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(54) CARTRIDGE CONTAINING MENTHOL AND FLAVORING AGENT, AND AEROSOL GENERATING SYSTEM COMPRISING SAME

(57) Provided are a cartridge including a liquid storage including an aerosol generating material, and an atomizer configured to generate an aerosol from the aerosol generating material, in which the aerosol generating material includes menthol, a flavoring agent, propylene glycol (PG), and vegetable glycerin (VG), and an aerosol generating system including the same.

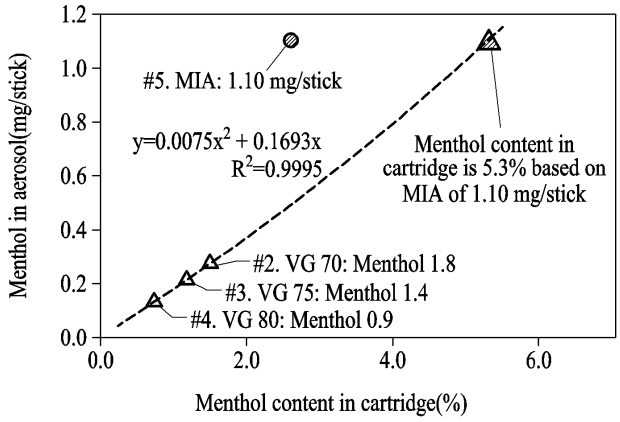

FIG. 1A

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Description

Technical Field

[0001] The present disclosure relates to a cartridge containing menthol and a flavoring agent and an aerosol generating system.

Background Art

[0002] In general, tobacco refers to perennials of the dicotyledonous plants in the Solanaceae family, but recently, tobacco is also a general term for products manufactured for the purpose of smoking, in which tobacco leaves are wrapped with cigarette paper and a filter portion is formed on one side. There are a thousand types of such tobacco products worldwide, and they are released in various shapes and forms.

[0003] Among them, in a case of combustible tobacco, such as cigarettes, cigars, and pipe tobacco, which are lit and smoked, the smoke thereof contains many components such as tar, nitroamine, hydrocarbons, carbon monoxide, etc. in addition to an aerosol containing nicotine.

[0004] As an alternative to compensate for the disadvantages of the combustible tobacco, a method of generating an aerosol by heating an aerosol generating material in a cigarette or cartridge is widely used rather than a method of generating an aerosol by burning a cigarette, and the demand, therefore, is increasing. Accordingly, research on a heating-type (heat-not-burn) cigarette or a heating-type (heat-not-burn) aerosol generating system has been actively conducted.

[0005] Specifically, the aerosol generating system has a configuration similar to the combustible tobacco of the related art and generates mainstream smoke containing an aerosol by heating an aerosol generating material in a heating-type (heat-not-burn) cigarette or cartridge with a heater or through ultrasonic vibration. Accordingly, the aerosol generating system has the advantages of minimizing discharge of a component such as tar while satisfying cigarette cravings of smokers, and thus a new market that replaces typical combustible cigarettes has been formed.

[0006] Meanwhile, compared to the tobacco in the form of a cigarette of the related art, in the heat-not-burn tobacco, a transition amount of nicotine decreases and tobacco flavors and the amount of atomization are reduced as a puff is continued. Accordingly, there is a problem in that satisfaction is not provided to the smokers. In addition, menthol or other flavoring agents may be added to a stick, but even in this case, strength of menthol and other flavors decreases, which may cause a problem in that durability of tobacco flavors and tastes is less likely to be maintained.

Prior Art Document

(1) Korean Laid-open Patent Publication No. 10-2021-0042744 (Published on April 20, 2021) **Disclosure of the Invention**

Technical Goals

[0007] In order to solve the problems and/or limitations of the related art described above, an object of the present disclosure is to provide a cartridge containing both menthol and a flavoring agent and an aerosol generating system including the same.

[0008] However, goals to be achieved are not limited to those described above, and other goals not mentioned above are clearly understood by one of ordinary skill in the art from the following description.

Technical Solutions

[0009] According to an embodiment of the present disclosure, there is provided a cartridge including a liquid storage including an aerosol generating material, and an atomizer configured to generate an aerosol from the aerosol generating material, in which the aerosol generating material includes menthol, a flavoring agent, propylene glycol (PG), and vegetable glycerin (VG).

[0010] According to another embodiment, there is provided an aerosol generating system including an aerosol generating stick including a tobacco medium portion, a front end plug, and a filter portion, a cartridge, and an aerosol generating device, in which the tobacco medium portion includes menthol, a flavoring agent, PG, and VG, the cartridge is the cartridge including the liquid storage including the aerosol generating material including the menthol, the flavoring agent, the PG, and the VG, and the atomizer configured to generate the aerosol from the aerosol generating material, and the aerosol generating device includes an aerosol generating stick accommodating groove, and a heater configured to heat the aerosol generating stick.

Effects

[0011] In a case of using the cartridge including the aerosol generating material containing the menthol, the flavoring agent, the PG, and the VG and/or the aerosol generating system including this according to an aspect of the present disclosure, the uniform menthol and flavor may transition according to each puff during smoking to improve taste durability, and various smoking experiences may be provided through various combinations of the stick and cartridge to improve satisfaction of a user.

[0012] It should be understood that the effects of the present disclosure are not limited to the above-described effects, but are construed as including all effects that can be inferred from the configurations and features described in the following description or claims of the present disclosure.

Brief Description of Drawings

[0013]

FIG. 1A is a graph showing a menthol content (%) in a cartridge containing menthol in aerosol (MIA) equivalent to that of a stick containing 1.10 mg/stick of the MIA.

FIG. 1B is a graph showing a glycerin (VG) content in a cartridge according to a menthol content in the cartridge.

FIG. 2A is a graph showing a difference between nicotine contents in an aerosol by comparing a control group (left), to which a stick containing 2.6% of menthol and a cartridge containing 80% of VG without containing menthol are applied, with an experimental group (right), to which a stick not containing menthol and a cartridge containing 60% of the VG and 3.6% of the menthol are applied.

FIG. 2B is a graph showing a difference between glycerin contents in an aerosol by comparing a control group (left), to which a stick containing 2.6% of menthol and a cartridge containing 80% of VG without containing menthol are applied, with an experimental group (right), to which a stick not containing menthol and a cartridge containing 60% of the VG and 3.6% of the menthol are applied.

FIG. 2C is a graph showing a difference between menthol contents in an aerosol by comparing a control group (left), to which a stick containing 2.6% of menthol and a cartridge containing 80% of VG without containing menthol are applied, with an experimental group (right), to which a stick not containing menthol and a cartridge containing 60% of the VG and 3.6% of the menthol are applied.

FIG. 3A is a graph showing a change in a glycerin content according to a puff by comparing #1, to which a stick containing 7 mg/stick of menthol and an unflavored cartridge are applied, with #2, to which a stick containing 7 mg/stick of menthol and a melon cartridge containing a melon flavor (3.6%) are applied.

FIG. 3B is a graph showing a change in a menthol content according to a puff by comparing #1, to which a stick containing 7 mg/stick of menthol and an unflavored cartridge are applied, with #2, to which a stick containing 7 mg/stick of menthol and a melon cartridge containing menthol (3.6%) and a melon flavor (3.6%) are applied.

FIG. 4 is a diagram illustrating an aerosol generating system including a cartridge and an aerosol generating device according to an embodiment of the present disclosure.

Best Mode for Carrying Out the Invention

[0014] Hereinafter, embodiments will be described in detail with reference to the accompanying drawings. However, various alterations and modifications may be made to the embodiments. Here, the embodiments are not construed as limited to the disclosure. The embodiments should be understood to include all changes, equivalents, and replacements within the idea and the technical scope of the disclosure.

[0015] The terminology used herein is for the purpose of describing particular embodiments only and is not to be limiting of the embodiments. The singular forms "a", "an", and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises/comprising" and/or "includes/including" when used herein, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components and/or groups thereof.

[0016] Unless otherwise defined, all terms including technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which embodiments belong. It will be further understood that terms, such as those defined in commonly-used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0017] When describing the embodiments with reference to the accompanying drawings, like reference numerals refer to like components and a repeated description related thereto will be omitted. In the description of embodiments, detailed

description of well-known related structures or functions will be omitted when it is deemed that such description will cause ambiguous interpretation of the present disclosure.

[0018] In addition, the terms first, second, A, B, (a), and (b) may be used to describe constituent elements of the embodiments. These terms are used only for the purpose of discriminating one component from another component, and the nature, the sequences, or the orders of the components are not limited by the terms.

[0019] The constituent element, which has the same common function as the constituent element included in any one embodiment, will be described by using the same name in other embodiments. Unless otherwise mentioned, the descriptions of the embodiments may be applicable to the following embodiments and thus, duplicated descriptions will be omitted for conciseness.

[0020] According to an embodiment of the present disclosure, there is provided a cartridge including a liquid storage including an aerosol generating material, and an atomizer configured to generate an aerosol from the aerosol generating material, in which the aerosol generating material includes menthol, a flavoring agent, propylene glycol (PG), and vegetable glycerin (VG).

[0021] When the menthol and the flavoring agent are added to an aerosol generating stick (a cigarette) of the related art, strength of the menthol and a flavor decreases, as a puff is repeatedly performed. In contrast, when the menthol and the flavoring agent are added to the cartridge, uniform menthol and flavor may be transitioned continuously by performing heating at a constant temperature, and thus, an effect of improving taste durability for a smoker is obtained.

[0022] Meanwhile, a type of the flavoring agents included in the cartridge may be one or more selected from a group consisting of mint, chocolate, cocoa, coffee, licorice, coriander, vanillin, ethyl vanillin, maltol, ethyl maltol, eucalyptol, acetic acid, a breath freshener flavor, spice, bergamot oil, geranium oil, lemon oil, orange oil, lime oil, grapefruit oil, mint oil, ginger oil, isosweet, a fruit flavor component, and a tobacco flavor, and is not limited to the listed types.

[0023] The cartridge may include the liquid storage including the aerosol generating material, and the atomizer configured to generate the aerosol from the aerosol generating material, the aerosol generating material included in the liquid storage may generally include at least one of PG or VG, may further include at least one of ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, or oleyl alcohol, and may include at least one of nicotine, moisture, or a flavoring agent.

[0024] However, in the present disclosure, the aerosol generating material may include the menthol, the flavoring agent, the PG, and the VG. As described above, when the menthol, the PG, and the VG are all included in the cartridge, a certain restriction is applied to a ratio of the PG and the VG and the ratio of these is important for the menthol to be added to the cartridge, unlike a case where the above components are added to the aerosol generating stick of the related art.

[0025] Specifically, the PG may be mixed well with the menthol due to its characteristics but the VG does not dissolve well with the menthol. Also, as a temperature is low due to an effect of the temperature, a liquid aerosol generating material containing the menthol may not have fluidity, and thus solidification thereof may significantly occur. Accordingly, due to such characteristics of the menthol, the PG, and the VG, a content of the menthol may be determined according to a content of the VG and a result thereof is shown in Table 1 and FIGS. 1A and 1B.

[0026] According to Table 1 and FIGS. 1A and 1B described in the present disclosure, since degrees of dissolution of the menthol and the VG at a certain temperature are determined, the content of VG which changes according to the content of the menthol may be confirmed. In the simple calculation performed with the above point, it may be found that the content of the menthol in the cartridge needs to be 5.3% and the content of the VG needs to be 55.6% accordingly, to obtain menthol in aerosol (MIA) equivalent to that of the aerosol generating stick of the related art containing 1.10 mg/stick of the MIA.

[Table 1]

Features	1	2	3	4	5	6
Content of VG	80%	75%	70%	60%	59%	55.6%
Content of menthol	0.9%	1.4%	1.8%	3.6%	4.0%	5.3%

[0027] However, unlike a general liquid aerosol generating system (a liquid electronic cigarette), in a case of a hybrid type to which an aerosol generating stick is inserted, an aerosol generated in the cartridge is filtered in the stick. Accordingly, in order to provide a sufficient amount of atomization, it is necessary to set the content of the VG to be higher (80% or higher) than that of the liquid electronic cigarette of the related art, and it is important to select an appropriate content because the menthol and the flavoring agent are also filtered in the aerosol generating stick.

[0028] Therefore, as shown in Table 1 and FIGS. 1A and 1B, it is inappropriate to set the content of the VG to 55.6% (the content of menthol: 5.3%) in the hybrid-type aerosol generating device, because of a low content of the VG, which is an element for determining the amount of atomization.

[0029] Considering this point, the content of the menthol included in the cartridge according to an embodiment of the present disclosure is desirably 0.5 wt% to 4.0 wt% and the content of the VG is desirably 80 wt% to 59 wt%.

[0030] When the content of the VG exceeds 80 wt%, as shown in Table 2 below, a viscosity exceeds approximately 500 cP at a temperature of 25°C and relative humidity of 60%, and thus the aerosol generating material included in the liquid storage of the cartridge exists in the thick form such as gel, not in the liquid form. Accordingly, the aerosol may be less likely to be generated and the storage thereof may be difficult due to changes in the temperature and humidity.

[0031] Furthermore, when the content of the VG is less than 59 wt%, a sufficient amount of atomization may not be generated, which may cause a problem in that the smoking satisfaction of smokers decreases.

[0032] In order to obtain the results in Table 2 below, the present inventors filled a 600 ml beaker with 400 ml of a sample, sealed it with a lid, and measured a viscosity thereof with a viscometer (BROOKFILED VISCOMETER (DV2TRVTJ0)) after air conditioning carried out in a dryer at 25°C for 3 hours. The result thereof is shown in the table below.

[Table 2]

Features	Composition ratio		Spindle No.	Torque (%)	Viscosity (cP)
	PG	VG			
#1	10	90	2	33.4	668
#2	20	80	2	24.0	480
#3	30	70	2	18.7	374
#4	40	60	1	49.8	249
#5	45	55	1	40.5	205
• Test conditions - Temperature: 25°C ± 0.5°C, (Relative) humidity: 60% ± 5%					

[0033] Meanwhile, the content of the flavoring agent other than the menthol included in the aerosol generating material of the cartridge is desirably 10 wt% or less and more desirably 3 wt% to 8 wt%.

[0034] When the content thereof exceeds 10 wt%, the content of the VG relatively decreases according to an increase in the content of the PG for dissolving the flavoring agent, and this may cause a problem regarding a deterioration in performance of the amount of atomization.

[0035] Meanwhile, according to another embodiment of the present disclosure, there is provided an aerosol generating system including an aerosol generating stick including a tobacco medium portion, a front end plug, and a filter portion, a cartridge, and an aerosol generating device, in which the tobacco medium portion includes menthol, a flavoring agent, PG, and VG, the cartridge is a cartridge including a liquid storage including an aerosol generating material containing menthol, a flavoring agent, PG, and VG, and an atomizer configured to generate an aerosol from the aerosol generating material, and the aerosol generating device includes an aerosol generating stick accommodating groove, and a heater configured to heat the aerosol generating stick.

[0036] In this case, as described above, the cartridge may contain 0.5 wt% to 4.0 wt% of the menthol, 80 wt% to 59 wt% of the VG, and 10 wt% or less of the flavoring agent other than the menthol.

[0037] The "aerosol generating system" in the present disclosure may refer to a device for generating an aerosol by using an aerosol generating base material to generate an aerosol capable of being directly inhaled into the user's lungs through the user's mouth. The aerosol generating system is a heat-not-burn tobacco product which is indirectly heated with electric energy rather than direct combustion. The heat-not-burn tobacco product includes heating-type and non-heating type tobacco products, and the heating-type tobacco is desirably used in the present disclosure. The heating-type tobacco product may be a product which generates an aerosol by sucking the surrounding air heated with the electric energy and allows the user to smoke as the aerosol is inhaled by the user and then discharged. For example, the aerosol generating device may include a hybrid-type aerosol generating device formed of both a liquid cartridge and a cigarette and may further include various other types of aerosol generating devices, and thus the scope of the present disclosure is not limited to the examples described above.

[0038] In addition, the aerosol generating stick may include the tobacco medium portion, the front end plug, and the filter portion, and the tobacco medium portion may include menthol and a flavoring agent according to an embodiment of the present disclosure.

[0039] The aerosol generating base material may refer to a liquid composition including one or more aerosol generating materials. The aerosol generating material may include, for example, at least one of PG or VG and may further include at least one of ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, or oleyl alcohol. In addition, the aerosol generating base material may include at least one of nicotine, moisture, or a flavoring agent.

[0040] Meanwhile, according to an embodiment of the present disclosure, Table 3 and FIGS. 3A and 3B show results of changes in transition amounts of the glycerin and menthol according to a puff by comparing an aerosol generating system (an example) including an aerosol generating stick including the menthol and the flavoring agent and a cartridge (a melon cartridge) including the menthol and the flavoring agent, with an aerosol generating system (a comparative example) including an aerosol generating stick including the menthol and the flavoring agent and a non-flavored cartridge, and a specific experimental method is as follows.

[0041] The aerosol generated under the conditions of a temperature of 22°C and relative humidity (RH) of 60% was collected in a filter and quantified through component extraction, and in this case, the Health Canada Intense smoking regime was applied to a device under driving conditions of 4 min and 20 sec and 14 puffs.

[0042] A puff flow rate corresponds to 55 ml/2sec, a puff interval corresponds to 19 sec, and the number of puffs corresponds to 14 puffs.

[Table 3]

	Stick containing 7 mg/stick of menthol + unflavored cartridge							Stick containing 7 mg/stick of menthol + melon cartridge						
Number of puffs	**TPM**	**Tar**	**Nicotine**	**PG**	**Gly**	**Water**	**Menthol**	**TPM**	**Tar**	**Nicotine**	**PG**	**Gly**	**Water**	**Menthol**
1puff	3.87	1.95	0.027	0.11	1.19	1.89	**0.12**	3.38	1.56	0.026	0.09	0.91	1.79	**0.13**
2puff	4.08	2.22	0.057	0.14	1.03	1.81	**0.17**	3.56	2.01	0.057	0.14	0.78	1.49	**0.19**
3puff	3.90	2.26	0.097	0.20	0.88	1.55	**0.19**	3.41	1.96	0.084	0.21	0.67	1.37	**0.22**
4puff	2.91	1.64	0.083	0.21	0.66	1.19	**0.16**	2.50	1.59	0.064	0.22	0.53	0.85	**0.19**
5puff	2.43	1.60	0.076	0.24	0.67	0.75	**0.13**	2.10	1.48	0.059	0.26	0.50	0.56	**0.17**
6puff	2.32	1.60	0.079	0.29	0.68	0.64	**0.12**	2.05	1.40	0.063	0.32	0.52	0.59	**0.17**
7puff	2.28	1.62	0.076	0.32	0.70	0.59	**0.12**	2.00	1.42	0.060	0.36	0.52	0.52	**0.17**
8puff	2.26	1.57	0.075	0.35	0.73	0.62	**0.11**	2.00	1.47	0.060	0.40	0.53	0.47	**0.17**
9puff	2.32	1.69	0.075	0.39	0.79	0.55	**0.11**	2.03	1.59	0.059	0.43	0.55	0.38	**0.17**
10puff	2.38	1.73	0.072	0.41	0.86	0.57	**0.11**	2.12	1.66	0.059	0.48	0.60	0.40	**0.17**
11puff	2.52	1.91	0.066	0.43	0.99	0.55	**0.10**	2.39	1.86	0.060	0.56	0.74	0.47	**0.16**
12puff	2.60	2.01	0.059	0.42	1.13	0.54	**0.09**	2.48	2.00	0.054	0.57	0.84	0.43	**0.15**
13puff	2.76	2.13	0.054	0.44	1.29	0.57	**0.08**	2.54	2.03	0.050	0.57	0.92	0.46	**0.14**
14puff	2.81	2.20	0.051	0.44	1.33	0.57	**0.08**	2.51	1.96	0.046	0.56	0.91	0.50	**0.14**
SUM	39.4	26.1	0.94	4.4	12.9	12.4	**1.68**	35.1	24.0	0.80	5.2	9.5	10.3	**2.32**

[0043] Through this, it may be confirmed that, in the example in which the menthol and the flavoring agent are included in both the stick and the cartridge, the transition amount of the menthol is higher while there is no significant difference in the transition amount of nicotine, compared to the comparative example in which the same stick as in the example and the unflavored cartridge are included (FIG. 3B). Meanwhile, in a case of glycerin, the result of the comparative example shows a value higher than that in the example (FIG. 3A), but this may be considered as a result obtained because the unflavored cartridge contains a larger amount of the VGthan that in the melon cartridge.

[0044] Therefore, the aerosol generating system according to the present disclosure may maintain a uniform taste durability with a more intense taste even after the puff is continued, by adding specific amounts of the menthol and the flavoring agent to both the stick and the cartridge. Even in this case, an effect of obtaining a sufficient amount of atomization and a high level of the transition amount of nicotine is exhibited.

[0045] Meanwhile, in the aerosol generating system according to an embodiment of the present disclosure, the atomizer included in the cartridge may contain a liquid delivery means for absorbing the aerosol generating material and may also include a heater configured to generate the aerosol.

[0046] In addition, as shown in FIG. 4 herein, the aerosol generating device may include a battery, a controller, and a detector. FIG. 4 is merely an example of the aerosol generating system, and structures of a system, a device, a product, etc. are not limited to the structures shown in FIG. 4. In addition, different arrangements may be performed or additional components may be added by one of ordinary skill in the art related to the embodiment within the scope not significantly changing the action and purpose of the present disclosure.

[0047] The tobacco medium portion included in the aerosol generating stick may include a tobacco material typically including nicotine such as leaf tobacco, as an aerosol forming material for discharging a volatile compound when being heated, and may further include an excipient such as a binder or other additives. In an example, a tobacco medium included in the tobacco medium portion may be produced in the form of granules containing a tobacco material and an excipient, and the excipient, as a material which may be included in the tobacco medium, may include a pH adjusting agent, a binder, an aerosol forming agent, and other additives, except for the tobacco material, and is not limited thereto.

[0048] In the present disclosure, the tobacco material is a material forming the aerosol generating base material and may be tobacco leaf pieces, tobacco stems, tobacco dust generated during a tobacco treatment, and/or tobacco leaf strips. The tobacco leaves may be at least one or more selected from flue-cured tobacco, Burley tobacco, Oriental tobacco, cigar leaves, and toasted tobacco, but are not limited thereto.

[0049] In addition, the tobacco medium portion may separately include a carrier for carrying the flavoring agent, and the carrier may include a cavity capable of accommodating the flavoring agent or carry a flavoring component in the form of a capsule. The type of the carrier is not particularly limited as long as it may carry a specific flavoring agent, and examples thereof may include cyclodextrin and the like.

[0050] In addition, the front end plug included in the aerosol generating stick may prevent the tobacco medium portion from being separated to the outside, and may prevent an aerosol liquefied from the tobacco medium portion during the smoking from flowing into the aerosol generating device. In addition, examples of the type thereof may correspond to a cellulose acetate filter, a paper filter, or a filter formed of a polymer material.

[0051] While the embodiments are described with reference to drawings, it will be apparent to one of ordinary skill in the art that various alterations and modifications in form and details may be made in these embodiments without departing from the spirit and scope of the claims and their equivalents. For example, suitable results may be achieved if the described techniques are performed in a different order and/or if components in a described system, architecture, device, or circuit are combined in a different manner and/or replaced or supplemented by other components or their equivalents.

[0052] Therefore, the scope of the disclosure is defined not by the detailed description, but by the claims and their equivalents, and all variations within the scope of the claims and their equivalents are to be construed as being included in the disclosure.

Claims

1. A cartridge comprising:

   a liquid storage comprising an aerosol generating material; and
   an atomizer configured to generate an aerosol from the aerosol generating material,
   wherein the aerosol generating material comprises menthol, a flavoring agent, propylene glycol (PG), and vegetable glycerin (VG).

2. The cartridge of claim 1, wherein the flavoring agent comprises at least one selected from a group consisting of mint, chocolate, cocoa, coffee, licorice, coriander, vanillin, ethyl vanillin, maltol, ethyl maltol, eucalyptol, acetic acid, a breath freshener flavor, spice, bergamot oil, geranium oil, lemon oil, orange oil, lime oil, grapefruit oil, mint oil,

ginger oil, isosweet, a fruit flavor component, and a tobacco flavor.

3. The cartridge of claim 1, wherein a content of the menthol in the aerosol generating material is 0.5 wt% to 4.0 wt% and a content of the VG is 80 wt% to 59 wt%.

4. The cartridge of claim 1, wherein a content of the flavoring agent other than the menthol in the aerosol generating material is 10 wt% or less.

5. The cartridge of claim 1, wherein the atomizer comprises a liquid delivery means for absorbing the aerosol generating material and a heater configured to generate the aerosol.

6. An aerosol generating system comprising:

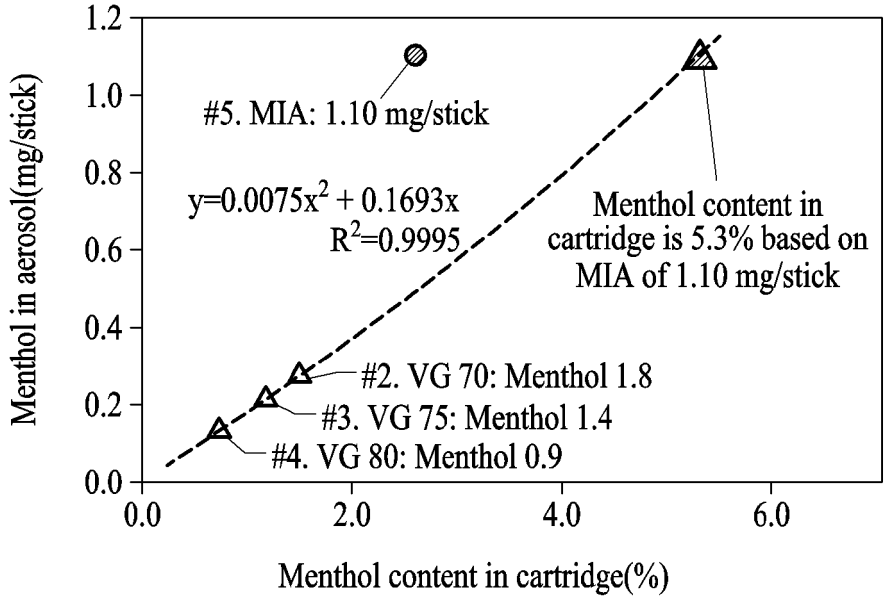
an aerosol generating stick comprising a tobacco medium portion, a front end plug, and a filter portion;
a cartridge; and
an aerosol generating device,
wherein the tobacco medium portion comprises menthol, a flavoring agent, propylene glycol (PG), and vegetable glycerin (VG),
wherein the cartridge is the cartridge according to any one of claims 1 to 5, and
wherein the aerosol generating device comprises an aerosol generating stick accommodating groove, and a heater configured to heat the aerosol generating stick.

7. The aerosol generating system of claim 6, wherein the aerosol generating device further comprises a battery, a controller, and a detector.

8. The aerosol generating system of claim 6, wherein the tobacco medium portion comprises a carrier for carrying the flavoring agent.

9. The aerosol generating system of claim 6, wherein the front end plug is a cellulose acetate filter, a paper filter, or a filter formed of a polymer material.

10. The aerosol generating system of claim 6, wherein the aerosol generating system is a heat-not-burn type.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2.0
4.0
6.0
Menthol in aerosol(mg/stick)
Menthol content in cartridge(%)
#5. MIA: 1.10 mg/stick
y=0.0075x2 + 0.1693x
R2=0.9995
Menthol content in cartridge is 5.3% based on MIA of 1.10 mg/stick
#2. VG 70: Menthol 1.8
#3. VG 75: Menthol 1.4
#4. VG 80: Menthol 0.9

FIG. 1A

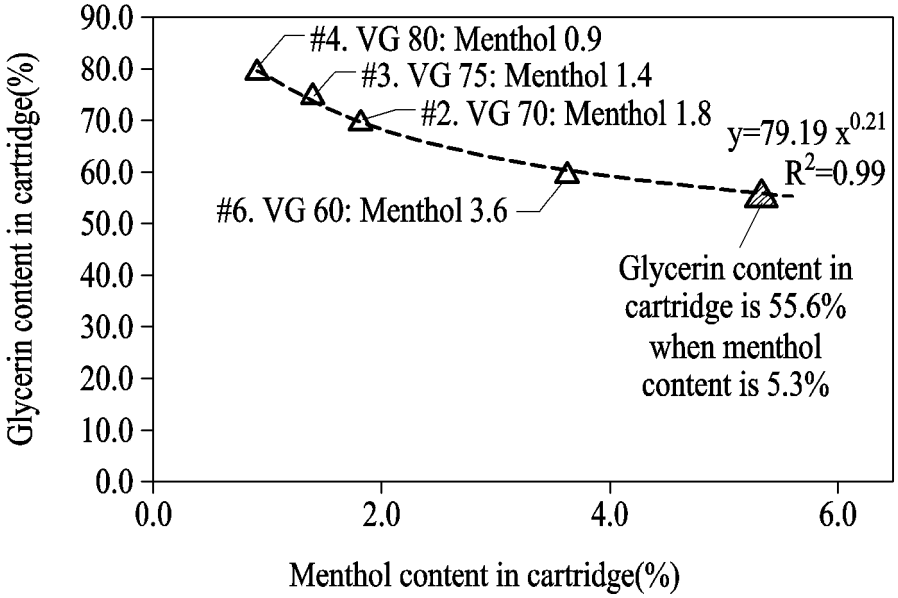
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0.0
2.0
4.0
6.0
Glycerin content in cartridge(%)
Menthol content in cartridge(%)
#4. VG 80: Menthol 0.9
#3. VG 75: Menthol 1.4
#2. VG 70: Menthol 1.8
y=79.19 x0.21
R2=0.99
#6. VG 60: Menthol 3.6
Glycerin content in cartridge is 55.6% when menthol content is 5.3%

FIG. 1B

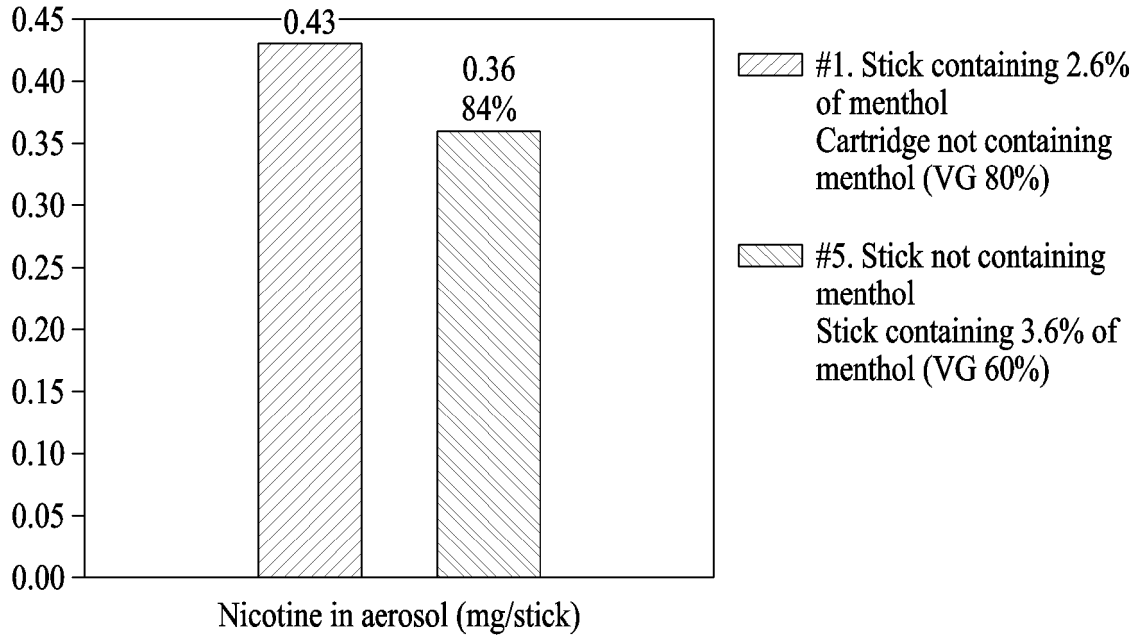
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.43
0.36
84%
Nicotine in aerosol (mg/stick)
#1. Stick containing 2.6% of menthol
Cartridge not containing menthol (VG 80%)
#5. Stick not containing menthol
Stick containing 3.6% of menthol (VG 60%)

FIG. 2A

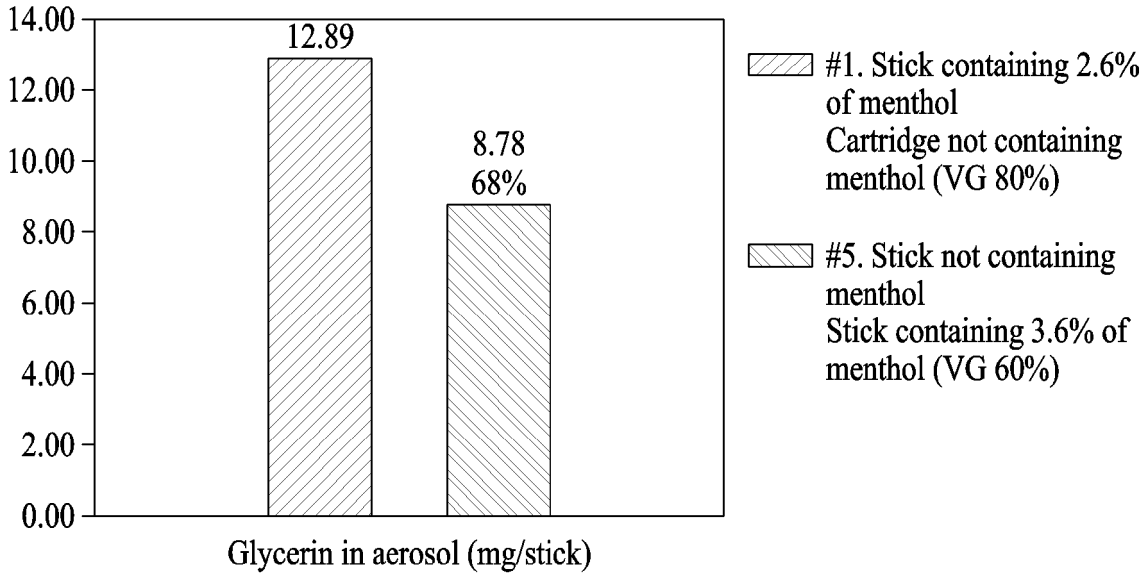
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
12.89
8.78
68%
Glycerin in aerosol (mg/stick)
#1. Stick containing 2.6% of menthol
Cartridge not containing menthol (VG 80%)
#5. Stick not containing menthol
Stick containing 3.6% of menthol (VG 60%)

FIG. 2B

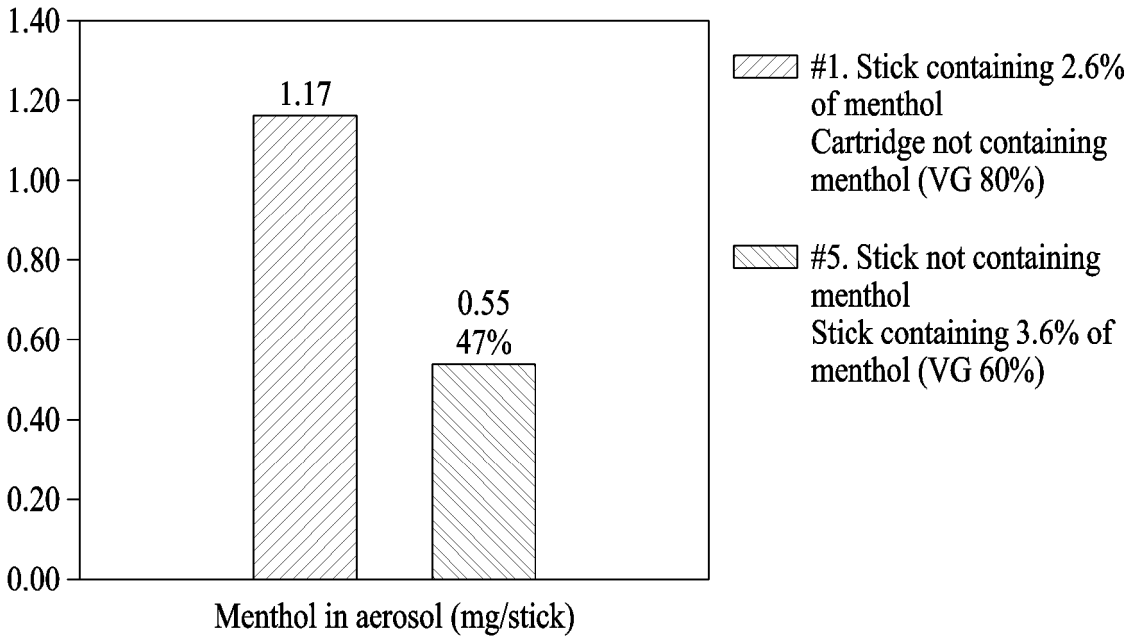
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1.17
0.55
47%
Menthol in aerosol (mg/stick)
#1. Stick containing 2.6% of menthol
Cartridge not containing menthol (VG 80%)
#5. Stick not containing menthol
Stick containing 3.6% of menthol (VG 60%)

FIG. 2C

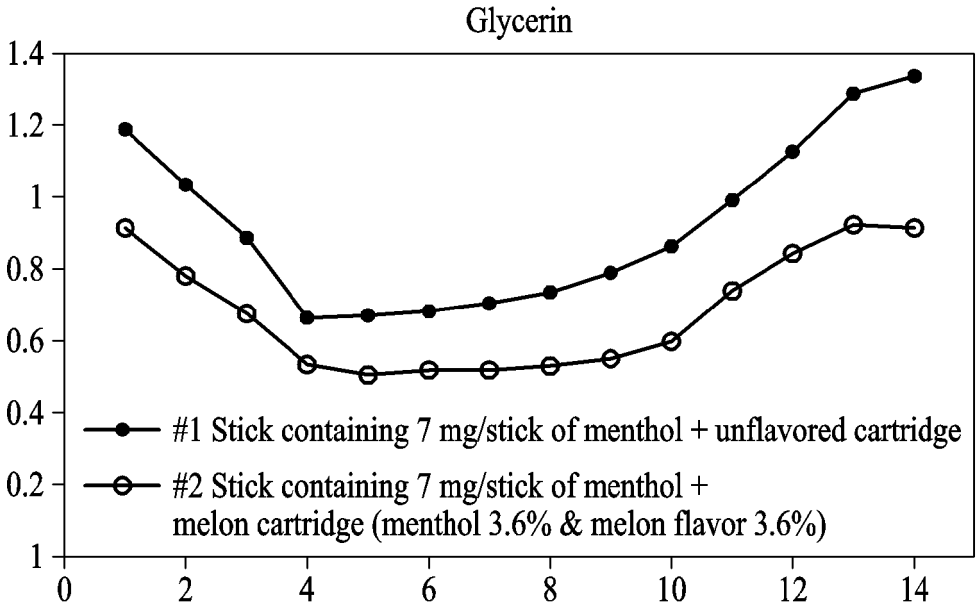
Glycerin
1.4
1.2
1
0.8
0.6
0.4
0.2
1
0
2
4
6
8
10
12
14
#1 Stick containing 7 mg/stick of menthol + unflavored cartridge
#2 Stick containing 7 mg/stick of menthol +
melon cartridge (menthol 3.6% & melon flavor 3.6%)

FIG. 3A

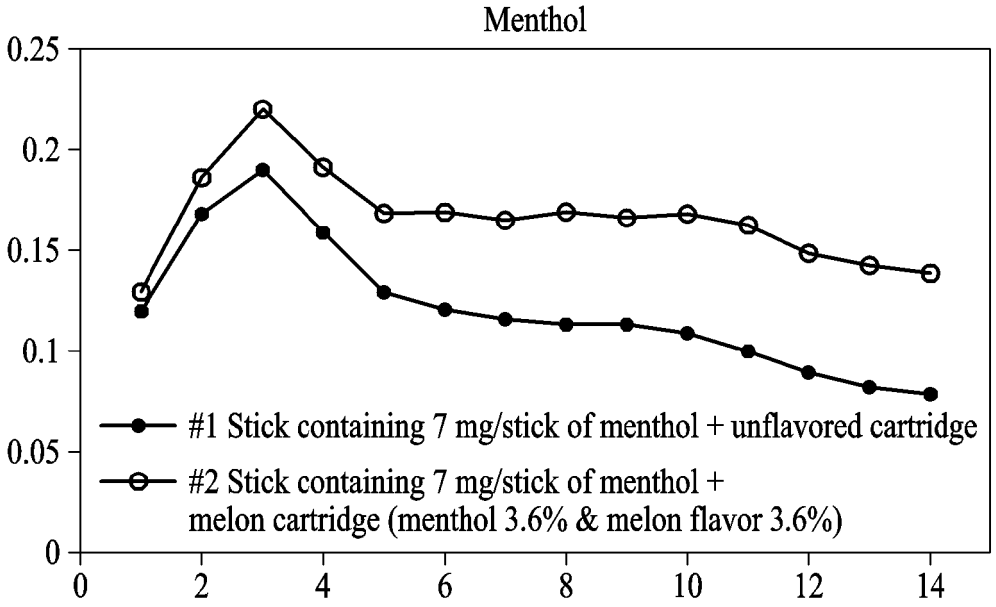
Menthol
0.25
0.2
0.15
0.1
0.05
0
0
2
4
6
8
10
12
14
#1 Stick containing 7 mg/stick of menthol + unflavored cartridge
#2 Stick containing 7 mg/stick of menthol +
melon cartridge (menthol 3.6% & melon flavor 3.6%)

FIG. 3B

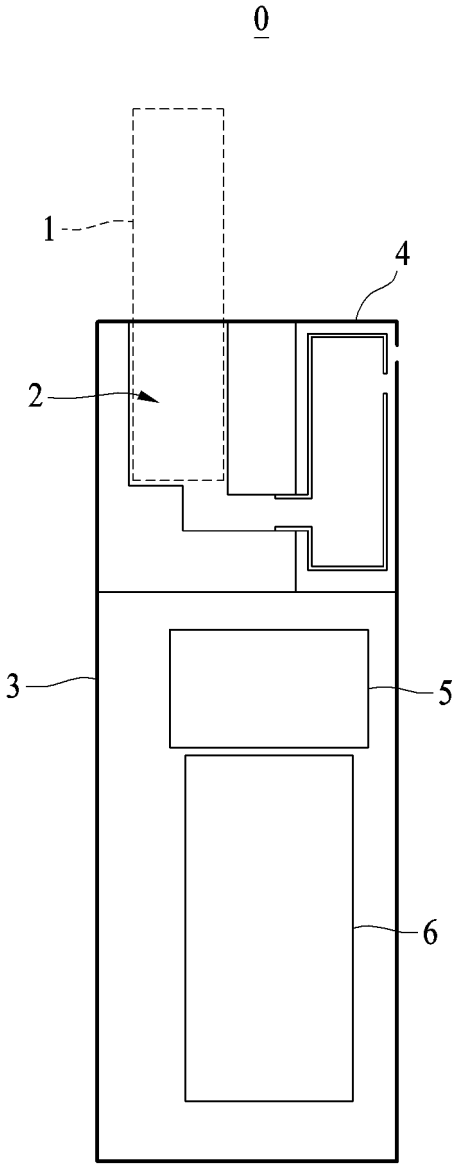

FIG. 4

TRANSLATION

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/016778

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/42(2020.01)i; **A24F 40/10**(2020.01)i; **A24B 15/34**(2006.01)i; **A24B 15/32**(2006.01)i; **A24B 15/28**(2006.01)i; **A24B 15/167**(2020.01)i; **A24B 15/30**(2006.01)i; **A24F 40/50**(2020.01)i; **A24F 40/51**(2020.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F 40/42(2020.01); A24B 15/16(2006.01); A24D 3/02(2006.01); A24D 3/06(2006.01); A24F 40/10(2020.01); A24F 40/57(2020.01); A24F 47/00(2006.01); A61M 15/06(2006.01); H05B 3/14(2006.01)

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

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

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

eKOMPASS (KIPO internal) & keywords: 에어로졸(aerosol), 멘솔(menthol), 향미제(flavoring), 카트리지(cartridge)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2018-0014576 A1 (WHITE, J. L.) 18 January 2018 (2018-01-18) See claims 1, 7 and 12; paragraphs [0018]-[0021]; tables 4 and 6; examples 9 and 17; and figures 1-3.	1-5
Y		6-10
Y	KR 10-2021-0078343 A (KT & G CORPORATION) 28 June 2021 (2021-06-28) See claim 1; paragraphs [0021], [0064] and [0093]; and figures 3-4.	6-10
A	US 2019-0045848 A1 (NU MARK INNOVATIONS LTD.) 14 February 2019 (2019-02-14) See entire document.	1-10
A	US 2016-0345621 A1 (LI, S. et al.) 01 December 2016 (2016-12-01) See entire document.	1-10
A	KR 10-2021-0101040 A (KT & G CORPORATION) 18 August 2021 (2021-08-18) See entire document.	1-10

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 February 2023	**03 February 2023**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208**	
Facsimile No. **+82-42-481-8578**	Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

TRANSLATION

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/016778

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
US 2018-0014576 A1	18 January 2018	US 10292431 B2	21 May 2019
		US 10624386 B2	21 April 2020
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KR 10-2021-0078343 A	28 June 2021	CN 113993398 A	28 January 2022
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KR 10-2021-0101040 A	18 August 2021	CN 113507852 A	15 October 2021
		EP 3880015 A1	22 September 2021
		EP 3880015 A4	19 January 2022
		JP 2022-522601 A	20 April 2022
		KR 10-2324197 B1	09 November 2021
		US 2022-0395028 A1	15 December 2022
		WO 2021-157846 A1	12 August 2021

Form PCT/ISA/210 (patent family annex) (July 2022)