(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 756 489 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
31.07.2024 Bulletin 2024/31

(21) Application number: **18906995.8**

(22) Date of filing: **01.03.2018**

(51) International Patent Classification (IPC):
A24F 47/00 *(2020.01)* ***A24B 15/16*** *(2020.01)*
A24B 15/30 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A24B 15/281; A24B 15/16; A24B 15/302

(86) International application number:
PCT/JP2018/007856

(87) International publication number:
WO 2019/163146 (29.08.2019 Gazette 2019/35)

(54) ELECTRONIC CIGARETTE FILLER AND ELECTRONIC CIGARETTE CARTRIDGE USING SAME

ELEKTRONISCHER ZIGARETTENFÜLLSTOFF UND DAMIT VERSEHENE KARTUSCHE EINER ELEKTRONISCHEN ZIGARETTE

CHARGE POUR CIGARETTE ÉLECTRONIQUE ET CARTOUCHE DE CIGARETTE ÉLECTRONIQUE L'UTILISANT

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **23.02.2018 JP 2018031034**
26.02.2018 JP 2018032617

(43) Date of publication of application:
30.12.2020 Bulletin 2020/53

(73) Proprietor: **Future Technology Co., Ltd.**
Izumi-shi, Kagoshima-ken 899-0501 (JP)

(72) Inventor: **WATANABE, Ryuji**
Tokyo 101-0021 (JP)

(74) Representative: **Müller-Boré & Partner**
Patentanwälte PartG mbB
Friedenheimer Brücke 21
80639 München (DE)

(56) References cited:
WO-A1-2006/090290
WO-A1-2015/082652
WO-A1-2017/149288
WO-A1-2018/007627
CN-B- 104 005 302
JP-A- H10 179 045
JP-B1- 6 280 287
JP-B1- 6 280 287
JP-B2- 6 005 664
JP-B2- 6 005 664
US-A1- 2005 241 656
US-A1- 2014 261 472
US-A1- 2015 068 545
US-A1- 2017 334 881

EP 3 756 489 B1

Description

TECHNICAL FIELD

[0001] The present invention relates to an electronic cigarette filler and an electronic cigarette cartridge using it.

BACKCRUSHED ART

[0002] In recent years, in order to match a non-smoking tendency, an electronic cigarette product for enjoying tobacco by heating an electronic cigarette cartridge containing a tobacco component without using a flame so as to inhale a vaporized tobacco component is beginning to spread. As a method for producing a tobacco filler to be filled in the electronic cigarette cartridge, there is a method of powdering a tobacco leaf, making the powdered tobacco leaf into an aqueous slurry, forming the aqueous slurry into a sheet, adding oil or glycerin to the sheet, and drying the sheet (refer to Patent Document 1).

[0003] In addition, there is disclosed an article for smoking by inserting an electronic cigarette cartridge having a tobacco filler at an end portion so as to heat the electronic cigarette cartridge (refer to Patent Document 2).

[0004] US 2005/0241656 A1 describes a high flavor load particle and a method of preparing the same. US 2017/0334881 A1 describes nicotine salts, co-crystals, and salt co-crystal complexes. US 2015/0068545 A1 describes a smokeless tobacco composition incorporating a botanical material. WO 2018/007627 A1 describes a mechanically-adjustable e-vaping device flavor assembly. JP 6 005664 B2 describes a composition derived from tobacco. WO 2017/149288 A1 describes devices for evaporation and inhalation of nicotine. US 2014/0261472 A1 describes a fiber-wrapped smokeless tobacco product. CN 104 005 302 B describes a multi-functional cork paper body paper and a preparation method thereof. JP 6 280287 B1 describes an electronic cigarette cartridge using a tobacco plant or non-tobacco plant and a supporting member thereof. WO 2015/082652 A1 describes a non-tobacco nicotine-containing article. WO 2006/090290 A1 describes a smoking article with tobacco beads.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0005]

Patent Document 1: JP-A-2010-520764
Patent Document 2: JP-A-2015-519915

DISCLOSURE OF INVENTION

TECHNICAL PROBLEM

[0006] When an electronic cigarette cartridge is handled by a user, such as when the electronic cigarette cartridge is inserted into the electronic cigarette main body or when the electronic cigarette cartridge is taken out from the electronic cigarette main body after use, there is a possibility that the filler drops off from the electronic cigarette cartridge or a part of the filler falls, thus soiling an inside of the electronic cigarette main body, and thus leading to a drawback of the electronic cigarette main body.

[0007] Accordingly, it is an object of the present invention to provide an electronic cigarette filler which has an advantageous effect to prevent dropping or falling of the filler from an electronic cigarette cartridge before use and after use when handled by a user.

SOLUTION TO PROBLEM

[0008] To achieve such an object, the present invention provides an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former and microcrystalline cellulose having an average particle size of at least 70 μm and at most 120 μm according to JIS K0069:1992, wherein the aerosol former is selected from the group consisting of glycerin, propylene glycol, sorbitol, triethylene glycol, lactic acid, glycerin diacetate, glycerin triacetate, triethylene glycol diacetate, triethyl citrate, isopropyl myristate, methyl stearate, dimethyl dodecanedioate, and dimethyl tetradecanedioate.

[0009] According to a preferred embodiment, the electronic cigarette filler is in the form of rods or rectangular strips.

[0010] According to a preferred embodiment, the electronic cigarette filler is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness

of at least 0.1 mm and at most 0.5 mm.

[0011] According to a preferred embodiment, the electronic cigarette filler is obtained by forming a non-tobacco plant composition,

wherein the length change rate La (%) of the non-tobacco plant composition, defined as La (%)=(L0-L10)/L0×100, is at least 92.8%, where L0 is the length of the non-tobacco plant composition before drying, and L10 is the length after drying at 105°C for 10 minutes.

[0012] According to a preferred embodiment, the electronic cigarette filler is obtained by forming a non-tobacco plant composition,

wherein the length change rate Lb (%) of the non-tobacco plant composition, defined as Lb (%)=(L0-L15)/L0×100, is at least 91.9%, where L0 is the length of the non-tobacco plant composition before drying, and L15 is the length after drying at 105°C for 15 minutes.

[0013] According to a preferred embodiment, the electronic cigarette filler is obtained by forming a non-tobacco plant composition,

wherein the volume change rate Va (%) of the non-tobacco plant composition, defined as Va (%)=(V0-V10)/V0×100, is at least 86.9%, where V0 is the volume of the non-tobacco plant composition before drying, and V10 is the volume after drying at 105°C for 10 minutes.

[0014] According to a preferred embodiment, the electronic cigarette filler is obtained by forming a non-tobacco plant composition,

wherein the volume change rate Vb (%) of the non-tobacco plant composition, defined as Vb (%)=(V0-V15)/V0×100, is at least 85.7%, where V0 is the volume of the non-tobacco plant composition before drying, and V15 is the volume after drying at 105°C for 15 minutes.

[0015] In order to achieve the above object, the present invention provides an electronic cigarette cartridge to be used for an electronic cigarette main body, which uses the above electronic cigarette filler at one end and a mouthpiece at the other end.

[0016] Further described herein is an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 and at most 2.0 mm and a thickness of at least 0.1 and at most 0.5 mm,

wherein the length change rate L'a (%) of the electronic cigarette filler, defined as L'a (%)=(L0'-L'10)/L'0×100, is at least 95.2%, where L'10 is the length after drying at 105°C for 10 minutes.

[0017] Further described herein is an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 and at most 2.0 mm and a thickness of at least 0.1 and at most 0.5 mm,

wherein the length change rate L'b (%) of the electronic cigarette filler, defined as L'b (%)=(L0'-L'15)/L'0×100, is at least 94.2%, where L'0 is the length of the filler, and L'15 is the length after drying at 105°C for 15 minutes.

[0018] Further described herein is an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 and at most 2.0 mm and a thickness of at least 0.1 and at most 0.5 mm,

wherein the volume change rate V'a (%) of the electronic cigarette filler, defined as V'a (%)=(V0'-V'10)/V'0×100, is at least 88.1 %, where V'0 is the volume of the electronic cigarette filler before drying, and V'10 is the volume after drying at 105°C for 10 minutes.

[0019] Further described herein is an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 and at most 2.0 mm and a thickness of at least 0.1 and at most 0.5 mm,

wherein the volume change rate V'b (%) of the electronic cigarette filler, defined as V'b (%)=(V0'-V'15)/V'0×100, is at least 83.1 %, where V'0 is the volume of the non-tobacco plant composition before drying, and V'15 is the volume after drying at 105°C for 15 minutes.

[0020] Further described herein is an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 and at most 2.0 mm and a thickness of at least 0.1 and at most 0.5 mm,

wherein the width change rate Wa (%) of the electronic cigarette filler, defined as W'a (%)=(WO'-W'10)/W'0×100, is at least 93.9%, where W'0 is the width of the non-tobacco plant composition before drying, and W10 is the width after drying at 105°C for 10 minutes.

[0021] Further described herein is an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 and at most 2.0 mm and a thickness of at least 0.1 and at most 0.5 mm,

wherein the width change rate Wb (%) of the electronic cigarette filler, defined as Wb (%)=(WO'-W'15)/W'0×100, is at least 99.6%, where W'0 is the width of the non-tobacco plant composition before drying, and W15 is the width after drying at 105°C for 15 minutes.

[0022] Further described herein is an electronic cigarette cartridge to be used for an electronic cigarette main body, which uses the above electronic cigarette filler as defined in any one of Claims 9 to 14 at one end and a mouthpiece at the other end.

ADVANTAGEOUS EFFECTS OF INVENTION

[0023] According to the present invention, it is possible to provide an electronic cigarette filler which has an advantageous effect to prevent dropping or falling of the filler from an electronic cigarette cartridge before use and after when handled by a user.

BRIEF DESCRIPTION OF DRAWINGS

[0024]

Fig. 1 is a view illustrating an embodiment of use of an electronic cigarette cartridge.
Fig. 2 is a view illustrating an example of the structure of an electronic cigarette cartridge.
Fig. 3 is a view illustrating an example of a filler produced as an electronic cigarette filler.
Fig. 4 is a view illustrating a method for preparing an electronic cigarette cartridge.
Fig. 5 is views illustrating a modified example of an electronic cigarette cartridge.
Fig. 6 is a view illustrating another embodiment of use of an electronic cigarette cartridge.
Fig. 7 is a view illustrating another embodiment of the structure of an electronic cigarette cartridge.
Fig. 8 is a flowchart illustrating an example of a process for producing an electronic cigarette filler.
Fig. 9 is a graph illustrating the length change rate when a sheet of a non-tobacco plant composition is dried.
Fig. 10 is a graph illustrating the volume change rate when a sheet of a non-tobacco plant composition is dried.
Fig. 11 is a graph illustrating the length change rate when an electronic cigarette filler is dried.
Fig. 12 is a graph illustrating the volume change rate when an electronic cigarette filler is dried.
Fig. 13 is a graph illustrating the width change rate when an electronic cigarette filler is dried.

DESCRIPTION OF EMBODIMENTS

[0025] Now, embodiments of the present invention will be described in detail with reference to the drawings. The present invention is not limited to the following embodiments. In the description of the drawings, the same elements are expressed by the same symbols, and duplicate descriptions are omitted. Further, the dimensional ratio in the drawing may sometimes be different from the actual ratio for convenience of explanation.

[0026] Fig. 8 is a flowchart illustrating an example of a process for producing a non-tobacco plant composition and an electronic cigarette filler in an embodiment to which the present invention is applied.

[0027] The process for producing an electronic cigarette filler has a drying/crushing step (A) of e.g. drying/crushing and weighing the non-tobacco plant which will produce the aroma, and the like. In a case where the raw material can be used as it is, this step can be omitted. Further, the other materials for producing the electronic cigarette filler may be subjected to a preparation step (B) of conducting pretreatment, weighing, etc., if necessary.

[0028] After subjected to the drying/crushing step (A) or the preparation step (B), the materials are then subjected to a mixing step (M) and mixed under predetermined conditions to be formed into a non-tobacco plant composition.

[0029] The non-tobacco plant composition is formed into a desired shape by means of a filler-forming step (F). The non-tobacco plant composition formed into a desired shape is, as the electronic cigarette filler, subjected to an electronic cigarette cartridge production step (G) and formed into an electronic cigarette cartridge.

[0030] The respective steps will be described in order. For convenience of explanation, the above steps are explained individually, but two or more steps may be conducted simultaneously. The non-tobacco plant as the raw material will be described in detail later.

[0031] First, in the drying/crushing process, in order to form a use site (for example, leaves, seeds, dried fruits, stems, barks, roots, or the like) of the non-tobacco plant as the raw material, into a non-tobacco plant composition, the use site is processed into a predetermined crushed material. In this case, it is preferred to adjust the moisture content to be convenient for absorbing or supporting the aerosol former, water, and other components to be added later.

[0032] The drying temperature is preferably at least 60°C and at most 80°C. Within this range, it is easy to achieve a desired moisture content while avoiding dissipation of a required flavor component. When the temperature is at least 65°C, the desired moisture content can be more easily achieved, and when the temperature is at most 75°C, dissipation of a required flavor component can be further prevented.

[0033] The moisture content after drying and crushing is preferably at most 5 mass%, whereby a slurry is easily formed in a later process. The moisture content is more preferably at most 3 mass%. Further, when the moisture content is at

least 0.1 mass%, it is possible to maintain a good compatibility with water or the like.

[0034] Furthermore, the drying/crushing process can include a sieving step for sieving the dried and crushed material, and thus, the dried and crushed material having a desired particle size can be introduced into the mixing step (M).

[0035] In the preparation step (B), materials necessary for producing the electronic cigarette filler can be prepared.

[0036] Microcrystalline cellulose is, for example, obtained by partially depolymerizing α-cellulose obtained from pulp of a fibrous plant with an acid, and is obtained by removing a soluble portion from the cellulose and properly crystallizing an insoluble portion.

[0037] After various investigations, the followings were found for the electronic cigarette filler containing the non-tobacco plant, the aerosol former, and microcrystalline cellulose. When the electronic cigarette filler is placed under dry conditions, the microcrystals of the cellulose maintain a structure of the filler even when the filler formed of the non-tobacco plant and the aerosol former loses water, and a structural change such as volume shrinkage is suppressed. Such an effect is obtained by using the microcrystalline cellulose.

[0038] In the present invention, as an example, the microcrystalline cellulose is weighed in the preparation step (B) and subjected to the mixing step (M). The microcrystalline cellulose may be charged in the form of powder as it is or as a suspension as dispersed in a solvent such as water. In this case, a high-speed stirrer, a high pressure homogenizer or the like can be used to disperse the microcrystalline cellulose in the solvent.

[0039] The amount of the microcrystalline cellulose added is generally at least 1% and at most 15% as the content in the electronic cigarette filler. The amount added is preferably at least 3% and at most 12%, more preferably at least 5% and at most 10%.

[0040] The addition of the microcrystalline cellulose is effective to improve the formability, improve workability at the time of kneading with a roll mill, and particularly, is effective to suppress shrinkage and a volume change of the electronic cigarette filler, and is effective to control the quality of the electronic cigarette cartridge and to homogenize usability.

[0041] The average particle size of the microcrystalline cellulose used in the present invention is at least 70 μm and at most 120 μm.

[0042] When the average particle size of the microcrystalline cellulose is at least 30 μm, the effect of suppressing shrinkage of the electronic cigarette filler is excellent, and when the average particle size is at most 150 μm, in addition to the effect of suppressing the shrinkage, formability can be improved.

[0043] The average particle size of the microcrystalline cellulose is determined by a sieving method. The average particle size is obtained by the method described in JIS K0069:1992. The average particle size means, for example, a size corresponding to 50% of the mass by performing an integration of the mass from a larger mesh size for a test result by a plurality of sieves.

[0044] Furthermore, preferably, a sieved residue with a mesh size of 250 μm is at most 8 mass%, and a sieved residue with a mesh size of 75 μm is at least 45 mass%.

[0045] When the sieved residue with the mesh size of 250μm is at most 8 mass%, the sieved microcrystalline cellulose has an effect of suppressing the shrinkage of the electronic cigarette filler. When the sieved residue of the mesh size of 75 μm is at least 45 mass%, the formability of the electronic cigarette filler can be improved.

[0046] The mass average molecular weight (Mw) of the microcrystalline cellulose is preferably at least 10,000 and at most 200,000. When the mass average molecular weight is at least 10,000, the effect of suppressing the shrinkage of the electronic cigarette filler is excellent, and when the mass average molecular weight is at most 100,000, the formability can be made excellent in addition to the effect of suppressing the shrinkage. The mass average molecular weight is particularly preferably at least 20,000 and at most 60,000.

[0047] The molecular weight of the cellulose can be measured by gel permeation chromatography (GPC). For example, the measurement method as described in JP-A-H06-109715 is adopted, and polyethylene glycol or the like is appropriately used as a standard material.

[0048] Now, the mixing step (M) of conducting mixing will be described below.

[0049] The non-tobacco plant as the raw material is weighed, via the drying/crushing step (A) if necessary, and is subjected to the mixing step (M).

[0050] Now, the non-tobacco plant to be used as the raw material will be described. The non-tobacco plant which can be used in the present embodiment is not particularly limited as long as it is a plant other than tobacco. As a part of the plant to be used, for example, various parts such as a root (including a bulb, a tuberous root (potatoes), a corm, and the like), a stem, a tuber, a skin (including a stem bark, a bark, and the like), a leaf, a flower (including a petal, a stamen, a pistil, and the like), and a trunk and a branch of a tree can be used.

[0051] There are onion, red spider lily, tulip, hyacinth, garlic, Allium chinense, and lily as the bulb, there are crocus, gladiolus, freesia, iris, taro, and Konjac as the corm, there are cyclamen, anemone, begonia, crosne, potato, and ground-nut as the tuber, there are canna, lotus root, and ginger as a rhizome, there are dahlia, sweet potato, cassava, and Jerusalem artichoke as a tuberous root, there is dioscorea (yams such as yam, Japanese yam, and Chinese yam) as a rhizophore, and others include turnip, burdock, carrot, Japanese radish, and East Asian arrowroot. As a stem, there are konjac, asparagus, bamboo shoot, udo, Japanese radish, and yacon.

[0052] The above-mentioned potatoes and plants listed below contain carbohydrates and are preferably used as a material of at least a portion of the filler 111. For example, as a starch, there are corn starch (corn), potato starch (potato), sweet potato starch (sweet potato), tapioca starch (tapioca), and the like, and there are examples of use as thickeners, stabilizers and the like. The starch can improve acid resistance, heat resistance, shear resistance and the like by crosslinking, can improve storage stability, gelatinization promotion and the like by esterification and etherification, and can improve transparency, film properties, storage stability and the like by oxidation.

[0053] It is possible to obtain tamarind seed gum, guar gum and locust bean gum from a plant seed, to obtain arabic gum and karaya gum from sap, to obtain pectin from a fruit, and to obtain cellulose, konjak mannan mainly composed of agarose, and soybean polysaccharide from other plants. Further, it can be used after being denatured like cationized guar gum.

[0054] From seaweed, carrageenan classified into three types of kappa carrageenan, iota carrageenan and lambda carrageenan, agar, and alginic acid can be obtained, and these are also used as a salt such as a carrageenan metal salt or sodium alginate.

[0055] As specific examples, as plants used as herbs and spices, gardenia nut, citrus leaf, Japanese ginger, mugwort, wasabi, ajowan seed, anise, alfalfa, echinacea, shallot, estragon, everlasting flower, elder, allspice, orris root, oregano, orange peel, orange flower, orange leaf, cayenne chili pepper, chamomile german, chamomile roman, cardamon, curry leaf, garlic, catnip, caraway, caraway seed, sweet osmanthus, cumin, cumin seed, clove, green cardamon, green pepper, coneflower, saffron, cedar, cinnamon, jasmine, juniper berries, jolokia, ginger, star anise, spearmint, sumac, sage, savory, celery, celery seed, turmeric (curcuma longa), thyme, tamarind, tarragon, chervil, chives, dill, dill seed, tomato (dried tomato), tonka bean, dried phakchi, nutmeg, hibiscus, habanero chili, jalapeno, bird's eye chili, basil, vanilla, phakchi (coriander), parsley, paprika, hyssop, Piment d'Espelette, pink pepper, fenugreek seed, fennel, brown mustard, black cardamon, black cumin, black pepper, vetiver, pennyroyal, peppermint (mint), horseradish, white pepper, white mustard, poppy seed, porcini, marjoram, mustard seed, melegueta, marigold, malva flower, mace, yarrow flower, eucalyptus, lavender, licorice, linden, red clover, red pepper, lemon grass, lemon verbena, lemon balm, lemon peel, rose, rosebuds (purple), rose hip, rose petal, rosemary, rose red, laurel (bay leaf), long pepper, sesame (raw sesame, roasted sesame), golden chili pepper, sichuan pepper (hoajao), santaka pepper, zanthoxylum fruit, cayenne pepper, yuzu, and the like can be used. In addition, a mixture of various plants used as mixed spices (for example, five-spice powder, garam masala, ras el hanout, barigoule, chicken curry masala, tandoori masala, quatre epice, and herbes de provence), potpourri, and the like can be used.

[0056] In addition, for example, it is possible to use edible fruits (flesh portion) and seeds of e.g. peach, blueberry, lemon, orange, apple, banana, pineapple, mango, grape, kumquat, melon, plum, almond, cacao, coffee beans, peanut, sunflower, olive, walnut, and other nuts.

[0057] In addition, teas can be used. Teas differ not only in the plant which becomes tea, but even in the same plant, they become different teas depending on a processing method. Specifically, examples of tea include Japanese tea, black tea, angelica keiskei tea, Amacha, fiveleaf ginseng tea, aloe tea, ginkgo leaf tea, oolong tea, turmeric tea, quercus salicina tea, acanthopanax senticosus tea, Chinese plantain tea, alehoof tea, persimmon leaf tea, chamomile tea, chamomile tea, chamaecrista nomame tea, quince tea, chrysanthemum tea, gymnema tea, guava tea, Chinese matrimony vine tea, mulberry tea, black bean tea, geranium thunbergii tea, brown rice tea, burdock tea, comfrey tea, sea tangle tea, cherry blossom tea, saffron tea, shiitake tea, red shiso tea, jasmine tea, ginger tea, field horsetail tea, Japanese sweet flag tea, swertia japonica tea, buckwheat tea, Aralia elata tea, dandelion tea, tian cha, Houttuynia cordata tea, Eucommia ulmoides tea, sword bean tea, Japanese red elder tea, Ligustrum japonicum tea, adlay tea, Senna obtusifolia tea, loquat leaf tea, puér tea, safflower tea, pine needle tea, mate tea, barley tea, Acer maximowiczianum tea, mugwort tea, eucalyptus tea, Momordica grosvenorii tea, rooibos tea, bitter melon tea, and the like. For these teas, tea leaves after drinking may be used. If the tea leaves are used, it is possible to effectively reuse expensive tea or the like.

[0058] As specific examples of plants which can be used, sea tangle is mentioned, and in addition, as plants, sea lettuce, green laver, Sargassum horneri, Pyropia tenera, arame, rock seaweed, Campylaephora hypnaeoides, Gracilaria vermiculophylla, Saccharina sculpera, Ecklonia cava Kjellman, Laminariaceae rhizoid, Caulerpa lentillifera, Ecklonia kurome, Kombu, Pyropia yezoensis, dulse, Pyropia kurogii, Ecklonia stolonifera, gelidium, Saccharina gyrata, Arthrothamnus Ruprecht, nori, Petalonia binghamiae, hijiki, Monostroma nitidum, Undaria undarioides, Gloiopeltis, Ulva intestinalis, Saccharina japonica, mekabu, Nemacystus decipiens, wakame, and the like can also be used.

[0059] As specific examples of plants which can be used, brown rice is mentioned, and as other rice varieties, Indica rice (indian, continental and long-grain), Oryza glaberrima (African rice), Oryza sativa (Asian rice), javanica rice (java, tropical island and large grain), japonica rice (Japanese, temperate island and short grain), and NERICA (interspecific hybrid between Asian rice and African rice) can be also used, and can be also used as powder or rice bran.

[0060] As specific examples of plants which can be used, barley is mentioned, and as other barley varieties, Foxtail millet, oats (cultivated species of common wild oat), barley, common wild oat, common millet, Paspalum scrobiculatum (Kodo millet), wheat, finger millet, teff, pearl millet, naked barley (a variety of barley), Job's tears (fruits, not seeds), Japanese barnyard millet, fonio, Manchurian wild rice, glutinous barley, sorghum (great millet, kaoliang and sorghum),

corn and rye can be also used.

[0061] As specific examples of plants which can be used, black bean is mentioned, and as other legume variety, adzuki bean, carbo, kidney bean, pea, pigeon pea, cluster bean, grass pea (Lathyrus sativus), black gram, cowpea, winged bean, geocarpa groundnut, broad bean, soybean, ricebean, jack bean, tamarind, tepary bean, sword bean, velvet bean (Mucuna pruriens), bambara bean, chickpea, hyacinth bean, runner bean, horse gram (Macrotyloma uniflorum), moth bean, lima bean, peanut, mung bean, Lupinus, lentil, and almond can be also used.

[0062] As specific examples of plants which can be used, buckwheat is mentioned, and as examples of other plants, amaranth(Amaranthus and Amaranthus caudatus), quinoa and tartary buckwheat can be also used.

[0063] As specific examples of plants which can be used, shiitake is mentioned, and as mushroom varieties, pine mushroom, shiitake, Lactarius hatsutake, Shimeji, Rhizopogon roseolus, common mushroom and field mushroom can be also used.

[0064] In addition, it is possible to use sugar cane (draff of molasses may be used), sugar beet (beet), stems and branches of trees with aroma such as Japanese cypress, pine, Cryptomeria japonica, Sawara cypress, camellia and sandalwood, and barks, leaves and roots thereof. Ferns, mosses, and the like can also be used as non-tobacco plants. Further, as the plants, for example, by-products, pomace (sake lees, pomace of grape (composed of skin, seeds, fruit axis, and the like of grape)), and the like in production of fermented liquors such as sake and wine can be used. Furthermore, various plants described above may be used as mixed. Of course, plants other than those listed here can also be used.

[0065] In addition, those known as traditional Chinese medicine are also preferably used. Examples of the above include: indigo plant, rubia argyi, mallotus bark, gambir, benzoin, clematis root, artemisia capillaris flower, fennel, turmeric, processed mume, lindera root, quercus salicina, bearberry leaf, rose fruit, corydalis tuber, isodon herb, astragalus root, scutellaria root, polygonatum rhizome, phellodendron bark, coptis rhizome, cherry bark, hypericum erectum, polygala root, sophora japonica flower, allium macrostemon, prunella spike, myrobalan fruit, polygonum root, curcuma rhizome, pogostemon herb, pueraria root, german chamomile, trichosanthes root, trichosanthes seed, processed ginger, glycyrrhiza, coltsfoot flower, artemisia leaf, platycodon root, hovenia dulcis, orange fruit, immature orange, chrysanthemum flower, citrus peel, notopterygium, apricot kernel, kumquat, lonicera flower, alehoof, lycium fruit, lycium leaf, sophora root, walnut, chinaberry bark, lindera umbellata, dianthus chinensis, schizonepeta spike, cinnamon bark, cassia seed, pharbitis seed, scrophularia root, koi, safflower, albizziae cortex, dalbergia odorifera, fermented black soybean, elsholtzia herb, red ginseng, cyperus rhizoma, brown rice, magnolia bark, ligusticum sinense rhizome, acanthopanax bark, achyranthes root, euodia fruit, Japanese knotweed, burdock fruit, Schisandra fruit, bupleurum root, asiasarum root, saffron, smilax rhizome, crataegus fruit, gardenia fruit, cornus fruit, subprostrata root, jujube seed, japanese zanthoxylum peel, sparganium rhizome, dioscorea rhizome, rehmannia root, aster root, lycii cortex, lithospermum root, perilla fruit, perilla leaves, tribulus fruit, persimmon calyx, bassia scoparia fruit, peony root, chidium monnieri fruit, adenophora root, plantago seed, plantago herb, amomum seed, houttuynia herb, ginger, palm fruit, palm leaf, cimicifuga rhizome, wheat, sweet flag root, biond magnolia flower, ligustrum japonicum, ash bark, malted rice, gentiana lutea root, leonurus japonicus seed, zanthoxylum simulans seed, immature citrus unshiu peel, acorus gramineus rhizome, granati cortex, dendrobium, cnidium rhizome peucedanum root, nuphar rhizome, inula flower, sambucus sieboldiana leaf, lanxangia tsaoko fruit, gleditsiae semen, colored mistletoe herb, siberian cocklebur fruit, atractylodes lancea rhizome, oriental arborvitae leafy twig, himalayan teasel root, mulberry bark, sappan wood, perilla herb, chinese honeylocust abnozmal fruit, rhubarb, jujube, areca pericarp, alisma tuber, salvia miltiorrhiza root, bamboo culm, panax japonicus rhizome, bamboo leaf, common anemarrhena rhizome, garden burnet root, clove, uncaria hook, citrus unshiu peel, arisaema tuber, gastrodia tuber, asparagus root, benincasa seed, japanese angelica root, castor seed, codonopsis root, rush, peach kernel, bitter orange peel, dodder seed, aesculus turbinate, eucommia bark, aralia rhizome, trichosanthes cucumeroides, cistanche herb, nutmeg, lonicera leaf and stem, ginseng, fritillaria bulb, malt, platycladus orientalis kernel, lablab purpureus seed, ophiopogon root, malaytea scurfpea fruit, mentha herb, unripe guara fruit, pinellia tuber, agkistrodon skin, isatis root, barbated skullcup herb, lily root, angelica dahurica root, hedyotis diffusa, stemona root, atractylodes rhizome, areca, sinomenium stem and rhizome, imperata rhizome, saposhnikovia root rhizome, typha latifolia, dandelion root, moutan bark, ephedra herb, hemp fruit, shrub chaste tree fruit, pine resin, akebia stem, chaenomeles fruit, saussurea root, myrrh, common scouring rush herb, blackberry lily rhizome, bitter cardamom, reynoutria multiflora, grosvenor momordica fruit, eupatorium japonicum, longan aril, japanese gentian, alpiniae officinarum rhizome, ganoderma, forsythia fruit, glechoma hederacea herb, nelumbo seed, and phragmites rhizome.

[0066] In addition, extracts of the non-tobacco plants exemplified above, so-called extracts can also be used. Examples of the form of the extract include liquid, syrup, powder, granules and solution.

[0067] Among the above-exemplified non-tobacco plants, ones which are not required to be dried and crushed, may be subjected to the mixing step (M) as they are.

[0068] As other materials which can be used for the electronic cigarette filler, the following may be mentioned.

[0069] According to the present invention, the electronic cigarette filler contains an aerosol former, and the aerosol former is selected from the group consisting of glycerin, propylene glycol, sorbitol, triethylene glycol, lactic acid, diacetin

(glycerin diacetate), triacetin (glycerin triacetate), triethylene glycol diacetate, triethyl citrate, isopropyl myristate, methyl stearate, dimethyl dodecanedioate, dimethyl tetradecanedioate, and glycerin and propylene glycol are particularly preferably used. These are preferably used in an amount of at least 1 mass% and at most 80 mass% to the electronic cigarette filler, particularly preferably at least 10 mass% and at most 40 mass%.

[0070] In addition, if necessary, a flavor additive which adds flavor is also preferably used. The flavor additive may, for example, be an extract of mint, cocoa, coffee, black tea, or the like.

[0071] In addition, if necessary, a preservative for food may be added, and for example, sorbic acid, potassium sorbate, benzoic acid, sodium benzoate or the like may be added.

[0072] As materials other than the above, as binders, thickeners, and the like, gums such as guar gum, xanthan gum, gum arabic, or locust bean gum, for example, cellulose binders such as hydroxypropyl cellulose, carboxymethyl cellulose, hydroxyethyl cellulose, methyl cellulose and ethyl cellulose, polysaccharides such as starch, organic acids such as alginic acid, sodium alginate, sodium carboxymethyl cellulose, carrageenan, conjugate bases of organic acids such as agar and pectin, and combinations thereof are also used.

[0073] The above exemplified aerosol former, flavor additive, preservative, binder, thickener, etc. are prepared in the preparation step (B) in Fig. 8 and subjected to the mixing step (M).

[0074] In the mixing step (M), a normal mixer can be used. For example, it is preferred to mix the material in a mixing tank while applying a shear force by a stirring blade.

[0075] Then, the filler-forming step (F) may be conducted, for example, by a method of pressurizing the non-tobacco plant composition to make it pass through an orifice thereby to form rods, a method of forming the composition into a thin sheet, or a method of e.g. drying and crushing the non-tobacco composition thereby to form particles.

[0076] In the present invention, a method of forming the composition into a thin sheet, followed by cutting, will be described in detail. A three-roll mill is prepared to form a thin sheet. It is preferred to use the three-roll mill, whereby it is possible to obtain a sheet having a desired thickness by a doctor blade while performing kneading, dispersion, or the like by compression by pushing the composition between narrow rolls and by shearing due to a roll speed difference. Further, it is also preferred to prepare a sheet using a press roller or a pressing machine.

[0077] Further, in the filler-forming step (F), if necessary, the non-tobacco plant, the aerosol former, the binder, the thickener or the like, the flavor additive, the preservative may be further added, or water may be added.

[0078] In the present invention, as water to be used for production, it is preferred to use water which is sterilized or water from which microorganisms are removed, and it is preferable to use pure water obtained by a reverse osmosis membrane, ion exchange, or the like.

[0079] The thickness of the sheet obtained in the filler-forming step (F) is preferably at least 0.1 mm to 1.0 mm, more preferably at least 0.1 mm to 0.5 mm. The obtained sheet is cut by a cutter into a desired shape, and for cutting, a cutter, a rotary blade type rotary cutter may, for example, be mentioned.

[0080] As a specific example of the filler-forming step (F), cutting a sheet having a thickness of 0.3 mm into a desired shape will be described as an example. For example, the sheet is cut into a rectangle of 150 mm $\times$ 240 mm. The sheet is cut by a rotary cutter into a shape of 1.5 mm $\times$ 240 mm to obtain a cut sheet product. 50 such cut sheet products are wrapped with tobacco paper to prepare a roll having an outer diameter of approximately 6.9 mm. The roll is cut by a cutter into a length of 12.0 mm to obtain an aerosol-forming base material (110). On that occasion, the mass of the filler is 0.29 g. The proportion of the volume of the filler to the volume of the aerosol-forming base material (110), which is called the volume filling rate, is 0.60 in the above case. That is, the density of the filler calculated from the volume filling rate and the mass of the filler is 1.07 g/cm^3.

[0081] In the above filler-forming step (F), a plurality of rods or rectangular strips constituting the filler are arranged along the longitudinal direction of the electronic cigarette cartridge. Further, the plurality of rods or rectangular strips constituting the filler are wrapped with a wrapping member (151) such as tobacco paper along the axis of the height of the roll to form an aerosol-forming base material (110).

[0082] The electronic cigarette cartridge production step (G) will be described. The aerosol-forming base material (110) thus obtained, a support element (300), which will be described in detail later, and a mouthpiece (140) are wrapped with a packaging member (150), or a packaging member (150) is preliminarily formed into a cylinder, into which a mouthpiece (140), a support element (300) and a filler (111) are inserted, to prepare an electronic cigarette cartridge.

[0083] As an example of a preferred constitution of the present invention, an electronic cigarette cartridge comprising the aerosol-forming base material (110), the support element (300) and the mouthpiece (140) disposed from the upstream side (10) toward downstream (20) may be mentioned.

[0084] In a case where a heating element of an electronic cigarette main body of the present invention is inserted, as a preferred embodiment, a filler formed into a shape having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm is preferred.

[0085] The reason why microcrystalline cellulose is contained in the electronic cigarette filler in the present invention is that by the presence of the crystalline cellulose, components in the filler composition tend to be compatible with each other, thus increasing mechanical strength and structure-maintaining property, reducing changes of the length, width

and thickness with time, and thus reducing a volume change resulting from those changes.

[0086] Accordingly, improvement in formability of the filler and improvement in workability e.g. at the time of kneading by a roll mill can be expected. Particularly, such is effective in that the length, width, thickness and volume change rates e.g. due to shrinkage of the electronic cigarette filler can be suppressed.

[0087] By adding microcrystalline cellulose having a predetermined particle size in the present invention into the filler material, even when formed into a filler of the above shape, the length, width, thickness and volume change rates can be suppressed and further, a drawback of dropping of the electronic cigarette filler from the electronic cigarette cartridge which occurs at the time of transport can be suppressed. Further, by suppressing the above changes with time after production, usability can be homogenized regardless of the time period after production, and such is effective also in view of quality maintenance control.

[0088] Properties of the electronic cigarette filler thus prepared can be confirmed as follows. The length, thickness and volume changes of the non-tobacco plant composition or the electronic cigarette filler are observed, whereby the effects by incorporation of the microcrystalline cellulose can be evaluated.

[0089] The prepared non-tobacco plant composition or electronic cigarette filler is dried by a halogen moisture meter, and the length, width, thickness and volume of the filler before and after drying are measured, and the change rates are evaluated.

[0090] In the present invention, the length, the width, the thickness and the volume of the sheet or the non-tobacco plant composition or the electronic cigarette filler before drying are measured when the moisture content of the sheet of the non-tobacco plant composition or the electronic cigarette filler is at least 15 mass% and at most 20 mass%. The moisture content may be adjusted to the above range, for example, at a temperature of from 28°C to 30°C under a relative humidity of about 40%.

[0091] Measurement of the moisture content was conducted by an electronic halogen moisture content measuring apparatus, model DHS-50-5 (Bangxi Instrument Technology Co. Ltd.). At an automatic drying mode, and at a drying temperature of 105°C, the moisture content (mass%) is obtained from the moisture loss rate at the time of completion of automatic measurement. At the automatic measurement mode, the moisture loss rate is obtained by subtracting the sample mass at the time of completion of measurement from the sample weight before measurement, and dividing the value with the sample mass before measurement. The mass change is taken as the moisture content.

[0092] The length, width, thickness and volume change rates of the non-tobacco plant composition or the electronic cigarette filler are obtained by subtracting the length, width, thickness and volume after drying for a predetermined time from the length, width, thickness and volume before drying, and dividing these values with the length, width, thickness and volume before drying.

[0093] Specifically, when the length of the non-tobacco plant composition or the electronic cigarette filler before drying is represented as L0, and the length of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is represented as L10, the length change rate La (%) of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is defined as La (%)=(L0-L10)/L0×100.

[0094] Further, when the length of the non-tobacco plant composition or the electronic cigarette filler after drying for 15 minutes is represented by L15, the length change rate Lb (%) of the non-tobacco plant composition or the electronic cigarette filler after drying for 15 minutes is defined as Lb (%)=(L0-L15)/L0×100.

[0095] When the width of the non-tobacco plant composition or the electronic cigarette filler before drying is represented as WO, and the width of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is represented as W10, the width change rate Wa (%) of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is defined as Wa (%)=(WO-W10)/WO×100.

[0096] Further, when the width of the non-tobacco plant composition or the electronic cigarette filler after drying for 15 minutes is represented as W15, the width change rate Wb (%) of the non-tobacco plant composition or the electronic cigarette filler after drying for 15 minutes is defined as Wb (%)=(WO-W15)/WO×100.

[0097] When the thickness of the non-tobacco plant composition or the electronic cigarette filler before drying is represented as T0, and the thickness of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is represented as T10, the thickness change rate Ta (%) of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is defined as Ta (%)=(T0-T10)/T0×100.

[0098] Further, when the thickness of the non-tobacco plant composition or the electronic cigarette filler after drying for 15 minutes is represented as T15, the thickness change rate Tb (%) of the non-tobacco plant composition or the electronic cigarette filler after drying for 15 minutes is defined as Tb (%)=(T0-T15)/T0×100.

[0099] When the volume of the non-tobacco plant composition or the electronic cigarette filler before drying is represented as V0, and the volume of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is represented as V10, the volume change rate Va (%) of the non-tobacco plant composition or the electronic cigarette filler after drying for 10 minutes is defined as Va (%)=(V0-V10)/V0×100.

[0100] Further, when the volume of the non-tobacco plant composition or the electronic cigarette filler after drying for 15 minutes is represented as V15, the volume change rate Vb (%) of the non-tobacco plant composition or the electronic

cigarette filler after drying for 15 minutes is defined as Vb (%)=(V0-V15)/V0×100.

[0101] In the present invention, when the length change rate La (%) in a case where the non-tobacco plant composition is dried at 105°C for 10 minutes is at least 92.8%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is more preferably at least 93.0%, further preferably at least 93.5%.

[0102] Further, when the length change rate Lb (%) in a case where the non-tobacco plant composition is dried at 105°C for 15 minutes is at least 91.9%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is more preferably at least 92.0%, further preferably at least 92.5%.

[0103] In the present invention, when the volume change rate Va (%) in a case where the non-tobacco plant composition is dried at 105°C for 10 minutes is at least 86.9%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is more preferably at least 87.0%, further preferably at least 87.5%.

[0104] Further, when the volume change rate Vb (%) in a case where the non-tobacco plant composition is dried at 105°C for 15 minutes is at least 85.7%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is more preferably at least 86.0%, further preferably at least 86.5%.

[0105] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where L'0 is the length of the electronic cigarette filler before drying, and L'10 is the length after drying at 105°C for 10 minutes,
the length change rate L'a (%) of the electronic cigarette filler, is defined as L'a (%)=(L0'-L'10)/L'0×100

[0106] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where L'0 is the length of the electronic cigarette filler before drying, and L'15 is the length after drying at 105°C for 15 minutes,
the length change rate L'b (%) of the electronic cigarette filler is defined as L'b (%)=(L0'-L'15)/L'0×100

[0107] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where W'0 is the width of the electronic cigarette filler before drying, and W10 is the width after drying at 105°C for 10 minutes,
the width change rate Wa (%) of the electronic cigarette filler is defined as Wa (%)=(WO'-W'10)/W'0×100

[0108] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where W'0 is the width of the electronic cigarette filler before drying, and W15 is the width after drying at 105°C for 10 minutes,
the width change rate Wb (%) of the electronic cigarette filler is defined as Wb (%)=(WO'-W'15)/W'0×100

[0109] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a thickness of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where T'0 is the thickness of the electronic cigarette filler before drying, and T'10 is the thickness after drying at 105°C for 10 minutes,
the thickness change rate T'a (%) of the electronic cigarette filler is defined as T'a (%)=(T0'-T'10)/T'0×100

[0110] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a thickness of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where T'0 is the thickness of the electronic cigarette filler before drying, and T'15 is the thickness after drying at

105°C for 10 minutes,
the thickness change rate T'b (%) of the electronic cigarette filler is defined as T'b (%)=(T0'-T'15)/T'0×100

[0111] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where V'0 is the volume of the electronic cigarette filler before drying, and V'10 is the volume after drying at 105°C for 10 minutes,
the volume change rate V'a (%) of the electronic cigarette filler is defined as V'a (%)=(V0'-V'10)/V'0×100

[0112] In an electronic cigarette filler using a non-tobacco plant, which contains an aerosol former, and which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 mm and at most 2.0 mm and a thickness of at least 0.1 mm and at most 0.5 mm,

where V'0 is the volume of the electronic cigarette filler before drying, and V'15 is the volume after drying at 105°C for 15 minutes,
the volume change rate V'b (%) of the electronic cigarette filler is defined as V'b (%)=(V0'-V'15)/V'0x100

[0113] When the length change rate L'a (%) in a case where the electronic cigarette filler is dried at 105°C for 10 minutes is at least 95.2, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 95.7%, more preferably at least 96.2%.

[0114] Further, when the length change rate L'b (%) in a case where the electronic cigarette filler is dried at 105°C for 15 minutes is at least 94.2%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 95.0%, more preferably at least 95.9%.

[0115] The volume change rate V'a (%) in a case where the electronic cigarette filler is dried at 105°C for 10 minutes is at least 88.1%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 91.1%, more preferably at least 94.2%.

[0116] Further, when the volume change rate V'b (%) in a case where the electronic cigarette filler is dried at 105°C for 15 minutes is at least 83.1%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 87.2%, more preferably at last 91.4%.

[0117] The width change rate Wa (%) in a case where the electronic cigarette filler is dried at 105°C for 10 minutes is at least 93.9%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 96.2%, more preferably at least 98.6%.

[0118] Further, when the width change rate Wb (%) in a case where the electronic cigarette filler is dried at 105°C for 15 minutes is at least 89.6%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 92.9%, more preferably at last 96.3%.

[0119] The thickness change rate T'a (%) in a case where the electronic cigarette filler is dried at 105°C for 10 minutes is at least 98.8%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 99.0%, more preferably at least 99.2%.

[0120] Further, when the thickness change rate T'b (%) in a case where the electronic cigarette filler is dried at 105°C for 15 minutes is at least 98.5%, dropping of the filler from the electronic cigarette cartridge can be suppressed. The rate is preferably at least 98.6%, more preferably at last 98.9%.

[0121] In the present invention, by forming the electronic cigarette cartridge using a filler containing microcrystalline cellulose, change rates, for example, decreases of the length, width, thickness and volume with time after production can be suppressed, whereby a drawback such as dropping of the electronic cigarette filler from the electronic cigarette cartridge due to the changes with time can be reduced and in addition, e.g. a change of the aerosol flowability which will influence usability of the electronic cigarette cartridge can be suppressed, and such is effective also in that favorable usability can be maintained and homogenized regardless of the time period after production.

[0122] Now, an example of use of the produced electronic cigarette filler will be described.

[0123] Fig. 1 illustrates an embodiment of use of an electronic cigarette cartridge. An electronic cigarette cartridge (100) is mounted on an electronic cigarette main body (200) at the time of use by the user. The electronic cigarette main body (200) is provided with an inserting portion (210) for inserting the electronic cigarette cartridge (100).

[0124] A heating element (211) is provided at a center portion of a bottom inside the inserting portion (210), and the heating element (211) has a member in the form of a blade or in the form of a pin having a sharp front end, and is inserted into the aerosol-forming base material (110) and heats the aerosol-forming base material (110). More specifically, the heating element (211), when the electronic cigarette cartridge (100) is inserted into the inserting portion (210) of the electronic cigarette main body (200), is inserted into the center portion of the aerosol-forming base material (110).

[0125] The heating element (211) generates heat directly or indirectly by an electric power supplied from a battery (not shown in the diagram) provided inside the electronic cigarette main body (200). By the aerosol-forming base material (110) being heated by the heat of this heating element (211), an aerosol containing an aroma component is generated. Moreover, the aerosol generated is transferred to a mouthpiece (140) via a support element (300) and an aerosol transferring member (130), and inhaled by the user from the mouthpiece (140) side, whereby the aroma component is delivered into a mouth of the user. Hereinafter, for description of the present invention, the aerosol-forming base material (110) side of the electronic cigarette cartridge will be referred to as upstream side (10), and the mouthpiece side will be referred to as downstream side (20). Further, the upstream side (10) will sometimes be referred to as one end side, and the downstream side (20) will sometimes be referred to as the other end side.

[0126] Fig. 1 illustrates a case where the heating element (211) has one member in the form of a pin or a blade, and as an example of another embodiment, the heating element (211) has a plurality of members in the form of a pin or a blade.

[0127] Fig. 2 illustrates an example of a structure of an electronic cigarette cartridge (100). From the side where the heating element (211) is inserted, that is, from the upstream side (10) toward the downstream side (20), an aerosol-forming base material (110), a support element (300), a transferring member (130) and a mouthpiece (140) are disposed in this order.

[0128] The support element (300) supports the aerosol-forming base material (110). The support element (300) is disposed adjacent to the aerosol-forming base material (110), and a side portion (160) of the support element (300) is in contact with a packaging member (150) located on a periphery of the electronic cigarette cartridge (100). The side portion (160) is fixed to the inside of the packaging member (150) for example by an adhesive.

[0129] Further, the support element (300) may suitably be formed by using, for example, silicone, but the support element is not limited to silicone, and other material excellent in heat resistance may be used.

[0130] As shown in Fig. 3, the filler (111) produced as the aerosol-forming base material (110) is preferably in the form of rods or rectangular strips, which are filled in so as to be along the longitudinal direction of the shape of the fillers (111). In this example, the filler is filled in a wrapping member (151) formed into a cylinder. As the wrapping member (151), one having paper such as tobacco paper formed into a cylinder may be used. Further, the packaging member (150) may function also as the wrapping member (151). In such a structure, an air flow is stabilized, and it becomes easy for the user to inhale an aroma component from the aerosol-forming base material (110).

[0131] In Fig. 4, the above formed aerosol-forming base material (110), a transferring member (130), a mouthpiece (140) and the following support element (300) are disposed adjacent to one another in the order of the aerosol-forming base material (110), the support element (300), the transferring member (130) and the mouthpiece (140), and wrapped by a packaging member (150) such as tobacco paper to form a wound rod. In such a case, to a side portion (160) of the support element, an adhesive in a small amount is applied. An electronic cigarette cartridge (100) is constituted as above.

[0132] Now, an example of use of the electronic cigarette cartridge of the present invention will be described in detail.

[0133] An electronic cigarette cartridge (100) has an outer appearance of, for example, a rod or a cylinder, as shown in Fig. 2.

[0134] In the interior of the electronic cigarette cartridge (100), for example, as shown in Fig. 2, an aerosol-forming base material (110) is provided at one end, and toward a mouthpiece (140) on the other end, a support element (300) and a transferring member (130) are disposed in this order. And, these components are wrapped with a wrapping member (150).

[0135] The aerosol-forming base material (110) has an electronic cigarette filler. The aerosol-forming base material (110) generates an aerosol containing an aroma component contained in the plant from which the filler originates, by heating.

[0136] When the filler as the aerosol-forming base material (110) is, as shown in Fig. 3, in the form of pieces, rectangular strips or rods such that the length of the long side is from about 2 to about 20 times the short side, the filler (111) is filled in so that its longitudinal direction is along the longitudinal direction of the cartridge, whereby fluidity of the air flow will be good, and the user can easily inhale the air flow. Fig. 3 is a diagram as viewed from the end of the side of the aerosol-forming base material (110) of the electronic cigarette cartridge, and is partially perspective so that the filler (111) in the interior of the cartridge is visible. However, the longest portion of each piece, strip or rod is preferably from about 1 to about 20 mm. If the longest portion is too long, handling efficiency may be impaired at the time of filling in the cartridge due to a too large size. Further, in addition to the above, for example a filler in the form of flat plates having a substantially constant shape, is easily handled since it can be filled as wound.

[0137] As other aerosol-forming base material, wrinkled, pleated, gathered or folded sheets may also be preferred.

[0138] A filler in the form of fibers is, in the same manner as the rods, facilitates flow of air when inhaled, by filling the filler so that the fiber length direction is along the longitudinal direction of the cartridge.

[0139] A filler in the form of a porous material is one of preferred embodiments, since when filled in the cartridge, it facilitates flow of air when inhaled. In order to obtain a porous material, for example, a dried sheet may be pierced by a plurality of needles, or the porous material may be obtained by other method.

[0140] The filler in the form of pieces, plates such as squares, rectangles or rhomboids, or powder, granules or pellets,

can easily be filled so as to be poured into the cartridge opening. Further, the amount filled in the cartridge (filling amount) can minutely be controlled, and the flow of air when inhaled can easily be adjusted by the amount filled. Such a filler can more preferably be used by taking countermeasures such as providing a cover on the cartridge opening.

[0141] The filler in the form of blocks has a good thermal conductivity and easily draws an aroma component, and is one of preferred embodiments. Further, the size of the blocks may be increased for storage efficiency. In such a case, at the time of filling, the blocks may be formed again into smaller blocks, rods or particles.

[0142] The support element (300) supports the aerosol-forming base material (110). The support element (300) is disposed adjacent to the aerosol-forming base material (110), has an air hole or a notch for air flow at the center portion or the side portion, and makes an aerosol generated from the aerosol-forming base material (110) flow towards the mouthpiece (140) direction.

[0143] The mouthpiece (140) is adjacent to the transferring member (130) and is disposed at the other end portion of the electronic cigarette cartridge (100). The mouthpiece (140) may have a cellulose acetate filter for example, as a filter eliminating fine particles. The aroma component which has passed through the filter of the mouthpiece (140) is inhaled by the user.

[0144] As to whether the transferring member (130) is present or not, air permeability is good and an aromatic component generated is easily inhaled when there is no transferring member (130). On the other hand, it is also preferred to add a function to cool the generated aerosol by the transferring member (130). Instead of addition of the transferring member (130), it is preferred to extend the mouthpiece so as to be adjacent to or in contact with the support element (300), whereby a cooling function may be imparted to the filter to be used for the mouthpiece and the number of members can be reduced.

[0145] As the transferring member (130), a hollow tubular member wrapped with a crimped polymer sheet in the electronic cigarette cartridge longitudinal direction may, for example, be used.

[0146] Fig. 5(1) illustrates a structure in which the aerosol-forming base material (110) and the support element (300) are in contact with each other, which is a preferred embodiment, since the aerosol-forming base material can stably be supported. Further, such a structure is advantageous in production due to a simple structure.

[0147] Fig. 5(2) illustrates a structure in which a partitioning member (180) is provided between the aerosol-forming base material (110) and the support element (300) so that they are in contact with each other via the partitioning member (180). The partitioning member (180) may be one formed of a filter, paper or the like with good air permeability, and is preferably one which will be broken when the heating element (211) is inserted. By providing such a partitioning member, it is effective to prevent the aerosol-forming base material (110) from moving in the electronic cigarette cartridge by the influence of distribution e.g. at the time of transportation.

[0148] The structure shown in Fig. 5(3) such that a cover (170) is provided on the side where the heating element (211) is inserted of the aerosol-forming base material is also preferred. Such a structure is effective to prevent dissipation of aroma of the aerosol-forming base material (110). Further, such is also effective to prevent dropping of the aerosol-forming base material (110) from the electronic cigarette cartridge to the outside by the influence of distribution e.g. at the time of transportation. As a material of the cover (170), a filter, paper or sponge may, for example, be mentioned. In a case where the heating element is inserted, making one or more slits in the cover (170) or providing a circular or polygonal induction hole at the position to which the heating element is to be inserted is also a preferred embodiment.

[0149] Particularly in a case where the aerosol-forming base material (110) is in the form of particles such as a powder, granules, flakes or pellets, it is preferred to provide the partitioning member (180) or the cover (170). It is more preferred to provide both of them.

[0150] Now, a production process in the case of using black tea or the like will be described in detail, however, the present invention is not limited to the black tea or the like, and needless to say, it is applicable to the non-tobacco plants described in this specification.

[0151] One of preferred specific embodiments as the electronic cigarette cartridge is as follows. The aerosol-forming base material (110) is in a substantially cylindrical shape having the filler wrapped with e.g. tobacco paper, the diameter of the bottom or the upper surface of the substantial cylinder is at least 6.5 mm and at most 7.5 mm, and the height of the substantial cylinder is at least 11.0 mm and at most 13.0 mm. Further, it is preferred that the filler is in the form of rods or rectangular strips, which are filled along the longitudinal direction of the electronic cigarette cartridge, and the length of the filler is substantially equal to the height of the substantial cylinder, that is, at least 11.0 mm and at most 13.0 mm.

[0152] Further, the support element (300) has an outer diameter of preferably substantially equal to the diameter of the bottom or the upper surface of the substantial cylinder of the aerosol-forming base material (110). Further, it has a length of at least 9.0 mm and at most 11.0 mm.

[0153] Further, the mouthpiece (140) has a length of longer than 20.0 mm, preferably at least 21.0 mm and preferably at most 25.0 mm.

[0154] Further, the volume filling rate of the aerosol-forming base material is preferably at least 0.55 and at most 0.65.

[0155] Fig. 6 illustrates another embodiment of use of the electronic cigarette cartridge. The electronic cigarette car-

tridge is different in the specific structure from the above electronic cigarette cartridge (100) and thus is described below as an electronic cigarette cartridge (101). The electronic cigarette main body used is also different from the above electronic cigarette main body (200) and thus is described below as an electronic cigarette main body (201).

[0156] The electronic cigarette cartridge (101) is mounted on the electronic cigarette main body (201) at the time of use by the user. The electronic cigarette main body (201) is provided with an inserting portion (450) for inserting the electronic cigarette cartridge (101). The electronic cigarette main body (101) has an exterior portion (410), and by a heating portion (440) surrounding the periphery of the electronic cigarette cartridge, the aerosol-forming base material (110) of the electronic cigarette cartridge is heated, and an aerosol is generated and is inhaled. At the time of inhale from the other end side (20), air flows in from an air hole (431), and the generated aerosol passes through a hollow tubular member (530), a transferring member (130) and a mouthpiece (140) and is inhaled. In a control portion (420), a battery, an apparatus for controlling the heating portion, etc. are built in. A movable cover (430) is opened to clean the inside of the electronic cigarette main body after completion of use.

[0157] Fig. 7 illustrates another example of the structure of the electronic cigarette cartridge. From one end side (10) toward the other end side (20), an aerosol-forming base material (110), a hollow tubular member (530), a transferring member (130) and a mouthpiece (140) are disposed and are wrapped with a packaging member (150). Since the aerosol-forming base material (110) portion is heated by the electronic cigarette main body, the hollow tubular member (530) is disposed for heat insulation. The transferring member (130) may function also as a cooling member.

[0158] As a preferred shape of the electronic cigarette cartridge shown in Fig. 7, the outer diameter is at least 4 mm and at most 6 mm, and in the longitudinal direction, the aerosol-forming base material (110) is at least 30 mm and at most 70 mm, and the hollow tubular member (530) is at least 20 mm and at most 30 mm. The transferring member (130) is at least 5 mm and at most 15 mm, and the mouthpiece (140) is at least 10 mm and at most 25 mm.

[0159] Now, the present invention will be described in further detail with reference to Production Examples and Examples of the present invention.

(Production Example 1)

[0160]

Black tea leaves dried at 70°C, crushed and passed through a 80 mesh sieve were used. The moisture content was 2 mass%.
Dried and crushed black tea leaves: 100 parts by mass
Glycerin: 30 parts by mass
Propylene glycol: 30 parts by mass
Menthol: 5 parts by mass
Microcrystalline cellulose: 15 parts by mass
Polyvinyl polypyrrolidone: 10 parts by mass
Sodium carboxymethylcellulose: 4 parts by mass
Xylitol: 1.5 parts by mass
Glucomannan: 1 part by mass

[0161] The above components were charged into a mixing machine and mixed for 15 minutes to obtain a non-tobacco plant composition.

[0162] The microcrystalline cellulose in Production Example 1 is one having an average particle size of 90 μm and a mass average molecular weight (Mw) of 36,000. The sieved residue with a mesh size of 75 μm is 52 mass%, and the sieved residue with a mesh size of 250 μm is 1 mass%.

[0163] The obtained non-tobacco plant composition was subjected to the filler-forming step (F). The non-tobacco plant composition was kneaded and dispersed by a three-roll mill and formed into a sheet having a desired thickness. In this Example, the non-tobacco plant composition was charged into the three-roll mill, and procedure of adding 20 parts by mass of pure water while the state of the sheet was observed, and pressing a doctor blade to a roll to obtain a sheet-shaped product, was repeated eight times to obtain a non-tobacco plant composition sheet.

[0164] The non-tobacco plant composition sheet thus obtained had a thickness of 0.3 mm. The non-tobacco composition sheet was cut into a rectangle of 150 mm × 240 mm.

[0165] The cut non-tobacco plant composition sheet was further processed into a shape of 15 mm in width, 50 mm in length and 0.3 mm in thickness. The mass of the processed composition sheet was about 0.30 g.

(Production Example 2)

[0166] In the same manner as in Production Example 1, a non-tobacco plant composition sheet was obtained.

[0167] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.1 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was 6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Production Example 3)

[0168] In the same manner as in Production Example 1, a non-tobacco plant composition sheet was obtained.
[0169] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.3 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was 6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Production Example 4)

[0170] In the same manner as in Production Example 1, a non-tobacco plant composition sheet was obtained.
[0171] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.5 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was 6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Production Example 5)

[0172] A tobacco plant composition sheet was prepared in the same manner as in Production Example 1 with the non-tobacco plant composition in Production Example 1 except that no microcrystalline cellulose was used.

(Production Example 6)

[0173] In the same manner as in Production Example 5, a non-tobacco plant composition sheet was obtained.
[0174] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.1 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was 6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Production Example 7)

[0175] In the same manner as in Production Example 5, a non-tobacco plant composition sheet was obtained.
[0176] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.3 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was 6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Production Example 8)

[0177] In the same manner as in Production Example 5, a non-tobacco plant composition sheet was obtained.
[0178] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.5 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was

6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Production Example 9)

[0179] A tobacco plant composition sheet was prepared in the same manner as in Production Example 1 using the non-tobacco plant composition in Production Example 1 except that methyl cellulose was used instead of microcrystalline cellulose.

[0180] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.3 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was 6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Production Example 10)

[0181] A non-tobacco plant composition sheet was prepared in the same manner as in Production Example 1 using the non-tobacco plant composition in Production Example 1 except that 4 parts by mass of microcrystalline cellulose was used.

[0182] The sheet was cut by a rotary cutter into a shape of 1.5 mm in width, 240 mm in length and 0.3 mm in thickness to obtain a filler. 50 such cut sheet products were bundled and aligned in a longitudinal direction, wrapped with paper having a basis weight of 34 g/m^2, stuck with a paste and formed into a cylinder. The inner diameter of the cylinder was 6.9 mm. The cylinder was cut into a length of 12.0 mm to form an aerosol-forming base material (110). The mass of the aerosol-forming base material was 0.29 g, and the volume filling rate of the filler to the volume of the aerosol-forming base material was 0.60.

(Example 1)

[0183] The aerosol-forming base material prepared in Production Example 2, a support element (300) which is a tubular hollow tube, and a filter (140) to be a mouthpiece were prepared. The support element (300) had a diameter of the bottom and the upper surface, that is, an outer diameter of 6.9 mm, and had a 4 mm through hole as the hollow portion. The filter (140) to be a mouthpiece had a length of 23 mm. As a packaging member, two and a half layers of paper having a basis weight of 38 g/m^2 were wrapped so that the inner diameter would be 6.9 mm and stuck with a paste. A paper tube prepared by wrapping two and a half layers of paper having a basis weight of at least 32 g/m^2 and at most 45 g/m^2 thus prepared, that is, a packaging member, is suitable for an electronic cigarette cartridge to be used for an electronic cigarette main body used by inserting a heating element.

[0184] An adhesive was applied to the inside of the paper tube, the filter was inserted from the other end side (20) to form a mouthpiece (140), and from one end side (10), the support element (300) was inserted and then the aerosol-forming base material was inserted. Further, at a portion of the mouthpiece, paper having a basis weight of 40 g/m^2 was wound so as to substantially cover the mouthpiece (140).

[0185] In such a manner, an electronic cigarette cartridge was prepared.

(Example 2)

[0186] An electronic cigarette cartridge was prepared in the same manner as in Example 1 except that the aerosol-forming base material prepared in Production Example 3 was used instead of the aerosol-forming base material in Production Example 2.

(Example 3)

[0187] An electronic cigarette cartridge was prepared in the same manner as in Example 1 except that the aerosol-forming base material prepared in Production Example 4 was used instead of the aerosol-forming base material in Production Example 2.

(Example 4)

[0188] An electronic cigarette cartridge was prepared in the same manner as in Example 1 except that the aerosol-forming base material prepared in Production Example 10 was used instead of the aerosol-forming base material in Production Example 2.

(Comparative Example 1)

[0189] An electronic cigarette cartridge was prepared in the same manner as in Example 1 except that the aerosol-forming base material prepared in Production Example 6 was used instead of the aerosol-forming base material in Production Example 2.

(Comparative Example 2)

[0190] An electronic cigarette cartridge was prepared in the same manner as in Comparative Example 2 except that the aerosol-forming base material prepared in Production Example 7 was used instead of the aerosol-forming base material in Production Example 6.

(Comparative Example 3)

[0191] An electronic cigarette cartridge was prepared in the same manner as in Comparative Example 2 except that the aerosol-forming base material prepared in Production Example 8 was used instead of the aerosol-forming base material in Production Example 6.

[0192] The non-tobacco plant compositions and the electronic cigarette cartridges obtained by the above method were subjected to the following evaluation.

(Evaluation 1)

[0193] With respect to the sheets prepared using the non-tobacco plant compositions in Production Examples 1, 5, 9 and 10, the length, the width, the thickness and the volume before and after drying by halogen lamp irradiation were measured, and the changes were quantitatively determined.

[0194] To measure the change, a halogen moisture content meter (manufactured by Bangxi Instrument Technology Co. Ltd., model: DHS-50-5) was used.

[0195] On a sample plate of the halogen moisture content meter, the sheet of the non-tobacco plant composition was placed, and heated from above the sample plate by a halogen lamp disposed in a heater cover. After a predetermined drying time at a heating temperature of 105°C, the length, the width and the thickness of the sheet of the non-tobacco plant composition were measured, and the volume change was measured. The measurement was conducted after drying times of 0 minute, 10 minutes and 15 minutes.

[0196] The volume change rate is a value obtained by subtracting the volume of the sheet of the non-tobacco plant composition after drying for a predetermined time from the volume of the sheet of the non-tobacco plant composition before drying, and dividing the value by the volume of the sheet of the non-tobacco plant composition before drying.

[0197] In the present invention, when the length of the sheet of the non-tobacco plant composition before drying is represented as L0, and the length of the sheet of the non-tobacco plant composition after drying for 10 minutes is represented as L10, the length change rate La (%) of the sheet of the non-tobacco plant composition is defined as La (%)=(L0-L10)/L0×100.

[0198] Further, when the length of the sheet of the non-tobacco plant composition after drying for 15 minutes is represented as L15, the length change rate Lb (%) of the sheet of the non-tobacco plant composition after drying for 15 minutes is defined as Lb (%)=(L0-L15)/L0×100.

[0199] In the present invention, when the width of the sheet of the non-tobacco plant composition before drying is represented as WO, and the width of the sheet of the non-tobacco plant composition after drying for 10 minutes is represented as W10, the width change rate Wa (%) of the sheet of the non-tobacco plant composition is defined as Wa (%)=(WO-W10)/WO×100.

[0200] Further, when the width of the sheet of the non-tobacco plant composition after drying for 15 minutes is represented as W15, the width change rate Wa (%) of the sheet of the non-tobacco plant composition after drying for 15 minutes is defined as Wb (%)=(WO-W15)/WO×100.

[0201] In the present invention, when the thickness of the sheet of the non-tobacco plant composition before drying is represented as T0, and the thickness of the sheet of the non-tobacco plant composition after drying for 10 minutes is represented as T10, the thickness change rate Ta (%) of the sheet of the non-tobacco plant composition is defined as

Ta (%)=(T0-T10)/T0×100.

[0202] Further, when the thickness of the sheet of the non-tobacco plant composition after drying for 15 minutes is represented as T15, the thickness change rate Tb (%) of the sheet of the non-tobacco plant composition after drying for 15 minutes is defined as Tb (%)=(TO-T15)/TOx100.

[0203] In the present invention, when the volume of the sheet of the non-tobacco plant composition before drying is represented as V0, and the volume of the sheet of the non-tobacco plant composition after drying for 10 minutes is represented as V10, the volume change rate Va (%) of the sheet of the non-tobacco plant composition is defined as Va (%)=(V0-V10)/V0×100.

[0204] Further, when the volume of the sheet of the non-tobacco plant composition after drying for 15 minutes is represented as V15, the volume change rate Vb (%) of the sheet of the non-tobacco plant composition after drying for 15 minutes is defined as Vb (%)=(V0-V15)/V0×100.

[0205] In (Evaluation 1), the results of measurement of the length, the width, the thickness and the volume were as follows.

[0206] Further, a graph illustrating the length change rate is shown in Fig. 9. A graph illustrating the volume change rate is shown in Fig. 10.

[0207] After drying for 10 minutes, the volume change rate Va (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 86.7%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 89.4%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 86.9%.

[0208] After drying for 15 minutes, the volume change rate Vb (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 85.5%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 88.0%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 85.7%.

[0209] After drying for 10 minutes, the length change rate La (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 92.7%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 93.6%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 92.8%.

[0210] After drying for 15 minutes, the length change rate Lb (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 91.8%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 92.7%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 91.9%.

[0211] After drying for 10 minutes, the width change rate Wa (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 94.8%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 96.2%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 95.0%.

[0212] After drying for 15 minutes, the width change rate Wb (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 94.7%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 96.0%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 94.9%.

[0213] After drying for 10 minutes, the thickness change rate Ta (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 98.6%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 99.3%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 98.8%.

[0214] After drying for 15 minutes, the thickness change rate Tb (%) of the sheet of the non-tobacco plant composition in Production Example 5 containing no microcrystalline cellulose was 98.3%, whereas the rate of the sheet of the non-tobacco plant composition in Production Example 1 containing microcrystalline cellulose was 99.0%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 98.5%.

[0215] With respect to the sheet of the non-tobacco plant composition prepared in Production Example 9 containing methyl cellulose instead of microcrystalline cellulose, the length, the width, the thickness and the volume before and after drying by halogen lamp irradiation in the same manner were measured, whereupon the changes were the same as in Production Example 5.

[0216] Here, methyl cellulose has no microcrystalline structure.

[0217] The results of the evaluation 1 are shown in Table 2.

[Table 2]

	Production Ex. 1	Production Ex. 5	Production Ex. 10
Va	89.4%	86.7%	86.9%

(continued)

	Production Ex. 1	Production Ex. 5	Production Ex. 10
Vb	88.0%	85.5%	85.7%
La	93.6%	92.7%	92.8%
Lb	92.7%	91.8%	91.9%
Wa	96.2%	94.8%	95.0%
Wb	96.0%	94.7%	94.9%
Ta	99.3%	98.6%	98.8%
Tb	99.0%	98.3%	98.5%

(Evaluation 2)

[0218] With respect to an electronic cigarette cartridge, the following evaluation was conducted.

[0219] The electronic cigarette main body used is described. The electronic cigarette main body used was IQOS (registered trademark) which is a heated electronic cigarette made of Philip Morris. The scheme of the electronic cigarette is as follows. The heating element (211) has a width of 4.5 mm, a length to the tip of 12 mm and a thickness of 0.4 mm.

[0220] The inner diameter of the inserting portion (210) is 7 mm, which is substantially equal to the outer diameter of the electronic cigarette cartridge. The heating element (211) generates heat by an electric power supplied from a battery (not shown in the diagram) provided inside the electronic cigarette main body (200) and reaches about 370°C. By an internal control system, use of one electronic cigarette cartridge is completed by 14 puffs. When the electronic cigarette cartridge in Examples is inserted, the electronic cigarette cartridge portion which appears on the outside from the downstream side of the electronic cigarette main body is about 20 mm.

[0221] After use of each of the electronic cigarette cartridges produced in Examples of the present invention and Comparative Examples by the electronic cigarette main body, the filler falling test was conducted.

[0222] The filler falling test after use was conducted as follows. The electronic cigarette cartridge after use was held so that one end side (10) faced vertically downward and shaken up and down, and evaluation was conducted as to whether popping out and falling of the filler occur or not.

[0223] The evaluation standards are as follows.

A: No popping out nor falling observed.
B: Popping out or falling observed.

[0224] The test results obtained by (Evaluation 2) are shown in Table 1.

(Evaluation 3)

[0225] Falling of the filler after stored at room temperature for a predetermined time was evaluated as follows.

[0226] The prepared electronic cigarette cartridges were filled in a paper box of 70 mm × 14 mm × 45 mm in height so that the aerosol-forming base material faced the bottom. The box containing the electronic cigarette cartridges was left to stand in a 45°C environment for 2 weeks.

[0227] Then, the following evaluation was conducted.

[0228] One electronic cigarette cartridge was pulled from the paper box so that one end side (10) of the electronic cigarette cartridge faced vertically downward, and evaluation was conducted as to whether popping out and falling of the filler occur or not.

[0229] The evaluation standards are as follows.

A: No popping out nor falling observed.
B: Popping out or falling observed.

[0230] The test results obtained by (Evaluation 3) are shown in Table 1.

[Table 1]

	Filler used	Evaluation 2	valuation 3
Ex. 1	Production Ex. 2	A	A
Ex. 2	Production Ex. 3	A	A
Ex. 3	Production Ex. 4	A	A
Ex. 4	Production Ex. 10	A	A
Comp. Ex. 1	Production Ex. 6	B	A
Comp. Ex. 2	Production Ex. 7	B	B
Comp. Ex. 3	Production Ex. 8	B	B

(Evaluation 5)

[0231] With respect to the fillers prepared in Production Examples 3, 7 and 10, the length, the width, the thickness and the volume before and after drying by halogen lamp irradiation were measured, and the changes were quantitatively determined.

[0232] Measurement of the moisture content was conducted in the same manner as in (Evaluation 1) using the same halogen moisture content meter (manufactured by Bangxi Instrument Technology Co. Ltd., model DHS-50-5) as in (Evaluation 1).

[0233] In the present invention, when the length of the filler before drying is represented as L'0, and the length of the filler after drying for 10 minutes is represented as L'10, the length change rate L'a (%) of the filler is defined as L'a (%)=(L0'-L'10)/L'0×100.

[0234] Further, when the length of the filler after drying for 15 minutes is represented as L'15, the length change rate L'b (%) of the filler after drying for 15 minutes is defined as L'b(%)=(L0'-L'15)/L'0×100.

[0235] In the present invention, when the width of the filler before drying is represented as W'0, and the width of the filler after drying for 10 minutes is represented as W 10, the width change rate Wa (%) of the filler is defined as Wa (%)=(WO'-W'10)/W'0×100.

[0236] Further, when the width of the filler after drying for 15 minutes is represented as W 15, the width change rate Wb (%) of the filler after drying for 15 minutes is defined as Wb (%)=(WO'-W'15)/W'0×100.

[0237] In the present invention, when the thickness of the filler before drying is represented as T'0, and the thickness of the filler after drying for 10 minutes is represented as T'10, the thickness change rate T'a (%) of the filler is defined as T'a (%)=(T0'-T'10)/T'0×100.

[0238] Further, when the thickness of the filler after drying for 15 minutes is represented as T'15, the thickness change rate T'b (%) of the filler after drying for 15 minutes is defined as T'b (%)=(T0'-T'15)/T'0×100.

[0239] In the present invention, when the volume of the filler before drying is represented as V'0, and the volume of the filler after drying for 10 minutes is represented as V'10, the volume change rate V'a (%) of the filler is defined as V'a (%)=(V0'-V'10)/V'0×100.

[0240] Further, when the volume of the filler after drying for 15 minutes is represented as V'15, the volume change rate V'b (%) of the filler after drying for 15 minutes is defined as V'b (%)=(V0'-V'15)/V'0×100.

[0241] In (Evaluation 4), the results of measurement of the length, the width, the thickness and the volume were as follows.

[0242] Further, a graph illustrating the length change rate is shown in Fig. 11. A graph illustrating the volume change rate is shown in Fig. 12. A graph illustrating the width change rate is shown in Fig. 13.

[0243] After drying for 10 minutes, the volume change rate V'a (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 87.9%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 94.3%, and the rate of the filler in Production Example 10 was88.1%.

[0244] After drying for 15 minutes, the volume change rate V'b (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 82.9%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 91.5%, and the rate of the filler in Production Example 10 was 83.1%.

[0245] After drying for 10 minutes, the length change rate L'a (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 95.0%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 96.3%, and the rate of the filler in Production Example 10 was 95.2%.

[0246] After drying for 15 minutes, the length change rate L'b (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 94.1%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 96.0%, and the rate of the filler in Production Example 10 was 94.2%.

[0247] After drying for 10 minutes, the width change rate Wa (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 93.7%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 98.7%, and the rate of the filler in Production Example 10 was 93.9%.

[0248] After drying for 15 minutes, the width change rate Wb (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 89.4%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 96.4%, and the rate of the filler in Production Example 10 was 89.6%.

[0249] After drying for 10 minutes, the thickness change rate T'a (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 98.6%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 99.3%, and the rate of the non-tobacco plant composition sheet in Production Example 10 was 98.8%.

[0250] After drying for 15 minutes, the thickness change rate T'b (%) of the filler in Production Example 7 containing no microcrystalline cellulose was 98.3%, whereas the rate of the filler in Production Example 3 containing microcrystalline cellulose was 99.0%, and the rate of the filler in Production Example 10 was 98.5%.

[0251] With respect to the filler prepared in Example 9 containing methyl cellulose instead of microcrystalline cellulose, the length, the width, the thickness and the volume before and after drying by halogen lamp irradiation in the same manner were measured, whereupon the changes were the same as in Production Example 7.

[0252] Here, methyl cellulose has no microcrystalline structure.

[0253] The results obtained by (Evaluation 4) are shown in Table 3.

[Table 3]

	Production Ex. 3	Production Ex. 7	Production Ex. 10
V'a	94.3%	87.9%	88.1%
V'b	91.5%	82.9%	83.1%
L'a	96.3%	95.0%	95.2%
L'b	96.0%	94.1%	94.2%
Wa	98.7%	93.7%	93.9%
Wb	96.4%	89.4%	89.6%
T'a	99.3%	98.6%	98.8%
T'b	99.0%	98.3%	98.5%

[0254] According to the present embodiment, the following effects are obtained.

[0255] According to the electronic cigarette filler using a non-tobacco plant composition of the present invention, and the electronic cigarette cartridge using the filler, shrinkage and volume change of the electronic cigarette filler at the time of production and during storage can be reduced. By reduction of shrinkage and volume change of the electronic cigarette filler, dropping of the electronic cigarette filler from the electronic cigarette cartridge can be reduced, and in addition, voids in the electronic cigarette filler through which the aerosol will pass can be kept to have a certain size regardless of the period and the temperature of the storage after production, and favorable usability can be kept.

[0256] The present invention has been described with reference to specific embodiments, however, the present invention is by no means restricted to such embodiments.

REFERENCE SYMBOLS

[0257]

10: upstream side (one end side)
20: downstream side (the other end side)
100: electronic cigarette cartridge
110: aerosol-forming base material
111: filler
130: transferring member
140: mouthpiece
150: packaging member
151: wrapping member
170: cover

180: partitioning member
200: electronic cigarette main body
210: inserting portion
211: heating element
300: support element
201: electronic cigarette main body
410: exterior portion
420: control portion
430: movable cover
431: air hole
440 heating portion
450: inserting portion
101: electronic cigarette cartridge
530: hollow tubular member

Claims

1. An electronic cigarette filler using a non-tobacco plant, which contains an aerosol former and microcrystalline cellulose having an average particle size of at least 70 μm and at most 120 μm according to JIS K0069:1992, wherein the aerosol former is selected from the group consisting of glycerin, propylene glycol, sorbitol, triethylene glycol, lactic acid, glycerin diacetate, glycerin triacetate, triethylene glycol diacetate, triethyl citrate, isopropyl myristate, methyl stearate, dimethyl dodecanedioate, and dimethyl tetradecanedioate.

2. The electronic cigarette filler according to Claim 1, which is in the form of rods or rectangular strips.

3. The electronic cigarette filler according to Claim 1 or 2, which is in the form of rods or rectangular strips, having a length of at least 10 mm and at most 20 mm, a width of at least 1.1 and at most 2.0 mm and a thickness of at least 0.1 and at most 0.5 mm.

4. The electronic cigarette filler according to any one of Claims 1 to 3, which is obtained by forming a non-tobacco plant composition,
wherein the length change rate La (%) of the non-tobacco plant composition, defined as La (%)=(L0-L10)/L0×100, is at least 92.8%, where L0 is the length of the non-tobacco plant composition before drying, and L10 is the length after drying at 105°C for 10 minutes.

5. The electronic cigarette filler according to any one of Claims 1 to 4, which is obtained by forming a non-tobacco plant composition,
wherein the length change rate Lb (%) of the non-tobacco plant composition, defined as Lb (%)=(L0-L15)/L0×100, is at least 91.9%, where L0 is the length of the non-tobacco plant composition before drying, and L15 is the length after drying at 105°C for 15 minutes.

6. The electronic cigarette filler according to any one of Claims 1 to 5, which is obtained by forming a non-tobacco plant composition,
wherein the volume change rate Va (%) of the non-tobacco plant composition, defined as Va (%)=(V0-V10)/V0×100, is at least 86.9%, where V0 is the volume of the non-tobacco plant composition before drying, and V10 is the volume after drying at 105°C for 10 minutes.

7. The electronic cigarette filler according to any one of Claims 1 to 6, which is obtained by forming a non-tobacco plant composition,
wherein the volume change rate Vb (%) of the non-tobacco plant composition, defined as Vb (%)=(V0-V15)/V0×100, is at least 85.7%, where V0 is the volume of the non-tobacco plant composition before drying, and V15 is the volume after drying at 105°C for 15 minutes.

8. An electronic cigarette cartridge to be used for an electronic cigarette main body, which uses the electronic cigarette filler as defined in any one of Claims 1 to 7 at one end and a mouthpiece at the other end.

Patentansprüche

1. Elektronischer Zigarettenfüllstoff unter Verwendung einer Nicht-Tabakpflanze, der einen Aerosolbildner und mikrokristalline Cellulose mit einer durchschnittlichen Teilchengröße von mindestens 70 μm und höchstens 120 μm gemäß JIS K0069:1992 enthält,
wobei der Aerosolbildner ausgewählt ist aus der Gruppe, bestehend aus Glycerin, Propylenglycol, Sorbitol, Triethylenglycol, Milchsäure, Glycerindiacetat, Glycerintriacetat, Triethylenglycoldiacetat, Triethylcitrat, Isopropylmyristat, Methylstearat, Dimethyldodecandioat und Dimethyltetradecandioat.

2. Elektronischer Zigarettenfüllstoff nach Anspruch 1, der in Form von Stäben oder rechteckigen Streifen vorliegt.

3. Elektronischer Zigarettenfüllstoff nach Anspruch 1 oder 2, der in Form von Stäben oder rechteckigen Streifen mit einer Länge von mindestens 10 mm und höchstens 20 mm, einer Breite von mindestens 1,1 und höchstens 2,0 mm und einer Dicke von mindestens 0,1 und höchstens 0,5 mm vorliegt.

4. Elektronischer Zigarettenfüllstoff nach einem der Ansprüche 1 bis 3, der durch Bildung einer Nicht-Tabak-Pflanzenzusammensetzung erhalten wird,
wobei die Längenänderungsrate La (%) der Nicht-Tabak-Pflanzenzusammensetzung, definiert als La (%)=(L0-L10)/L0×100, mindestens 92,8 % beträgt, wobei L0 die Länge der Nicht-Tabak-Pflanzenzusammensetzung vor dem Trocknen ist und L10 die Länge nach dem Trocknen bei 105°C für 10 Minuten ist.

5. Elektronischer Zigarettenfüllstoff nach einem der Ansprüche 1 bis 4, der durch Bildung einer Nicht-Tabak-Pflanzenzusammensetzung erhalten wird,
wobei die Längenänderungsrate Lb (%) der Nicht-Tabak-Pflanzenzusammensetzung, definiert als Lb (%)=(L0-L15)/L0×100, mindestens 91,9 % beträgt, wobei L0 die Länge der Nicht-Tabak-Pflanzenzusammensetzung vor dem Trocknen ist und L15 die Länge nach dem Trocknen bei 105°C für 15 Minuten ist.

6. Elektronischer Zigarettenfüllstoff nach einem der Ansprüche 1 bis 5, der durch Bildung einer Nicht-Tabak-Pflanzenzusammensetzung erhalten wird,
wobei die Volumenänderungsrate Va (%) der Nicht-Tabak-Pflanzenzusammensetzung, definiert als Va (%)=(V0-V10)/V0×100, mindestens 86,9 % beträgt, wobei V0 das Volumen der Nicht-Tabak-Pflanzenzusammensetzung vor dem Trocknen ist und V10 das Volumen nach dem Trocknen bei 105°C für 10 Minuten ist.

7. Elektronischer Zigarettenfüllstoff nach einem der Ansprüche 1 bis 6, der durch Bildung einer Nicht-Tabak-Pflanzenzusammensetzung erhalten wird,
wobei die Volumenänderungsrate Vb (%) der Nicht-Tabak-Pflanzenzusammensetzung, definiert als Vb (%)=(V0-V15)/V0×100, mindestens 85,7 % beträgt, wobei V0 das Volumen der Nicht-Tabak-Pflanzenzusammensetzung vor dem Trocknen ist und V15 das Volumen nach dem Trocknen bei 105°C für 15 Minuten ist.

8. Elektronische Zigarettenkartusche zur Verwendung für einen elektronischen Zigarettenhauptkörper, der an einem Ende den elektronischen Zigarettenfüllstoff nach einem der Ansprüche 1 bis 7 und am anderen Ende ein Mundstück verwendet.

Revendications

1. Charge de cigarette électronique utilisant une plante différente du tabac, qui contient un générateur d'aérosol et de la cellulose microcristalline ayant une taille particulaire moyenne d'au moins 70 μm et d'au plus 120 μm conformément à JIS K0069 : 1992,
dans laquelle le générateur d'aérosol est sélectionné parmi le groupe constitué de la glycérine, du propylène glycol, du sorbitol, du triéthylène glycol, de l'acide lactique, du diacétate de glycérine, du triacétate de glycérine, du diacétate de triéthylène glycol, du citrate de triéthyle, du myristate d'isopropyle, du stéarate de méthyle, du dodécanedioate de diméthyle et du tétradécanedioate de diméthyle.

2. Charge de cigarette électronique selon la revendication 1, qui est sous la forme de bâtons ou de bandes rectangulaires.

3. Charge de cigarette électronique selon la revendication 1 ou 2, qui est sous la forme de bâtons ou de bandes

rectangulaires, ayant une longueur d'au moins 10 mm et d'au plus 20 mm, une largeur d'au moins 1,1 et d'au plus 2,0 mm, et une épaisseur d'au moins 0,1 et d'au plus 0,5 mm.

4. Charge de cigarette électronique selon l'une quelconque des revendications 1 à 3, qui est obtenue en formant une composition de plante différente du tabac,
dans laquelle le taux de changement de longueur La (%) de la composition de plante différente du tabac, défini en tant que La (%)=(L0-L10)/L0x100, est d'au moins 92,8 %, où L0 est la longueur de la composition de plante différente du tabac avant séchage et L10 est la longueur après séchage à 105 °C pendant 10 minutes.

5. Charge de cigarette électronique selon l'une quelconque des revendications 1 à 4, qui est obtenue en formant une composition de plante différente du tabac,
dans laquelle le taux de changement de longueur Lb (%) de la composition de plante différente du tabac, défini en tant que Lb (%)=(L0-L15)/L0x100, est d'au moins 91,9 %, où L0 est la longueur de la composition de plante différente du tabac avant séchage et L15 est la longueur après séchage à 105 °C pendant 15 minutes.

6. Charge de cigarette électronique selon l'une quelconque des revendications 1 à 5, qui est obtenue en formant une composition de plante différente du tabac,
dans laquelle le taux de changement de volume Va (%) de la composition de plante différente du tabac, défini en tant que Va (%)=(V0-V10)/V0x100, est d'au moins 86,9 %, où V0 est le volume de la composition de plante différente du tabac avant séchage et V10 est le volume après séchage à 105 °C pendant 10 minutes.

7. Charge de cigarette électronique selon l'une quelconque des revendications 1 à 6, qui est obtenue en formant une composition de plante différente du tabac,
dans laquelle le taux de changement de volume Vb (%) de la composition de plante différente du tabac, défini en tant que Vb (%)=(V0-V15)/V0x100, est d'au moins 85,7 %, où V0 est le volume de la composition de plante différente du tabac avant séchage et V15 est le volume après séchage à 105 °C pendant 15 minutes.

8. Cartouche de cigarette électronique devant être utilisée pour un corps principal de cigarette électronique, qui utilise la charge de cigarette électronique selon l'une quelconque des revendications 1 à 7 à une extrémité et un embout à l'autre extrémité.

Fig. 1

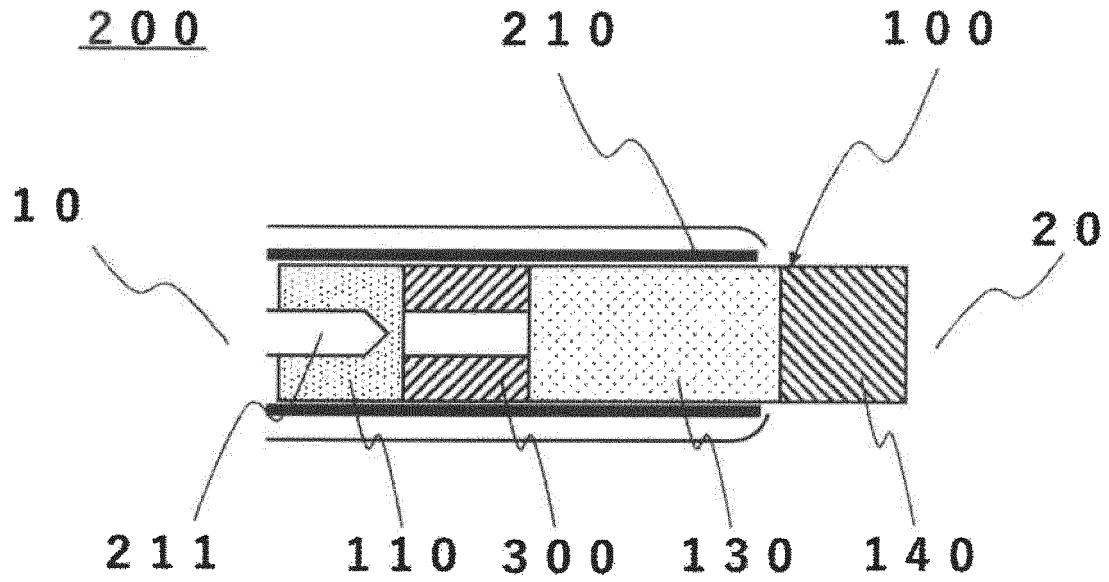


Fig. 2

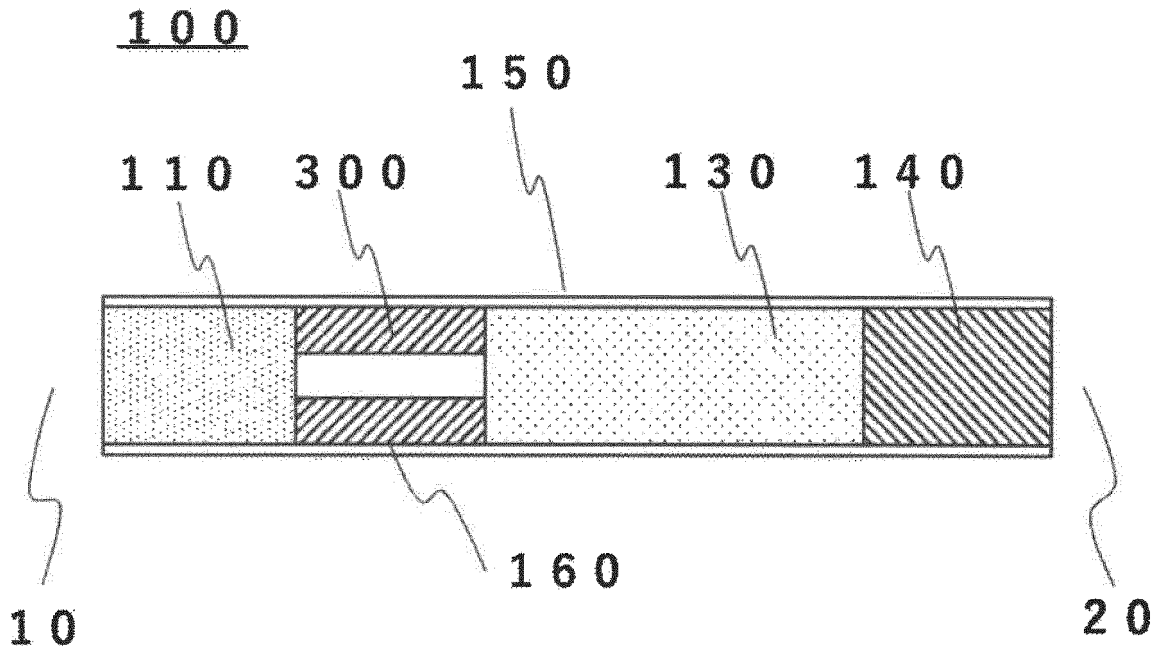


Fig. 3

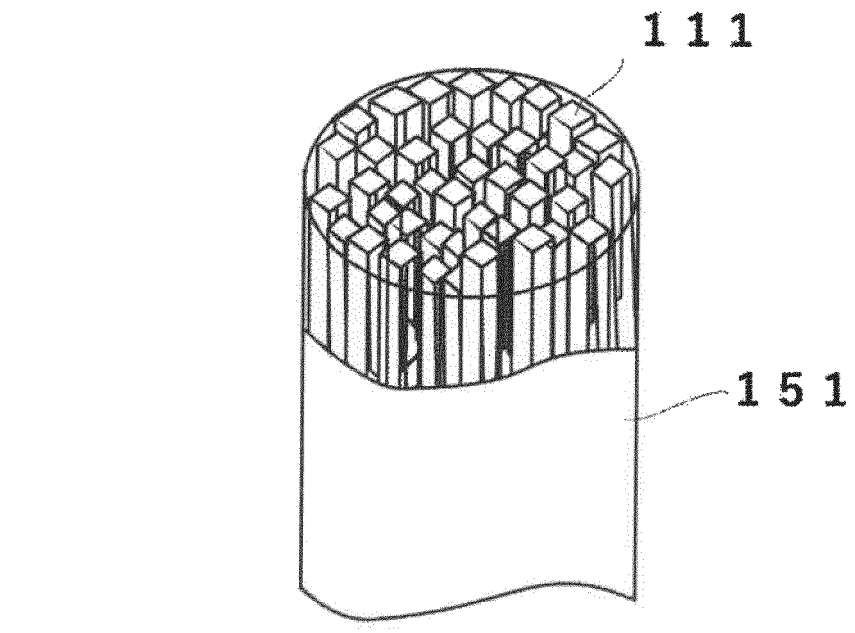


Fig. 4

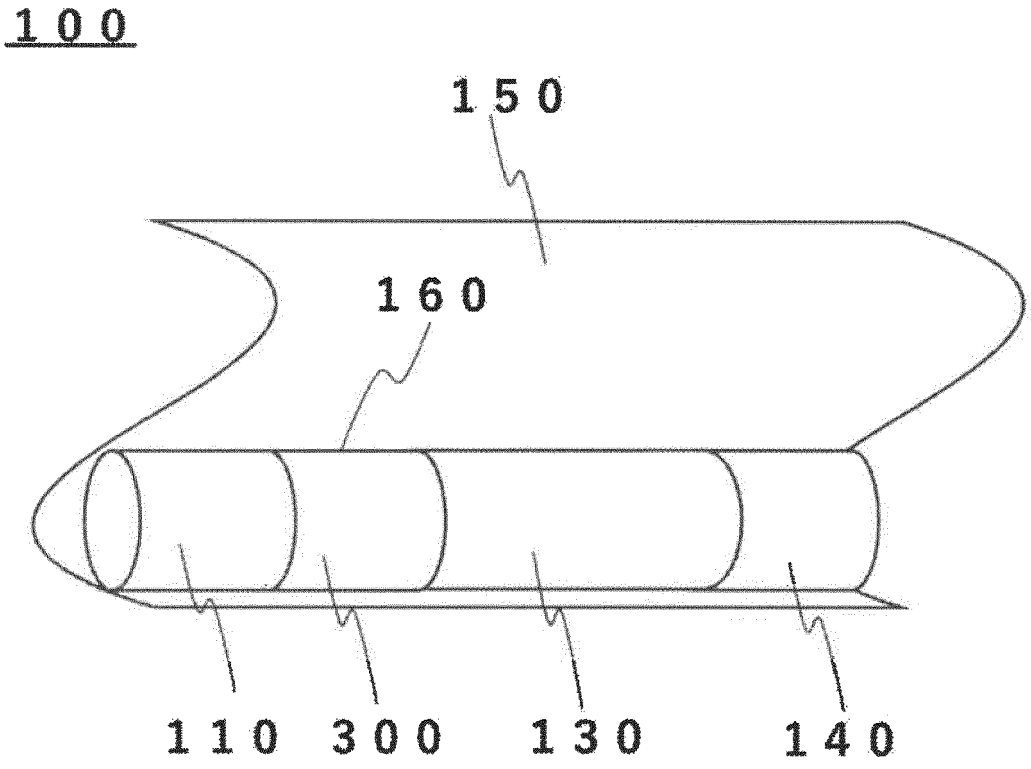


Fig. 5 (1)

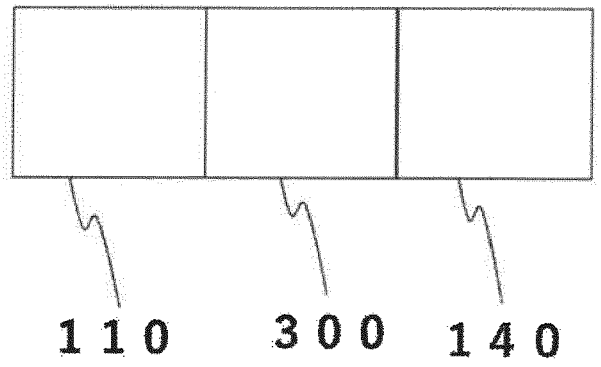


Fig. 5 (2)

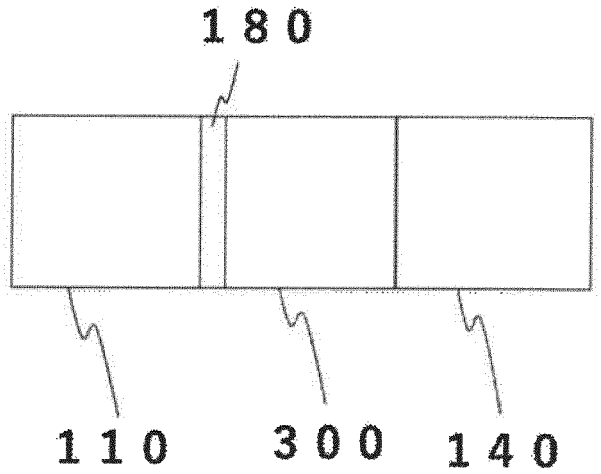


Fig. 5 (3)

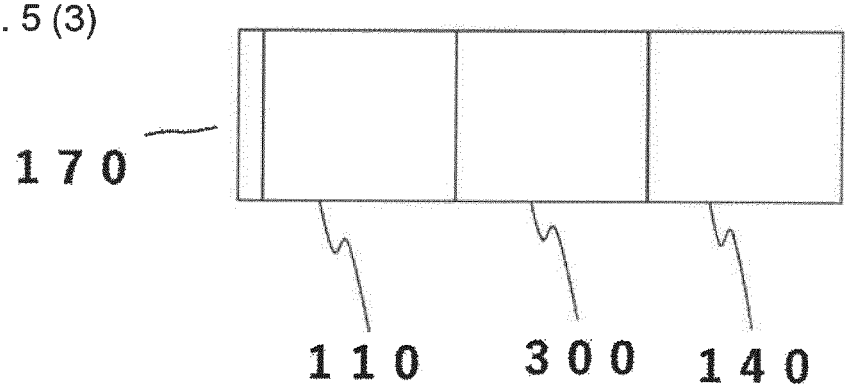


Fig. 6

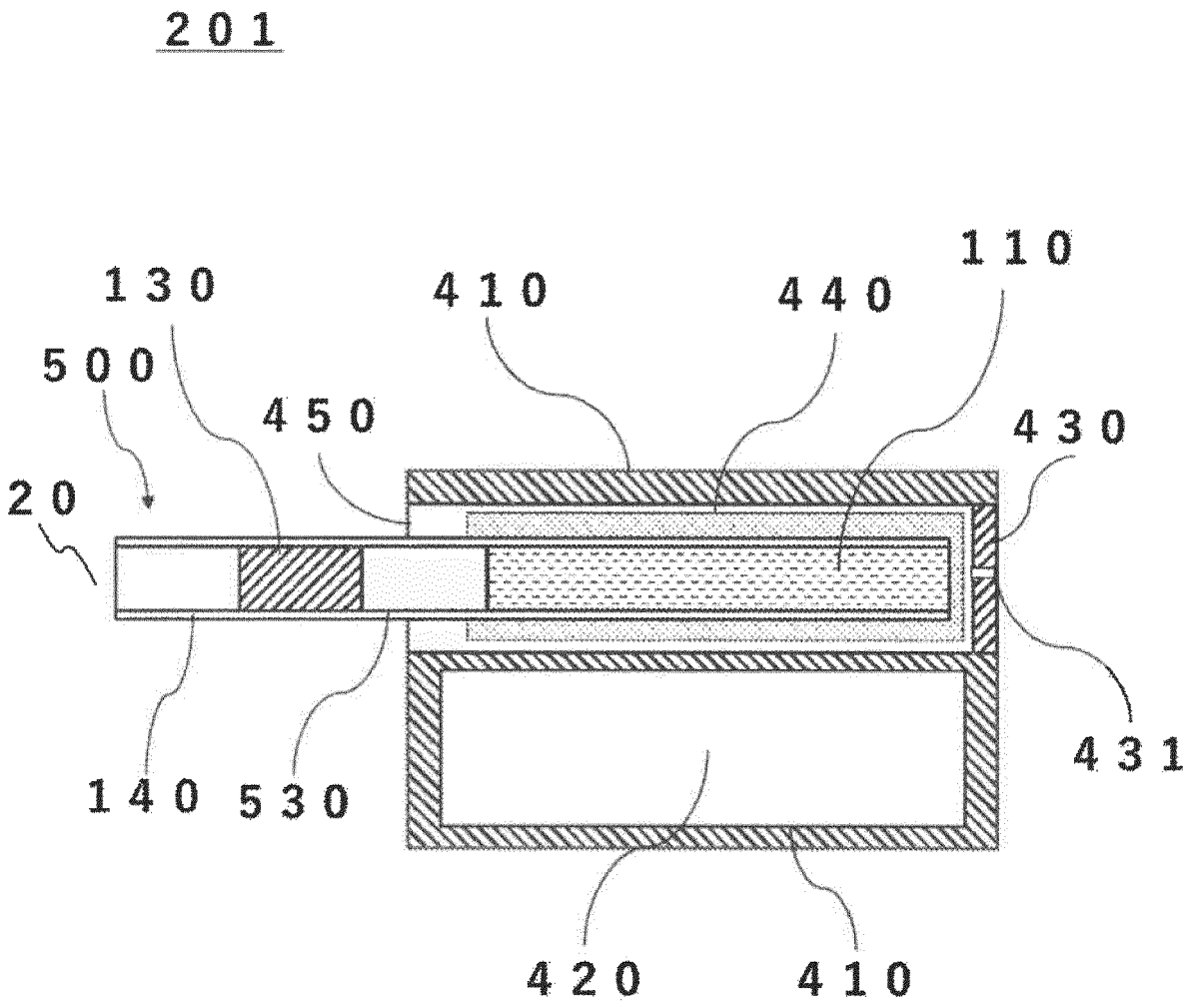


Fig. 7

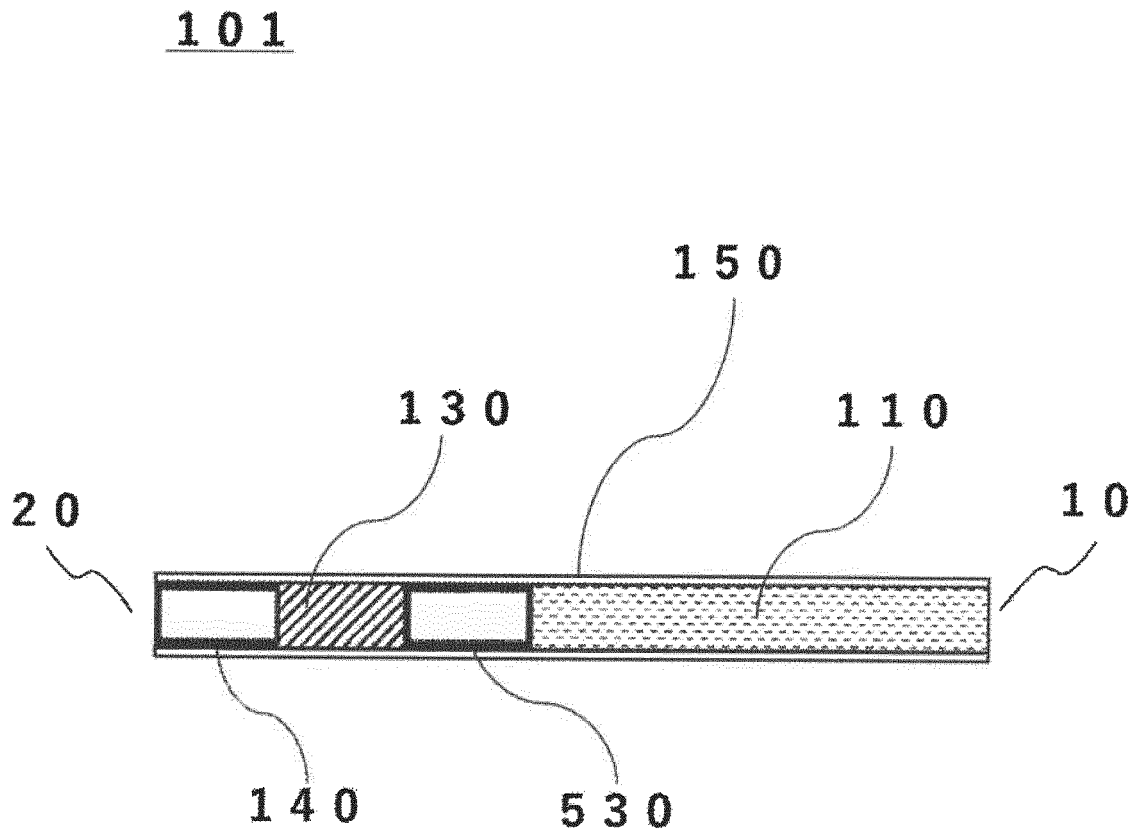


Fig. 8

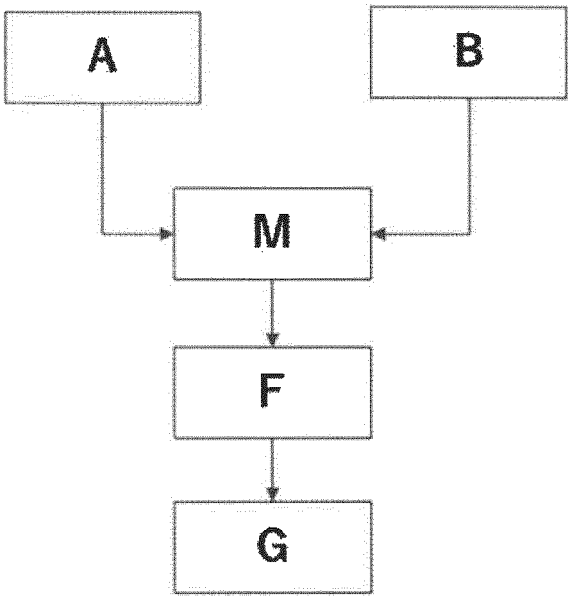


Fig. 9

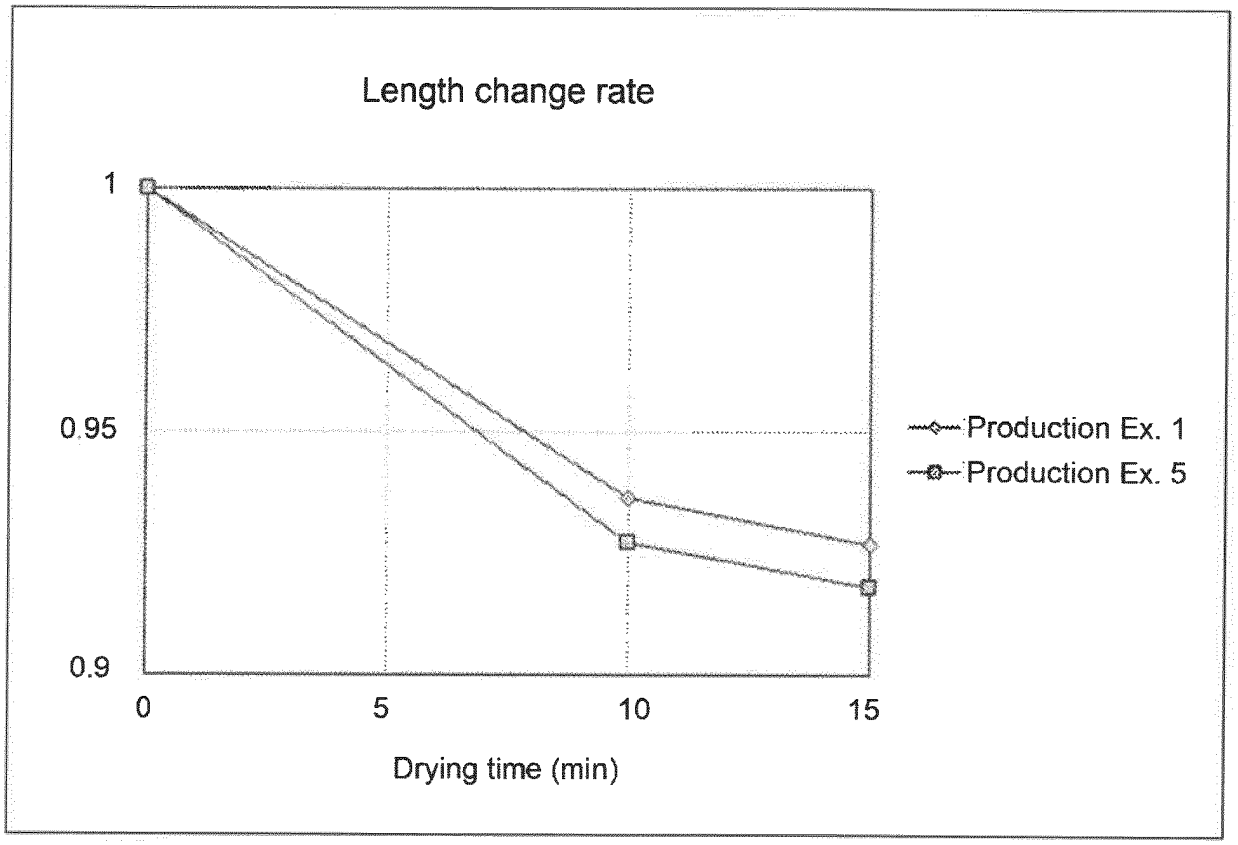

Length change rate
1
0.95
0.9
0
5
10
15
Drying time (min)
Production Ex. 1
Production Ex. 5

Fig. 10

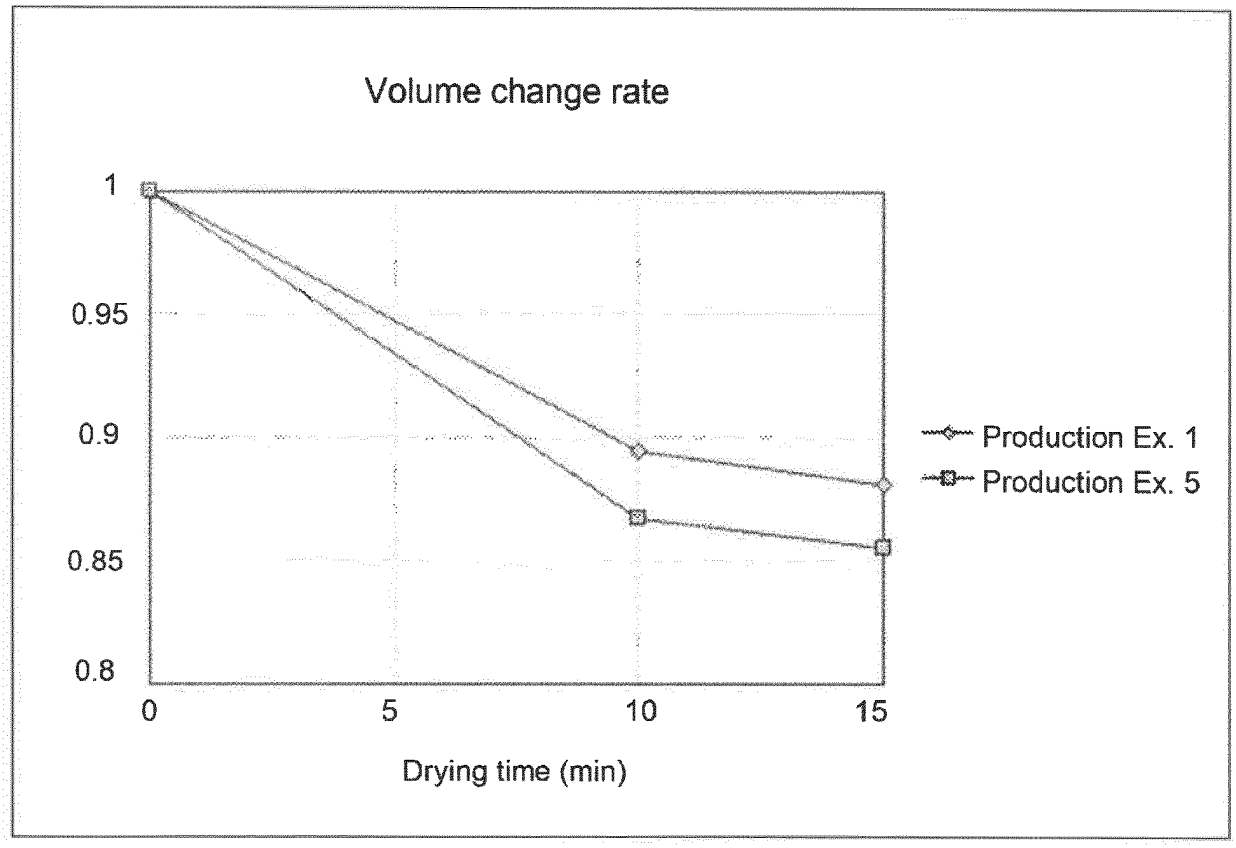

Volume change rate
1
0.95
0.9
0.85
0.8
0
5
10
15
Drying time (min)
Production Ex. 1
Production Ex. 5

Fig. 11

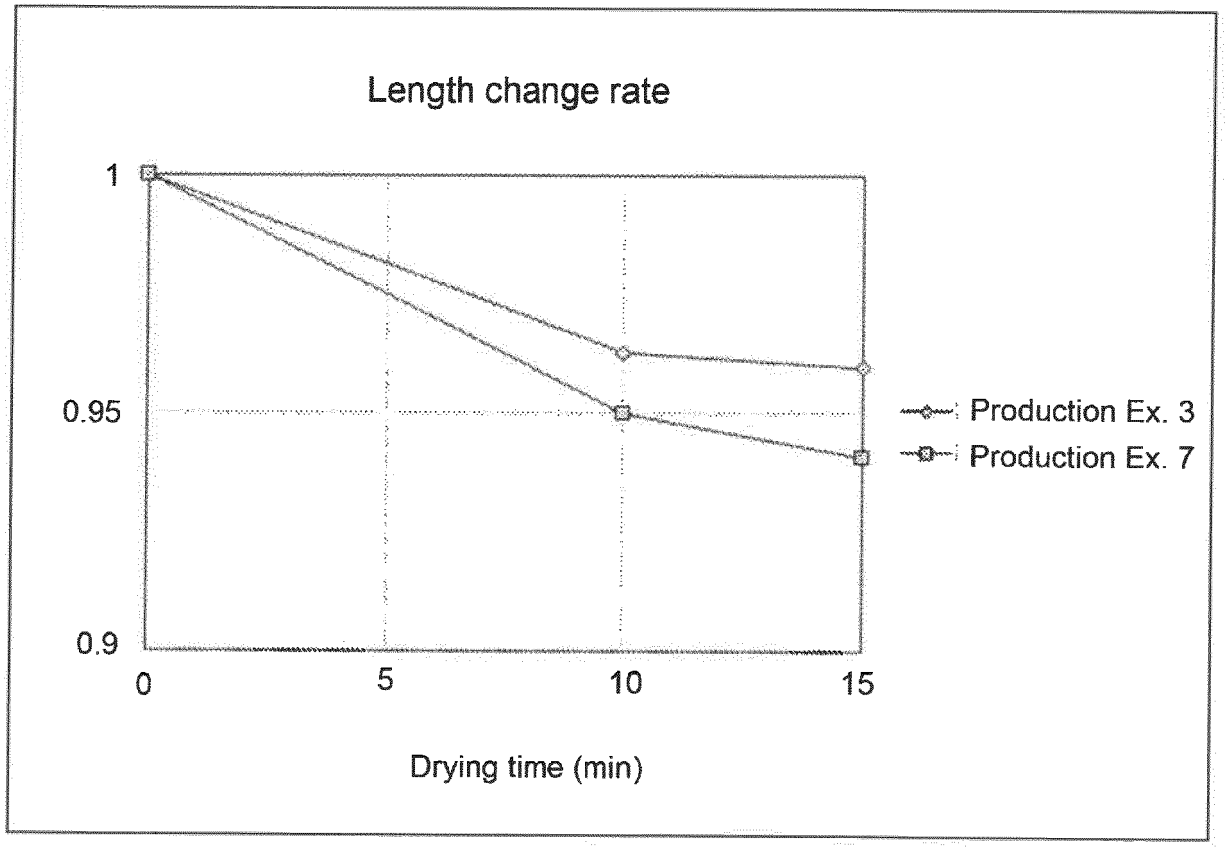

Length change rate
1
0.95
0.9
0
5
10
15
Drying time (min)
Production Ex. 3
Production Ex. 7

Fig. 12

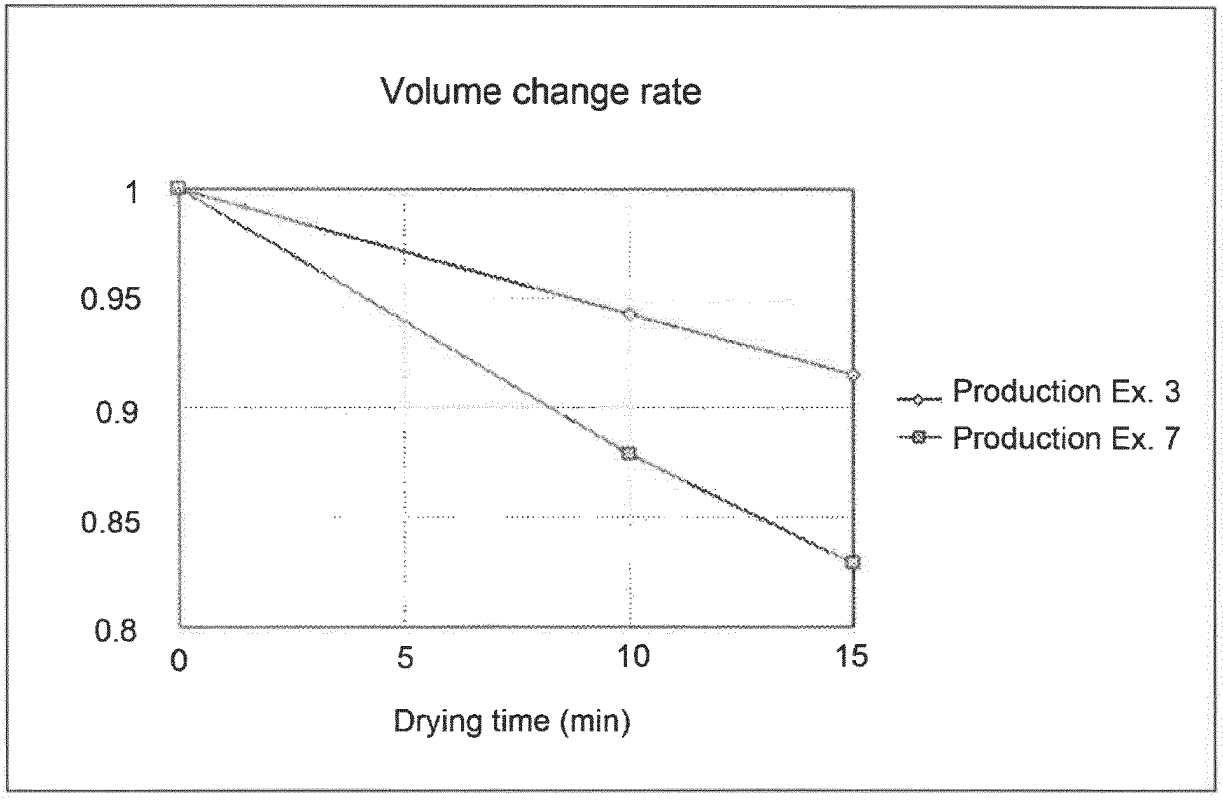
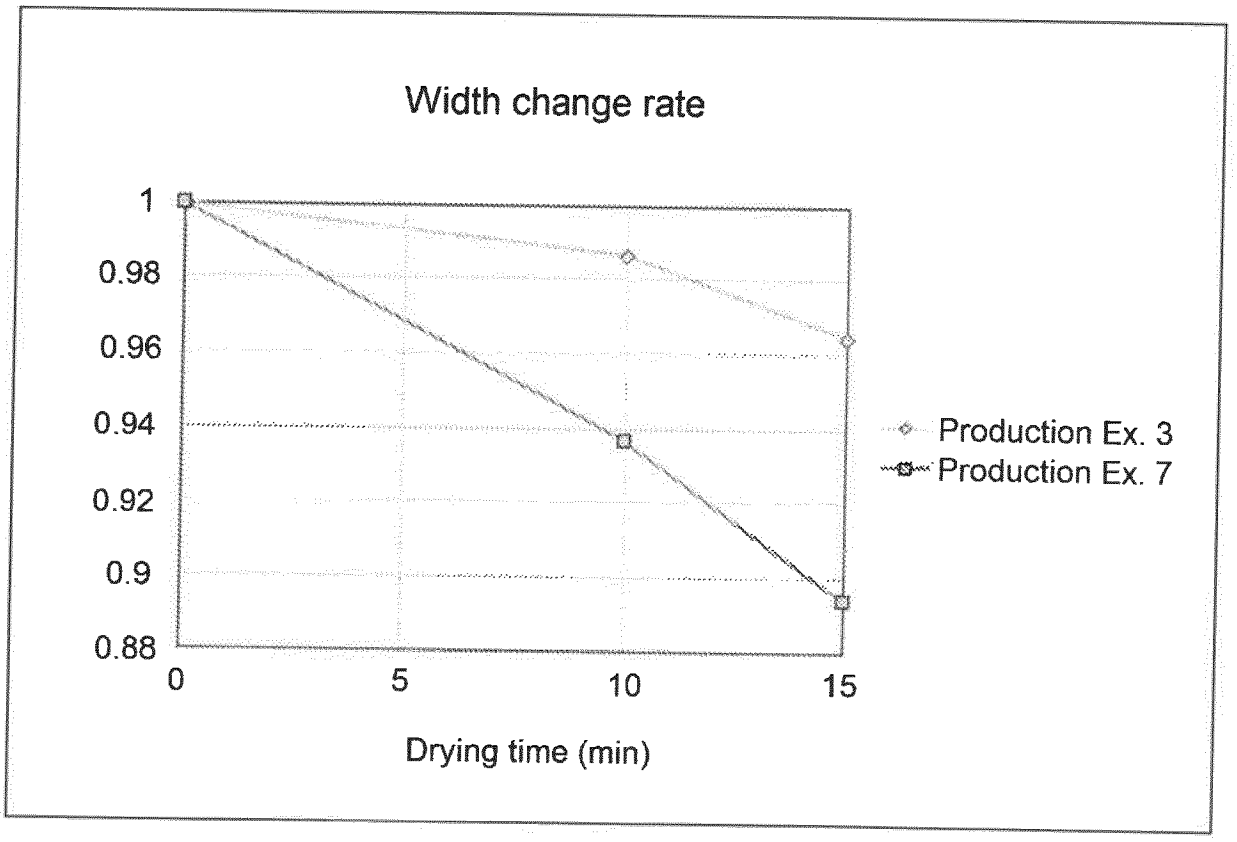

Volume change rate
1
0.95
0.9
0.85
0.8
0
5
10
15
Drying time (min)
Production Ex. 3
Production Ex. 7

Fig. 13


Width change rate
1
0.98
0.96
0.94
0.92
0.9
0.88
0
5
10
15
Drying time (min)
Production Ex. 3
Production Ex. 7

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20050241656 A1 **[0004]**
- US 20170334881 A1 **[0004]**
- US 20150068545 A1 **[0004]**
- WO 2018007627 A1 **[0004]**
- JP 6005664 B **[0004]**
- WO 2017149288 A1 **[0004]**
- US 20140261472 A1 **[0004]**
- CN 104005302 B **[0004]**
- JP 6280287 B **[0004]**
- WO 2015082652 A1 **[0004]**
- WO 2006090290 A1 **[0004]**
- JP 2010520764 A **[0005]**
- JP 2015519915 A **[0005]**
- JP H06109715 A **[0047]**