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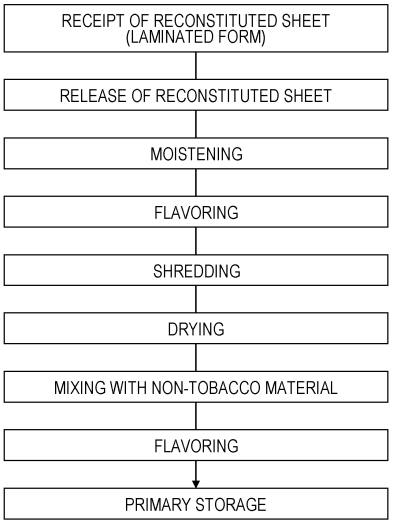
(54) METHOD FOR MANUFACTURING TOBACCO ROD PART FOR NON-COMBUSTION HEATING-TYPE FLAVOR INHALATION ARTICLE

(57) This method for manufacturing a tobacco rod part for a non-combustion heating-type flavor inhalation article comprises: step 1 for humidifying a tobacco filling material, followed by drying; and step 2 for preparing a tobacco rod part in which the tobacco filling material obtained in step 1 is filled in a cylindrical wrapper.

Fig. 1



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Description

Technical Field

[0001] The present invention relates to a method for manufacturing a tobacco rod portion for a non-combustion-heating-type flavor inhalation article.

Background Art

[0002] As alternatives to conventional combustion-type flavor inhalation articles, non-combustion-heating-type flavor inhalation articles have been developed. For such an article, a reconstituted tobacco sheet containing a relatively large amount of aerosol-source material is used. For example, Patent Literatures 1 and 2 each disclose a method for manufacturing a tobacco rod portion by discharging the reconstituted tobacco sheet from a bobbin and directly filling the sheet into a wrapper.

Citation List

Patent Literature

[0003]

PTL 1: Japanese Patent No. 6017546
PTL 2: Japanese Patent No. 6307661

Non Patent Literature

[0004] NPL 1: Jaccard G. et al., "Investigation and comparison of the transfer of TSNA from tobacco to cigarette mainstream smoke and to the aerosol of a heated tobacco product, THS2.2", Reg. Toxicol. Pharmacol., Vol. 97, p. 103-109, 2018

Summary of Invention

Technical Problem

[0005] The tobacco rod portion can be efficiently manufactured by the method described in each patent literature. The present inventors have conceived that the quality can be further improved by performing a specific treatment before a tobacco filler is filled into a wrapper. In view of the foregoing circumstances, it is an object of the present invention to provide a tobacco rod portion having improved quality for a non-combustion-heating-type flavor inhalation article.

Solution to Problem

[0006] The above object is achieved by the present invention described below.

First Aspect

[0007] A method for manufacturing a tobacco rod portion for a non-combustion-heating-type flavor inhalation article includes:

step 1 of moistening and then drying a tobacco filler; and
step 2 of preparing a tobacco rod portion in which a tubular wrapper is filled with the tobacco filler obtained in the step 1.

Second Aspect

[0008] In the method described in the first aspect, the tobacco filler contains an aerosol-source material and a reconstituted tobacco sheet.

Third Aspect

[0009] The method described in the second aspect further includes a step of cutting the tobacco filler into a strand shape.

Fourth Aspect

[0010] In the method described in any one of the first to third aspects,

the tobacco filler contains a reconstituted tobacco sheet A and a reconstituted tobacco sheet B, and
the step 1 includes separately moistening the reconstituted tobacco sheets, then mixing the reconstituted tobacco sheets to give a mixture, and drying the mixture, or includes separately moistening and then drying the reconstituted tobacco sheets, and subsequently mixing the reconstituted tobacco sheets.

Fifth Aspect

[0011] In the method described in any one of the first to third aspects,

the tobacco filler contains a reconstituted tobacco sheet A and a lamina, and
the step 1 includes separately moistening the reconstituted tobacco sheet A and the lamina, then mixing the reconstituted tobacco sheet A and the lamina to give a mixture, and drying the mixture, or includes separately moistening and then drying the reconstituted tobacco sheet A and the lamina, and subsequently mixing the reconstituted tobacco sheet A and the lamina.

Sixth Aspect

[0012] The method described in any one of the first to fifth aspects further includes a step of mixing the tobacco filler with a non-tobacco material.

Seventh Aspect

[0013] The method described in any one of the first to sixth aspects further includes a step of adding an additive to the tobacco filler.

Eighth Aspect

[0014] The method described in the fourth or sixth aspect further includes a step of adding an additive to one or both of the reconstituted tobacco sheet A and the reconstituted tobacco sheet B.

Ninth Aspect

[0015] The method described in the fifth or sixth aspect further includes a step of adding an additive to one or both of the reconstituted tobacco sheet and the lamina.

Tenth Aspect

[0016] The method described in any one of the seventh to ninth aspect further includes a step of measuring a component of the tobacco filler and adjusting the amount or type of the additive added based on the measurement result.

Eleventh Aspect

[0017] In the method described in the fourth or fifth aspect,

a component of the reconstituted tobacco sheet A is measured, and
the type of the reconstituted tobacco sheet B or the lamina is determined based on the measurement result.

Twelfth Aspect

[0018] In the method described in the seventh aspect,

a component of the reconstituted tobacco sheet A is measured, and
based on the measurement result,
the amount or type of the additive added to the reconstituted tobacco sheet B is determined, or
the amount or type of the additive added to the lamina is determined.

Thirteenth Aspect

[0019] In the method described in any one of the first to third, sixth, and seventh aspects, the moistening is performed in such a manner that the tobacco filler has a moisture content of 15% to 25% by weight.

Fourteenth Aspect

[0020] In the method described in any one of the fourth to twelfth aspects, the moistening is performed in such a manner that the reconstituted tobacco sheet has a moisture content of 15% to 25% by weight.

Fifteenth Aspect

[0021] In the method described in any one of the first to fourteenth aspects, the drying is performed by a flash drying method or an annular drying method.

Sixteenth Aspect

[0022] In the method described in any one of the fourth to fifteenth aspects, the reconstituted tobacco sheets are each a sheet formed by papermaking, a cast sheet, or an extruded sheet.

Advantageous Effects of Invention

[0023] According to the present invention, it is possible to provide a tobacco rod portion having improved quality for a non-combustion-heating-type flavor inhalation article.

Brief Description of Drawings

[0024]

[Fig. 1] Fig. 1 is a conceptual diagram of a first embodiment.
[Fig. 2] Fig. 2 is a conceptual diagram of a second embodiment.
[Fig. 3] Fig. 3 is a conceptual diagram of a third embodiment.
[Fig. 4] Fig. 4 is a conceptual diagram of a fourth embodiment.
[Fig. 5] Fig. 5 is a conceptual diagram of a fifth embodiment.
[Fig. 6] Fig. 6 is a schematic cross-sectional diagram of an example of a non-combustion-heating-type smoking system.
[Fig. 7] Fig. 7 is a schematic cross-sectional diagram of an example of a non-combustion-heating-type flavor inhalation article.

Description of Embodiments

[0025] The present invention will be described in detail below. In the present invention, "X to Y" includes X and Y that are end values.

[0026] A manufacturing method of the present invention includes step 1 of moistening and then drying a tobacco filler, and step 2 of preparing a tobacco rod portion in which a tubular wrapper is filled with the tobacco filler obtained in the step 1.

1. Step 1

(1) Tobacco Filler

[0027] The tobacco filler is a material that is filled into the wrapper and used for smoking. A known tobacco filler can be used in the present invention. A tobacco sheet is preferably contained from the viewpoint of ease of manufacture. The tobacco sheet is a sheet-shaped tobacco material. A reconstituted tobacco sheet is preferred in the present invention.

In one embodiment, the term "tobacco sheet" refers to a sheet-shaped tobacco material or a material derived from the sheet-shaped tobacco material (for example, shreds). A reconstituted tobacco sheet is a tobacco sheet containing a reconstituted material (reconstituted tobacco or reconstituted tobacco granules) composed of the fine powder of plants of the genus Nicotiana. The tobacco sheet may be a sheet produced by a papermaking method, a cast sheet produced by a casting method, or an extruded sheet produced by an extrusion method.

[0028] The papermaking method is a method in which a mixture containing a tobacco raw material and a liquid medium, such as water, is made into paper and dried to produce a sheet. The mixture typically contains a pulped or fiberized tobacco material. The casting method is a method in which a mixture containing a tobacco raw material and a liquid medium, such as water, is spread (cast) on a substrate and dried to produce a sheet. The extrusion method is a method in which a mixture containing a tobacco raw material and a liquid medium, such as water, is extruded through a die, such as a T-die, to produce a sheet.

[0029] The tobacco filler may contain an aerosol-source material. The aerosol-source material is a material that is vaporized by heating and cooled to generate an aerosol or generates an aerosol by atomization. As the aerosol-source material, a known substance can be used. Examples thereof include polyhydric alcohols, such as glycerine and propylene glycol (PG); and materials, such as triethyl citrate (TEC) and triacetin, each having a boiling point of higher than 100°C. The amount of aerosol-source material in the tobacco filler is preferably 1% to 40% by weight, more preferably 5% to 30% by weight, still more preferably 5% to 20% by weight, on a dry weight basis (weight excluding the amount of water contained, the same applies hereinafter). An amount of aerosol-source material of more than the upper limit may result in a difficulty in producing the tobacco filler. An amount of aerosol-source material of less than the lower limit may result in a reduction in smoke sensation.

[0030] In the case of using the reconstituted tobacco sheet, it is preferable to release reconstituted tobacco sheets in laminated form and quantitatively supply them in the step 1. The term "release" indicates that the laminated block of the reconstituted tobacco sheets (in laminated form) is delaminated into individual sheets. The size thereof is not limited. In one embodiment, the laminated form of the reconstituted tobacco sheets has a pillar shape whose cross section has a quadrangular shape with a side of 3 to 10 cm.

[0031] When the reconstituted tobacco sheets in laminated form are conveyed, they are preferably packed in packaging containers each having a shape and a size that are easy to handle. An example of packaging containers is a C-48 box known among tobacco manufacturers. The C-48 box is made of cardboard and measures about 115 $\times$ 70 $\times$ 75 cm. The reconstituted tobacco sheets in laminated form can be directly packed in the C-48 box, but may be packed in plastic bags and then accommodated in the C-48 box in order to inhibit a change in quality during conveyance. In an embodiment of the present invention, about 100 to 200 kg of the reconstituted tobacco sheets in laminated form are packed in the C-48 box.

[0032] In another embodiment, the regenerated tobacco sheets are conveyed in the form of a bobbin. In a process for manufacturing a reconstituted sheet, a longitudinally continuous sheet having a width of 10 to 100 cm can be wound around a core into a bobbin shape. When the reconstituted tobacco sheet conveyed in the form of a bobbin is used in the present invention, it is necessary to cut the reconstituted tobacco sheet into a predetermined size with, for example, a shredder before the reconstituted tobacco sheet is subjected to the step 1.

(2) Moistening

[0033] The moistening can be performed with a known apparatus. In the present invention, a cylinder-type apparatus is preferably used from the viewpoint of efficiency. The apparatus includes a water supply device, a heating device, an exhaust device, and a rotating device configured to rotate about a central axis of the cylinder. The moistening is performed by supplying water to the tobacco filler from the water supply device. The moistening conditions are adjusted in such a manner that the moisture content of the tobacco filler after the moistening is about 15% to 25% by weight. In one embodiment, the temperature of the inner wall of the cylinder can be about 50°C to 70°C, the flow rate of air in the cylinder can be about 0.05 to 0.15 m/sec, and the residence time of the tobacco filler can be about 3 to 6 minutes. The dimensions of the cylinder are not limited. In one embodiment, the cylinder has a diameter of about 2 to 4 m and a length of about 5 to 10 m. The moistening is more preferably performed by ventilating the inside of the cylinder. As the tobacco filler is heated, some content components having low boiling points, such as ammonia, are volatilized and vented out of the cylinder by exhaust, thereby reducing negative taste and aroma during use.

(3) Drying

[0034] Drying allows the tobacco filler to be in a state suitable for storage. The drying can be performed by a known method. In the present invention, it is preferable to use a flash drying method or an annular drying method from the viewpoint of efficiency. In the former method, the tobacco filler is brought into contact with a heated gas stream (preferably superheated steam) in a tube to dry the tobacco filler. An example of such a device is a device described in International

Publication No. 2013/052490. In this method, distinctive flavor characters can also be imparted to the tobacco filler. In this method, the moisture in the tobacco filler is reduced in a short time; thus, the tobacco filler after the drying can be expanded as compared with that before the drying. The shape of the tobacco filler after the drying has a curled shape, thereby increasing the filling capacity of the tobacco filler. In addition, the tobacco filler is dried in a short time in an atmosphere of a large amount of superheated steam; thus, the amount of oxygen in the atmosphere during heating in the drying step can be reduced to inhibit an undesired chemical change of the tobacco filler due to oxygen.

[0035] The latter is a method in which the tobacco filler is heated and dried in a cylinder-type apparatus. With this method, highly volatile components contained in the tobacco filler can also be removed. This method requires a longer time for drying than that of the flash drying method; thus, it is possible to perform fine moisture control and to accurately achieve the finish moisture content at the outlet, which is preferable.

(4) Embodiments

[0036] The step 1 will be described below with reference to preferred embodiments.

(4-1) First Embodiment

1) Preparation

[0037] Fig. 1 illustrates a first embodiment. According to the present embodiment, reconstituted tobacco sheets in laminated form are provided and released. The moisture content of each reconstituted tobacco sheet at this stage is preferably 5% to 15% by weight. The aerosol-source material is added before or after the release. The amount of aerosol-source material in the sheet is preferably 5% to 30% by weight. Foreign matter is removed from the released reconstituted tobacco sheet. A blending silo can also be used to mix the reconstituted tobacco sheets, thereby achieving uniform quality.

2) Moistening

[0038] The reconstituted tobacco sheet is then moistened. The apparatus used for moistening and the moistening conditions are as described above. At this time, the moisture content of the reconstituted tobacco sheet is adjusted to 15% to 25% by weight. In this step, undesirable components derived from the tobacco raw material (e.g., components that impart an acrid taste) are removed.

3) Addition of Additive (Flavoring)

[0039] In this step, an additive is added to the reconstituted tobacco sheet after the moistening. The additive is a material other than the raw material, such as the reconstituted tobacco sheet, or the aerosol-source material. Examples of the additive include tobacco powders; flavoring agents; the above-described aerosol-source material; tobacco flavor enhancers, such as acids and alkalis; solvents, such as ethanol, water, benzyl alcohol, and propylene glycol; and antioxidants, such as polyphenols and vitamins. The additive can be added by a known method, i.e., by filling the reconstituted tobacco sheet into a rotating cylinder-type apparatus and spraying, for example, a flavoring agent. In particular, the addition of a tobacco powder or a flavoring agent, which is a flavor component, is particularly referred to as "flavoring". Flavoring is preferably performed in the present embodiment. Flavoring at this stage is suitable for adding a flavor component having a relatively large molecular weight. This is because such a flavor component has a low vapor pressure and a high affinity for water, and therefore, when added to the reconstituted tobacco sheet after moistening, the flavor component easily permeates into the sheet.

Examples of the flavoring agent include the following, which may be used alone or in combination of two or more.

[0040] Examples thereof include 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, cinnamic aldehyde, 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 herb 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 lactone, 4-hydroxy-4-(3-hydroxy-1-butenyl)-3,5,5-trimethyl-2-cyclohexen-1-one, 4-(p-hydroxyphenyl)-2-butanone, sodium 4-hydroxyundecanoate, immortelle absolute, β-ionone, isoamyl acetate, isoamyl butyrate, isoamyl phenylacetate, isobutyl acetate, isobutyl phenylacetate, jasmine absolute, kola nut tincture, labdanum oil, terpeneless lemon oil, glycyrrhiza 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, methylcyclopentenolone, 3-methylvaleric acid, mimosa absolute, molasses, myristic acid, nerol, nerolidol, γ-nonalactone, nutmeg oil, δ-octalactone, octanal, octanoic acid, orange flower oil, orange oil, orris root oil, palmitin acid, ω-pentadecalactone, peppermint oil, petitgrain Paraguay oil, phenethyl alcohol, phenethyl phenylacetate, phenylacetic acid, piperonal, plum extract, propenyl guaethol, propyl acetate, 3-propylidene phthalide, 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-oxacyclo(8.3.0.0(4.9))tridecane, 2,3,5,6-tetramethylpyrazine, thyme oil, tomato extract, 2-tridecanone, triethyl citrate, 4-(2,6,6-trimethyl-1-cyclohexenyl)-2-buten-4-one, 2,6,6-trimethyl-2-cyclohexene-1,4-dione, 4-(2,6,6-trimethyl-1,3-cyclohexadienyl)-2-buten-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), ethyl-2-(p-menthane-3-carboxamide) acetate (WS-5), sugars (such as sucrose and fructose), cacao powders, carob powders, coriander powders, licorice powders, orange peel powders, rose hip powders, chamomile flower powders, Lemon verbena powders, peppermint powders, leaf powders, spearmint powders, tea powders, natural vegetable flavoring agents (such as jasmine oil, lemon oil, vetiver oil, and lovage oil), esters (such as menthyl acetate and isoamyl propionate), and alcohols (such as phenylethyl alcohol and cis-6-nonen-1-ol).

[0041] It is also preferable to add an antioxidant as an additive. It has been reported that tobacco vapors from non-combustion-heating-type flavor inhalation articles contain TSNAs (Tobacco specific nitrosamines) (Non Patent Literature 1). In the non-combustion-heating-type flavor inhalation article, the tobacco filler is continuously heated for a long time during use. Thus, prolonged heating may form an unintended component in the tobacco filler of the non-combustion-heating-type flavor inhalation article. The addition of the antioxidant can inhibit the aforementioned reaction and inhibit the formation of the unintended component.

[0042] As the antioxidant, for example, an antioxidant known as a food additive can be used. Examples thereof include gallic acid, erythorbic acid, ascorbic acid, catechin, dihydrocaffeic acid, p-coumaric acid, ferulic acid, 3-(4-hydroxyphenyl) propionic acid, quercetin, esculetin, kaempferol, caffeic acid, tocopherol, dibutylhydroxytoluene (BHT), quinic acid, chlorogenic acid, rutin, scopoletin, and cinnamic acid. The antioxidant is preferably at least one selected from the group consisting of gallic acid and erythorbic acid. The antioxidant is contained in the tobacco filler in an amount of, for example, 0.25% to 10% by weight, preferably 0.25% to 5.0% by weight, more preferably % by weight, based on the tobacco filler. The antioxidant can be added to the tobacco filler by, for example, melting or dispersing the antioxidant in a solvent, such as water or ethanol, and spraying the resulting mixture.

4) Shredding

[0043] In this step, the reconstituted tobacco sheet that has been flavored is shredded. The shredding can be performed with a known apparatus. In the present invention, preferably, the reconstituted tobacco sheet is fed while compressed in such a manner that the end portions thereof are parallel to the direction in which the blades of the knife drum extend, and cut into strands. Regarding the shape of the strands, the strands can each have a width of about 0.6 to 1.5 mm from the viewpoint of, for example, ease of filling into the wrapper. The length of the strands after the shredding is determined by the size of the individual reconstituted tobacco sheets supplied to the shredding step, the crushed states of the individual reconstituted tobacco sheets in the individual steps, and the crushed states of the strands during and after the shredding. For ease of filling into the wrapper, each strand preferably has a length of about 5 to 40 mm. The reconstituted tobacco sheet is preferably supplied to a shredder using a metering tube. In this step, the moisture content of the reconstituted tobacco sheet supplied in the shredding step may be adjusted to 15% to 25% by weight in order to efficiently perform cutting.

5) Drying

[0044] In this step, the strand-shaped reconstituted tobacco sheet is dried. The apparatus used for drying and the drying conditions are as described above. At this time, the moisture content of the reconstituted tobacco sheet is adjusted to 8% to 12% by weight. This step also improves the filling capacity of the strand-shaped reconstituted tobacco sheet.

6) Mixing of Non-Tobacco Material

[0045] In this step, a solid additive carrying a filler or flavoring agent is added to the strand-shaped reconstituted tobacco sheet. Examples of the filler include strand-shaped paper, strand-shaped calcium carbonate sheets, and granular porous polysaccharide beads. From the viewpoint of enhancing the mixing properties, a material to be added preferably has a shape similar to the strands. For example, when a flavoring agent-carrying polysaccharide sheet is added as a flavoring agent-carrying solid additive, the taste and flavor of the non-combustion-heating-type flavor inhalation article during use can be advantageously enhanced. The flavoring agent-carrying sheet to be mixed with the tobacco filler is preferably one containing a polysaccharide thickener as a base material, which is disclosed in Japanese Patent Nos. 5941988, 5934799, 5514953, and 5481574, in view of the balance between the flavor retention performance during storage and the flavoring agent release performance during use. The sheet of the flavoring agent-carrying polysaccharide can have a width of about 0.5 to 1.5 mm, a length of about 2 to 4 mm, and a thickness of about 70 μm. The mixing method is not limited. Examples thereof include a method in which a conveyor on which a shredded flavoring agent-carrying polysaccharide sheet is conveyed is joined to a conveyor on which a strand-shaped reconstituted tobacco sheet is conveyed to mix them together, and a method in which they are introduced into a cylinder-type mixer to mix them.

7) Flavoring

[0046] The strand-shaped reconstituted tobacco sheet after drying may be flavored again. A flavoring method and a component used are as described above. The flavoring at this stage is suitable when a flavor component having a relatively small molecular weight is added. After this step, a flavor inhalation article can be produced without drying the tobacco filler. For this reason, in this step, the addition of a relatively easily volatile flavor component expressing a flavor, strong flavor characteristics can be imparted to the final product.

8) Primary Storage

[0047] The strands thus obtained are stored. The stored tobacco filler (strands) is subjected to the step 2.

(4-2) Second Embodiment

[0048] Fig. 2 illustrates a second embodiment. In the present embodiment, two lines are used. On one line, 1) to 3) of the first embodiment are performed to prepare a reconstituted tobacco sheet A. Similarly, on the other line, 1) to 3) of the first embodiment are performed to prepare a reconstituted tobacco sheet B. In this case, the reconstituted tobacco sheets A and B are preferably composed of different components. Both reconstituted tobacco sheets A and B may be flavored, one of them may be flavored, or neither need be flavored.

[0049] The reconstituted tobacco sheets A and B are then mixed together. The mixing ratio is appropriately adjusted so as to achieve a desired flavor. Mixing them at this point can result in high mixing efficiency. In addition, the mixture can be subjected to processes, such as shredding and drying, thus resulting in a more uniform product.

[0050] Subsequently, the mixture of the reconstituted tobacco sheets A and B is subjected to steps of shredding, drying, mixing with a non-tobacco material, and flavoring. The resulting product is subjected to primary storage. These steps are as described in the first embodiment 4) to 8).

[0051] This embodiment is suitable for producing brands having different flavor characteristics. For example, when a base material common to these brands is the reconstituted tobacco sheet A, different brands can be efficiently produced by appropriately using the reconstituted tobacco sheet B serving as a sub-raw material at the time of brand switching. When the reconstituted tobacco sheet A is analyzed during the production of the reconstituted tobacco sheet A and found to contain insufficient components, the reconstituted tobacco sheet B designed to compensate for the insufficient components is mixed therewith. This can produce a mixture of the reconstituted tobacco sheets with stable quality.

[0052] Examples of the varieties of tobacco used as a material for the reconstituted tobacco include flue-cured varieties of Nicotiana tabacum, Burley varieties, Oriental varieties, and native varieties. These may be used alone or in combination as a mixture. Typically, the blend ratio thereof is changed to achieve the desired taste and flavor. An example of the design concept of blending the sheet A and the sheet B is as follows: The sheet A having high proportions of a flue-cured variety and an Oriental variety, which are constituent tobacco varieties, is prepared (the total amount thereof is preferably more than 50% by weight, more preferably 80% or more by weight, of the total amount of tobaccos). The sheet B having a high proportion of a Burley variety or a native variety, which is a constituent tobacco variety, is prepared (the total amount thereof is preferably more than 30% by weight, more preferably 80% or more by weight, of the total amount of tobaccos). The blending ratio of the sheet A and the sheet B is determined in accordance with the target taste and flavor, and thus it is possible to manufacture flavor inhalation articles having a large number of variations although the number of types of sheets prepared is two.

[0053] In addition to the above-mentioned four varieties of tobaccos that exhibit different flavors, there are tobacco varieties that have strong taste and flavor characteristics even in a small amount. Examples of such tobaccos include those referred to as Perique, Latakia, and Dark Fire-Cured. These varieties are the same as the aforementioned flue-cured varieties, Burley varieties, Oriental varieties, or native species, but are subjected to smoke treatment or forced fermentation treatment under high-temperature and high-moisture conditions after harvesting in leaf tobacco farmers. Specially treated tobaccos, such as fermented tobaccos, e.g., Perique and Dark Fire-Cured tobaccos, or smoked tobaccos, e.g., Latakia tobacco, develop unique flavor characteristics when blended in small amounts. A reconstituted tobacco sheet containing Perique, Latakia, Dark Fire-Cured, or the like can be used as the sheet B to expand the variation in brand characteristics. The total amount of Perique, Latakia, and Dark Fire-Cured tobaccos is preferably 1.0% or more by weight and less than 10.0% by weight, more preferably 1.0% or more by weight and less than 5.0% by weight, based on the total amount of tobacco.

(4-3) Third Embodiment

[0054] Fig. 3 illustrates a third embodiment. In the present embodiment, two lines are used. On one line, 1) to 5) of the first embodiment are performed to prepare a strand-shaped reconstituted tobacco sheet A. Similarly, on the other line, 1) to 5) of the first embodiment are performed to prepare a strand-shaped reconstituted tobacco sheet B. In this case, the reconstituted tobacco sheets A and B are preferably composed of different components. Both reconstituted tobacco sheets A and B may be flavored, or one of them may be flavored.

[0055] The strand-shaped reconstituted tobacco sheets A and B are then mixed together. The mixing ratio is appropriately adjusted so as to achieve a desired flavor.

[0056] Subsequently, the resulting mixture is subjected to steps of mixing with a non-tobacco material and flavoring. The resulting product is subjected to primary storage. These steps are as described in 6) and 7) of the first embodiments.

[0057] This embodiment is suitable for producing brands having different flavor characteristics as in the second embodiment. For example, when a base material common to these brands is the reconstituted tobacco sheet A, different brands can be efficiently produced by appropriately using the reconstituted tobacco sheet B serving as a sub-raw material at the time of brand switching. When the reconstituted tobacco sheet A is analyzed during the production of the reconstituted tobacco sheet A and found to contain insufficient components, the reconstituted tobacco sheet B designed to compensate for the insufficient components can also be mixed therewith to produce the reconstituted tobacco sheet A with stable quality. In the present embodiment, the reconstituted tobacco sheets A and B are separately subjected to shredding and drying; thus, it is possible to set conditions according to individual characteristics. For example, when a flavoring agent added to the reconstituted tobacco sheet A is different from a flavoring agent added to the reconstituted tobacco sheet B, the optimal drying conditions are different depending on the flavoring agent. In the present embodiment, there is an advantage that the conditions suitable for each flavoring agent can be selected.

(4-4) Fourth Embodiment

[0058] Fig. 4 illustrates a fourth embodiment. In the present embodiment, two lines are used. In one line, 1) to 3) of the first embodiment are performed to process a reconstituted tobacco sheet A. On the other line, laminae are similarly processed. The term "laminae" refers to stemmed leaves obtained by removing midribs from tobacco leaves. While Fig. 4 illustrates an embodiment in which two types of laminae are used, one or more types of laminae can be used. In this case, laminae A and B are preferably composed of different components. The steps up to a step of flavoring a lamina can be performed in the same manner as in 1) to 3) of the first embodiment.

[0059] The laminae A and B are then mixed together, and the resulting mixture is moistened. The moistening can be performed in the same manner as in 2) of the first embodiment. The moistened mixture is further mixed with the flavored reconstituted tobacco sheet A. Subsequently, the resulting mixture is subjected to steps of shredding, drying, mixing with a non-tobacco material, and flavoring. The resulting product is subjected to primary storage. These steps are as described in the first embodiment 4) to 8). The flavoring may be performed on one or more of the reconstituted tobacco sheet A, the lamina A, and the lamina B, or may be performed on all of them.

[0060] In the present embodiment, the effects described in the second embodiment can be provided. When a lamina having a higher filling capacity than the tobacco sheet is mixed, the amount of filling materials required to achieve the same firmness of the wrapped tobacco rod portion can be reduced, compared with the case where the tobacco rod portion is formed of only the tobacco sheet.

(4-5) Fifth Embodiment

[0061] Fig. 5 illustrates a fifth embodiment. In the present embodiment, two lines are used. On one line, 1) to 5) of the first embodiment are performed to prepare a strand-shaped reconstituted tobacco sheet A. Similarly, in the other line,

a mixture of the laminae A and B is prepared in the same manner as in 1) to 3) of the first embodiment. The mixture is subjected to moistening, shredding, and drying in the same manner as in 2), 3), and 5) of the first embodiment.

[0062] The strand-shaped reconstituted tobacco sheet A and the strand-shaped lamina mixture are mixed together. The mixing ratio is appropriately adjusted so as to achieve a desired flavor.

[0063] Subsequently, the resulting mixture is subjected to steps of mixing with a non-tobacco material and flavoring. The resulting product is subjected to primary storage. These steps are as described in the first embodiments 6) and 7). The flavoring may be performed on one or more of the reconstituted tobacco sheet A, the lamina A, and the lamina B, or may be performed on all of them.

[0064] In the present embodiment, the effects described in the third embodiment can be provided. As described in the fourth embodiment, the amount of filling materials can also be reduced.

(5) Other Steps

[0065] The manufacturing method of the present invention may further include a step of measuring a component of the tobacco filler and adjusting the amount of additive to be added on the basis of the measurement result. In this case, it is preferable to transmit the measurement result to a controller and to transmit the resulting information from the controller to an additive-adding device. In particular, it is preferable to measure nitrite in the tobacco filler and to determine the amount of antioxidant added on the basis of the measurement result. An excessively large amount of antioxidant added results in an increase in cost or a deterioration in flavor. Thus, the determination of an appropriate amount can provide a user-friendly product without causing such an disadvantage.

(6) Preparation of Reconstituted Tobacco Sheet

[0066] Preferred embodiments of the preparation of reconstituted tobacco sheets will be described below.

(6-1) Papermaking Method

[0067] As tobacco plant materials, flue-cured varieties of Nicotiana tabacum, Burley varieties, Oriental varieties, and native varieties can be used alone or in combination. Regarding plant parts, any one or combination of flowers, leaves, veins, stems, and roots may be used.

[0068] The tobacco plant material is coarsely ground to a size of about 1 to 40 mm and subjected to extraction with water. The extraction temperature is preferably 30°C to 90°C, and the extraction time is preferably 10 to 45 minutes.

[0069] The mixture subjected to the extraction step is subjected to a separation operation by centrifugation or using a wire mesh, and separated into an extract and a residue. The extract is concentrated under reduced pressure at a temperature of 40°C to 70°C in such a manner that the ratio of the extract to water is 40% to 55% by weight. The concentrated liquid is mixed with an aerosol-source material, such as glycerine. The residue is mixed with coarsely ground wood pulp. The mixture is treated in a refining device (refiner) to fluff the fibers, and then the mixture is further ground to a uniform size. The mixture of the residue and the wood pulp is suspended in a large amount of water, supplied onto a mesh wire used in a papermaking process at a constant feed rate, dewatered, and dried, thereby forming a sheet. The sheet is sprayed with the concentrated liquid. Drying is performed again after the spraying. Finally, the sheet may be wound on a bobbin, or may be cut into 3 to 10 cm squares with a shredder and stored in a container.

[0070] Examples of the raw-material composition, components, and physical properties of the reconstituted tobacco sheet by the papermaking method is described below.

(Raw-Material Composition)

[0071]

Flue-cured lamina/scrap (mesophyll): 50% to 70% by weight
Burley lamina: 0% to 50% by weight
Flue-cured midrib (vein): 0% to 50% by weight
Burley midrib: 0% to 35% by weight
Wood pulp: 7% to 12% by weight
Glycerine: 10% to 20% by weight
Moisture content: 7% to 12% by weight

(Component)

[0072]

Nicotine: 0.8% to 3.0% by weight (dry basis)
Reducing sugar: 5.0% to 20.0% by weight (dry basis)

(Physical Properties)

[0073]

Filling capacity after simply shredding to a width of 0.8 mm: 250 to 400 cm^3/100 g
Filling capacity after addition of water, shredding to a width of 0.8 mm, and flash drying: 300 to 450 cm^3/100 g

(6-2) Casting Method

[0074] As tobacco plant materials, flue-cured varieties of Nicotiana tabacum, Burley varieties, Oriental varieties, and native varieties can be used alone or in combination. Regarding plant parts, any one or combination of flowers, leaves, veins, stems, and roots may be used.

[0075] The tobacco plant material is ground to a size of 100 μm or less and mixed with water, pulp, an aerosol-source material, such as glycerine, a binder, such as a gum, a modified cellulose, a polysaccharide thickener, or a modified starch, and a flavoring agent to prepare a slurry. The moisture content of the slurry is preferably 50% by volume or more. Thereafter, the slurry is spread on a substrate in a thin sheet and dried with a dryer until the moisture content reaches about 7% to 14% by weight. Finally, the sheet may be wound on a bobbin, or may be cut into 3 to 10 cm squares with a shredder and stored in a container.

[0076] Examples of the raw-material composition and components of the reconstituted tobacco sheet by the casting method is described below.

(Raw-Material Composition)

[0077]

Flue-cured lamina (mesophyll): 60% to 95% by weight
Burley lamina: 0% to 20% by weight
Flue-cured midrib (vein): 0% to 20% by weight
Burley midrib: 0% by weight
Wood pulp: 3% to 5% by weight
Glycerine: 10% to 20% by weight
Guar gum: 2% to 10% by weight
Moisture content: 7% to 14%

(Component)

[0078]

Nicotine: 1.5% to 5.0% by weight (dry basis)
Reducing sugar: 5% to 20% by weight (dry basis)

(6-3) Extrusion Method

[0079] The tobacco plant material is ground to a size of 300 μm or less and mixed with water, pulp, an aerosol-source material, such as glycerine, a binder, such as a gum, a modified cellulose, a polysaccharide thickener, or a modified starch, and a flavoring agent to prepare a kneaded material. Thereafter, the kneaded material is placed into an extruder in which a die having an opening with a predetermined thickness and a predetermined width is disposed at an outlet portion. A sheet-like kneaded product is extruded from the extruder to a drying section, such as a drying drum or a drying conveyor. Drying is performed with the drying section until the moisture content reaches about 7% to 14% by weight. Finally, the sheet may be wound on a bobbin, or may be cut into 3 to 10 cm squares with a shredder and stored in a container.

[0080] Examples of the raw-material composition and components of the reconstituted tobacco sheet by the extrusion method is described below.

(Raw-Material Composition)

[0081]

Flue-cured lamina (mesophyll): 60% to 95% by weight
Burley lamina: 0% to 20% by weight
Flue-cured midrib (vein): 0% to 20% by weight
Burley midrib: 0% by weight
Wood pulp: 3% to 5% by weight
Glycerine: 10% to 20% by weight
Hydroxypropyl cellulose: 2% to 10% by weight
Moisture content: 7% to 14%

(Component)

[0082]

Nicotine: 1.5% to 5.0% by weight (dry basis)
Reducing sugar: 5% to 20% by weight (dry basis)

2. Step 2

[0083] In this step, a tobacco rod portion is prepared in which a tubular wrapper is filled with the tobacco filler prepared in the step 1. For example, the tobacco rod portion can be produced by providing paper as a wrapper and wrapping the tobacco filler with the paper. Alternatively, the tobacco rod portion can also be produced by providing a tubular wrapper and filling the tobacco filler into the wrapper. The cross-sectional shape of the tubular wrapper is not limited and can be circular, elliptical, or polygonal.

3. Characteristics

[0084] The tobacco filler provided by the manufacturing method of the present invention has particularly better filling capacity. The term "filling capacity" refers to a volume per unit weight when a lump of the tobacco filler (preferably shreds) is compressed at a constant force, and is also an index of bulk density. Specifically, the filling capacity is calculated from the following formula using the height of the column of shredded tobacco, the height being obtained after applying a load of 11.4 kg for 5 seconds to the inside of a measurement cylinder, having a diameter of 95 mm, into which a sample has been placed:

$$FP = (A \times h5)/W \ [cm^3/100\ g]$$

where

FP: filling capacity,
A: the cross-sectional area of the column of the shredded tobacco,
W: the weight of the shredded tobacco, and
h5: the height of the column of the shredded tobacco at the end of loading.

[0085] The tobacco rod portion of a flavor inhalation article (or smoking article) is mainly manufactured by wrapping a tobacco filler with a cylindrical paper wrapper. Typically, users tend to prefer tobacco rod portions having certain degrees of firmness. To harden the tobacco rod portion, it is conceivable to increase the amount of tobacco filler filled, but a larger amount of tobacco filler filled results in higher costs. A tobacco filler having high filling capacity, however, can provide a tobacco rod portion having required firmness when filled in a smaller amount.

3. Non-Combustion-Heating-Type Flavor Inhalation Article

[0086] Examples of smoking articles include a flavor inhalation article in which a user tastes flavor by inhalation; and smokeless tobacco (smokeless smoking article) in which a user tastes flavor by directly holding a product in a nasal cavity or an oral cavity. Flavor inhalation articles can be roughly classified into combustion-type smoking articles represented by conventional cigarettes and non-combustion-type smoking articles. The tobacco rod portion of the present invention is used for a non-combustion-heating-type flavor inhalation article to be heated for use, among non-combustion smoking articles.

[0087] The non-combustion-heating-type flavor inhalation article may be heated by a heating device separate from the article, or may be heated by a heating device integrated with the article. In the former flavor inhalation article (separate type), the non-combustion-heating-type flavor inhalation article and the heating device are also collectively referred to as a "non-combustion-heating-type smoking system". An example of the non-combustion-heating-type smoking system will be described below with reference to Figs. 6 and 7.

[0088] Fig. 6 is a schematic cross-sectional diagram of an example of a non-combustion-heating-type smoking system, and illustrates a state before a heater 12 is inserted into a tobacco rod portion 20A of a non-combustion-heating-type flavor inhalation article 20. In use, the heater 12 is inserted into the tobacco rod portion 20A. Fig. 7 is a cross-sectional diagram of the non-combustion-heating-type flavor inhalation article 20.

[0089] As illustrated in Fig. 6, the non-combustion-heating-type smoking system includes a non-combustion-heating-type flavor inhalation article 20 and a heating device 10 configured to heat the tobacco rod portion 20A from the inside thereof. However, the non-combustion-heating-type smoking system is not limited to the configuration of Fig. 6.

[0090] The heating device 10 illustrated in Fig. 6 includes a body 11 and the heater 12. Although not illustrated in the figure, the body 11 may include a battery unit and a control unit. The heater 12 may be an electric resistance heater, and is inserted into the tobacco rod portion 20A to heat the tobacco rod portion 20A.

[0091] The figure illustrates an embodiment in which the tobacco rod portion 20A is heated from the inside thereof. However, the non-combustion-heating-type flavor inhalation article 20 is not limited to the embodiment. In another embodiment, the tobacco rod portion 20A is heated from the outside thereof.

[0092] In the heating device 10, the heating temperature is preferably, but not particularly limited to, 400°C or lower, more preferably 50°C to 400°C, still more preferably 150°C to 350°C. The term "heating temperature" refers to the temperature of the heater 12 of the heating device 10.

[0093] As illustrated in Fig. 7, the non-combustion-heating-type flavor inhalation article 20 (hereinafter, simply referred to as a "flavor inhalation article 20") has a cylindrical shape. The circumference of the flavor inhalation article 20 is preferably 16 mm to 27 mm, more preferably 20 mm to 26 mm, still more preferably 21 mm to 25 mm. The total length (length in the horizontal direction) of the flavor inhalation article 20 is preferably, but not particularly limited to, 40 mm to 90 mm, more preferably 50 mm to 75 mm, still more preferably 50 mm to 60 mm.

[0094] The flavor inhalation article 20 includes the tobacco rod portion 20A, a filter portion 20C constituting an inhalation port, and a connecting portion 20B connecting them.

[0095] The tobacco rod portion 20A has a cylindrical shape, and the overall length (length in the axial direction) thereof is, for example, preferably 5 to 100 mm, more preferably 10 to 50 mm, still more preferably 10 to 25 mm. The cross-sectional shape of the tobacco rod portion 20A is not particularly limited and can be, for example, circular, elliptical, or polygonal.

[0096] The tobacco rod portion 20A includes a tobacco filler 21 and a wrapper 22 wrapped therearound. The wrapper 22 may be a tobacco sheet composed of the tobacco filler of the present invention.

[0097] The filter portion 20C has a cylindrical shape. The filter portion 20C has a rod-shaped first segment 25 filled with cellulose acetate fibers and a rod-shaped second segment 26 also filled with cellulose acetate fibers. The first segment 25 is located adjacent to the tobacco rod portion 20A. The first segment 25 may have a hollow portion. The second segment 26 is located adjacent to the inhalation port. The second segment 26 is solid. The first segment 25 is composed of a first filling layer (cellulose acetate fibers) 25a and an inner plug wrapper 25b wound around the first filling layer 25a. The second segment 26 is composed of a second filling layer (cellulose acetate fibers) 26a and an inner plug wrapper 26b wound around the second filling layer 26a. The first segment 25 and the second segment 26 are connected by an outer plug wrapper 27. The outer plug wrapper 27 is bonded to the first segment 25 and the second segment 26 with a vinyl acetate emulsion-based adhesive or the like.

[0098] The length of the filter portion 20C can be, for example, 10 to 30 mm, the length of the connecting portion 20B can be, for example, 10 to 30 mm, the length of the first segment 25 can be, for example, 5 to 15 mm, and the length of the second segment 26 can be, for example, 5 to 15 mm. The lengths of these individual segments are merely examples, and can be appropriately changed in accordance with manufacturing suitability, required qualities, the lengths of the tobacco rod portion 20A, and the like.

[0099] For example, the first segment 25 (center hole segment) includes the first filling layer 25a having one or multiple hollow portions and the inner plug wrapper 25b covering the first filling layer 25a. The first segment 25 has the function

of increasing the strength of the second segment 26. The first filling layer 25a of the first segment 25 is densely filled with, for example, cellulose acetate fibers. A plasticizer containing triacetin is added to the cellulose acetate fibers in an amount of, for example, 6% to 20% by weight based on the weight of the cellulose acetate, and the cellulose acetate fibers are hardened. The hollow portion of the first segment 25 has an inside diameter of, for example, ø10 to o5.0 mm.

[0100] The first filling layer 25a of the first segment 25 may have, for example, a relatively high fiber filling density, or may have a fiber filling density comparable to the second filling layer 26a of the second segment 26 described below. Thus, at the time of inhalation, air or aerosol flows through only the hollow portion, and air or aerosol hardly flows through the first filling layer 25a. For example, in order to reduce the decrease of an aerosol component in the second segment 26 due to filtration, for example, the length of the second segment 26 may be reduced, and the first segment 25 may be lengthened by the shortened length.

[0101] Replacing the shortened portion of the second segment 26 with the first segment 25 is effective in increasing the amount of aerosol component delivered. The first filling layer 25a of the first segment 25 is a fiber-filled layer; thus, the tactile sensation from the outside during use does not cause discomfort to the user.

[0102] The second segment 26 is composed of the second filling layer 26a and the inner plug wrapper 26b covering the second filling layer 26a. The second segment 26 (filter segment) is filled with cellulose acetate fibers at a typical packing density and has typical filtration performance for aerosol components.

[0103] The first segment 25 and the second segment 26 may have different filtration performances for filtering aerosol (mainstream smoke) released from the tobacco rod portion 20A. At least one of the first segment 25 and the second segment 26 may contain a flavoring agent. The structure of the filter portion 20C is freely selected, and may be a structure having multiple segments as described above, or may be composed of a single segment. Alternatively, the filter portion 20C may be composed of one segment. In this case, the filter portion 20C may be composed of any of the first segment and the second segment.

[0104] The connecting portion 20B has a cylindrical shape. The connecting portion 20B includes a paper tube 23 formed of, for example, cardboard in a cylindrical shape. The connecting portion 20B may be filled with a cooling member for cooling the aerosol. An example of the cooling member is a sheet of a polymer, such as poly(lactic acid), and this sheet can be folded and filled. A support portion may be disposed between the tobacco rod portion 20A and the connecting portion 20B configured to inhibit variations in the position of the tobacco rod portion 20A. The support portion can be composed of a known material, such as a center hole filter like the first segment 25.

[0105] A wrapper 28 is cylindrically wound around the outside of the tobacco rod portion 20A, the connecting portion 20B, and the filter portion 20C, and integrally connects them. On one surface (inner surface) of the wrapper 28, a vinyl acetate emulsion-based adhesive is applied to the entire surface or substantially the entire surface excluding the vicinities of vent hole portions 24. After the tobacco rod portion 20A, the connecting portion 20B, and the filter portion 20C are integrated with the wrapper 28, the multiple vent hole portions 24 are formed by laser processing from the outside.

[0106] The vent hole portions 24 have two or more through-holes penetrating the connecting portion 20B in the thickness direction. The two or more through-holes are formed so as to be radially arranged when viewed from the extension of the central axis of the flavor inhalation article 20. In the present embodiment, the vent hole portions 24 are provided in the connecting portion 20B, but may be provided in the filter portion 20C. In the present embodiment, the two or more through-holes of the vent hole portions 24 are provided in one row at regular intervals on one circular ring, or may be provided in two rows at regular intervals on two circular rings. One or two rows of the vent hole portions 24 may be arranged discontinuously or irregularly. When a user holds the inhalation port in user's mouth and inhales, outside air is taken into the mainstream smoke through the vent hole portions 24. However, the vent hole portions 24 need not be provided.

EXAMPLES

[Preparation of Reconstituted Tobacco Sheet]

[0107] Reconstituted tobacco sheets were prepared by a papermaking method. Table 1 presents proportions of components in finished products, and Table 2 presents the basic physical properties of the finished products.

[Table 1]

[0108]

Table 1

Raw material	Name: Sheet 1	Name: Sheet 2
Tobacco mesophyll (variety: flue-cured, Burley, Oriental)	66.6%	63.2%

(continued)

Raw material	Name: Sheet 1	Name: Sheet 2
Tobacco vein (variety: flue-cured)	7.4%	15.8%
Wood pulp	11.0%	6.0%
Glycerine	15.0%	15.0%
Total	100.0%	100.0%
* % by weight on wet basis		

[Table 2]

[0109]

Table 2

	Name: Sheet 1	Name: Sheet 2
Thickness [μm]	220	220
Basis weight [g/m^2]	102	102
Filling capacity [cm^3/100 g] *	303	342
Moisture content [%]	13.7	13.2
*Filling capacity after processing into a shredded shape with a shred width of 0.8 mm		

[Method for Measuring Filling Capacity]

[0110] The filling capacity was measured according to the following procedure.

<Apparatus>

[0111]

Instrument name: Factory Densimeter D51 (version 12 Rev 27/03/02)
Instrument manufacturer: Borgwaldt (Germany)

<Work Environment>

[0112] Temperature: 22°C, relative humidity: 60%

<Measurement Conditions>

[0113]

Tobacco container size
Inside diameter: 95 mm
Capacity: about 1.5 L
Loading weight: 11.4 kg
Descending speed: about 30 mm/s
Loading interval: 5 seconds
Interval time: 10 seconds

<Definition>

[0114] The filling capacity is a value calculated from the height of the column of shredded tobacco, the height being obtained after applying a load of 11.4 kg for 5 seconds to the inside of a measurement cylinder, having a diameter of

95 mm, into which a sample has been placed. That is, the filling capacity represents the volume per unit weight of shreds when the lump of the shreds is compressed at a constant force.

$$FP = (A \times h5)/W \ [cm^3/100\ g]$$

where

FP: filling capacity,
A: the cross-sectional area of the column of the shredded tobacco,
W: the weight of the shredded tobacco, and
h5: the height of the column of the shredded tobacco at the end of loading.

[Comparative Example 1]

[0115] A reconstituted tobacco sheet (name: sheet 1) was shredded with a shredder (available from Hauni, name: KT2L) set at a shred width of 0.8 mm. After the shredding, the shreds had various lengths, and the lengths were in the range of about 5.0 mm to 30.0 mm. The moisture content and the filling capacity of the reconstituted tobacco sheet after the shredding were measured. In the moisture content measurement, the weight loss after storage in an oven at 105°C for 1 hour was calculated as the moisture loss.

[0116] The results are described below.

Water content: 13.7 [% by weight]
Filling capacity: 303 [cm^3/100 g]

[Comparative Example 2]

[0117] Shredding was performed in the same manner as in Comparative example 1, except that the type of reconstituted tobacco sheet was changed to sheet 2. The filling capacity was evaluated. The results are described below.

[0118] The results are as follows.

Moisture content: 13.2 [% by weight]
Filling capacity: 342 [cm^3/100 g]

[Example 1]

<Moistening>

[0119] The reconstituted tobacco sheet (name: sheet 1) was placed in a cylindrical container (inside diameter: 0.9 m, length: 2.0 m) equipped with a moisture-supplying device, a heating device, and a rotating device, and was moistened by adding water vapor. At this time, the temperature of the reconstituted tobacco sheet was about 50°C to 70°C. The cylinder was evacuated when steam and hot water were added. The moisture content of the reconstituted tobacco sheet after the moistening was 18.0% by weight.

<Shredding>

[0120] The reconstituted tobacco sheet after the moistening was shredded with a shredder (available from Hauni, name: KT2L) set at a shred width of 0.8 mm. The shreds after the shredding had various lengths, and the lengths were in the range of about 5.0 mm to 30.0 mm. The moisture content was 18.0% by weight.

<Drying>

[0121] The tobacco sheet after the shredding was dried with a flash dryer. The flash dryer (available from Garbuio/Dickinson, name: EVA Dryer 400) was used.

<Evaluation>

[0122] The moisture content and the filling capacity of the reconstituted tobacco sheet after the flash drying were

measured. In the moisture content measurement, the weight loss after storage in an oven at 105°C for 1 hour was calculated as the moisture loss. The results are described below.

Moisture content: 13.3 [% by weight]
Filling capacity: 354 [cm^3/100 g]

[Example 2]

[0123] Shredding was performed in the same manner as in Example 1, except that the type of reconstituted tobacco sheet was changed to sheet 2. The filling capacity was evaluated. The results are described below.

Moisture content: 13.2 [% by weight]
Filling capacity: 371 [cm^3/100 g]

[0124] The above results are summarized in the table below.

[Table 3]

		Moisture content [% by weight]	Filling capacity [cm^3/100 g]
Sheet 1	Before treatment (Comparative example 1)	13.7	303
	After treatment (Example 1)	13.3	354
Sheet 2	Before treatment (Comparative example 2)	13.2	342
	After treatment (Example 2)	13.2	371

[0125] Each of the two types of reconstituted tobacco sheets produced by the method of the present invention had a higher filling capacity than the reconstituted tobacco sheets produced by the comparative examples. The value of the filling capacity is strongly influenced by the shape of the tobacco when measuring the filling capacity. For this reason, all the shredded tobaccos in these examples were of the same shape. In addition, the moisture content of the shredded tobaccos also affects the filling capacity. For this reason, the shredded tobaccos in these examples were made to have the same moisture content as much as possible. As an empirical formula (experimental formula), there is a correction formula for correcting the moisture content of tobacco in terms of filling capacity. In these examples, differences in moisture content among these levels were small. It was thus determined that moisture content correction was unnecessary.

Claims

1. A method for manufacturing a tobacco rod portion for a non-combustion-heating-type flavor inhalation article, comprising:

   step 1 of moistening and then drying a tobacco filler; and
   step 2 of preparing a tobacco rod portion in which a tubular wrapper is filled with the tobacco filler obtained in the step 1.

2. The method according to claim 1, wherein the tobacco filler contains an aerosol-source material and a reconstituted tobacco sheet.

3. The method according to claim 2, further comprising a step of cutting the tobacco filler into a strand shape.

4. The method according to any one of claims 1 to 3,

   wherein the tobacco filler contains a reconstituted tobacco sheet A and a reconstituted tobacco sheet B, and the step 1 includes separately moistening the reconstituted tobacco sheets, then mixing the reconstituted tobacco sheets to give a mixture, and drying the mixture, or includes separately moistening and then drying the reconstituted tobacco sheets, and subsequently mixing the reconstituted tobacco sheets.

5. The method according to any one of claims 1 to 3,

wherein the tobacco filler contains a reconstituted tobacco sheet A and a lamina, and
the step 1 includes separately moistening the reconstituted tobacco sheet A and the lamina, then mixing the reconstituted tobacco sheet A and the lamina to give a mixture, and drying the mixture, or includes separately moistening and then drying the reconstituted tobacco sheet A and the lamina, and subsequently mixing the reconstituted tobacco sheet A and the lamina.

6. The method according to any one of claims 1 to 5, further comprising a step of mixing the tobacco filler with a non-tobacco material.

7. The method according to any one of claims 1 to 6, further comprising a step of adding an additive to the tobacco filler.

8. The method according to claim 4 or 6, further comprising a step of adding an additive to one or both of the reconstituted tobacco sheet A and the reconstituted tobacco sheet B.

9. The method according to claim 5 or 6, further comprising a step of adding an additive to one or both of the reconstituted tobacco sheet and the lamina.

10. The method according to any one of claims 7 to 9, further comprising a step of measuring a component of the tobacco filler and adjusting an amount or type of the additive added based on a measurement result.

11. The method according to claim 4 or 5,

wherein a component of the reconstituted tobacco sheet A is measured, and
a type of the reconstituted tobacco sheet B or the lamina is determined based on a measurement result.

12. The method according to claim 7,

wherein a component of the reconstituted tobacco sheet A is measured, and
based on a measurement result,
an amount or type of the additive added to the reconstituted tobacco sheet B is determined, or
an amount or type of the additive added to the lamina is determined.

13. The method according to any one of claims 1 to 3, 6, and 7, wherein the moistening is performed in such a manner that the tobacco filler has a moisture content of 15% to 25% by weight.

14. The method according to any one of claims 4 to 12, wherein the moistening is performed in such a manner that the reconstituted tobacco sheet has a moisture content of 15% to 25% by weight.

15. The method according to any one of claims 1 to 14, wherein the drying is performed by a flash drying method or an annular drying method.

16. The method according to any one of claims 4 to 15, wherein the reconstituted tobacco sheets are each a sheet formed by papermaking, a cast sheet, or an extruded sheet.

Fig. 1

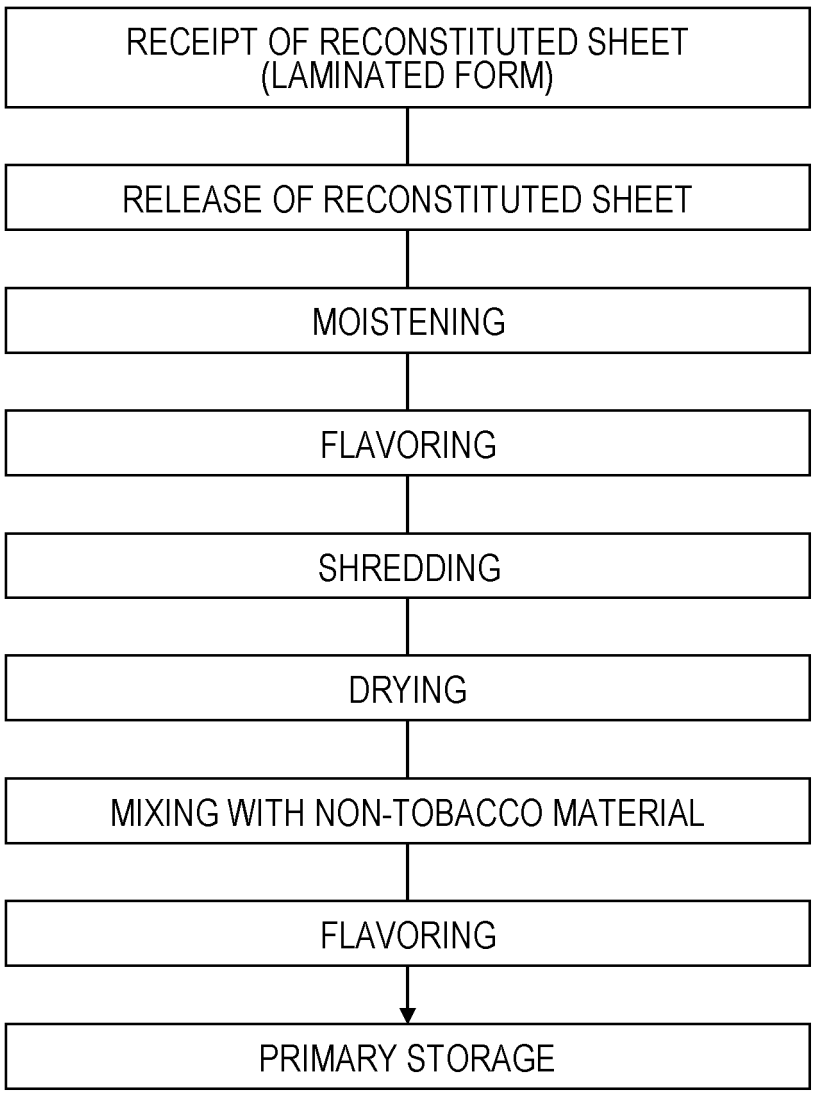
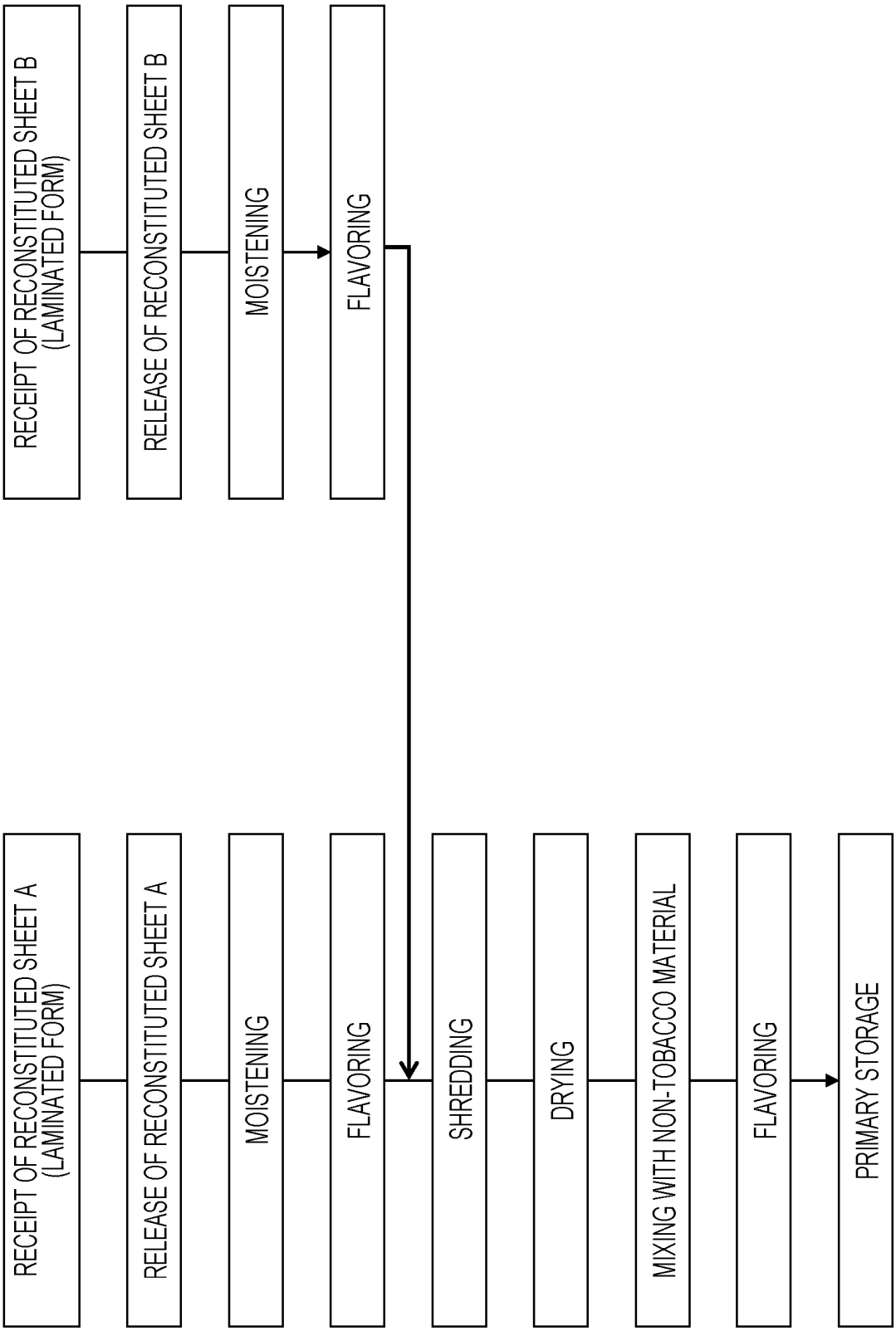

RECEIPT OF RECONSTITUTED SHEET (LAMINATED FORM)
RELEASE OF RECONSTITUTED SHEET
MOISTENING
FLAVORING
SHREDDING
DRYING
MIXING WITH NON-TOBACCO MATERIAL
FLAVORING
PRIMARY STORAGE

Fig. 2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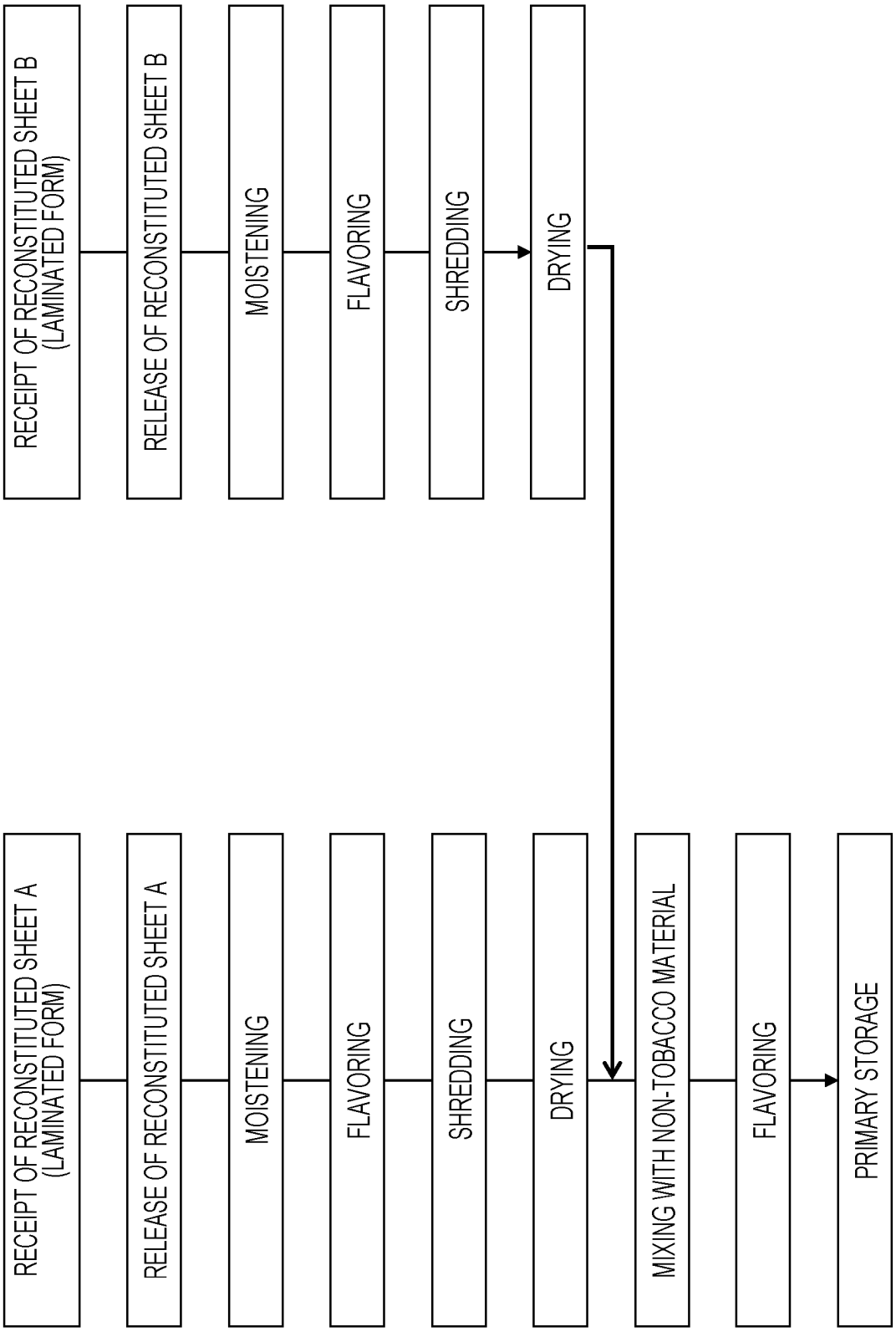
SHREDDING
DRYING
MIXING WITH NON-TOBACCO MATERIAL
FLAVORING
PRIMARY STORAGE
RECEIPT OF RECONSTITUTED SHEET B (LAMINATED FORM)
RELEASE OF RECONSTITUTED SHEET B
MOISTENING
FLAVORING

Fig. 3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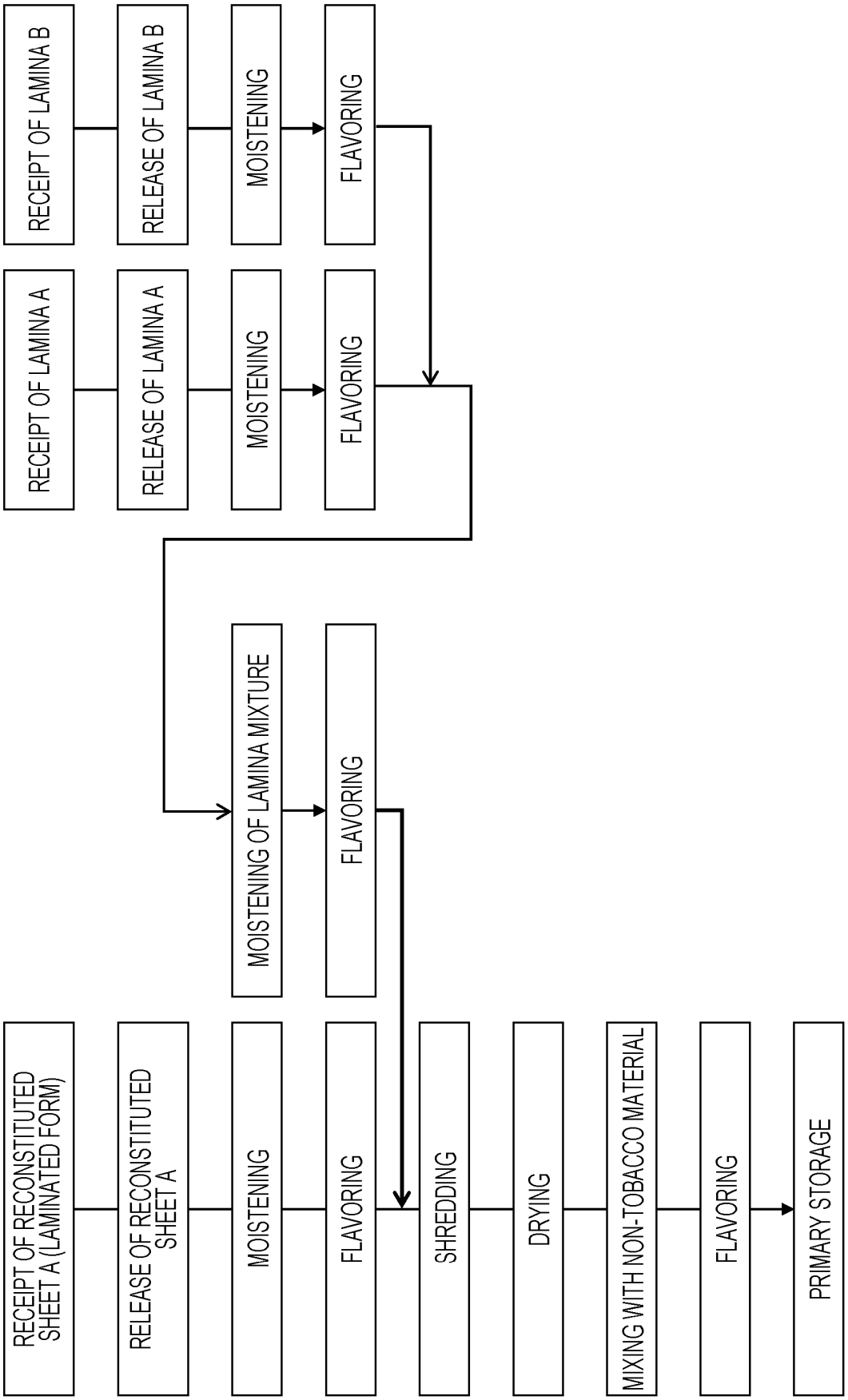
RELEASE OF RECONSTITUTED SHEET B
MOISTENING
FLAVORING
SHREDDING
DRYING
MIXING WITH NON-TOBACCO MATERIAL
FLAVORING
PRIMARY STORAGE

Fig. 4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FLAVORING
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FLAVORING
MOISTENING OF LAMINA MIXTURE
FLAVORING
RECEIPT OF RECONSTITUTED SHEET A (LAMINATED FORM)
RELEASE OF RECONSTITUTED SHEET A
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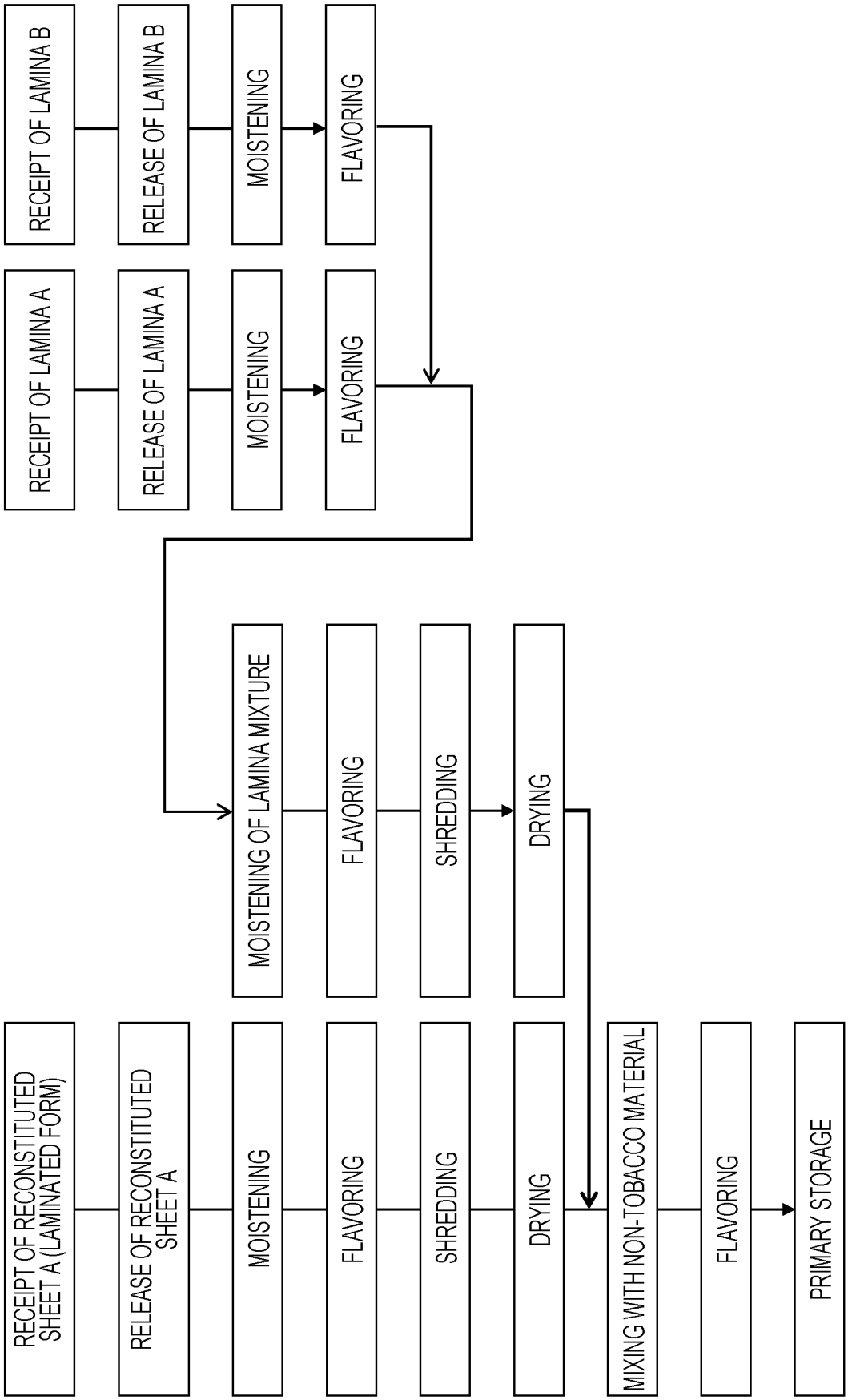
FLAVORING
SHREDDING
DRYING
MIXING WITH NON-TOBACCO MATERIAL
FLAVORING
PRIMARY STORAGE

Fig. 5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FLAVORING
SHREDDING
DRYING
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RELEASE OF RECONSTITUTED SHEET A
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MIXING WITH NON-TOBACCO MATERIAL
FLAVORING
PRIMARY STORAGE

Fig. 6

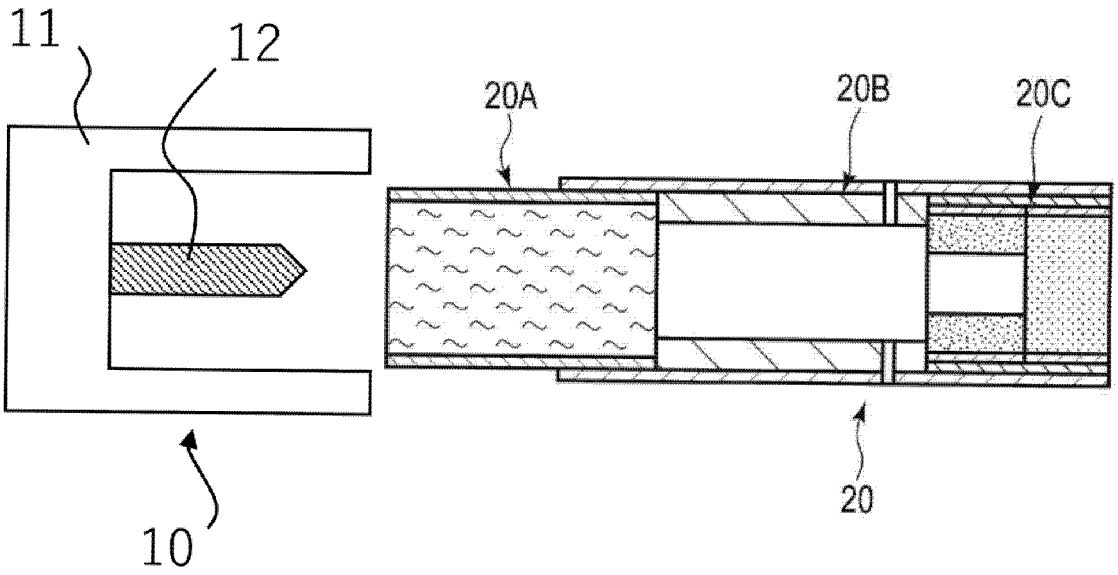
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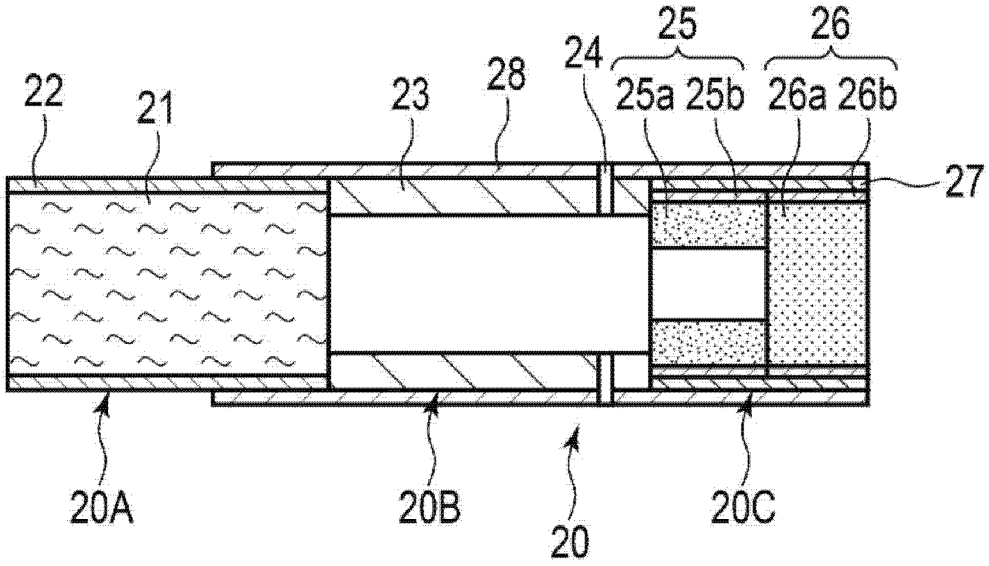
Fig. 7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20B
20
20C

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/045741

A. CLASSIFICATION OF SUBJECT MATTER

A24B 15/16(2020.01)i; ***A24F 40/20***(2020.01)i; ***A24B 3/14***(2006.01)i
FI: A24B15/16; A24F40/20; A24B3/14

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24B15/16; A24F40/20; A24B3/14

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

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2020/089080 A1 (NERUDIA LIMITED) 07 May 2020 (2020-05-07) p. 7, lines 21-29, p. 14, lines 6-24, fig. 1, 5	1-2, 6-7
Y		3-16
Y	CN 109288137 A (HUBEI CHINA TOBACCO INDUSTRY CO., LTD.) 01 February 2019 (2019-02-01) paragraphs [0012]-[0024], fig. 1	3-16
A		1-2
Y	WO 2020/104964 A1 (MAGG CONSULTING S.R.L.) 28 May 2020 (2020-05-28) p. 12, lines 3-20	3-16
A		1-2
Y	JP 7-184624 A (PHILIP MORRIS PROD INC) 25 July 1995 (1995-07-25) paragraphs [0005], [0033]-[0036], fig. 1	4-16
A		1-3
Y	WO 2020/032715 A1 (KT&G CORPORATION) 13 February 2020 (2020-02-13) paragraphs [0082]-[0094], fig. 4	4-16

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

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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 February 2022	**15 February 2022**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/045741

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A		1-3
Y	CN 211211416 U (QINHUANGDAO TOBACCO MACHINERY CO., LTD.) 11 August 2020 (2020-08-11) paragraphs [0028]-[0046]	6-16
A		1-5
Y	CN 101305836 A (YUNNAN REASCEND TOBACCO TECH.(GROUP) CO., LTD) 19 November 2008 (2008-11-19) claim 1	10-16
Y	CN 104770846 A (CHINA TOBACCO YUNNAN INDUSTRIAL CO., LTD.) 15 July 2015 (2015-07-15) claim 1	10-16
A	CN 110771936 A (CHINA TOBACCO FUJIAN INDUSTRIAL CO., LTD.) 11 February 2020 (2020-02-11) paragraphs [0003]-[0018]	1-16
A	JP 2016-527913 A (BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED) 15 September 2016 (2016-09-15) paragraphs [0033]-[0034], fig. 84-92	1-16
A	JP 2016-506744 A (BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED) 07 March 2016 (2016-03-07) paragraphs [0028]-[0056], fig. 1	1-16

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/045741

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2020/089080 A1	07 May 2020	(Family: none)	
CN 109288137 A	01 February 2019	(Family: none)	
WO 2020/104964 A1	28 May 2020	CN 112384083 A	
JP 7-184624 A	25 July 1995	EP 651951 A2 column 1, lines 45-58, column 7, line 43 to column 8, line 47, fig. 1	
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CN 104770846 A	15 July 2015	(Family: none)	
CN 110771936 A	11 February 2020	(Family: none)	
JP 2016-527913 A	15 September 2016	US 2016/0205992 A1 paragraphs [0038]-[0039], [0088]-[0096] WO 2015/025158 A1 CN 105555153 A	
JP 2016-506744 A	07 March 2016	US 2015/0366262 A1 fig. 1, paragraphs [0029]-[0057] WO 2014/125251 A1 CN 105007765 A	

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REFERENCES CITED IN THE DESCRIPTION

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- JP 5941988 B **[0045]**
- JP 5934799 B **[0045]**
- JP 5514953 B **[0045]**
- JP 5481574 B **[0045]**

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- **JACCARD G. et al.** Investigation and comparison of the transfer of TSNA from tobacco to cigarette mainstream smoke and to the aerosol of a heated tobacco product, THS2.2. *Reg. Toxicol. Pharmacol.,* 2018, vol. 97, 103-109 **[0004]**