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(71) Applicant: **Em-tech. Co., Ltd.**
Changwon-si, Gyeongsangnam-do 51539 (KR)

(72) Inventors:
- **JEONG, Seung Kiu**
  50946 Gimhae-si Gyeongsangnam-do (KR)
- **KWON, Joong Hak**
  14038 Anyang-si, Gyeonggi-do (KR)
- **LIM, Dong Wook**
  14063 Anyang-si, Gyeonggi-do (KR)
- **LEE, Seung An**
  21522 Incheon (KR)
- **CHOE, Hwan Ock**
  51231 Changwon-si, Gyeongsangnam-do (KR)
- **JANG, Ji Hye**
  47539 Busan (KR)

(74) Representative: **Müller Hoffmann & Partner Patentanwälte mbB**
St.-Martin-Strasse 58
81541 München (DE)

(54) ELECTRICALLY HEATED SMOKING ARTICLE

(57) The present disclosure relates to an electrically heated smoking article, and more particularly, to an electrically heated smoking article including an aerosol medium capable of generating an aerosol by a heating method rather than a combustion method.

The electrically heated smoking article includes a filter rod, an aerosol medium rod stacked at a lower end of the filter rod and including an aerosol medium generating an aerosol by heating and a moisture absorbent accommodating or absorbing the aerosol medium, and a wrapping portion surrounding and wrapping the filter rod and the aerosol medium rod to maintain a stack structure, wherein the aerosol medium, including glycerin and a thickener, is maintained in a semi-solid or solid state in a first temperature range including room temperature and is in a liquefied state in a second temperature range higher than the first temperature range, wherein glycerin vaporizes in a third temperature range higher than the second temperature range to generate an aerosol, and the thickener does not vaporize in the third temperature range but remains in the moisture absorbent.

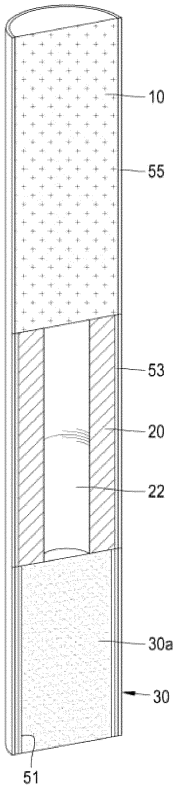

FIG. 1

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to an electrically heated smoking article, and more particularly, to an electrically heated smoking article including an aerosol medium capable of generating an aerosol by a heating method rather than a combustion method.

BACKGROUND ART

[0002] In recent years, there has been a growing demand for alternative methods that overcome the disadvantages of general cigarettes. For example, demand for a method of generating an aerosol by heating an aerosol generating material in a cigarette, rather than a method of generating an aerosol by burning the cigarette has increased.

[0003] In general, a slurry reconstructed tobacco sheet, which is a main raw material of a tobacco medium, is difficult to manufacture due to weak tensile force and has poor physical properties because it contains a large amount of humectant in the tobacco medium. In addition, a tobacco medium including a liquid, such as glycerin, is sensitive to humidity of the surrounding environment due to hydrophilicity thereof, making it difficult to control a manufacturing process environment. There is a limit to the amount of liquid that may be included in the tobacco medium.

[0004] In addition to the cigarette including the tobacco medium, it is also proposed to store a liquid in a separate cartomizer to additionally generate an aerosol so that a user inhales the aerosol derived from the liquid through the cigarette when inhaling the cigarette, but there is difficulty (an expiration date, deterioration, etc.) in managing the liquid phase included in the cartomizer, and condensate may occur in an air flow path in which the aerosol generated in the cartomizer moves, resulting in contamination.

[0005] Accordingly, there is a need to provide an aerosol medium in a disposable electrically heated smoking article and obtain an aerosol therefrom.

DISCLOSURE OF THE INVENTION

[0006] An aspect of the present disclosure is to provide a disposable, electrically heated smoking article including an aerosol medium capable of generating an aerosol by a heating method rather than a combustion method and obtaining an aerosol therefrom.

[0007] In an aspect, an electrically heated smoking article includes: a filter rod; an aerosol medium rod stacked at a lower end of the filter rod and including an aerosol medium generating an aerosol by heating and a moisture absorbent accommodating or absorbing the aerosol medium; and a wrapping portion surrounding and wrapping the filter rod and the aerosol medium rod to maintain a stack structure, wherein the aerosol medium, including glycerin and a thickener, is maintained in a semi-solid or solid state in a first temperature range including room temperature and is in a liquefied state in a second temperature range higher than the first temperature range, wherein glycerin vaporizes in a third temperature range higher than the second temperature range to generate an aerosol, and the thickener does not vaporize in the third temperature range but remains in the moisture absorbent.

[0008] The thickener may include at least one material selected from the group consisting of monosaccharides, disaccharides, sugar alcohols, and oligosaccharides.

[0009] The monosaccharides may be plant extracts including at least one substance selected from the group consisting of glucose, fructose, and galactose.

[0010] The disaccharides may include gradients extracted from sugar.

[0011] The sugar alcohol may include one or more substances selected from the group consisting of isomalt, maltitol, xylitol, and sorbitol.

[0012] The monosaccharides may be sugars higher than disaccharides, and include maltodextrin.

[0013] The aerosol medium may additionally include one or more selected from the group consisting of propylene glycol, nicotine, flavoring agents, caffeine, nutritional tonics, water, ethanol, sugar alcohols, and cannabinoids, as an aerosol raw material.

[0014] The aerosol medium may further include a flavoring component, and the flavor component includes one or more substances selected from the group consisting of menthol, fruit flavor, herbal flavor, clove or a clove extract.

[0015] The electrically heated smoking article may further include a cooling tube rod having a hollow in a vertical direction between the filter rod and the aerosol medium rod.

[0016] The electrically heated smoking article may further include a tobacco body rod at the top or bottom of the aerosol medium rod.

[0017] The electrically heated smoking article may further include a nicotine rod at the top or bottom of the aerosol medium rod.

[0018] The embodiment includes an aerosol medium capable of generating an aerosol by a heating method rather than a combustion method and a saccharide (monosaccharide, disaccharide, sugar alcohol, oligosaccharide, etc.) component as a thickener so as to maintain a semi-solid or solid state at room temperature, flavoring may also be provided, and when the aerosol medium vaporizes and aerosolizes, the thickener does not vaporize but remains in a hydroscopic body, so that the user inhales only the aerosol derived from the aerosol medium.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a schematic vertical cross-sectional view of an electrically heated smoking article according to an embodiment.

FIG. 2 shows the results of thermal decomposition analysis of an aerosol medium according to the embodiment at 300°C.

FIG. 3 conceptually shows a partially exploded perspective view and a cross-sectional view of an electrically heated smoking article according to another embodiment.

FIG. 4 conceptually shows a partially exploded perspective view and a cross-sectional view of an electrically heated smoking article according to another embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

[0020] Hereinafter, various embodiments of the present disclosure will be disclosed with reference to the accompanying drawings. However, it should be appreciated that various embodiments of the present disclosure and the terms used therein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements.

[0021] In the present disclosure, an expression, such as "having," "may have," "comprising," or "may comprise" indicates existence of a corresponding characteristic (e.g., a numerical value, a function, an operation, or an element like a part) and does not exclude existence of additional characteristic.

[0022] As used herein, each of such phrases as "A or B," "at least one of A or/and B," "at least one or more of A or/and B," and so forth may include all possible combinations of the items enumerated together in a corresponding one of the phrases. For example, "A or B," "at least one of A and B," or "one or more of A or B" may indicate the entire of (1) including at least one A, (2) including at least one B, or (3) including both at least one A and at least one B.

[0023] Expressions, such as "first," "second," "primarily," or "secondary," used herein may represent various elements regardless of order and/or importance and do not limit corresponding elements. For example, a first user device and a second user device may represent different user devices regardless of order or importance. For example, a first element may be named as a second element without departing from the right scope of the various embodiments of the present disclosure, and similarly, a second element may be named as a first element.

[0024] When it is described that an element (such as a first element) is "operatively or communicatively coupled with/to" or "connected" to another element (such as a second element), the element may be directly connected to the other element or may be connected to the other element through another element (e.g., a third element). However, when it is described that an element (such as a first element) is "directly connected" or "directly coupled" to another element (such as a second element), it means that there is no intermediate element (such as a third element) between the element and the other element.

[0025] An expression "configured to (or set)" used in the present disclosure may be replaced with, for example, "suitable for," "having the capacity to," "designed to," "adapted to," "made to," or "capable of" according to a situation. A term "configured to (or set)" does not always mean only "specifically designed to" by hardware. Alternatively, in some situation, an expression "apparatus configured to" may mean that the apparatus "can" operate together with another apparatus or component.

[0026] Terms defined in the present disclosure are used for only describing a specific embodiment and may not have an intention to limit the scope of other embodiments. The singular forms are intended to include the plural forms as well, unless the context clearly indicates otherwise. All of the terms used herein including technical or scientific terms have the same meanings as those generally understood by an ordinary skilled person in the related art. The terms defined in a generally used dictionary should be interpreted as having meanings that are the same as or similar with the contextual meanings of the relevant technology and should not be interpreted as having ideal or exaggerated meanings unless they are clearly defined in the various embodiments. In some case, terms defined in the present disclosure cannot be analyzed to exclude the present embodiments.

[0027] FIG. 1 is a schematic cross-sectional view of an electrically heated smoking article according to an embodiment.

[0028] The electrically heated smoking article according to the embodiment is integrated with three rods stacked and wrapped by wrapping paper. The rods includes a filter rod 10, which is a mouth filter, on an upper side, a cooling tube rod 20 stacked at a lower end of the filter rod 10, and an aerosol medium rod (or aerosol-forming medium rod) 30 stacked at a lower end of the cooling tube rod 20 and including or accommodating an aerosol medium (or aerosol-forming medium) generating an aerosol by heating, and wrapping portions 51, 53, and 55 surrounding and wrapping outer surfaces of the filter rod 10, the cooling tube rod 20, and the aerosol medium rod 30 to maintain a stack structure among the filter rod 10, the cooling tube rod 20, and the aerosol medium rod 30. Since the electrically heated smoking article having such a shape and structure according to the embodiment has a size that meets the standard of a general cigarette or an electrically heated smoking article (referring to a cigarette-shaped electronic cigarette) that is currently being used, the electrically heated smoking article is not different from the general cigarettes or the electrically heated smoking article from the perspective of users.

[0029] The filter rod 10 is a filter that serves as a mouth-

piece, and serves to allow an aerosol to pass therethrough and blocks a liquid inflow. The filter rod 10 may be formed of pulp and may have a cylindrical or tube shape. The filter rod 10 may be formed of a material, such as cellulose acetate, paper, PP, or PLA. Meanwhile, the filter rod 10 may include a flavoring ingredient to improve user's satisfaction. Flavoring ingredients may include, for example, licorice, sucrose, fructose syrup, isosweeteners, cocoa, lavender, cinnamon, cardamom, celery, fenugreek, cascarilla, sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon oil, orange oil, mint oil, caraway, cognac, jasmine, chamomile, menthol, ylang-ylang, salvia, spearmint, ginger, coriander, coffee, and the like.

[0030] The cooling tube rod 20 may include a hollow 22 extending in a vertical direction formed therein to provide a passage for aerosol movement. The cooling tube rod 20 may include polylactic acid (PLA) to lower a temperature of the aerosol to prevent the user from getting burned when inhaling the aerosol. That is, an open lower end of the hollow 22 faces the aerosol medium rod 30 and an open upper end of the hollow 22 faces the filter rod 10. The cooling tube rod 20 may be formed of cellulose acetate, and the cooling tube rod 20 serving as a cooling structure may be formed of pure PLA or a combination of PLA and other degradable polymers.

[0031] The aerosol medium rod 30 may be manufactured so that an aerosol medium including glycerin in a liquid state is accommodated or absorbed in a moisture absorbent 30a, and thereafter, the aerosol medium including glycerin is maintained in a semi-solid or solid state at room temperature.

[0032] The aerosol medium may include aerosol raw materials other than glycerin. The aerosol medium may include, as additional aerosol raw materials, one or more substances selected from the group consisting of propylene glycol, nicotine, flavoring agent, caffeine, nutritional tonic, water, ethanol, sugar alcohol, and cannabinoids.

[0033] The aerosol medium accommodated or absorbed by the moisture absorbent 30a exists in a semi-solid or solid state in a first temperature range including room temperature, is liquefied in a temperature range (a second temperature range) of 50 °C to 100 °C including 70 °C, and is then vaporized into an aerosol within a temperature range (a third temperature range) of about 150 °C to 300 °C through additional heating.

[0034] The aerosol medium rod 30 liquefies the aerosol medium including glycerin in the second temperature range higher than room temperature, allows the aerosol medium in a liquid state having fluidity to be absorbed into the moisture absorbent 30a, and then cools the aerosol medium to room temperature to phase-change the aerosol medium to a solid state or a semi-solid state. Therefore, after the phase change, the aerosol medium remains in a gel, solid, or semi-solid state in the first temperature range, so that the aerosol medium does not flow out and remains within the aerosol medium rod during subsequent manufacturing processes or during distribution of smoking articles (referring to electronic cigarettes in the form of cigarettes).

[0035] The amount of glycerin included in the aerosol medium rod 30 may be an amount suitable for puffing the number of puffs similar to that of a conventional cigarette with the smoking article of the embodiment. Thus, after a predetermined amount of aerosol derived from glycerin is generated, no more aerosol is generated or a satisfactory amount of aerosol is not generated and the smoking article may be used once and then discarded by the user. A known aerosol generating device used to heat a smoking article recognizes a user's puffing action and when a preset number of puffs is reached, the known aerosol generating device informs the user thereof and/or cuts off application of power to a heater to prevent further puffing. Therefore, since it is necessary to continuously provide a sufficient amount of aerosol during a predetermined number of puffing operations to users with high puffing strength, the amount of glycerin included in the aerosol medium rod 30 is preferably an amount that meets the user's needs.

[0036] As described above, the aerosol medium in the aerosol medium rod 30 manufactured in a solid or semi-solid state vaporizes and aerosolizes in a temperature range of about 150 °C to 300 °C (the third temperature range) higher than the second temperature range, and an aerosol medium in a liquefied state which has not been aerosolized and inhaled after heating may be cooled to room temperature and then solidified again in the moisture absorbent 30a.

[0037] In order to maintain the aerosol medium in a semi-solid or solid state in the first temperature range as described above, the aerosol medium includes a thickener. The thickener is not vaporized in the temperature range of about 150 °C to about 300 °C, in which the aerosol medium including glycerin vaporizes and aerosolizes, but remains in the moisture absorbent 30a as it is. That is, when glycerin, a main aerosol medium, vaporizes into an aerosol, the thickener does not vaporize and remains in the moisture absorbent 30a.

[0038] The thickener includes at least one material selected from the group consisting of monosaccharides, disaccharides, sugar alcohols, and oligosaccharides. A method of using gelatin extracted from fish or meat or vegetable gelatin is used as a thickener that gelates glycerin, or a method of mixing such gelatin thickener and water with glycerin and cooling while stirring has been considered. However, since a vaporization point of glycerin in the gel-like aerosol medium obtained thusly is approximately 200 °C to 300 °C under atmospheric pressure and a vaporization point of water is approximately 100 °C under atmospheric pressure, the gelatin or water thickener may vaporize together with glycerin to aerosolize in the temperature range (the third temperature range) of about 150 °C to 300 °C in which the aerosol including glycerin vaporizes to aerosolize. Therefore, the inventors consider other thickeners, and in embodiments, the thickeners include at least one material se-

lected from the group consisting of monosaccharides, disaccharides, sugar alcohols, and oligosaccharides.

[0039] In an embodiment, the monosaccharide is a plant extract and includes at least one substance selected from the group consisting of glucose, fructose and galactose. A vaporization point of glucose is 527.1 °C ± 50.0 °C under atmospheric pressure, a vaporization point of fructose is 697.1 °C ± 50.0 °C under atmospheric pressure, and a vaporization point of galactose is 527.1 °C ± 50.0 °C under atmospheric pressure, and thus, the monosaccharide does not vaporize in the temperature range of about 150 °C to 300 °C (the third temperature range), in which the aerosol medium including glycerin vaporizes to aerosolize, but remains in the moisture absorbent as it is.

[0040] In another embodiment, the disaccharide includes components derived from sugar or the like. Since a vaporization point of sugar is 697.1 °C ± 50.0 °C under atmospheric pressure, the disaccharide does not vaporize in the temperature range of about 150 °C to 300 °C (the third temperature range), in which the aerosol medium including glycerin vaporizes to aerosolize, but remains in the moisture absorbent as it is.

[0041] In another embodiment, the sugar alcohol includes one or more substances selected from the group consisting of isomalt, maltitol, xylitol and sorbitol. Since a vaporization point of isomalt is 788.5 °C and a vaporization point of maltitol is 788.5 ± 60.0 °C under atmospheric pressure, the sugar alcohol does not vaporize in the temperature range of about 150 °C to 300 °C (the third temperature range), in which the aerosol medium including glycerin vaporizes to aerosolize, but remains in the moisture absorbent as it is.

[0042] In another embodiment, the oligosaccharides is a disaccharide or higher saccharide, including maltodextrin. Since a vaporization point of maltodextrin is 527.1 °C, the oligosaccharides does not vaporize in the temperature range of about 150 °C to 300 °C (the third temperature range), in which the aerosol medium including glycerin vaporizes to aerosolize, but remains in the moisture absorbent as it is.

[0043] The inventors conducted thermal decomposition analysis at 300 °C for aerosol medium, using a Pyrolyzer + Agilent Technologies 7890B, 5977B MSD system (GC/MS) as an analytical instrument, and the thermal decomposition condition was a multi-shot pyrolyzer (EGA/PY-3030D): 300 °C, a column was Frontier Laboratories, UA5, a carrier gas was helium 1.0 mL/min, and a molecular weight range was scan mode (33 to 550 m/z). The obtained analysis result was transferred to FIG. 2, and it was confirmed that only glycerin was vaporized from the aerosol medium and that the thickener was not vaporized.

[0044] Additionally, the aerosol medium may include flavoring components. In the present embodiment, the flavoring component includes one or more substances selected from the group consisting of menthol, fruit flavor, herbal flavor, cloves or clove extracts.

[0045] As described above, the aerosol medium may include at least an aerosol raw material, such as glycerin, and at least one material selected from the group consisting of monosaccharides, disaccharides, sugar alcohols, and oligosaccharides as a thickener, and may further include a flavoring component.

[0046] The moisture absorbent 30a may be formed by crumpling, folding, or rolling pulp or fabric including pulp to have a cylinder or column shape or by working pulp or fabric including pulp to have a cylinder or column shape, may be formed by crumpling or rolling cotton woven fabric or non-woven fabric to have a cylinder shape or by working cotton woven fabric or non-woven fabric to have a cylinder shape, or may be formed by crumpling or rolling a woven fabric or non-woven fabric of bamboo fiber to have a cylinder shape or by working the woven fabric or non-woven fabric of bamboo fiber to have a cylinder shape. As another embodiment, the moisture absorbent 30a is formed of porous ceramic, and the aerosol medium is absorbed into pores therein. In the present embodiment, a size of the pores of the moisture absorbent 30a formed of porous ceramics is in the range of 1 μm to 100 μm, and a porosity is in the range of 30 % to 70 %.

[0047] FIG. 3 conceptually shows a partially exploded perspective view and a cross-sectional view of an electrically heated smoking article according to another embodiment. The electrically heated smoking article of the present embodiment further includes a tobacco body rod 41 including cut tobacco leaves as another aerosol medium at a lower end of the aerosol medium rod 30. That is, the tobacco body rod 41 as another aerosol medium may be provided at the top or bottom of the aerosol medium rod 30 in this manner. In this case, the user may puff by mixing the aerosol derived from the aerosol medium rod 30 and the aerosol derived from the tobacco body rod 41. Depending on a relative position of the tobacco body rod 41 and the aerosol medium rod 30, as shown in FIG. 3, when the tobacco body rod 41 is located below (when located upstream), the aerosol derived from the tobacco body rod 41 may be mixed with the aerosol derived from the aerosol medium rod 30, while passing through the aerosol medium rod 30 so that the user may puff a corresponding mixture, and when the aerosol medium rod 30 is located below (when located upstream), the aerosol derived from the aerosol medium rod 30 is mixed with the aerosol derived from the tobacco body rod 41, while passing through the tobacco body rod 41 so that the user may puff a corresponding mixture. The tobacco body rod 41 may include a solid material based on a tobacco raw material, such as a reconstituted tobacco sheet, cut tobacco leaves, and reconstituted tobacco. In an embodiment, the tobacco body rod 41 may be filled with a corrugated reconstituted tobacco sheet. The reconstituted tobacco sheet may be wrinkled by being rolled, folded, compressed, or shrunken substantially transverse to a cylinder axis. The degree of porosity may be determined by controlling an interval between the val-

leys of the corrugated sheet.

[0048] In another embodiment the tobacco body rod 41 may be filled with cut tobacco leaves. Here, the cut tobacco leaves may be produced by shredding a tobacco sheet (or reconstituted tobacco sheet). In addition, the tobacco body rod 41 may be formed by combining a plurality of tobacco strands in the same direction (parallel) or randomly. Specifically, the tobacco body rod 41 is formed by combining a plurality of tobacco strands, and a plurality of longitudinal channels through which an aerosol may pass may be formed. At this time, depending on the size and arrangement of the tobacco strands, the longitudinal channels may be uniform or non-uniform.

[0049] The tobacco body rod 41 may further include at least one of ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol. In addition, the tobacco body rod 41 may further include glycerin and propylene glycol.

[0050] In addition, the tobacco rod 41 may include other additives, such as flavoring agents and/or organic acids. For example, flavoring agents may include licorice, sucrose, fructose syrup, isosweet, cocoa, lavender, cinnamon, cardamom, celery, fenugreek, cascarilla, sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon oil, orange oil, mint oil, caraway, cognac, jasmine, chamomile, menthol, ylang, salvia, spearmint, ginger, coriander, coffee, and the like. Meanwhile, the tobacco body rod 41 may also include a portion of glycerin or propylene glycol.

[0051] FIG. 4 conceptually shows a partially exploded perspective view and a cross-sectional view of an electrically heated smoking article according to another embodiment.

[0052] The electrically heated smoking article of the present embodiment further includes a nicotine rod 42 as another aerosol medium at a lower end of the aerosol medium rod 30. That is, the nicotine rod 42 as another aerosol medium may be provided at the upper or lower end of the aerosol medium rod 30 in this manner.

[0053] The nicotine rod 42 may include tobacco extract. The tobacco extract may be naturally generated pure nicotine or synthetic nicotine. For example, the tobacco extract may include freebase nicotine or nicotine salt, but is not limited thereto.

[0054] The nicotine rod 42 may include two or more nicotine salts. A nicotine salt may be formed by adding an appropriate acid, including an organic acid or an inorganic acid, to nicotine. The acid for forming the nicotine salt may be appropriately selected in consideration of an absorption rate of nicotine in a blood, a temperature at which the electrically heated smoking article is heated, flavor or savor, solubility, and the like.

[0055] For example, acids for the formation of nicotine salts may include a single acid selected from the group consisting of benzoic acid, lactic acid, salicylic acid, lauric acid, sorbic acid, levulinic acid, pyruvic acid, formic acid, acetic acid, propionic acid, butyric acid, valeric acid, caproic acid, caprylic acid, capric acid, citric acid, myristic acid, palmitic acid, stearic acid, oleic acid, linoleic acid, linolenic acid, phenylacetic acid, tartaric acid, succinic acid, fumaric acid, gluconic acid, saccharic acid, malonic acid, or malic acid, or a mixture of two or more selected from the above group, but is not limited thereto.

[0056] Additionally, the nicotine rod 42 may include an additional aerosol medium. The aerosol medium may be heated to serve as an aerosol forming agent providing a rich vapor production. For example, the aerosol medium may be, but is not limited to, glycerin and propylene glycol or a mixture of components thereof.

[0057] In addition, the nicotine rod 42 may include, for example, any one of water, solvent, ethanol, plant extract, fragrance and flavoring agent, or a mixture thereof. Fragrance may include menthol, peppermint, spearmint oil, various fruit flavor components, etc., but is not limited thereto. Flavoring agents may include ingredients that may provide a variety of flavors or savors to the user.

[0058] Like the aerosol medium rod 30, the nicotine rod 42 may include a moisture absorbent. Like the moisture absorbent of the aerosol medium rod 30, the moisture absorbent may be formed by crumpling, folding, or rolling pulp or fabric including pulp to have a cylinder or column shape or by working pulp or fabric including pulp to have a cylinder or column shape, may be formed by crumpling or rolling cotton woven fabric or non-woven fabric to have a cylinder shape or by working cotton woven fabric or non-woven fabric to have a cylinder shape, or may be formed by crumpling or rolling a woven fabric or non-woven fabric of bamboo fiber to have a cylinder shape or by working the woven fabric or non-woven fabric of bamboo fiber to have a cylinder shape. As another embodiment, the moisture absorbent 30a is formed of porous ceramic, and the aerosol medium is absorbed into pores therein. In the present embodiment, a size of the pores of the moisture absorbent formed of porous ceramics is in the range of 1 μm to 100 μm, and a porosity is in the range of 30 % to 70 %.

[0059] The wrapping portion includes a first wrapping portion 51 surrounding the aerosol medium rod 30 and preventing liquid leakage of the aerosol medium when heated by a heating device, a second wrapping portion 53 surrounding the cooling tube rod 20 and the aerosol medium rod 30 wrapped by the first wrapping portion 51 and maintaining a stack structure of the cooling tube rod 20 and the aerosol medium rod 30, and a third wrapping portion 55 surrounding the filter rod 10 and the cooling tube rod 20 and the aerosol medium rod 30 wrapped by the second wrapping portion 53 and maintaining a stack structure of the filter rod 10, the cooling tube rod 20, and the aerosol medium rod 30.

[0060] The tobacco body rod 41 and the nicotine rod 42 may also be wrapped around a separate wrapping portion, and may be surrounded and wrapped by the third wrapping portion 55 to maintain a stack structure of the filter rod 10, the cooling tube rod 20, the aerosol medium rod 30, and the tobacco body/nicotine rod 41 and 42.

[0061] The first wrapping portion 51 is formed of paper

or membrane material coated with a waterproof coating to prevent leakage of the aerosol-forming substrate. For example, the first wrapping portion 51 may be provided as a laminate formed by attaching aluminum foil to paper, and is wrapped in a cylinder shape so that the aluminum foil contacts the moisture absorbent 30a. Accordingly, the aluminum foil may eliminate or minimize a possibility that the aerosol medium in a liquid state included in the moisture absorbent 30a flows out through the side of the aerosol medium rod 30. The second and third wrapping portions 53 and 55 may be formed of plain paper or porous paper.

[0062] The smoking article according to an embodiment may be inserted into a heating space in a heating device to which a resistive heating method, such as a film heater, is applied and heated, or may be inserted into a heating space in a heating device to which an induction heating method is applied in another embodiment.

[0063] The heating device refers to a grippable and portable aerosol generating device having a heating space (cavity) into which a smoking article may be inserted and heated, and heating an aerosol medium, such as glycerin, of the smoking article inserted into the heating space or an aerosol-forming substrate, such as a tobacco body and/or nicotine by a heater to form an aerosol. As described above, the heater may be provided in a resistive heating method or an induction heating method as described above, and may be heated to a temperature of, for example, 100 °C to 400 °C to heat the aerosol-forming substrate provided in the electrically heated smoking article inserted into the heating space (cavity) of the heating device to generate an aerosol. According to an embodiment, a target temperature may be preferably in the range of 200 °C to 350 °C, and may be more preferably in the range of 250 °C to 320 °C (for example, 280 °C may be determined as a target). In some cases, the target temperature may be in the range of 150 °C to 250 °C (for example, 180 °C may be set as the target temperature), which may vary depending on whether a subject for generating an aerosol is glycerin, a tobacco body, a tobacco body to which a liquid composition, such as glycerin, is absorbed, or a nicotine liquid. In any case, since the aerosol generated in the electrically heated smoking article is intaken into the user's mouth through the cooling tube rod 20 and the filter rod 10 when the user puffs, the target temperature of a heating element needs to be determined in advance in consideration of the fact that an excessively high temperature of the generated aerosol may cause discomfort to the user or risk of burns cause excessive formation of an aerosol, making it difficult to puff several times, although cooling of the aerosol during a puffing process is taken into account. Also, for the above reason, an upper limit of the target temperature of the heating element is limited as mentioned above.

[0064] According to an embodiment, a temperature at which the generated aerosol passes through the cooling tube rod 20 and the filter rod 10 may be measured as a mouth end temperature, and in order not to discomfort the user, the temperature of the aerosol needs to be below 50 °C, preferably, 45 °C or lower. A preferred aerosol mouth end temperature ranges from 25 to 45 °C, and a more preferred aerosol mouth end temperature ranges from 30 °C to 40 °C.

[0065] In a smoking article according to an embodiment, the aerosol medium rod 30, the tobacco body rod 41 or the nicotine rod 42 are provided in a length direction of the smoking article (in some cases, the aerosol medium rod 30 may be located upstream or downstream), and as described above, since the target temperature of the aerosol medium rod 30, the target temperature of the tobacco rod 41, and the target temperature of the nicotine rod 42 are different from each other, It is preferable that an independent heater capable of heating the aerosol medium rod 30 and the tobacco body rod 41 or the nicotine rod 42 in response to each target temperature is provided in the heating space of the heating device.

[0066] In an embodiment, in the case of a smoking article formed in the order of filter rod - cooling tube rod - aerosol medium rod - tobacco body rod, since the target temperature (e.g., 300 °C) of the aerosol medium rod is different from the target temperature (e.g., 200 °C) of the tobacco body rod, it may be preferred that a heater (e.g., a resistive heating heater) for heating the aerosol medium rod and a heater (e.g., a resistive heating heater) for heating the tobacco body rod may be spaced apart from each other and heat the aerosol medium rod and the tobacco body rod in different temperature ranges to effectively generate aerosols derived from the respective rods.

[0067] Of course, the above example is given as an example, and it may be natural for those skilled in the art to change the arrangement and disposition in consideration of the above description according to a heating method and an arrangement order of the aerosol-forming substrate.

[0068] The present disclosure is not limited to the specific embodiments described above, and various modifications may be made by anyone skilled in the art without departing from the gist of the present disclosure claimed in the claims. Of course, such changes are within the scope of the claims.

Claims

1. An electrically heated smoking article comprising:

   a filter rod;
   an aerosol medium rod stacked at a lower end of the filter rod and including an aerosol medium generating an aerosol by heating and a moisture absorbent accommodating or absorbing the aerosol medium; and
   a wrapping portion surrounding and wrapping

the filter rod and the aerosol medium rod to maintain a stack structure,
wherein the aerosol medium, including glycerin and a thickener, is maintained in a semi-solid or solid state in a first temperature range including room temperature and is in a liquefied state in a second temperature range higher than the first temperature range,
wherein glycerin vaporizes in a third temperature range higher than the second temperature range to generate an aerosol, and the thickener does not vaporize in the third temperature range but remains in the moisture absorbent.

2. The electrically heated smoking article of claim 1, wherein the thickener includes at least one material selected from the group consisting of monosaccharides, disaccharides, sugar alcohols, and oligosaccharides.

3. The electrically heated smoking article of claim 2, wherein the monosaccharides are plant extracts including at least one substance selected from the group consisting of glucose, fructose, and galactose.

4. The electrically heated smoking article of claim 2, wherein the disaccharides include gradients extracted from sugar.

5. The electrically heated smoking article of claim 2, wherein the sugar alcohol includes one or more substances selected from the group consisting of isomalt, maltitol, xylitol, and sorbitol.

6. The electrically heated smoking article of claim 2, wherein the monosaccharides are sugars higher than disaccharides, and include maltodextrin.

7. The electrically heated smoking article of claim 1, wherein the aerosol medium further includes one or more selected from the group consisting of propylene glycol, nicotine, flavoring agents, caffeine, nutritional tonics, water, ethanol, sugar alcohols, and cannabinoids, as an aerosol raw material.

8. The electrically heated smoking article of claim 1, wherein the aerosol medium further includes a flavoring component, and the flavor component includes one or more substances selected from the group consisting of menthol, fruit flavor, herbal flavor, clove or a clove extract.

9. The electrically heated smoking article of any one of claims 1 to 8, further comprising a cooling tube rod having a hollow in a vertical direction between the filter rod and the aerosol medium rod.

10. The electrically heated smoking article of any one of claims 1 to 8, further comprising a tobacco body rod at the top or bottom of the aerosol medium rod.

11. The electrically heated smoking article of any one of claims 1 to 8, further comprising a nicotine rod at the top or bottom of the aerosol medium rod.

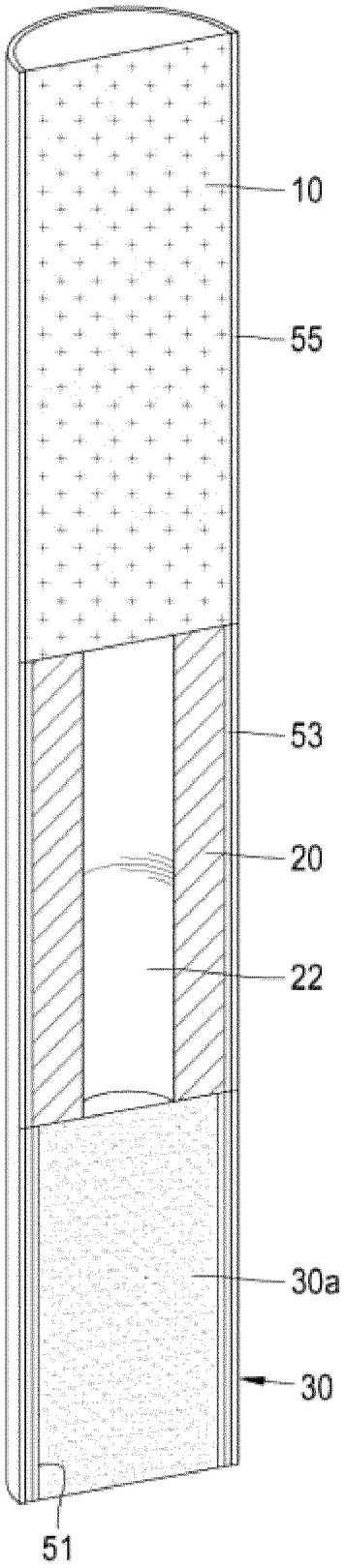
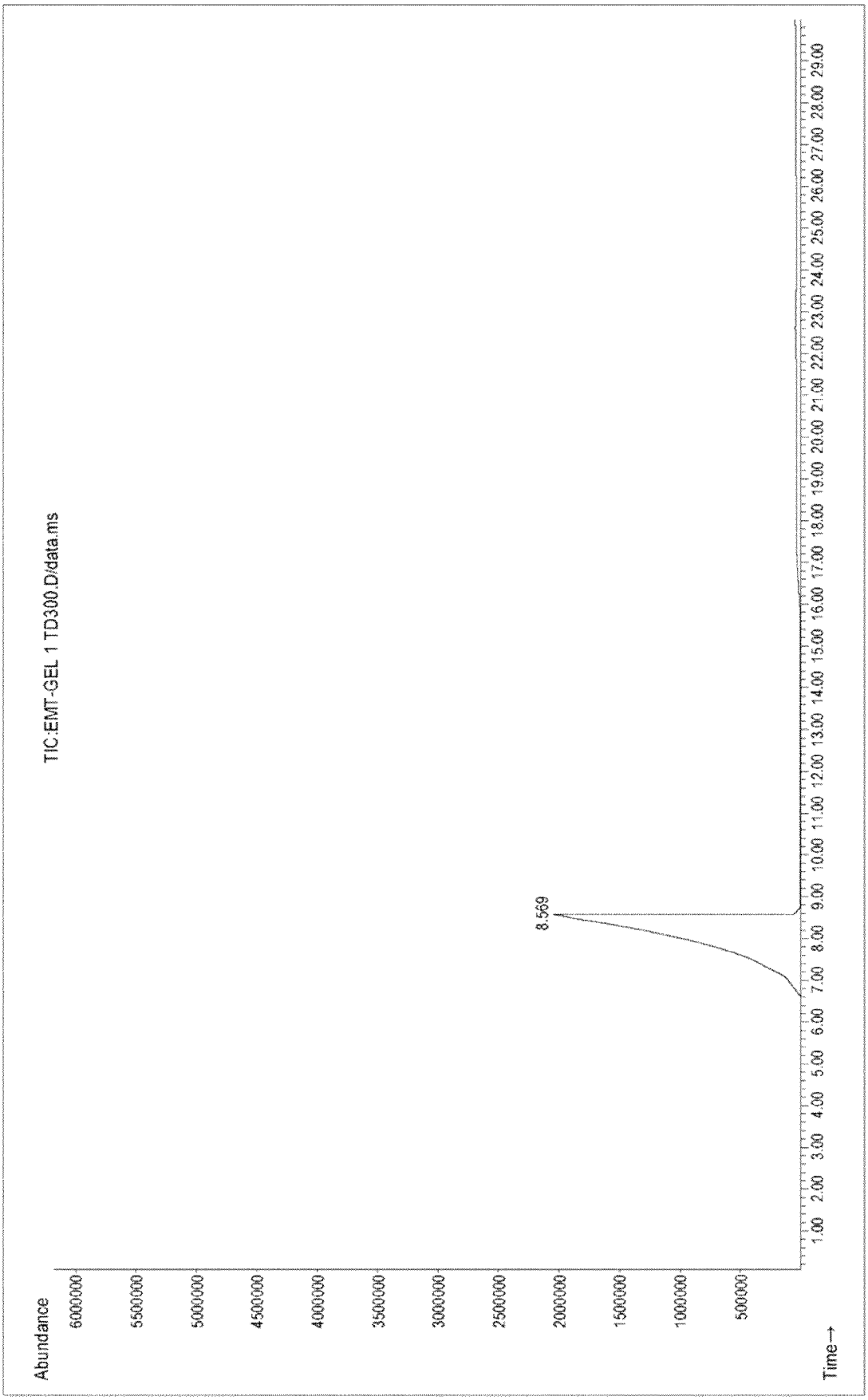


FIG. 1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Time→

FIG. 2

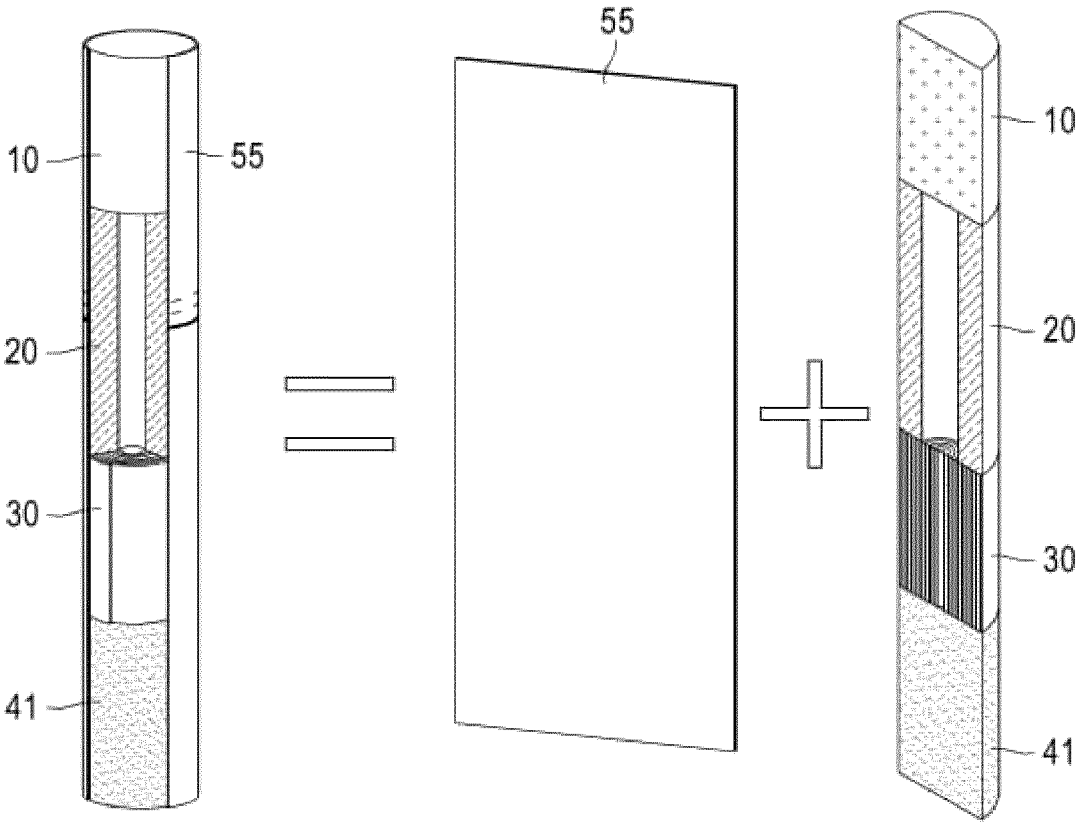

FIG. 3

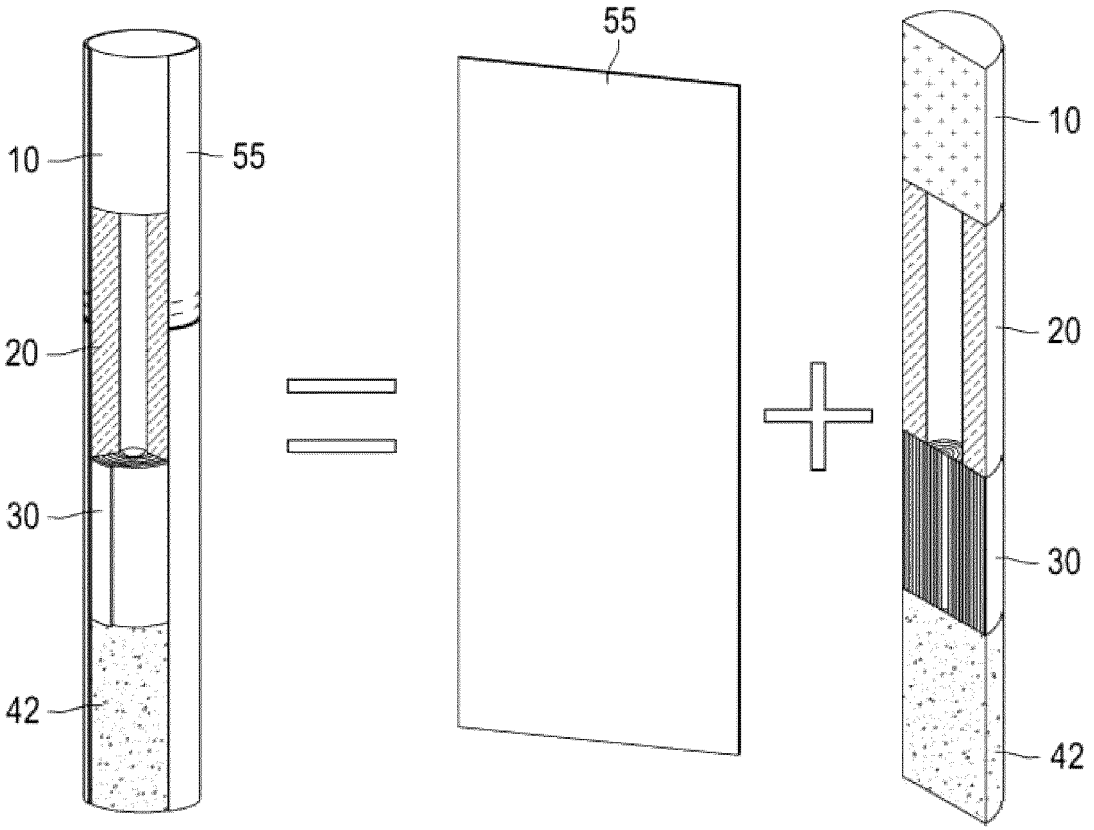

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 7234

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 915 405 A1 (INNO IT CO LTD [KR]) 1 December 2021 (2021-12-01) * paragraph [0001] * * paragraph [0006] - paragraph [0011] * * paragraph [0068] - paragraph [0070] * * claims 1-19 *	1-11	INV. A24B15/16 A24B15/167 A24B15/30 A24D1/20
A	US 2021/015746 A1 (CAPELLI SEBASTIEN [CH] ET AL) 21 January 2021 (2021-01-21) * paragraph [0001] * * paragraph [0005] * * paragraph [0022] - paragraph [0024] * * paragraph [0029] * * paragraph [0045] * * paragraph [0085] - paragraph [0086] *	1-11	
A	EP 3 900 552 A1 (INNO IT CO LTD [KR]) 27 October 2021 (2021-10-27)	1-11	

TECHNICAL FIELDS SEARCHED (IPC)

A24B
A24F
A24D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 September 2023	Dimoula, Kerasina

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 15 7234

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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12-09-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3915405 A1	01-12-2021	EP 3915405 A1	01-12-2021
		KR 20200092269 A	03-08-2020
US 2021015746 A1	21-01-2021	BR 112020017480 A2	22-12-2020
		BR 112020018153 A2	02-02-2021
		BR 112020019228 A2	12-01-2021
		CN 111836557 A	27-10-2020
		CN 111867405 A	30-10-2020
		CN 112218660 A	12-01-2021
		EP 3772253 A1	10-02-2021
		EP 3772254 A1	10-02-2021
		EP 3772255 A1	10-02-2021
		JP 2021518134 A	02-08-2021
		JP 2021518135 A	02-08-2021
		JP 2021519592 A	12-08-2021
		KR 20200135809 A	03-12-2020
		KR 20200139170 A	11-12-2020
		KR 20200140812 A	16-12-2020
		RU 2020132930 A	06-05-2022
		RU 2020132934 A	06-05-2022
		RU 2020135402 A	06-05-2022
		US 2021015144 A1	21-01-2021
		US 2021015746 A1	21-01-2021
		US 2021085666 A1	25-03-2021
		WO 2019193208 A1	10-10-2019
		WO 2019193209 A1	10-10-2019
		WO 2019193210 A1	10-10-2019
EP 3900552 A1	27-10-2021	CN 113226083 A	06-08-2021
		EP 3900552 A1	27-10-2021
		KR 20200078410 A	01-07-2020

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82