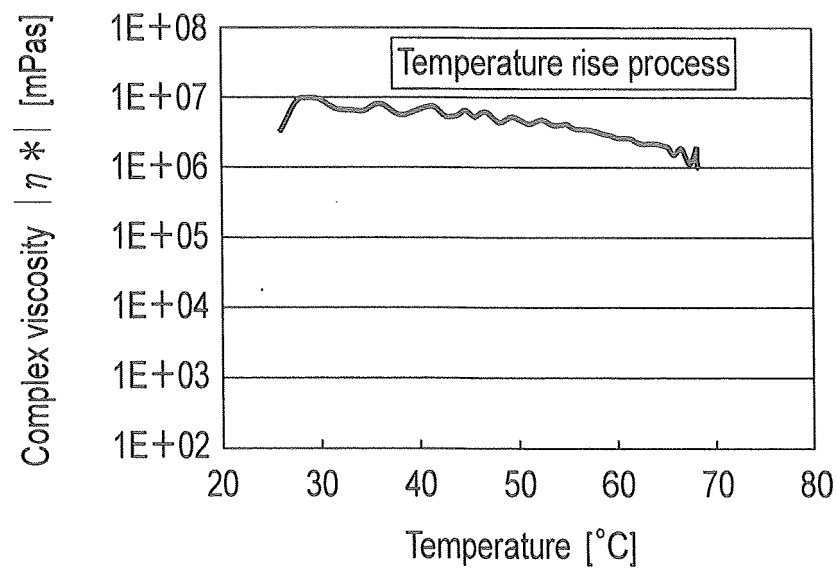


FIG. 6B

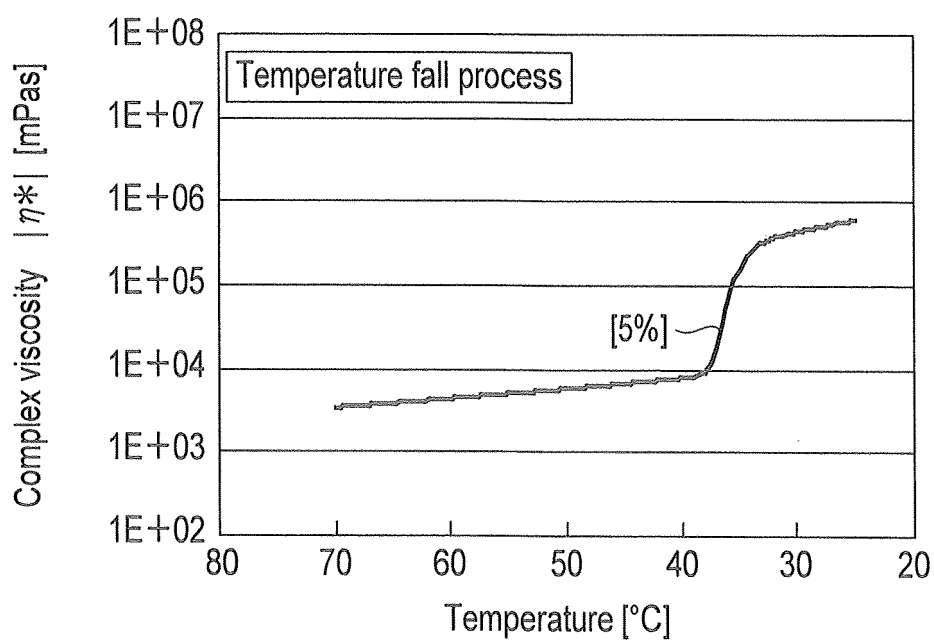


FIG. 7A

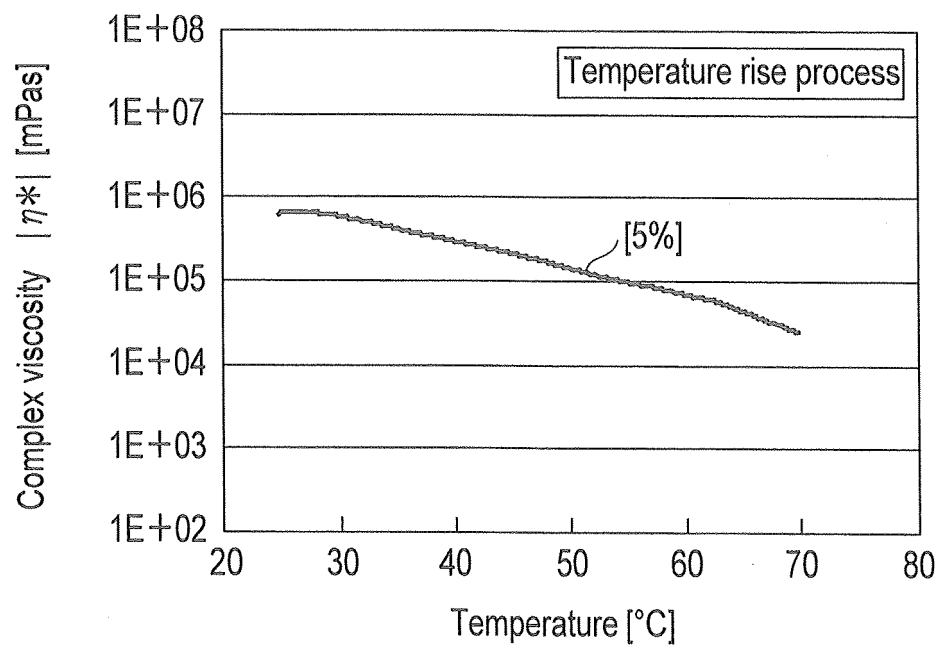


FIG. 7B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/072776

A. CLASSIFICATION OF SUBJECT MATTER

A24B15/30(2006.01)i, A24B13/00(2006.01)i, A24D1/02(2006.01)i, C11B9/00(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)

A24B15/30, A24B13/00, A24D1/02, C11B9/00

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013
 Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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 A	WO 2009/142159 A1 (Japan Tobacco Inc.), 26 November 2009 (26.11.2009), entire text; all drawings & JP 2013-99346 A & US 2011/0061667 A1 & EP 2279677 A1 & CA 2724820 A & CN 102036575 A & KR 10-2010-0132057 A & TW 201016148 A & RU 2010151986 A	1, 4-9 2, 3
Y	JP 2009-148233 A (Japan Tobacco Inc.), 09 July 2009 (09.07.2009), entire text; all drawings (Family: none)	1, 4, 7, 8

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

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Date of the actual completion of the international search
14 November, 2013 (14.11.13)Date of mailing of the international search report
26 November, 2013 (26.11.13)Name and mailing address of the ISA/
Japanese Patent Office

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/072776

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	US 5387416 A (R.J.Reynolds Tobacco Co.), 07 February 1995 (07.02.1995), entire text (Family: none)	1, 5, 6, 9
Y	JP 2009-508523 A (R.J.Reynolds Tobacco Co.), 05 March 2009 (05.03.2009), entire text; all drawings & JP 5066092 B & JP 2010-534475 A & US 2007/0062549 A1 & US 2007/0186941 A1 & US 2008/0029110 A1 & US 2011/0061666 A1 & EP 1926401 A & EP 2173200 A & EP 2179666 A2 & EP 2377413 A1 & WO 2007/037962 A1 & WO 2009/015142 A2 & CN 101272703 A & CN 101873809 A	1, 5, 6, 9
A	JP 11-509566 A (British American Tobacco Co., Ltd.), 24 August 1999 (24.08.1999), entire text & JP 3790828 B & GB 9513951 A0 & EP 840555 A & WO 1997/002759 A1 & DE 69616332 D & DE 69616332 T & BR 9609628 A & AU 6313996 A & AT 207309 T & DK 840555 T & ES 2162084 T & PT 840555 E & EA 299 B & CN 1193893 A	1-9
A	JP 2007-023065 A (San-Ei Gen F.F.I., Inc.), 01 February 2007 (01.02.2007), paragraphs [0011] to [0021] (Family: none)	1-9
P, Y	WO 2012/118032 A1 (Japan Tobacco Inc.), 07 September 2012 (07.09.2012), entire text; all drawings & WO 2012/118033 A & WO 2012/118034 A & TW 201240613 A & TW 201240614 A & TW 201242523 A	1-9

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REFERENCES CITED IN THE DESCRIPTION

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- US 5387416 A [0005]
- JP 2009508523 W [0005]