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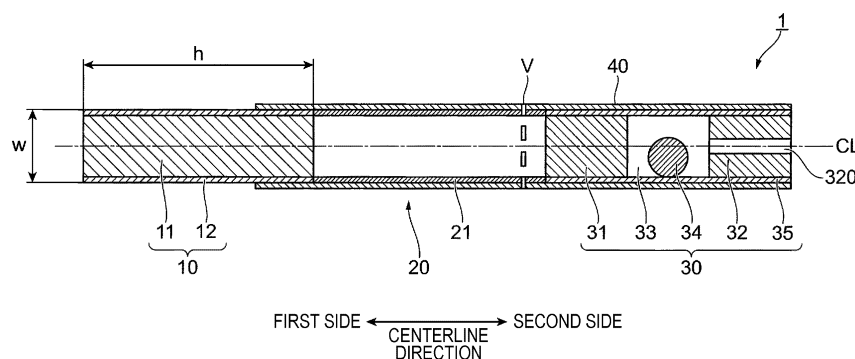
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(54) **NON-COMBUSTION HEATING-TYPE STICK**

(57) A non-combustion-heating-type stick 1 is provided with: a base material section 10 including an aerosol source; a cooling unit 20 for generating aerosol by cooling steam generated by heating the aerosol source 11; and, a filter section 30. The filter section 30 has: a first filter 31 disposed on the cooling unit 20 side; a second filter 32 disposed on the side opposite from the cooling unit 20 with respect to the first filter 31; and, a powder-containing substance 34 that is disposed in a cavity 33 formed between the first filter 31 and the second filter 32, is a mass of a raw material powder containing at least one of a taste component and a perfume component, and becomes a powder when an external force is applied. The second filter 32 is formed with a powder supply path for supplying powder from the cavity 33 to a suction port end.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a non-combustion-heating-type stick.

Background Art

[0002] For example, a filtered smoking article described in PTL 1 includes: a filter including a filter member disposed at a downstream end of a smoking body, an air-permeable paper wrapped around the outer side of the filter member, and a flavoring agent capsule disposed inside the filter; and a tipping paper that is wrapped around the outer circumferential surface of a downstream end portion of the smoking body and the outer circumferential surface of the filter and connects the smoking body and the filter, wherein the flavoring agent capsule includes a capsule body and a colored content liquid containing a flavor component.

Citation List

Patent Literature

[0003] PTL 1: Japanese Patent No. 6870104

Summary of Invention

Technical Problem

[0004] In an inhaler device in which a substrate containing an aerosol source is heated to generate an aerosol, there is a desire for the ability to impart a new inhaling flavor in order to provide a new experience to the user.

[0005] It is an object of the present invention to provide a non-combustion-heating-type stick capable of imparting a new inhaling flavor.

Solution to Problem

[0006] A first feature of the invention completed for achieving the foregoing object is a non-combustion-heating-type stick including: a substrate including an aerosol source; a cooling section for cooling vapor generated by heating the substrate to thereby generate an aerosol; and a filter section, wherein the filter section includes a first filter disposed on a cooling section side, a second filter disposed on an opposite side from the cooling section with respect to the first filter, and at least one powder-containing article that is disposed in a cavity formed between the first filter and the second filter, that is a lump of raw material powder containing at least one of a taste component and a flavor component, and that crumbles into powder when an external force is applied, and wherein a powder supply passage for supplying the powder

from the cavity to a mouthpiece end is formed in the second filter.

[0007] In a second feature, the cooling section may have a perforation that allows air to flow from an outside of the cooling section to an inside of the cooling section.

[0008] In a third feature, the at least one powder-containing article may have a size of 1 mm or more and 8 mm or less.

[0009] In a fourth feature, when the number of the at least one powder-containing article disposed in the cavity is one, the at least one powder-containing article may have a size of 3 mm or more and smaller than an inside diameter of the cavity.

[0010] In a fifth feature, when the number of the at least one powder-containing article disposed in the cavity is at least two, the at least one powder-containing article may have a size of 1 mm or more and smaller than an inside diameter of the cavity.

[0011] In a sixth feature, a fracture strength at which the at least one powder-containing article crumbles into the powder may be 5 N or more and 60 N or less.

[0012] In a seventh feature, in the at least one powder-containing article, the ratio of particles of the raw material powder having a particle diameter of 10 μm or more and 600 μm or less to the total mass of the at least one powder-containing article may be 50% by mass or more.

[0013] In an eighth feature, in a transverse cross section of the second filter, the powder supply passage may include a central portion located on a center side of the second filter and a plurality of peripheral portions extending from the central portion toward an outer circumferential side in mutually different directions.

Advantageous Effects of Invention

[0014] According to the first feature, the non-combustion-heating-type stick provided can impart a new inhaling flavor.

[0015] According to the second feature, the efficiency of delivery of the powder during inhalation can be improved as compared to that in a conventional non-combustion-heating-type stick including no cooling section.

[0016] According to the third feature, the user can accurately crush the at least one powder-containing article that is the lump of the raw material powder.

[0017] According to the fourth feature, the user can accurately crush the at least one powder-containing article that is the lump of the raw material powder.

[0018] According to the fifth feature, the user can accurately crush the at least one powder-containing article that is the lump of the raw material powder.

[0019] According to the sixth feature, the user can easily crush the at least one powder-containing article that is the lump of the raw material powder into powder.

[0020] According to the seventh feature, by crushing the at least one powder-containing article, a powder having a particle diameter suitable for inhalation can be obtained.

[0021] According to the eighth feature, the delivery amount of the powder during inhalation can be larger than that when a columnar powder supply passage is used.

Brief Description of Drawings

[0022]

[Fig. 1] An illustration showing a vertical cross section of a stick according to a first embodiment.

[Fig. 2] A schematic diagram schematically showing a configuration example of an inhaler device in the first embodiment.

[Fig. 3] An illustration showing an example of a transverse cross section of a second filter in the first embodiment. Description of Embodiments

[0023] Embodiments of the present invention will next be described in detail with reference to the accompanying drawings. In the drawings, the same parts are designated by the same numerals.

<First embodiment>

[0024] Fig. 1 is an illustration showing a vertical cross section of a stick 1 according to a first embodiment. Fig. 2 is a schematic diagram schematically showing a configuration example of an inhaler device 100 in the first embodiment.

[0025] The non-combustion-heating-type stick (which hereinafter may be referred to as a "stick") 1 according to the first embodiment includes a substrate 10, a cooling section 20, and a filter section 30. The substrate 10 is formed into a cylindrical shape. Hereinafter, the direction of the centerline CL of the substrate 10 may be referred to as a "centerline direction." The stick 1 further includes a tipping paper 40 wrapped around the substrate 10, the cooling section 20, and the filter section 30 arranged in this order in the centerline direction to integrate them. One end side in the centerline direction (the left side in Fig. 1) may be referred to as a first side, and the other end side in the centerline direction (the right side in Fig. 1) may be referred to as a "second side." The first side is the end side to be inserted into the inhaler device 100. The second side is the opposite side from the first side and is the end side that is to be held in the user's mouth for inhalation. A cross section along the centerline direction is referred to as a "vertical cross section," and a cross section cut along a plane orthogonal to the centerline direction is defined as a "transverse cross section."

[Mode of use of stick 1]

[0026] The stick 1 according to the first embodiment is used for the combustion-heating-type inhaler device 100. As shown in Fig. 2, the inhaler device 100 includes a power supply 111 that stores electric power and supplies

the electric power to each structural element of the inhaler device 100, a sensor 112 that detects various types of information about the inhaler device 100, and a notifier 113 that notifies the user of the information. The inhaler device 100 further includes a memory 114 that stores various types of information for the operation of the inhaler device 100, a communicator 115 for communicating information between the inhaler device 100 and another device, and a controller 116 that controls the overall operation of the inhaler device 100. The inhaler device 100 further includes a heater 121 that heats the stick 1, a holder 140 that holds the stick 1, an opening 142 that provides communication between an internal space 141 and the outside, and a heat insulator 144 that prevents heat transfer from the heater 121 to the other structural elements of the inhaler device 100. The user of the inhaler device 100 performs inhalation with the stick 1 held in the holder 140.

[0027] The heater 121 heats the substrate 10 of the stick 1. The heater 121 is formed of any material such as metal or polyimide. For example, the heater 121 is formed into a film shape and disposed so as to cover the outer circumferential surface of the holder 140. When the heater 121 generates heat, an aerosol source 11 included in the stick 1 is heated through the outer circumferential surface of the stick 1. The heater 121 generates heat when electric power is supplied from the power supply 111. For example, the electric power may be supplied when the sensor 112 detects a predetermined user input. When the temperature of the stick 1 heated by the heater 121 reaches a predetermined temperature, the user can perform inhalation. Then, when the sensor 112 detects a predetermined user input, the supply of the electric power may be stopped. In another example, the electric power may be supplied to generate an aerosol during a period in which the sensor 112 detects that the user is performing inhalation.

[0028] The heat insulator 144 is disposed so as to cover at least the outer circumferential surface of the heater 121. For example, the heat insulator 144 is formed from a vacuum heat insulator, an aerogel heat insulator, etc. The vacuum heat insulator is a heat insulator including, for example, glass wool, silica (silicon powder), etc. wrapped with a resin-made film, and the wrapped heat insulator is evacuated to a high-vacuum state, so that the heat conduction by gas is reduced to as close to zero as possible.

[Substrate 10]

[0029] The substrate 10 includes an aerosol source 11 that, when heated, generates a vapor that is to form an aerosol and a wrapping paper 12 that covers the outer circumferential surface of the aerosol source 11. The substrate 10 is an example of an aerosol source-containing substrate. The substrate 10 is formed into a cylindrical shape with the wrapping paper 12 wrapped around the aerosol source 11. The aerosol source 11 may be, for

example, a material derived from tobacco such as shredded tobacco or a processed material produced by processing a tobacco raw material into a granular, sheet, or powder form. The aerosol source 11 may contain a material not derived from tobacco and produced from a plant (such as mint or herb) other than tobacco. For example, the aerosol source 11 may contain a flavor component such as menthol. When the inhaler device 100 is a medical inhaler, the aerosol source 11 may contain a medicine to be inhaled by a patient. The aerosol source 11 is not limited to a solid and may be a liquid such as water or polyhydric alcohol such as glycerin or propylene glycol. At least part of the substrate 10 is to be accommodated in the internal space 141 of the holder 140 with the stick 1 held by the holder 140.

[0030] Preferably, the substrate 10 including the aerosol source 11 wrapped with the wrapping paper 12 has a cylindrical shape in which the aspect ratio defined by formula (1) is 1 or more.

[Math. 1]

$$\text{Aspect ratio} = h / w$$

[0031] In formula 1, w is the width of the transverse cross section of the substrate 10, and h is the dimension of the substrate 10 in the centerline direction. It is preferable that $h \geq w$. No particular limitation is imposed on the shape of the transverse cross section, and the shape of the transverse cross section may be polygonal, rounded polygonal, circular, elliptical, etc. The width w is the diameter when the transverse cross section is circular, the major axis when the transverse cross section is elliptical, and the diameter of the circumscribed circle or the major axis of the circumscribed ellipse when the transverse cross section is polygonal or rounded polygonal. The width of the aerosol source 11 included in the substrate 10 is preferably 4 mm or more and 9 mm or less.

[0032] The dimension h of the substrate 10 in the centerline direction may be appropriately changed according to the size of the product but is generally 10 mm or more, preferably 12 mm or more, more preferably 15 mm or more, and still more preferably 18 mm or more. The dimension h of the substrate 10 in the centerline direction is generally 70 mm or less, preferably 50 mm or less, more preferably 30 mm or less, and still more preferably 25 mm or less.

[0033] No particular limitation is imposed on the ratio of the dimension h of the substrate 10 to the dimension of the stick 1 in the centerline direction. From the viewpoint of the balance between the delivery amount of the aerosol and the temperature of the aerosol, the ratio is generally 10% or more, preferably 20% or more, more preferably 25% or more, and still more preferably 30% or more. The ratio of the dimension h of the substrate 10 to the dimension of the stick 1 is generally 80% or less,

preferably 70% or less, more preferably 60% or less, still more preferably 50% or less, particularly preferably 45% or less, and most preferably 40% or less.

[0034] No particular limitation is imposed on the content of the aerosol source 11 in the substrate 10, but the content may be 200 mg or more and 800 mg or less and is preferably 250 mg or more and 600 mg or less. The above range is particularly suitable when the substrate 10 has a circumferential length of 22 mm and a dimension in the centerline direction of 20 mm.

[0035] A description will be given of the aerosol source 11 containing shredded tobacco. No particular limitation is imposed on the material of the shredded tobacco contained in the aerosol source 11, and any well-known material such as lamina or midrib may be used. The material may be prepared by grinding dried tobacco leaves to an average grain diameter of 20 μm or more and 200 μm or less to obtain ground tobacco, then making the ground tobacco uniform, forming the resulting ground tobacco into a sheet (hereinafter referred to simply as a uniform sheet), and then shredding the sheet. Alternatively, a so-called strand type may be used. Specifically, a uniform sheet having a dimension equivalent to the dimension of the substrate 10 in the centerline direction is shredded substantially horizontally in the centerline direction of the substrate 10, and the shredded product is filled into the aerosol source 11.

[0036] The width of the shredded tobacco is preferably 0.5 mm or more and 2.0 mm or less because it is to be filled into the aerosol source 11.

[0037] As for the tobacco leaves used to produce the shredded tobacco and the uniform sheet, various types of tobacco may be used. Examples of the type of tobacco include a flue cured type, a burley type, an oriental type, native species, other *Nicotiana tabacum* varieties, *Nicotiana rustica* varieties, and mixtures thereof. As for the mixtures, different types may be appropriately blended so as to obtain an intended taste. The details of the varieties of tobacco are disclosed in "Tobacco no Jiten (Dictionary of Tobacco), Tobacco Academic Studies Center, March 31, 2009." There are a plurality of conventional methods for producing a uniform sheet, i.e., methods for shredding tobacco leaves and forming the shredded leaves into a uniform sheet. A first example is a method for producing a sheet made through a paper making process. A second example is a method including mixing the shredded tobacco leaves and a suitable solvent such as water uniformly to obtain a uniform mixture, casting the uniform mixture thinly onto a metallic sheet or a metallic sheet belt, and drying the mixture to produce a cast sheet. A third example is a method including mixing the shredded tobacco leaves and a suitable solvent such as water uniformly to obtain a uniform mixture and extruding the mixture into a sheet shape to produce a rolled sheet. The details of the types of uniform sheets are disclosed in "Tobacco no Jiten (Dictionary of Tobacco), Tobacco Academic Studies Center, March 31, 2009."

[0038] The content of moisture in the aerosol source

11 with respect to the total mass of the aerosol source 11 is, for example, 10% by mass or more and 15% by mass or less and preferably 11% by mass or more and 13% by mass or less. When the moisture content is as described above, the occurrence of stains on the wrapping paper is prevented, and the machinability during production of the substrate 10 is improved.

[0039] No particular limitation is imposed on the aerosol source 11, and the aerosol source 11 may contain extracts from various natural products and/or constituent components thereof according to the intended application. Examples of the extracts and/or the constituent components thereof include glycerin, propylene glycol, triacetin, 1,3-butanediol, and mixtures thereof.

[0040] No particular limitation is imposed on the content of the extracts and/or the constituent components thereof in the aerosol source 11. From the viewpoint of generating the aerosol sufficiently and imparting a good flavor, the content with respect to the total mass of the aerosol source 11 is generally 5% by mass or more and preferably 10% by mass or more. The content of the extracts and/or the constituent components thereof in the aerosol source 11 is generally 50% by mass or less and preferably 15% by mass or more and 25% by mass or less.

[0041] The aerosol source 11 may contain a flavoring agent. No particular limitation is imposed on the type of flavoring agent. From the viewpoint of imparting a good flavor, the flavoring agent is particularly preferably menthol. One flavoring agent may be used alone, or two or more may be used in combination.

[0042] No particular limitation is imposed on the filling density in the aerosol source 11. From the viewpoint of ensuring the performance of the stick 1 and imparting a good flavor, the filling density is generally 250 mg/cm³ or more and preferably 300 mg/cm³ or more. The filling density in the aerosol source 11 is generally 400 mg/cm³ or less and preferably 350 mg/cm³ or less.

[0043] The aerosol source 11 may be formed of a tobacco sheet. The number of tobacco sheets may be one or may be two or more.

[0044] In one exemplary mode of the aerosol source 11 formed of one tobacco sheet, the tobacco sheet having a side length equivalent to the centerline direction dimension of a body to be filled is folded a plurality of times horizontally with respect to the centerline direction of the to-be-filled body (to form a so-called gathered sheet) and then filled into the to-be-filled body. In another mode, the tobacco sheet with a side length equivalent to the centerline direction dimension of the to-be-filled body is rolled up in a direction orthogonal to the centerline direction of the to-be-filled body and then filled into the to-be-filled body.

[0045] In one exemplary mode of the aerosol source 11 formed of two or more tobacco sheets, the tobacco sheets each having a side length equivalent to the centerline direction dimension of the to-be filled body are rolled up in a direction orthogonal to the centerline direc-

tion of the to-be-filled body such that the tobacco sheets are disposed concentrically, and the rolled tobacco sheets are filled into the to-be-filled body.

[0046] The phrase "disposed concentrically" means that the tobacco sheets are disposed such that the centers of all the tobacco sheets are located at substantially the same position. No particular limitation is imposed on the number of tobacco sheets, and the number of tobacco sheets may be 2, 3, 4, 5, 6, or 7.

[0047] The two or more tobacco sheets may all have the same composition or the same physical properties, or some or all of the tobacco sheets may have different compositions or physical properties. The thicknesses of the tobacco sheets may be the same or different.

[0048] No particular limitation is imposed on the thickness of each tobacco sheet. However, from the viewpoint of the tradeoff between heat transfer efficiency and strength, the thickness is preferably 150 μm or more and 1000 μm or less and more preferably 200 μm or more and 600 μm or less.

[0049] The aerosol source 11 may be produced by preparing a plurality of tobacco sheets having different widths, laminating the tobacco sheets to prepare a laminate such that its width decreases from the first side to the second side, causing the laminate to pass through a rolling tube to thereby roll up the laminate.

[0050] With this production method, the plurality of tobacco sheets extend in the centerline direction and are disposed concentrically with the CL as the center.

[0051] In this production method, it is preferable that the laminate is prepared such that a non-contact portion is formed between adjacent rolled tobacco sheets. When the non-contact portion (gap) is present between tobacco sheets such that the tobacco sheets are not in contact with each other, a flavor flow path is maintained, and the delivery efficiency of the flavor component can be increased. On the other hand, since heat from a heater 121 can be transferred to outer tobacco sheets through contact portions of the plurality of tobacco sheets, high heat transfer efficiency can be maintained.

[0052] Examples of a method for preparing the laminate in which non-contact portions in which tobacco sheets are not in contact with each other are provided between the tobacco sheets include a method in which embossed tobacco sheets are used, a method in which adjacent tobacco sheets are laminated without bonding their entire surfaces together, a method in which adjacent tobacco sheets are laminated with parts thereof bonded together, and a method in which adjacent laminated tobacco sheets are partially or entirely bonded together weakly such that they can be separated after the rolling-up process.

[0053] When the substrate 10 including the wrapping paper 12 is prepared, the wrapping paper 12 may be disposed on the first-side end face of the laminate.

[0054] No particular limitation is imposed on the filling density in the aerosol source 11. From the viewpoint of ensuring the performance of the stick 1 and imparting a

good flavor, the filling density is generally 250 mg/cm³ or more and preferably 300 mg/cm³ or more. The filling density in the aerosol source 11 is generally 400 mg/cm³ or less and preferably 350 mg/cm³ or less.

[0055] A polyol such as glycerin, propylene glycol, or 1,3-butanediol may be added to the tobacco sheet. The amount of the polyol added to the tobacco sheet with respect to the dry mass of the tobacco sheet is preferably 5% by mass or more and 50% by mass or less and more preferably 15% by mass or more and 25% by mass or less.

[0056] The tobacco sheet can be appropriately produced using a well-known method such as a paper making method, a slurry method, or a rolling method. The uniform sheet described above may also be used.

[0057] When the paper making method is used, a method including the following steps can be used for the production. 1) Dried tobacco leaves are coarsely ground and extracted with water to separate the leaves into a water extract and a residue. 2) The water extract is dried under reduced pressure and concentrated. 3) Pulp is added to the residue. The mixture is formed into fibers using a refiner, and the fibers are subjected to paper making to produce a sheet. 4) The concentrate of the water extract is added to the produced sheet, and the sheet is dried to obtain a tobacco sheet. In this case, the step of removing some components such as nitrosamines may be added (see Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2004-510422).

[0058] When the slurry method is used, a method including the following steps can be used for the production. 1) Water, pulp, a binder, and ground tobacco leaves are mixed. 2) The mixture is thinly spread (cast) and dried. In this case, the step of irradiating the slurry prepared by mixing water, the pulp, the binder, and the ground tobacco leaves with ultraviolet rays or X-rays to remove some components such as nitrosamines may be added.

[0059] Moreover, a nonwoven fabric-like tobacco sheet produced by a method including the following steps may be used, as described in International Publication No. WO2014/104078. 1) Granular tobacco leaves and a binder are mixed. 2) The mixture is sandwiched between nonwoven fabrics. 3) The laminate is formed into a given shape by heat fusion to thereby obtain a nonwoven fabric-like tobacco sheet.

[0060] The type of raw material tobacco leaves used in the above methods may be the same as that described for the aerosol source 11 containing shredded tobacco.

[0061] No particular limitation is imposed on the composition of the tobacco sheet. For example, the content of the tobacco raw material (tobacco leaves) with respect to the total mass of the tobacco sheet is preferably 50% by mass or more and 95% by mass or less. The tobacco sheet may contain a binder, and examples of the binder include guar gum, xanthan gum, carboxymethyl cellulose, and a sodium salt of carboxymethyl cellulose. The

amount of the binder with respect to the total mass of the tobacco sheet is preferably 1% by mass or more and 10% by mass or less. The tobacco sheet may further contain an additional additive. Examples of the additive include fillers such as pulp.

[0062] No particular limitation is imposed on the structure of the wrapping paper 12 used for the substrate 10, and a general structure may be used. For example, a wrapping paper containing pulp as a main component may be used. The pulp may be made of wood pulp such as soft wood pulp or hard wood pulp or may be produced using a pulp mixture containing non-wood pulp generally used for the wrapping paper 12 for tobacco products such as flax pulp, hemp pulp, sisal pulp, or esparto.

[0063] Examples of the type of pulp that can be used include chemical pulp, ground pulp, chemiground pulp, and thermomechanical pulp that are produced, for example, by a kraft cooking method, an acidic/neutral/alkaline sulfite cooking method, or a soda salt cooking method.

[0064] In a paper making step using pulp in, for example, a fourdrinier machine, a cylinder paper machine, or a cylinder-tanmo complex paper machine, the texture of the pulp is controlled to distribute the pulp uniformly to thereby produce the wrapping paper 12. If necessary, a wet strength agent may be added to impart water resistance to the wrapping paper 12, or a sizing agent may be added to adjust the quality of printing on the wrapping paper 12. Moreover, internal auxiliary agents for paper making such as aluminum sulfate, an anionic, cationic, nonionic, or amphoteric retention aid, a freeness improving agent, and a strength agent may be added, and additives for paper making such as a dye, a pH modifier, an antifoaming agent, a pitch control agent, and a slime control agent may also be added.

[0065] The basis weight of the base sheet of the wrapping paper 12 is, for example, generally 20 gsm or more and preferably 25 gsm or more. The basis weight is generally 65 gsm or less, preferably 50 gsm or less, and still more preferably 45 gsm or less.

[0066] No particular limitation is imposed on the thickness of the wrapping paper 12. From the viewpoint of stiffness, air permeability, and the ease of adjustment during paper making, the thickness is generally 10 μm or more, preferably 20 μm or more, and more preferably 30 μm or more. The thickness of the wrapping paper 12 is generally 100 μm or less, preferably 75 μm or less, and still more preferably 50 μm or less.

[0067] The wrapping paper 12 for producing the substrate 10 may have a square shape or a rectangular shape.

[0068] When the wrapping paper 12 is used to wrap the aerosol source 11, one side length of the wrapping paper 12 is, for example, about 12 mm or more and about 70 mm or less, and the other side length is, for example, 15 mm or more and 28 mm or less. The other side length is preferably 22 mm or more and 24 mm or less and still more preferably about 23 mm. The aerosol source 11 is

wrapped with the wrapping paper 12 into a cylindrical shape as follows. For example, one edge of the wrapping paper 12 and the opposite edge of the wrapping paper 12 are brought to overlap by about 2 mm in the circumferential direction and bonded together to form a circular paper tube, and the aerosol source 11 is filled into the tubule shape. The size of the rectangular wrapping paper 12 can be determined according to the size of the substrate 10.

[0069] The wrapping paper 12 may contain a filler in addition to the pulp. The content of the filler with respect to the total mass of the wrapping paper 12 is 10% by mass or more and less than 60% by mass and preferably 15% by mass or more and 45% by mass or less.

[0070] In the wrapping paper 12, the content of the filler is preferably 15% by mass or more and 45% by mass or less when the basis weight is within the preferred range (25 gsm or more and 45 gsm or less).

[0071] When the basis weight is 25 gsm or more and 35 gsm or less, the content of the filler is preferably 15% by mass or more and 45% by mass or less. When the basis weight is 35 gsm or more and 45 gsm or less, the content of the filler is preferably 25% by mass or more and 45% by mass or less.

[0072] The filler used may be calcium carbonate, titanium dioxide, kaolin, etc. From the viewpoint of flavor and of increasing the whiteness, it is preferable to use calcium carbonate.

[0073] Various auxiliary agents other than the base sheet and the filler may be added to the wrapping paper 12. For example, to improve the water resistance, a water resistance improver may be added. Examples of the water resistance improver include a wet strength agent (WS agent) and a sizing agent. Examples of the wet strength agent include urea-formaldehyde resins, melamine formaldehyde resins, and polyamide epichlorohydrin (PAE). Examples of the sizing agent include rosin soap, alkyl ketene dimers (AKDs), alkenyl succinic anhydrides (ASAs), and highly saponified polyvinyl alcohols having a saponification degree of 90% or more.

[0074] A strength agent may be added as an auxiliary agent. Examples of the strength agent include polyacrylamide, cationic starch, oxidized starch, CMC, polyamide epichlorohydrin resins, and polyvinyl alcohol. In particular, it is known that the use of a trace amount of oxidized starch improves air permeability (Japanese Unexamined Patent Application Publication No. 2017-218699).

[0075] A coating agent may be added to at least one of the front and back surfaces of the wrapping paper 12. No particular limitation is imposed on the coating agent, but it is preferable to use a coating agent that can form a film on the surface of the paper to thereby reduce the liquid permeability of the paper. Examples of the coating agent include alginic acid and salts thereof (such as a sodium salt), polysaccharides such as pectin, cellulose derivatives such as ethyl cellulose, methyl cellulose, carboxymethyl cellulose, and nitrocellulose, and starch and derivatives thereof (e.g., ether derivatives such as car-

boxymethyl starch, hydroxyalkyl starch, and cationic starch and ester derivatives such as starch acetate, starch phosphate, and starch octenylsuccinate).

5 [Cooling section 20]

[0076] The cooling section 20 is a member that is disposed adjacent to the substrate 10 and the filter section 30 and includes a shaping paper 21 rolled up into, for example, a cylindrical shape having a transverse cross section with a hollow (cavity).

10 **[0077]** The dimension of the cooling section 20 in the centerline direction can be appropriately changed according to the size of the product and is generally 5 mm or more, preferably 10 mm or more, and more preferably 15 mm or more. The dimension of the cooling section 20 in the centerline direction is generally 35 mm or less, preferably 30 mm or less, and more preferably 25 mm or less. When the dimension of the cooling section 20 in the centerline direction is equal to or more than the above lower limit, a sufficient cooling effect can be achieved, and a good flavor can be obtained. When the dimension of the cooling section 20 in the centerline direction is equal to or less than the above upper limit, the loss of the generated vapor and aerosol due to adhesion to the shaping paper 21 can be reduced.

25 **[0078]** Preferably, the inner side of the cooling section 20 has a large surface area. The shaping paper 21 forming the cooling section 20 may be creped in order to form channels, and then the creped paper may be pleated, gathered, and folded to form a thin material sheet that forms the cooling section 20. When the number of folds or pleats in a volume in which the element is placed is large, the total surface area of the cooling section 20 is large.

30 **[0079]** No particular limitation is imposed on the thickness of the shaping paper 21. The thickness may be, for example, 5 μm or more and 500 μm or less and may be 10 μm or more and 250 μm or less. No particular limitation is imposed on the material of the shaping paper 21. The material may contain pulp as a main component or may contain polyethylene, polypropylene, polyvinyl chloride, polyethylene terephthalate, polylactic acid, cellulose acetate, or aluminum foil as a main component. Any combination of these materials may also be used.

35 **[0080]** The cooling section 20 has a plurality of perforations V (which are referred to also as a "ventilation filter (Vf)" in this technical field) arranged concentrically in the circumferential direction. The perforations V are holes passing through the shaping paper 21. Examples of the shape of the holes include polygonal shapes, rounded polygonal shapes, circular shapes, and elliptical shapes. The perforations V are present in a region through which air is allowed to flow from the outside of the stick 1. In other words, the perforations V are present in a region protruding from the opening 142 with the stick 1 held by the holder 140 of the inhaler device 100.

40 **[0081]** When the plurality of perforations V are present,

air flows from the outside into the cooling section 20 during inhalation, and therefore the temperature of vapor and air flowing from the substrate 10 can be reduced. When the cooling section 20 is positioned in a region spaced 4 mm or more from the boundary between the cooling section 20 and the filter section 30 in the direction toward the cooling section 20, not only is the cooling ability improved, but also a material (product) generated by heating is prevented from staying inside the cooling section 20, so that the delivery amount of the product can be increased.

[0082] When the substrate 10 is heated, vapor is generated with the aerosol serving as condensation nuclei. Then, when the vapor comes into contact with air from the outside, the temperature of the vapor decreases, and the vapor is liquefied, so that the generation of the aerosol can be facilitated. The cooling section 20 is an example of a cooling section in which vapor generated by heating the substrate is cooled to generate the aerosol.

[0083] When a plurality of perforations V disposed concentrically in the cooling section 20 are treated as one perforation group, the number of perforation groups may be one or may be two or more. When two or more perforation groups are present, it is preferable from the viewpoint of improving the delivery amount of the component generated by heating that these perforation groups are not formed in a region less than 4 mm from the boundary between the cooling section 20 and the filter section 30 in the direction toward the cooling section 20.

[0084] When the stick 1 is prepared by wrapping the substrate 10, the cooling section 20, and the filter section 30 with the tipping paper 40, it is preferable that the tipping paper 40 has perforations formed at positions directly above the perforations V formed in the cooling section 20. When this stick 1 is produced, a tipping paper 40 having perforations at positions overlapping the perforations V may be prepared and rolled up. However, from the viewpoint of the ease of production, it is preferable that a stick 1 having no perforations V is produced and then holes are formed so as to pass through both the cooling section 20 and the tipping paper 40.

[0085] From the viewpoint of improving the delivery of the product generated by heating, no particular limitation is imposed on the region in which the perforations V are present, so long as the region is spaced 4 mm or more from the boundary between the cooling section 20 and the filter section 30 in the direction toward the cooling section 20. From the viewpoint of improving the delivery of the product, the region is preferably a region spaced 4.5 mm or more from the boundary, more preferably a region spaced 5 mm or more from the boundary, and still more preferably a region spaced 5.5 mm or more from the boundary. From the viewpoint of ensuring the cooling function, the region in which the perforations V are present is preferably a region spaced 15 mm or less from the boundary between the cooling section 20 and the filter section 30, more preferably a region spaced 10 mm or less from the boundary, and still more preferably a

region spaced 7 mm or less from the boundary.

[0086] From the viewpoint of improving the delivery of the product generated by heating, the region in which the perforations V are present is preferably a region spaced 24 mm or more from the first-side end surface of the stick 1 in the direction toward the cooling section 20, preferably a region spaced 24.5 mm or more from the first-side end surface, preferably a region spaced 25 mm or more from the first-side end surface, and more preferably a region spaced 25.5 mm or more from the first-side end surface. From the viewpoint of ensuring the cooling function, the region in which the perforations V are present is preferably a region spaced 35 mm or less from the first-side end surface of the stick 1 in the direction toward the cooling section 20, preferably a region spaced 30 mm or less from the first-side end surface, and still more preferably a region spaced 27 mm or less from the first-side end surface.

[0087] The region in which the perforations V are present will next be considered with respect to the boundary between the cooling section 20 and the substrate 10. When the centerline direction dimension of the cooling section 20 is 20 mm or more, the region in which the perforations V are present is preferably a region spaced 5 mm or more from the boundary between the cooling section 20 and the substrate 10 in the direction toward the cooling section 20 from the viewpoint of ensuring the cooling function, more preferably a region spaced 10 mm or more from the boundary, and still more preferably a region spaced 13 mm or more from the boundary. From the viewpoint of improving the delivery of the product generated by heating, the region in which the perforations V are present is preferably a region spaced 16 mm or less from the boundary between the cooling section 20 and the substrate 10, more preferably a region spaced 15.5 mm or less from the boundary, still more preferably a region spaced 15 mm or less from the boundary, and particularly preferably a region spaced 14.5 mm or less from the boundary.

[0088] The perforations V are provided such that the ratio of air flowing through the perforations V when an automatic smoking machine is used for inhalation at 17.5 mL/second is 10% by volume or more and 90% by volume or less. The "ratio of air flow" is the volume ratio of the air flowing through the perforations V when the ratio of the air inhaled through a mouthpiece end is set to 100% by volume. The ratio of air flow is preferably 50% by volume or more and 80% by volume or less and more preferably 55% by volume or more and 75% by volume or less. The above ratio of air flow can be achieved, for example, as follows. The number of perforations V in one perforation group is selected from the range of 5 to 50, and the diameter of the perforations V is selected from the range of 0.1 to 0.5 mm. Then the number of perforations V and their diameter are appropriately combined.

[0089] The ratio of air flow can be measured using an automatic smoking machine (e.g., a single-port automatic smoking machine manufactured by Borgwaldt) by a

method according to ISO 9512.

[Tipping paper 40]

[0090] No particular limitation is imposed on the structure of the tipping paper 40, and the tipping paper 40 can have a general form. For example, the tipping paper 40 may include pulp as a main component. The pulp may be made of wood pulp such as soft wood pulp or hard wood pulp or may be produced using a pulp mixture containing non-wood pulp generally used for wrapping paper for tobacco products such as flax pulp, hemp pulp, sisal pulp, or esparto. One type of pulp may be used alone, and a combination of a plurality of types may be used at any ratio.

[0091] The tipping paper 40 may be formed of one sheet of paper or may be formed of a plurality of sheets of paper.

[0092] Examples of the type of pulp that can be used include chemical pulp, ground pulp, chemiground pulp, and thermomechanical pulp that are produced, for example, by a kraft cooking method, an acidic/neutral/alkaline sulfite cooking method, or a soda salt cooking method.

[0093] The tipping paper 40 may be produced by a method described later, or a commercial product may be used.

[0094] No particular limitation is imposed on the shape of the tipping paper 40, and the tipping paper 40 may have, for example, a square shape or a rectangular shape.

[0095] No particular limitation is imposed on the basis weight of the tipping paper 40, and the basis weight is generally 32 gsm or more and 60 gsm or less, preferably 33 gsm or more and 55 gsm or less, and more preferably 34 gsm or more and 53 gsm or less.

[0096] No particular limitation is imposed on the air permeability of the tipping paper 40. The air permeability is generally 0 CORESTA Units or more and 30000 CORESTA Units or less and preferably more than 0 CORESTA Units and 10000 CORESTA Units or less. The air permeability is a value measured according to ISO 2965:2009 and is represented as the flow rate (cm³) of gas passing through an area of 1 cm² per 1 minute when the difference in pressure between both sides of the paper is 1 kPa. 1 CORESTA Unit (1 C.U.) is cm³/(min·cm²) at 1 kPa.

[0097] The tipping paper 40 may contain a filler in addition to the pulp, and examples of the filler include metal carbonates such as calcium carbonate and magnesium carbonate, metal oxides such as titanium oxide, titanium dioxide, and aluminum oxide, metal sulfates such as barium sulfate and calcium sulfate, metal sulfides such as zinc sulfide, quartz, kaolin, talc, diatomaceous earth, and gypsum. In particular, from the viewpoint of increasing whiteness-opacity and increasing heating speed, it is preferable that the tipping paper 40 contains calcium carbonate. One of these fillers may be used alone, or a com-

bination of two or more may be used.

[0098] Various auxiliary agents other than the pulp and the filler may be added to the tipping paper 40. For example, to improve the water resistance, a water resistance improver may be contained. Examples of the water resistance improver include a wet strength agent (WS agent) and a sizing agent. Examples of the wet strength agent include urea-formaldehyde resins, melamine formaldehyde resins, and polyamide epichlorohydrin (PAE). Examples of the sizing agent include rosin soap, alkyl ketene dimers (AKDs), alkenyl succinic anhydrides (ASAs), and highly saponified polyvinyl alcohols having a saponification degree of 90% or more.

[0099] A coating agent may be added to at least one of the front and back surfaces of the tipping paper 40. No particular limitation is imposed on the coating agent, but it is preferable to use a coating agent that can form a film on the surface of the paper to thereby reduce the liquid permeability of the paper.

[0100] Part of the outer surface of the tipping paper 40 may be coated with a lip-release material. The lip-release material means a material that, when the user holds the filter section 30 of the stick 1 in the mouth, allows the contact between the tipping paper 40 and the lips to be easily released with substantially no adhesion. The lip-release material may contain, for example, ethyl cellulose, methyl cellulose, etc. For example, an ethyl cellulose-based ink or a methyl cellulose-based ink may be applied to the outer surface of the tipping paper 40 to coat the outer surface of the tipping paper 40 with the lip-release material.

[Filter section 30]

[0101] The filter section 30 is connected to the second side of the cooling section 20 using the tipping paper 40. The tipping paper 40 integrally wraps the second-side end portion of the cooling section 20 and the first-side end portion of the filter section 30 to thereby connect (join) them together.

[0102] The filter section 30 includes a first filter 31 connected to the second side of the cooling section 20, a second filter 32 located on the second side of the first filter 31, and a powder-containing article 34 accommodated in a hollow cavity 33 formed between the first filter 31 and the second filter 32.

[0103] The cavity 33 is formed by arranging the first filter 31 and the second filter 32 and wrapping them with a plug wrap paper 35. Moreover, part of the substrate 10, the cooling section 20, and the filter section 30 are wrapped with the tipping paper 40 disposed outward of the plug wrap paper 35.

[0104] The powder-containing article 34 is an example of a powder-containing article prepared by forming the raw material powder into a lump. The powder-containing article 34 is a lump of the raw material powder containing at least one of a taste component and a flavor component and is crushed into powder by the user. The term "crush"

means that, for example, the user holds the plug wrap paper 35 and the tipping paper 40 forming the cavity 33 between the user's thumb and forefinger from the outside of the plug wrap paper 35 and the tipping paper 40 and pushes the plug wrap paper 35 and the tipping paper 40 with the thumb and forefinger to press the powder-containing article 34. The details of the powder-containing article 34 will be described later.

[0105] The filter section 30 may have a member for adjusting the flow of the aerosol from the first side and guiding the aerosol to the cavity 33. This member may be formed between the first filter 31 and the cavity 33 so as to be continuous with the first side of the cavity 33.

[0106] The transverse cross sections of the first filter 31 and the second filter 32 of the filter section 30 each have a substantially circular shape, and the diameter of the circle can be appropriately changed according to the size of the product but is generally 4.0 mm or more and 9.0 mm or less, preferably 4.5 mm or more and 8.5 mm or less, and still more preferably 5.0 mm or more and 8.0 mm or less. When the transverse cross section is not circular, the diameter is determined as follows. The cross section is assumed to be a circle with the same area as the cross section, and the diameter of the circle is used.

[0107] The circumferential length of the transverse cross section of each of the first filter 31 and the second filter 32 of the filter section 30 can be appropriately changed according to the size of the product but is generally 14.0 mm or more and 27.0 mm or less, preferably 15.0 mm or more and 26.0 mm or less, and still more preferably 16.0 mm or more and 25.0 mm or less.

[0108] The dimension of the filter section 30 in the centerline direction can be appropriately changed according to the size of the product but is generally 5.0 mm or more and 35.0 mm or less, preferably 10.0 mm or more and 30.0 mm or less, and more preferably 15.0 mm or more and 25.0 mm or less. The shapes and dimensions of the first filter 31, the second filter 32, and the cavity 33 can be appropriately adjusted such that the shape and dimensions of the filter section 30 fall within the above ranges.

[0109] No particular limitation is imposed on the air-flow resistance per 120 mm of the dimension of the filter section 30 in the centerline direction. The air-flow resistance is generally 40 mmH₂O or more and 300 mmH₂O or less, preferably 70 mmH₂O or more and 280 mmH₂O or less, and more preferably 90 mmH₂O or more and 260 mmH₂O or less.

[0110] The air-flow resistance is measured, for example, using a filter air-flow resistance measurement device manufactured by Cerulean according to an ISO standard method (ISO 6565). The air-flow resistance of the filter section 30 is the difference in pressure between the first side and the second side when air is caused to flow from the first side to the second side at a predetermined flow rate (17.5 cc/min) with no air transmission through the side surface of the filter section 30. The unit of the air-flow resistance is generally mmH₂O.

[0111] No particular limitation is imposed on the first filter 31 and the second filter 32 so long as they each contain a filter material and have the functions of general filters. Examples of the functions of general filters include the function of controlling the amount of air mixed during inhalation of the aerosol etc., the function of reducing the amount of flavor, and the function of reducing the amounts of nicotine and tar. However, it is unnecessary that the filters have all of these functions. In the non-combustion-heating-type stick 1, the number of components generated is smaller than that in cigarette products, and the filling rate of the aerosol source 11 tends to be small. Therefore, the function of preventing the aerosol source 11 from falling off while the filtering function is reduced is one of the important functions.

[0112] The filter material forming the first filter 31 and the second filter 32 is a material prepared by forming a filler such as cellulose acetate fibers, a nonwoven fabric, or pulp paper into a cylindrical shape. A paper filter prepared by packing sheet-shaped pulp paper into a filter shape may also be used.

[0113] No particular limitation is imposed on the density of the filter material. The density is generally 0.10 g/cm³ or more and 0.25 g/cm³ or less, preferably 0.11 g/cm³ or more and 0.24 g/cm³ or less, and more preferably 0.12 g/cm³ or more and 0.23 g/cm³ or less.

[0114] The powder supply passage 320 is disposed in a central portion of the second filter 32 so as to pass through the second filter 32 in the centerline direction. The powder supply passage 320 provides communication between the cavity 33 and the mouthpiece end. The powder supply passage 320 has a transverse cross section that can prevent the powder-containing article 34 in the lump form from entering the powder supply passage 320. The powder supply passage 320 is an example of a powder supply passage for supplying the powder from the cavity 33 to the mouthpiece end. To reduce the deformation of the powder supply passage 320 when an external force is applied to the filter section 30, it is preferable to use a plasticizer for the second filter 32.

[0115] The cavity 33 is a space formed inside the filter section 30 and is a cylindrical space surrounded by the second-side surface of the first filter 31, the first-side surface of the second filter 32, and the plug wrap paper 35. It is only necessary that the cavity 33 be large enough to accommodate the powder-containing article 34. When a plurality of powder-containing articles 34 are installed, it is necessary that the cavity 33 be large enough to accommodate the plurality of powder-containing articles 34. The cavity 33 is, for example, a space having a volume larger than the volume of the plurality of the powder-containing articles 34. No particular limitation is imposed on the shape of the cavity 33. A plurality of cavities 33 may be provided.

[0116] The powder-containing article 34 is a spherical lump of the raw material powder and crumbles into powder when an external force is applied. The external force is, for example, a force stronger than a force applied dur-

ing manufacturing or transportation or a force stronger than a suction force during inhalation. Examples of the external force include a force applied by the user's fingers. For example, the fracture strength at which the powder-containing article 34 crumbles into powder is 5 N or more and 60 N or less. Preferably, the fracture strength at which the powder-containing article 34 crumbles into powder is 20 N or more and 30 N or less and more preferably 20 N or more and 25 N or less. No particular limitation is imposed on the shape of the powder-containing article 34, and examples of the shape of the powder-containing article 34 include ellipsoidal shapes, cylindrical shapes, hollow cylindrical shapes, conical shapes, pyramid shapes, torus shapes, polyhedral shapes such as cubic and rectangular parallelepipedic shapes, and combinations of these shapes. The raw material powder forming the powder-containing article 34 has a particle diameter that allows at least part of the raw material powder to pass through the powder supply passage 320. For example, the particle diameter of the raw material powder is preferably 10 μm or more and 600 μm or less.

[0117] The size of the powder-containing article 34 is larger than the opening width of the powder supply passage 320. For example, when the powder-containing article 34 is spherical, no particular limitation is imposed on its outside diameter, but the outside diameter is preferably 1 mm or more and 8 mm or less. The upper limit of the outside diameter of the powder-containing article 34 is set to 8 mm as described above, but it is only necessary that the outside diameter be smaller than the inside diameter of the cavity 33 and larger than the opening width of the powder supply passage 320.

[0118] When one powder-containing article 34 is placed in the cavity 33, it is preferable that the outside diameter of the powder-containing article 34 is 3 mm or more and is smaller than the inside diameter of the cavity 33.

[0119] When at least two powder-containing articles 34 are placed in the cavity 33, it is preferable that the outside diameter of the powder-containing article 34 is 1 mm or more and is smaller than the inside diameter of the cavity 33.

[0120] The powder-containing article 34 can be produced by adding an appropriate amount of water to a nucleating agent used as the raw material powder, mixing them, shaping the mixture, and drying the shaped mixture. A binder may also be added as a raw material of the powder-containing article 34. A flavoring agent may also be added to the nucleating agent together with water. The nucleating agent used may be a monosaccharide, a disaccharide, a polysaccharide, or a derivative thereof. Examples of the nucleating agent include ketotrioses (dihydroxyacetone), aldotrioses (glyceraldehyde), ketotetroses (erythrulose), aldotetroses (erythrose, threose), pentoses ketopentoses (ribulose, xylulose) aldopentose (ribose, arabinose, xylose, lyxose), deoxysugars (deoxyribose), ketohexoses (psicose, fructose, sorbose, tagatose), aldohexoses (allose, altrose, glucose, mannose,

gulose, idose, galactose, talose), deoxysugars (fucose, fuculose, rhamnose), sedoheptulose, sucrose, lactose, maltose, trehalose, turanose, cellobiose, raffinose, melezitose, maltotriose, acarbose, stachyose, glucose, starches (amylose, amylopectin), cellulose, dextrin, glucan, and fructose. One of these monosaccharides, disaccharides, polysaccharides, and derivatives thereof may be used alone, or a mixture of thereof may be used. Preferably, the nucleating agent is substantially soluble in the oral cavity.

[0121] The binder used may be a water-soluble polymer such as dextrin, gelatin, gum arabic, polyvinyl alcohol, or carboxymethyl cellulose. The amount of the binder added with respect to the amount of the nucleating agent is preferably 10 wt% or less.

[0122] No particular limitation is imposed on the flavoring agent added to the nucleating agent, and any existing flavoring agent may be used. Particularly suitably, a powdery flavoring agent or an oily flavoring agent is used. Typical examples of the powdery flavoring agent include powders of chamomile, fenugreek, menthol, mint, cinnamon, and herb. Typical examples of the oily flavoring agent include lavender, cinnamon, cardamom, celery, clove, cascarilla, nutmeg, sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon, orange, mint, cinnamon, caraway, cognac, jasmine, chamomile, menthol, cassia, ylang-ylang, serge, spearmint, fennel, pimento, ginger, anise, coriander, and coffee. One of these powdery flavoring agents and oily flavoring agents may be used alone, or a mixture thereof may be used. When a powdery flavoring agent is used, its particle diameter is preferably 500 μm or less. Preferably, the flavoring agent is a liquid or is substantially soluble in the oral cavity. The amount of the flavor component added with respect to the amount of the nucleating agent is preferably 10 wt% or less.

[0123] Examples of the taste component include citric acid, tartaric acid, sodium glutamate, neotame, thaumatin, stevia, sorbitol, xylitol, erythritol, aspartame, rutin, hesperidin, oxalic acid, tannic acid, catechin, naringin, quinine, quinic acid, limonin, caffeine, capsaicin, vitamins, amino acids, polyphenols, alginic acid, flavonoid, and lecithin. Preferably, the taste component is a liquid or is substantially soluble in the oral cavity. The amount of the taste component added with respect to the amount of the nucleating agent is preferably 10 wt% or less. The powder-containing article 34 may be a plastic capsule containing the powder, a tableted compact, or granules.

[0124] Preferably, the plug wrap paper 35 has specifications selected such that the plug wrap paper 35 is less likely to be folded or wrinkled when the user applies an external force to crush the powder-containing article 34 in the form of a lump. For example, the basis weight of the plug wrap paper 35 is preferably 50 to 200 g/m², and it is more preferable to determine the basis weight within the range of 50 to 110 g/m². The air permeability of the plug wrap paper 35 is preferably 1000 to 10000 [C.U.].

<<Mode of powder supply passage 320>>

[0125] The mode of the powder supply passage 320 will be described using Fig. 3.

[0126] Fig. 3 is an illustration showing an example of a transverse cross section of the second filter 32 in the first embodiment.

[0127] In the transverse cross section of the powder supply passage 320 in the present embodiment shown in Fig. 3, the powder supply passage 320 is formed as an opening having a single windmill-like overall shape. More specifically, in the transverse cross section of the second filter 32, the powder supply passage 320 includes a central portion 321 located on the center side of the second filter 32 and a plurality of peripheral portions 322 extending radially from the central portion 321 toward the outer circumference side of the second filter 32.

[0128] The plurality of peripheral portions 322 of the powder supply passage 320 each have an isosceles triangular shape and extend radially in different directions from the central portion 321. A forward end of each of the peripheral portions 322 (the end opposite to the central portion 321) is disposed at a position spaced apart from the plug wrap paper 35 of the second filter 32, and filter fibers forming the second filter 32 are present between the forward end of each peripheral portion 322 and the plug wrap paper 35. In each of the peripheral portions 322, its opening width increases gradually from the base end (the end connected to the central portion 321) toward the forward end. Therefore, in each of the peripheral portions 322 of the powder supply passage 320, the opening width of an outer circumferential-side region 322a located on the outer circumferential side in the transverse cross section of the second filter 32 is larger than the opening width of a center-side region 322b located on the center side in the transverse cross section. With the powder supply passage 320 of the second filter 32 having the structure described above, the spherical powder-containing article 34 prepared by forming the raw material powder into a lump is prevented from entering the powder supply passage 320 and thereby prevented from moving downstream of the cavity 33. Specifically, the powder supply passage 320 has an opening width smaller than the diameter of the lump-shaped powder-containing article 34.

[0129] The opening area of each of the peripheral portions 322 is larger than the opening area of the central portion 321. The opening width of the central portion 321 is, for example, 0.05 mm or more and 0.9 mm or less. The opening width of the base end of each of the peripheral portions 322 is, for example, 0.05 mm or more 0.5 mm or less, and the opening width of the forward end is, for example, 1 mm or more and 3 mm or less.

[0130] In the powder supply passage 320 in the present embodiment, the base ends of the plurality of peripheral portions 322 are mutually connected at the central portion 321 to form a single opening. Therefore, when the second filter 32 is produced, a single mandrel

can be used to produce the second filter 32, and the filter fibers can be uniformly packed in a region except for the powder supply passage 320 in the transverse cross section of the second filter 32. Specifically, the product quality of the second filter 32 can be stabilized. The mode of the powder supply passage 320 in the second filter 32 is not limited to the windmill type shown in Fig. 3, and various other modes can be used. The powder supply passage 320 may have a curved shape or a spiral shape. Moreover, the powder supply passage 320 may have a branch or a confluence at an intermediate point. The diameter of the powder supply passage 320 may be changed at an intermediate point in the flow path. It is only necessary that the inside diameter of the powder supply passage 320 be smaller than the outside diameter of the powder-containing article 34. A plurality of powder supply passages 320 may be formed. The second filter 32 may have, in addition to the powder supply passage 320 passing therethrough, a non-through flow path (not shown). By providing the non-through flow path, the flow rate in the powder supply through passage 320 can be reduced. This can reduce the supply amount of the powder.

[0131] As described above, the stick 1 includes the substrate 10 including the aerosol source 11, the cooling section 20 for cooling vapor generated by heating the substrate 10 to generate the aerosol, and the filter section 30. The filter section 30 includes the first filter 31 disposed on the cooling section 20 side, the second filter 32 disposed on the opposite side from the cooling section 20 with respect to the first filter 31, and the powder-containing article 34 that is disposed in the cavity 33 formed between the first filter 31 and the second filter 32, that is a lump of the raw material powder containing at least one of the taste component and the flavor component, and that crumbles into powder when an external force is applied. The second filter 32 has the powder supply passage 320 that is formed to provide communication between the cavity 33 and the mouthpiece end and to supply the powder from the cavity 33 to the mouthpiece end.

[0132] The stick 1 is inserted into the holder 140 of the inhaler device 100 after the user applies a force to the filter section 30 to crush the powder-containing article 34 into powder. After the temperature of the substrate 10 heated by the heater 121 reaches a predetermined temperature, the user performs inhalation, and the aerosol is generated. During the inhalation by the user, the powder and the aerosol, which is the product, are delivered to the oral cavity. In this manner, a new inhaling flavor can be imparted.

[0133] If the powder-containing article 34 is placed in the cooling section 20, the vapor generated by heating the substrate 10 passes through the powder obtained by crushing the powder-containing article 34. In this case, the content of moisture in the powder increases, and the efficiency of delivery of the powder decreases. In the present embodiment, the powder-containing article 34 is placed in the filter section 30. Therefore, the vapor gen-

erated by heating the substrate 10 is cooled in the cooling section 20 to generate the aerosol, and then the aerosol passes through the powder. In this manner, the increase in the content of moisture in the powder is reduced. Moreover, the reduction in the efficiency of delivery of the powder due to the increase in the content of moisture in the powder is prevented.

[0134] Since the powder-containing article 34 is accommodated in the cavity 33 between the first filter 31 and the second filter 32, the powder-containing article 34 is prevented from falling off during the production process of connecting the substrate 10, the cooling section 20, and the filter section 30 using the tipping paper 40. Moreover, the powder-containing article 34 is prevented from falling off during transportation etc.

[0135] The cooling in the cooling section 20 means that the vapor is liquefied and cooled so that the aerosol is generated. Therefore, when the aerosol generated in the cooling section 20 is directly inhaled, the user may feel uncomfortable because the temperature of the aerosol is too high. In the stick 1, the filter section 30 absorbs heat from the aerosol, which is too hot for the user to inhale, to further cool the aerosol. The first filter 31 has no through hole extending in the centerline direction in order to prevent the powder-containing article 34 from moving to the substrate 10 and the cooling section 20 and to prevent the powder from flowing therein. However, the second filter 32 has the powder supply passage 320, which is a through hole, formed in order to facilitate the inhalation of the powder.

[0136] Preferably, the cooling section 20 has perforations that allow air to flow from the outside into the cooling section 20.

[0137] Preferably, the aerosol passing through the powder is not condensation nuclei with water molecules adhering to their surfaces. When the cooling section 20 does not have the perforations V, air does not flow from the outside into the cooling section 20 during inhalation. In this case, the temperature inside the cooling section 20 increases, and the vapor flowing from the substrate 10 may not be sufficiently cooled. In the present embodiment, since the perforations V that allow the outside air to flow therethrough are provided, the cooling of the vapor can be facilitated. Therefore, the efficiency of delivery of the powder during inhalation can be further improved as compared to that in conventional products.

[0138] Preferably, the size of the powder-containing article 34 is 1 mm or more and 8 mm or less.

[0139] To deliver the powder into the oral cavity, the user must crush the powder-containing article 34. In this case, if the size of the powder-containing article 34 is less than 1 mm, the external force applied to the powder-containing article 34 is insufficient because the filter section 30 is not deformed sufficiently. If the size of the powder-containing article 34 is larger than 8 mm, the external force required to be applied to the powder-containing article 34 is large, and the possibility that the powder-containing article 34 cannot be crushed increases. If the frac-

ture strength of the powder-containing article 34 is reduced, the powder-containing article 34 may break without the user's intention. In the present embodiment, since the size of the powder-containing article 34 is 1 mm or more and 8 mm or less, the user can easily crush the powder-containing article 34.

[0140] When one powder-containing article 34 is disposed in the cavity 33, the size of the powder-containing article 34 is preferably 3 mm or more and smaller than the inside diameter of the cavity 33.

[0141] When one powder-containing article 34 is disposed in the cavity 33, if the size of the powder-containing article 34 is less than 3 mm, the external force applied to the powder-containing article 34 is insufficient because the filter section 30 is not deformed sufficiently. In the present embodiment, since the size of the powder-containing article 34 is 3 mm or more, the possibility that the external force applied to the powder-containing article 34 is insufficient can be reduced.

[0142] When at least two powder-containing articles 34 are disposed in the cavity 33, it is preferable that the size of the powder-containing articles 34 is 1 mm or more and smaller than the inside diameter of the cavity 33.

[0143] When a plurality of powder-containing articles 34 are disposed in the cavity 33, even if the size of the powder-containing articles 34 is less than 3 mm, a sufficient external force can be applied by increasing the occupancy ratio of the powder-containing articles 34 in the cavity 33. However, if the size of the powder-containing articles 34 is less than 1 mm, it is necessary that the opening width of the powder supply passage 320 be designed to be less than the size of the powder-containing articles 34. In this case, it is difficult to supply the powder to the oral cavity with high delivery efficiency. In the present embodiment, since the size of the powder-containing articles 34 is 1 mm or more, the possibility that the external force applied to the powder-containing articles 34 is insufficient can be reduced.

[0144] The fracture strength at which the powder-containing article 34 crumbles into powder is preferably 5 N or more and 60 N or less.

[0145] If the fracture strength at which the powder-containing article 34 crumbles into powder is less than 5 N, the powder-containing article 34 is highly likely to crumble into powder during the production process of the stick 1, during transportation of the stick 1, or at an unintended timing for the user. If the fracture strength at which the powder-containing article 34 crumbles into powder is more than 60 N, it is difficult to fully crush the powder-containing article 34 into powder. In this embodiment, since the fracture strength is 5 N or more and 60 N or less, the user can easily crush the powder-containing article 34 into powder. Therefore, the powder-containing article 34 can be crushed into powder small enough to pass through the powder supply passage 320.

[0146] Preferably, in the powder-containing article 34, the content of particles of the raw material powder having a particle diameter of 10 μm or more and 600 μm or less

with respect to the total mass of the powder-containing article 34 is 50% by mass or more.

[0147] It is necessary that at least part of the powder-containing article 34 crushed into powder have a particle diameter small enough to pass through the powder supply passage 320. The particle diameter of the powder tends to be proportional to the particle diameter of the raw material powder of the powder-containing article 34. If the particle diameter of the raw material powder of the powder-containing article 34 is, for example, smaller than 10 μm , even when the powder having a small particle diameter is delivered to the oral cavity, the user may not be able to experience the flavor component or the taste component. If the particle diameter of the raw material powder of the powder-containing article 34 is larger than, for example, 600 μm , the efficiency of delivery of the powder having a large particle diameter may be low because of its large mass. Moreover, to allow the user to experience the flavor component or the taste component, it is preferable that the content of the raw material powder with respect to the total mass of the powder-containing article 34 is 50% by mass or more. In the present embodiment, the powder obtained can have a particle diameter suitable for inhalation.

[0148] In a transverse cross section of the second filter 32, the powder supply passage 320 includes the central portion 321 disposed on the center side of the second filter 32 and the plurality of peripheral portions 322 extending from the central portion 321 toward the outer circumferential side in mutually different directions.

[0149] The powder accumulated in the gravity direction within the cavity 33 is blown up by the aerosol, passes through the powder supply passage 320 together with the aerosol, and is then delivered to the oral cavity of the user. When the powder supply passage 320 is a single cylindrical powder supply passage provided on the center side in the transverse cross section of the second filter, it is necessary for the blown-up powder to pass through the limited opening regions. In the present embodiment, the opening regions of the powder supply passage are not concentrated in one area but are distributed on the outer circumferential side. This allows the delivery amount of the powder during inhalation to increase.

[0150] Moreover, the powder supply passage 320 has an opening width smaller than the size of the powder-containing article 34.

[0151] The powder supply passage 320 is provided as a through hole in the second filter 32. If the opening width of the powder supply passage 320 is larger than the size of the powder-containing article 34, the powder-containing article 34 may fall off the stick 1 during the production or transportation process of the stick 1. In the present embodiment, the opening width of the powder supply passage 320 is smaller than the size of the powder-containing article 34. Therefore, the possibility that the powder-containing article 34 will fall off the stick 1 can be reduced.

Reference Signs List

[0152] 1 non-combustion-heating-type stick, 10 substrate, 11 aerosol source, 20 cooling section, 30 filter section, 31 first filter, 32 second filter, 33 cavity, 34 powder-containing article, 40 tipping paper, 320 powder supply passage, 321 central portion, 322 peripheral portion, 322a outer circumferential-side region, 322b center-side region

Claims

1. A non-combustion-heating-type stick comprising:

a substrate including an aerosol source;
a cooling section for cooling vapor generated by heating the substrate to thereby generate an aerosol; and
a filter section,
wherein the filter section includes a first filter disposed on a cooling section side, a second filter disposed on an opposite side from the cooling section with respect to the first filter, and at least one powder-containing article that is disposed in a cavity formed between the first filter and the second filter, that is a lump of raw material powder containing at least one of a taste component and a flavor component, and that crumbles into powder when an external force is applied, and wherein a powder supply passage for supplying the powder from the cavity to a mouthpiece end is formed in the second filter.

2. The non-combustion-heating-type stick according to claim 1, wherein the cooling section has a perforation that allows air to flow from an outside of the cooling section to an inside of the cooling section.

3. The non-combustion-heating-type stick according to claim 1 or 2, wherein the at least one powder-containing article has a size of 1 mm or more and 8 mm or less.

4. The non-combustion-heating-type stick according to any one of claims 1 to 3, wherein, when the number of the at least one powder-containing article disposed in the cavity is one, the at least one powder-containing article has a size of 3 mm or more and smaller than an inside diameter of the cavity.

5. The non-combustion-heating-type stick according to any one of claims 1 to 3, wherein, when the number of the at least one powder-containing article disposed in the cavity is at least two, the at least one powder-containing article has a size of 1 mm or more and smaller than an inside diameter of the cavity.

6. The non-combustion-heating-type stick according to any one of claims 1 to 5, wherein a fracture strength at which the at least one powder-containing article crumbles into the powder is 5 N or more and 60 N or less. 5
7. The non-combustion-heating-type stick according to any one of claims 1 to 6, wherein, in the at least one powder-containing article, the ratio of particles of the raw material powder having a particle diameter of 10 μm or more and 600 μm or less to the total mass of the at least one powder-containing article is 50% by mass or more. 10
8. The non-combustion-heating-type stick according to any one of claims 1 to 7, wherein, in a transverse cross section of the second filter, the powder supply passage includes a central portion located on a center side of the second filter and a plurality of peripheral portions extending from the central portion toward an outer circumferential side in mutually different directions. 15 20 25 30 35 40 45 50 55

FIG. 1

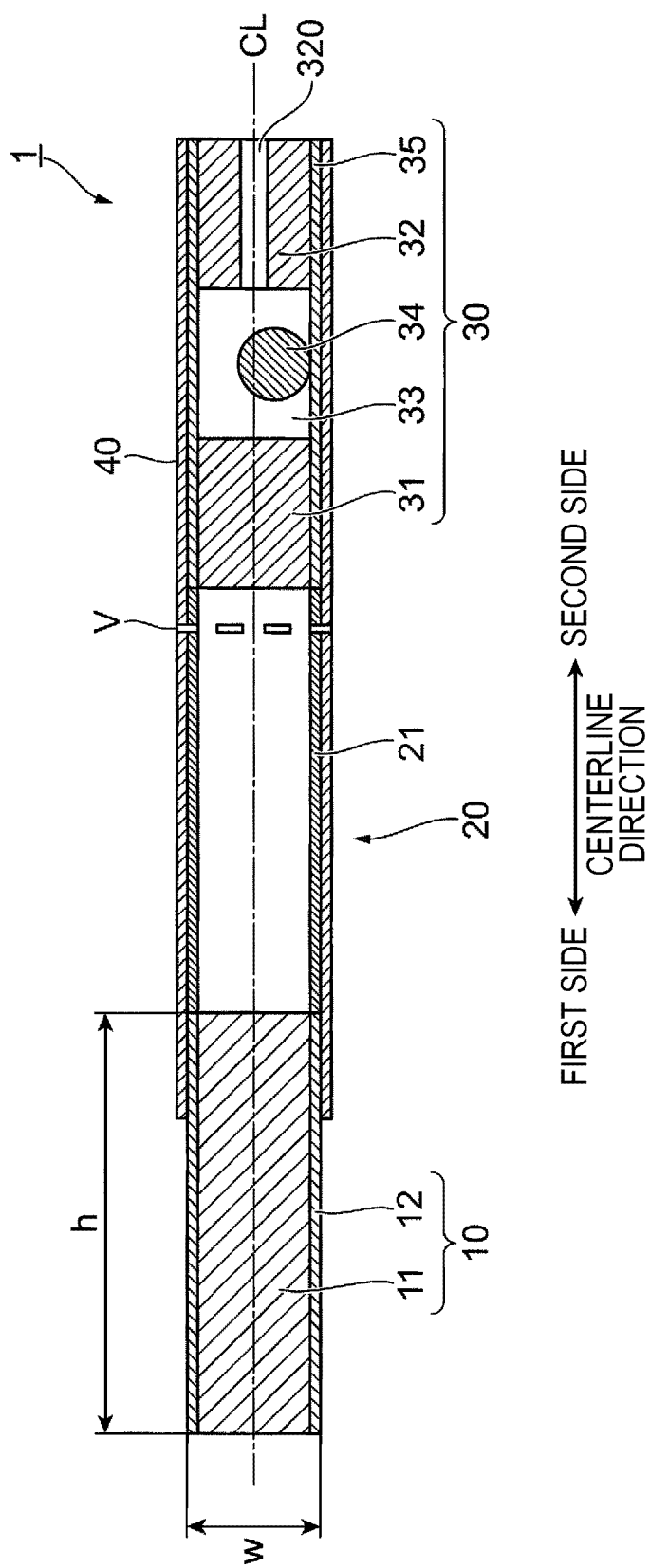


FIG. 2

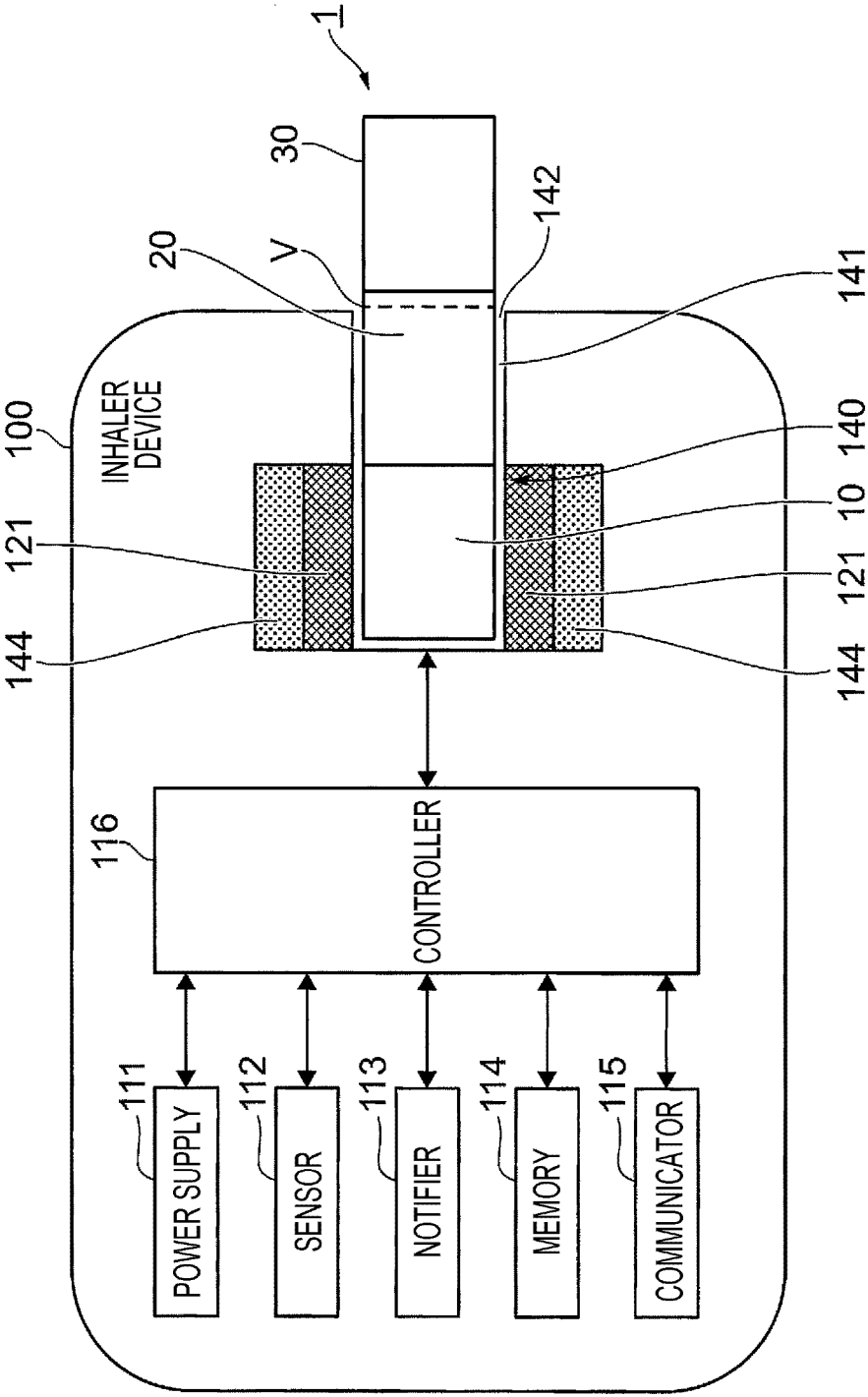
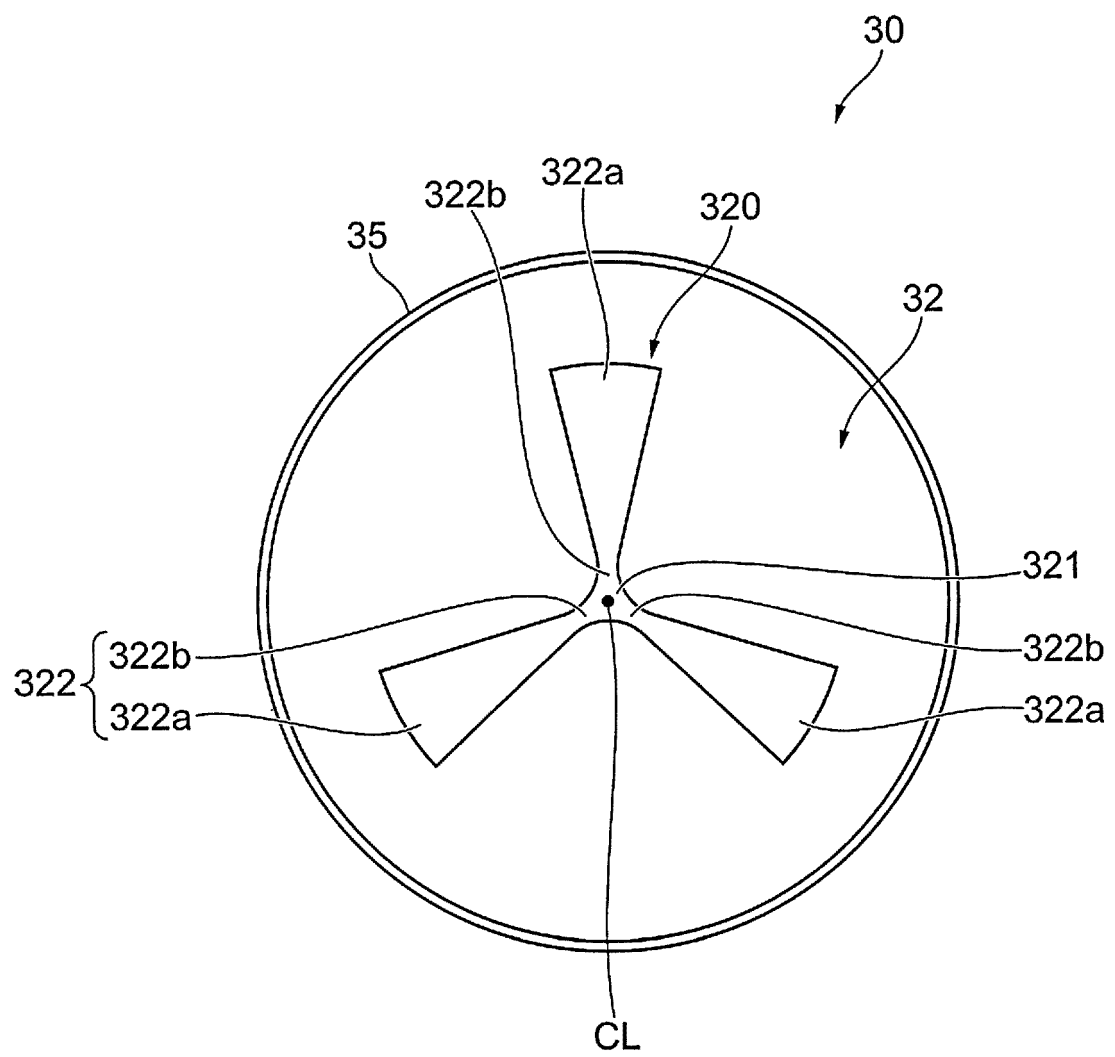


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/041715

A. CLASSIFICATION OF SUBJECT MATTER		
A24D 3/17(2020.01)i FI: A24D3/17		
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) A24D1/00 - 3/17		
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 1971-2021 Registered utility model specifications of Japan 1996-2021 Published registered utility model applications of Japan 1994-2021		
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	WO 2020/025728 A1 (NICOVENTURES TRADING LTD.) 06 February 2020 (2020-02-06) see, in particular, p. 11, lines 8-11, p. 14, lines 14-24, p. 17, lines 15-20, p. 19, lines 7-15, fig. 4, 5	1-8
Y	WO 2019/123645 A1 (JAPAN TOBACCO INC.) 27 June 2019 (2019-06-27) see, in particular, paragraphs [0020], [0023], [0025], [0029], [0038], [0039], fig. 1-3	1-8
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents:	"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 "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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 06 December 2021		Date of mailing of the international search report 21 December 2021
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.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/041715

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2020/025728 A1	06 February 2020	EP 3829350 A1	
WO 2019/123645 A1	27 June 2019	US 2020/0315245 A1 see, in particular, paragraphs [0027], [0030], [0032], [0036], [0044]-[0046], fig. 1-3 EP 3729976 A1 KR 10-2020-0094772 A CN 111511227 A	

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REFERENCES CITED IN THE DESCRIPTION

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