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

(11) **EP 4 023 274 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
06.07.2022 Bulletin 2022/27

(21) Application number: **20856003.7**

(22) Date of filing: **06.08.2020**

(51) International Patent Classification (IPC):
A61M 11/00 *(2006.01)* ***A61M 15/00*** *(2006.01)*
A61K 9/72 *(2006.01)* ***A61K 47/14*** *(2017.01)*
A24B 15/167 *(2020.01)* ***A24B 15/32*** *(2006.01)*
A24F 47/00 *(2020.01)* ***A24F 40/10*** *(2020.01)*

(52) Cooperative Patent Classification (CPC):
A24B 15/167; A24B 15/32; A24F 40/10; A24F 47/00; A61K 47/14; A61M 11/00; A61M 15/00

(86) International application number:
PCT/JP2020/030155

(87) International publication number:
WO 2021/039343 (04.03.2021 Gazette 2021/09)

(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
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **30.08.2019 JP 2019158166**

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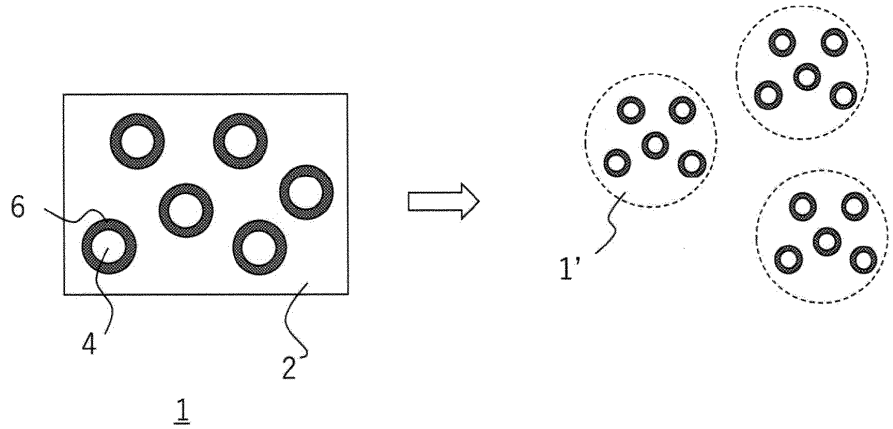
(54) **NON-HEATING TYPE FLAVOR INHALER**

(57) Provided is a non-heating type flavor inhaler including: a liquid for atomization containing a triglyceride, an emulsifier, and a water-based aerosol source; a liquid storage section for storing the liquid for atomization; and an atomization section for atomizing the liquid for atomization. The non-heating type flavor inhaler forms visible smoke exhibiting high visibility and a long persistent state of high visibility.

Fig. 1



EP 4 023 274 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a non-heating type flavor inhaler.

BACKGROUND ART

[0002] A non-combustion flavor inhaler uses, as an aerosol source, glycerol, propylene glycol, or water. Patent Literature (PTL) 1, for example, discloses an electronic cigarette that heats a liquid material containing glycerin. Moreover, PTL 2 discloses a non-combustion flavor inhaler including capsules that contain water, a triglyceride, and a flavor, where a user inhales the flavor inside the capsules by breaking the capsules. In this case, the triglyceride acts as a diluent for the flavor. As another liquid material containing a triglyceride, PTL 3 discloses an inhibitor of peristalsis in gastrointestinal tract smooth muscle, containing water, a triglyceride, and an emulsifier but does not suggest anything about flavor inhalation.

[0003] Meanwhile, during the use of a non-combustion flavor inhaler, a user tends to be highly satisfied when the visibility of visible smoke is high and such a high visibility state of visible smoke persists (highly persistent). For this reason, there is a need for a non-combustion flavor inhaler that exhibits high visibility of visible smoke and that can maintain such a high visibility state.

CITATION LIST

PATENT LITERATURE

[0004]

PTL 1: Japanese Unexamined Patent Application Publication No. 2018-078902
PTL 2: U.S. Patent Application No. 2017/064995
PTL 3: Japanese Patent No. 4526120

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] In a heating-type flavor inhaler, a glycerol- or propylene glycol-based aerosol source is used from a viewpoint of obtaining a stable aerosol. Meanwhile, in a non-heating type flavor inhaler that utilizes vibrations, such as ultrasonic vibrations, an aerosol source needs to have low viscosity in view of efficient aerosol generation, and thus, a water-based aerosol source is used. However, the present inventors found that when a water-based aerosol source is used, visible smoke exhibits low visibility and a short duration time compared with cases in which a glycerol- or propylene glycol-based aerosol source is used, and as a result, a user might not be fully satisfied. In view of this, an object of the present invention is to provide a non-heating type flavor inhaler that can form visible smoke exhibiting high visibility and a long persistent state of high visibility.

SOLUTION TO PROBLEM

[0006] The present inventors found that the object is attained by using a liquid for atomization containing a water-based aerosol source, a triglyceride, and an emulsifier. In other words, the object is attained by the present invention below.

(Embodiment 1) A non-heating type flavor inhaler including:

a liquid for atomization containing a triglyceride, an emulsifier, and a water-based aerosol source;
a liquid storage section for storing the liquid for atomization; and
an atomization section for atomizing the liquid for atomization.

(Embodiment 2) The non-heating type flavor inhaler according to Embodiment 1, where the concentration of the triglyceride is 10 weight% or less in the liquid for atomization.
(Embodiment 3) The non-heating type flavor inhaler according to Embodiment 1 or 2, where the aerosol source contains 80 weight% or more of water in the aerosol source.

(Embodiment 4) The non-heating type flavor inhaler according to any of Embodiments 1 to 3, where the liquid for atomization contains 70 weight% or more of water in the liquid.
(Embodiment 5) The non-heating type flavor inhaler according to any of Embodiments 1 to 4, where the triglyceride has an aliphatic group that is derived from a fatty acid and that has a carbon number of 6 or more.
(Embodiment 6) The non-heating type flavor inhaler according to any of Embodiments 1 to 5, where the liquid for atomization further contains a flavor.
(Embodiment 7) The non-heating type flavor inhaler according to any of Embodiments 1 to 6, where the atomization section has an atomizing mechanism by vibrations.
(Embodiment 8) A liquid for atomization for a non-heating type flavor inhaler, containing a triglyceride, an emulsifier, and a water-based aerosol source.

ADVANTAGEOUS EFFECTS OF INVENTION

[0007] According to the present invention, it is possible to provide a non-heating type flavor inhaler that can form visible smoke exhibiting high visibility and a long persistent state of high visibility.

BRIEF DESCRIPTION OF DRAWINGS

[0008]

Fig. 1 schematically illustrates a liquid for atomization used in the present invention and the atomized product thereof.
Fig. 2 illustrates an embodiment of a non-heating type flavor inhaler of the present invention.
Fig. 3 illustrates components disposed between the top surface cover and the bottom surface cover of an atomization section.
Fig. 4 illustrates the connection between the atomization section and a liquid storage section.
Fig. 5 is an enlarged view of a portion of the atomization section.
Fig. 6 illustrates a method for measuring the duration time of visible smoke.

DESCRIPTION OF EMBODIMENTS

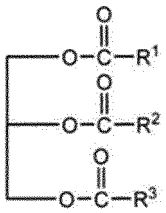
[0009] Hereinafter, the present invention will be described in detail. In the present invention, the expression of "X to Y" includes the lower and the upper limits of X and Y.

1. Liquid for atomization

(1) Triglycerides

[0010] A triglyceride is a compound in which three hydroxy groups of glycerol are esterified with fatty acids and is represented by the following formula.

[Formula 1]



[0011] R^1 to R^3 are aliphatic groups derived from fatty acids, and the carbon numbers are not limited. However, at least one of R^1 to R^3 is preferably a group having the carbon number of 6 or more, at least two of R^1 to R^3 are preferably groups having the carbon number of 6 or more, and all of R^1 to R^3 are more preferably groups having the carbon number of 6 or more. The upper limit of the carbon number is not limited but is preferably 12 or less. When the carbon number is excessively large, dispersion stability in a liquid decreases. In light of this, three aliphatic groups of a triglyceride preferably have the carbon number within the above-mentioned range. A triglyceride in which all of R^1 to R^3 are groups having the carbon number of 6 or more is also called a medium-chain triglyceride. Such a medium-chain triglyceride has a feature that a user does not feel the taste or flavor during smoking.

[0012] The concentration of a triglyceride in a liquid for atomization is not limited. However, when the concentration of a triglyceride is excessively high, the viscosity of the liquid increases. This causes a problem in which the amount to be atomized decreases in a non-heating type flavor inhaler that utilizes vibrations, such as ultrasonic vibrations. In light of these, the upper limit of the concentration in a liquid for atomization is preferably 10 weight% or less and more preferably 5 weight% or less. Meanwhile, the lower limit of the concentration is not limited but is preferably 1 weight% or more and more preferably 2 weight% or more.

(2) Emulsifiers

[0013] An emulsifier has an affinity with water in a liquid for atomization and a triglyceride as a hydrophobic substance. As an emulsifier, any publicly known emulsifier can be used, and examples include anionic surfactants (sodium lauryl sulfate and alkyl ether carboxylates, for example), cationic surfactants (benzalkonium chloride, for example), amphoteric surfactants (lecithin, for example), and nonionic surfactants (polyglycerol fatty acid esters, sucrose fatty acid esters, calcium stearoyl lactylate, sorbitan fatty acid esters, propylene glycol fatty acid esters, polyoxyethylene alkyl ethers, polyoxyethylene sorbitan fatty acid esters, and saponins, for example). The concentration of an emulsifier in a liquid for atomization is not limited but is preferably 2 weight% or less and more preferably 1 weight% or less. The lower limit of the concentration is not limited but is preferably 0.1 weight% or more and more preferably 0.2 weight% or more.

(3) Aerosol Sources

[0014] In the present invention, a water-based aerosol source is used. The expression of "water-based" herein means that 70 weight% or more of water is contained in an aerosol source. Water preferably accounts for 80 weight% or more relative to the entire aerosol source. Exemplary aerosol sources other than water include glycerol and propylene glycol. The amount of these is preferably 30 weight% or less and more preferably 20 weight% or less in an aerosol source. Alternatively, an aerosol source may solely consist of water. Moreover, water preferably accounts for 70 weight% or more in a liquid for atomization. Since water preferably contains no impurity, deionized water or the like may be used.

(4) Other Components

[0015] A liquid for atomization used in the present invention may contain any flavor publicly known in the field concerned. Such a flavor is not limited, and examples include menthol. The amount may be a publicly known amount but is preferably 8 weight% or less and more preferably 5 weight% or less in a liquid for atomization. The lower limit of the concentration is not limited, and other components (flavor) need not be contained. Further, a liquid for atomization used in the present invention does not contain nicotine in an embodiment.

(5) Mechanism

[0016] The mechanism in which the liquid for atomization can enhance the visibility of visible smoke and increase the duration time of a state in which the visibility of visible smoke is high is not limited but is presumably as follows. As illustrated in Fig. 1, it is considered that a liquid for atomization 1 originally has a structure in which an oil droplet 4 of a hydrophobic substance (triglyceride) having a low vapor pressure is finely dispersed in a water-based aerosol source 2. Such oil droplets exist in a stable manner by means of an emulsifier 6. The liquid for atomization is then atomized to form an atomized product of aggregated particles 1'. In an embodiment, the diameter of the particles 1' is 0.1 to 10 μm, and the diameter of oil droplets 4 present within each particle 1' is 0.01 to 1 μm. In the particle 1', oil droplets 4 act as nuclei and suppress vaporization of the surrounding aerosol source 2. Further, due to the low vapor pressure, oil droplets 4 alone remain there without vaporization even after the aerosol source 2 is vaporized. Consequently, it is presumed that the visibility of visible smoke is enhanced and the duration time of such a high visibility state increases.

2. Non-heating type flavor inhaler

[0017] A non-heating type flavor inhaler is an apparatus that makes a flavor component contained in a liquid for atomization inhalable and that includes at least a liquid storage section for storing the liquid for atomization and an atomization section for atomizing the liquid for atomization. The flavor inhaler is thus used in the state in which the liquid storage section is filled with the liquid for atomization. It is preferable that the non-heating type flavor inhaler includes a mouthpiece for facilitating inhalation. The atomization section may have a vibration generating mechanism that can apply vibration to the liquid for atomization. Such an atomization section having a vibration generating mechanism is preferable since atomization efficiency is high. The atomization section preferably does not have a heating mechanism. By including an atomization section that does not have a heating mechanism, a flavor component that is unsuitable for

heating also becomes inhalable. A heating mechanism herein means a mechanism that can alone atomize a liquid for atomization. For example, the temperature of a liquid rises in some cases when vibration is applied by a vibration generating mechanism. In this case, however, such a vibration generating mechanism is not regarded as a heating mechanism.

[0018] Further, the atomization section may have an auxiliary heating mechanism. The "auxiliary heating mechanism" herein means a heating mechanism that can heat a liquid for atomization but cannot alone atomize the liquid for atomization. Exemplary auxiliary heating mechanisms include a heating mechanism that does not heat a liquid for atomization to its boiling point.

[0019] Fig. 2 illustrates an embodiment of a non-heating type flavor inhaler. In the figure, 1000 is a non-heating type flavor inhaler, 1001D is a mouthpiece, 1100 is an atomization section, 1200A and 1200B are each a liquid storage section, 1202 is a housing, 1102 and 1104 are each an opening, 1106 is a top surface cover of the atomization section, 1107 is a bottom surface cover of the atomization section, and 1004 is a screw. The liquid storage sections 1200A and 1200B are placed in holding sections provided in the housing 1202, and to the top surfaces thereof, the atomization section 1100 and the mouthpiece 1001D are connected in this order using screws 1004. As illustrated in Fig. 2, the atomization section 1100 is shielded with the top surface cover 1106 of the atomization section and the bottom surface cover 1107 of the atomization section. Fig. 3 illustrates, in the atomization section 1100, components disposed between the top surface cover 1106 of the atomization section and the bottom surface cover 1107 of the atomization section. As illustrated in Fig. 3, the atomization section 1100 includes a PCB 1109, a piezoelectric element substrate 1031 equipped with an interdigital electrode 1033, and a pair of guide walls 1711A and 1711B. Although not illustrated, a top cover and a base component or the like may be disposed above and below these components, respectively. Moreover, a sensor and/or a seal may be disposed, as necessary, between these components and the top cover. Fig. 4 illustrates the connection between the atomization section and the liquid storage section. For simplicity, the figure illustrates only the liquid storage section 1200A, but in fact, the liquid storage section 1200B is also connected with the atomization section 1100. As illustrated in Fig. 4, the liquid storage section 1200A is connected with the atomization section 1100 such that a liquid discharge section provided on the top surface of the liquid storage section 1200A is in communication with a penetrating hole 1713A. Fig. 5 is an enlarged view of a portion of the atomization section 1100 illustrated in Fig. 3. Specifically, Fig. 5 illustrates, from the atomization section 1100 illustrated in Fig. 3, the PCB 1109, the piezoelectric element substrate 1031 equipped with the interdigital electrode 1033, the guide wall 1711A, a seal 1111, and a sensor 1070.

[0020] The atomization section 1100 includes the piezoelectric element substrate 1031 equipped with the interdigital electrode 1033 and is configured to atomize a liquid by surface acoustic waves (SAWs) generated under application of voltage at a high frequency to the interdigital electrode 1033. A liquid for atomization inside the liquid storage sections 1200A and 1200B is atomized by surface acoustic waves, and the atomized product reaches the mouthpiece.

[0021] The piezoelectric element substrate 1031 is configured to atomize a liquid by SAWs generated under application of voltage at a high frequency (resonance frequency) to the interdigital electrode 1033.

[0022] The piezoelectric element substrate 1031 includes a piezoelectric body that expands and contracts by voltage application. As the piezoelectric body, any known piezoelectric body formed of, for example, ceramic, such as quartz, barium titanate, or lithium niobate, can be used.

[0023] The interdigital electrode 1033 is electrically connected with a power source (not illustrated) provided inside the housing 1202 and is supplied with power. For example, the interdigital electrode 1033 is formed of a gold-plated metal or the like.

[0024] The piezoelectric element substrate 1031 has a pair of edges 1031A and 1031B that face each other. The guide wall 1711A is provided on the edge 1031A side of the piezoelectric element substrate 1031, and the guide wall 1711B is provided on the edge 1031B side. The guide walls 1711A and 1711B respectively have penetrating holes 1713A and 1713B that extend between the upper and lower surfaces. In addition, the guide walls 1711A and 1711B respectively have recesses 1714A and 1714B in communication with the respective penetrating holes 1713A and 1713B. As illustrated in Fig. 4, the liquid storage sections 1200A and 1200B are respectively connected to the lower surfaces of the guide walls 1711A and 1711B. A liquid for atomization supplied from the liquid storage sections 1200A and 1200B by a syringe pump (not illustrated) passes through each penetrating hole 1713A or 1713B upward and reaches the recess 1714A or 1714B. The liquid that has reached the recess 1714A or 1714B then reaches the edge 1031A or 1031B of the piezoelectric element substrate 1031 and is atomized by the energy of the interdigital electrode 1033. Here, the syringe pump is configured to supply the liquid for atomization to the edges 1031A and 1031B of the piezoelectric element substrate 1031.

[0025] A non-heating type flavor inhaler like this is disclosed in PCT/JP 2019/015377, for example. Although the figures illustrate an embodiment including two liquid storage sections, one liquid storage section may be included.

[0026] In addition to the flavor inhaler illustrated in Fig. 2, a non-heating type flavor inhaler including an atomization section having a vibration generating mechanism that utilizes ultrasonic vibrations, for example, may be used as well. Such an atomization section is used in an ultrasonic nebulizer (for example, NE-U17 and NE-U22 from Omron Corpo-

ration) and so forth.

[0027] Further, a non-heating type flavor inhaler including an atomization section that uses a nozzle may also be used. Such an atomization section includes a liquid storage section, a nozzle for ejecting compressed air, and a suction tube that is provided adjacent to the nozzle and is in communication with the liquid for atomization holding section; and atomizes the liquid for atomization by pressure differences generated between the nozzle section and the suction tube when compressed air is ejected from the nozzle. Such an atomization section is used in a compressor nebulizer and so forth.

[0028] The non-heating type flavor inhaler of the present invention may include a heating mechanism in portions excluding the atomization section. For example, the flavor inhaler of Fig. 2 may be provided, around the liquid storage sections 1200A and 1200B, with a heating mechanism for heating a liquid or may be provided with a heating mechanism in the flow channel of the mouthpiece 1001D.

EXAMPLES

[Example 1]

[0029] As a medium-chain triglyceride, 5 g of Coconad® MT (C_8/C_{10} triglyceride) from Kao Corporation, 5 g of an emulsifier (Emasol S-120V from Kao Corporation), and 490 g of water were mixed and emulsified with a homogenizer (Dostormix B DMM from Etekku Japan). The obtained liquid was further emulsified with a high pressure homogenizer (Panda Plus 2000 from GEA Niro Soavi) at a pressure of 50 MPa to yield a liquid for atomization.

[0030] An apparatus as illustrated in Fig. 6 was prepared. In the figure, 200 is a nebulizer (NE-U22 mesh nebulizer from Omron Corporation), 202 is a laser source, 204 is a light receiving section, 206 is a transparent chamber (5 cm × 5 cm × 24 cm), and 208 is a tube. A liquid filling section of the nebulizer 200 was filled with the liquid for atomization, and smoke was generated through atomization. The smoke was sucked for 2 seconds at a rate of 55 mL/2 sec from the upper side of the chamber. The position 8.5 cm from the chamber bottom surface was irradiated with a laser from the start of sucking (0 second later) to measure light transmittance 5 seconds later in the center of the chamber 206. The light transmittance was assessed using Spraytec from Malvern Panalytical, which includes a laser source 202 and a light receiving section 204. Here, the light transmittance of the chamber in the absence of smoke was set to 100%. The result is shown in Table 1. A lower light transmittance indicates higher visibility of visible smoke. Moreover, light transmittance was continuously measured from the start of sucking (0 second later) to 30 seconds later to record the total time (T) for the light transmittance being 85% or less until 30 seconds later. The result is shown in Table 1.

[Example 2]

[0031] An assessment was made in the same manner as Example 1 except for changing the concentration of a medium-chain triglyceride as shown in Table 1.

[Example 3]

[0032] An assessment was made in the same manner as Example 2 except for using Coconad® RK (Cs triglyceride) from Kao Corporation as a medium-chain triglyceride.

[Example 4]

[0033] An assessment was made in the same manner as Example 2 except for using MT-N (C_8/C_{10} triglyceride) from Kao Corporation as a medium-chain triglyceride.

[Example 5]

[0034] An assessment was made in the same manner as Example 2 except for using Coconad® ML ($C_8/C_{10}/C_{12}$ triglyceride) from Kao Corporation as a medium-chain triglyceride.

[Comparative Example 1]

[0035] An assessment was made in the same manner as Example 1 except for changing the composition of a liquid for atomization as shown in Table 1 without using a triglyceride.

[Comparative Example 2]

[0036] A liquid for atomization having the composition shown in Table 1 was prepared. Moreover, a commercial refillable heating-type electronic cigarette was prepared. A flavor liquid of this product was replaced by the liquid for atomization prepared in the present example, and the heating-type electronic cigarette for comparison was disposed in place of the nebulizer 200 in the apparatus illustrated in Fig. 6. Visible smoke was generated through heating under conditions of 5 W and assessed in the same manner as Example 1. The results are shown in Table 1.

[Table 1]

	Example					Comparative Example	
	1[1)]	2[1)]	3[2)]	4[3)]	5[4)]	1	2
Triglyceride (weight%)	1	5	5	5	5	0	0
Emulsifier (weight%)	1	1	1	1	1	1	1
Water (weight%)	98	94	94	94	94	99	0
Propylene glycol (weight%)	0	0	0	0	0	0	99
Light transmittance (%) 5 seconds later from the start of sucking	80.34	74.02	62.74	71.57	58.47	89.99	62.86
Total time (T) for light transmittance being 85% or less (sec)	4.57	12.18	18.81	14.24	20.55	3.92	28.72

1) Coconad® MT
2) Coconad® RK
3) MT-N
4) Coconad® ML

[0037] From the results of Comparative Examples 1 and 2, it is evident that a non-heating type flavor inhaler using a water-based aerosol source exhibits low visibility and short persistence of visible smoke compared with a heating-type flavor inhaler using a high-viscosity aerosol source, such as propylene glycol. As shown in the Examples, however, it is also evident that the non-heating type flavor inhaler of the present invention, which uses a liquid for atomization containing a triglyceride, an emulsifier, and a water-based aerosol source, significantly improves the visibility and persistence of visible smoke. In particular, it is clear from the comparison among Examples 2 to 5 that the visibility and persistence of visible smoke is further enhanced as the carbon numbers of aliphatic groups derived from fatty acids become larger.

REFERENCE SIGNS LIST

[0038]

1 Liquid for atomization

1' Particle

2 Aerosol source

4 Oil droplet

6 Emulsifier

200 Nebulizer

202 Laser source

204 Light receiving section

206 Transparent chamber

208 Tube

1000 Non-heating type flavor inhaler

1001D Mouthpiece

1004 Screw

1033 Interdigital electrode

1031 Piezoelectric element substrate

1031A, B Edge

1100 Atomization section

1102, 1104 Opening

1106 Top surface cover of atomization section

1107 Bottom surface cover of atomization section

1109 PCB

1111 Seal

1200A, B Liquid storage section

1202 Housing

1711A, B Guide wall

1070 Sensor

1713A, B Penetrating hole

1714A, B Recess

Claims

1. A non-heating type flavor inhaler comprising:

   a liquid for atomization containing a triglyceride, an emulsifier, and a water-based aerosol source;
   a liquid storage section for storing the liquid for atomization; and
   an atomization section for atomizing the liquid for atomization.

2. The non-heating type flavor inhaler according to Claim 1, wherein the concentration of the triglyceride is 10 weight% or less in the liquid for atomization.

3. The non-heating type flavor inhaler according to Claim 1 or 2, wherein the aerosol source contains 80 weight% or more of water in the aerosol source.

4. The non-heating type flavor inhaler according to any of Claims 1 to 3, wherein the liquid for atomization contains 70 weight% or more of water in the liquid.

5. The non-heating type flavor inhaler according to any of Claims 1 to 4, wherein the triglyceride has an aliphatic group that is derived from a fatty acid and that has a carbon number of 6 or more.

6. The non-heating type flavor inhaler according to any of Claims 1 to 5, wherein the liquid for atomization further contains a flavor.

7. The non-heating type flavor inhaler according to any of Claims 1 to 6, wherein the atomization section has an atomizing mechanism by vibrations.

8. A liquid for atomization for a non-heating type flavor inhaler, comprising a triglyceride, an emulsifier, and a water-based aerosol source.

Fig. 1

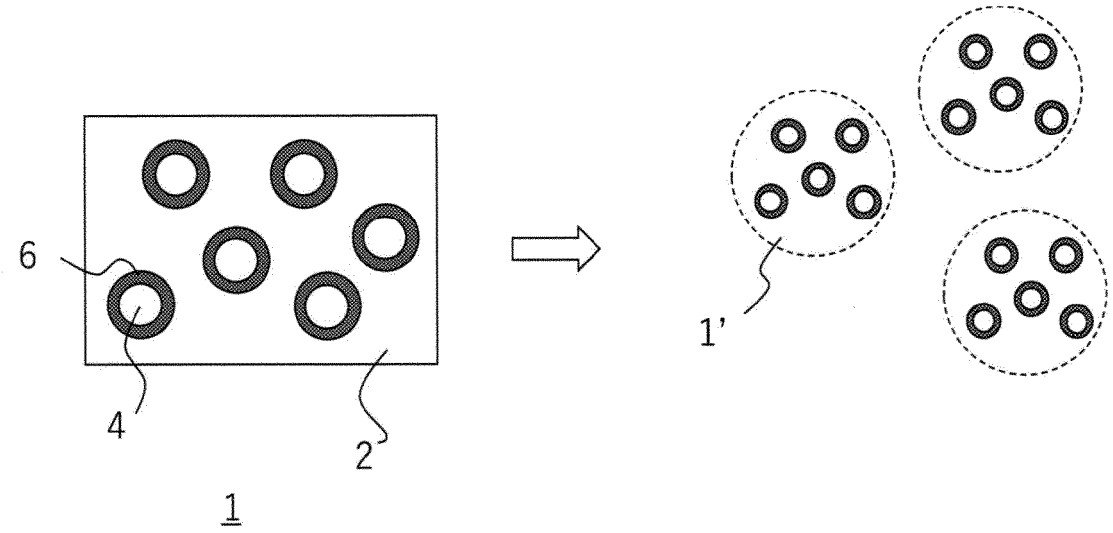


Fig. 2

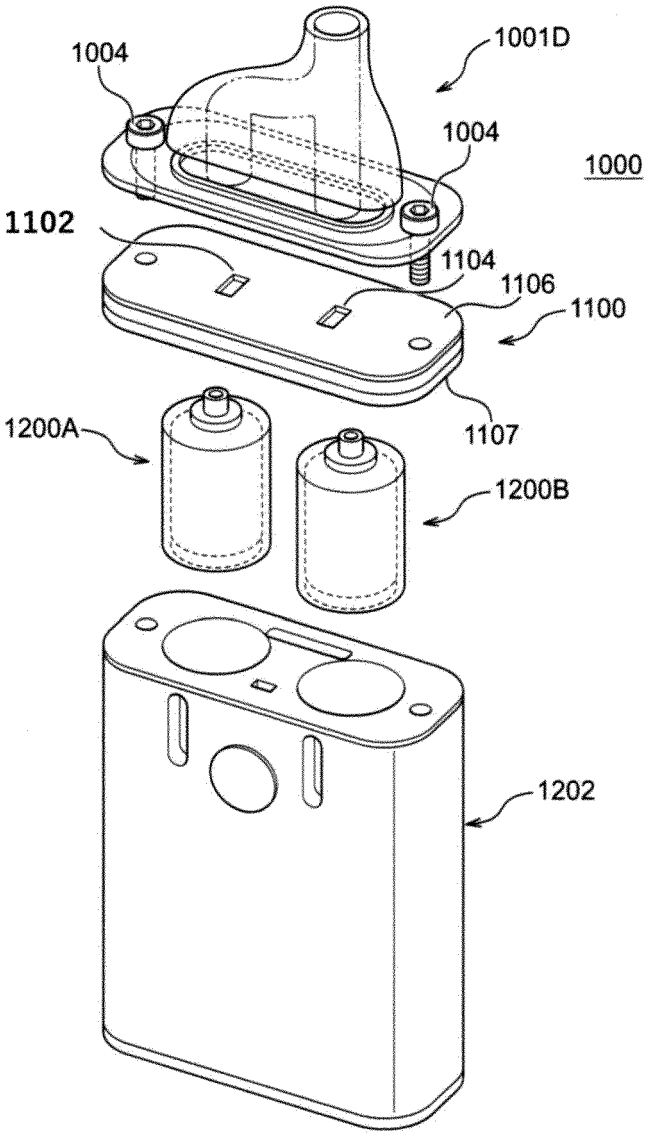

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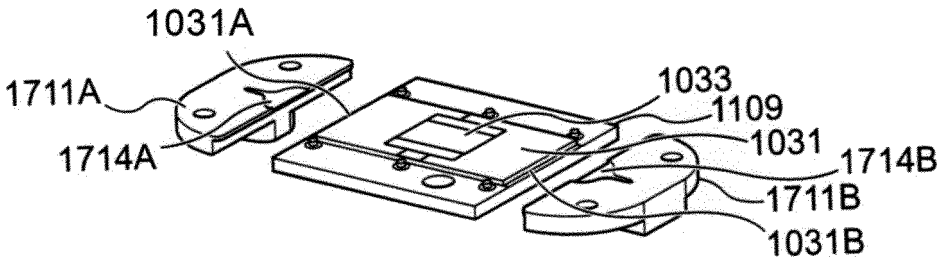
Fig. 3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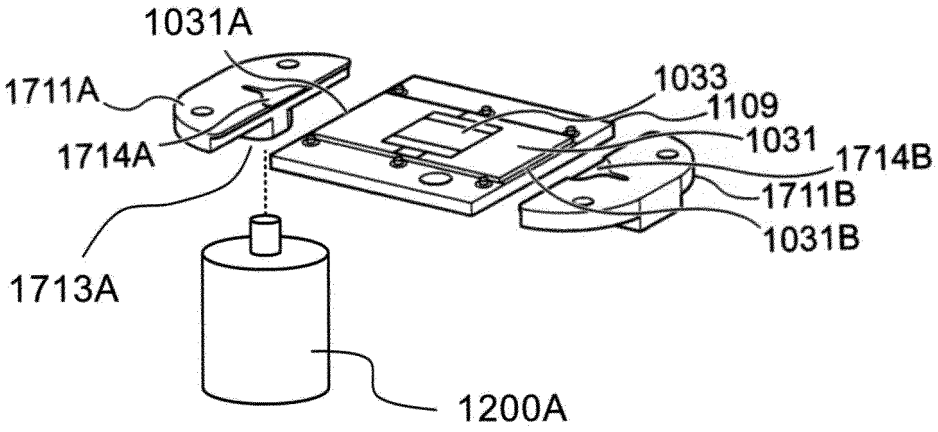
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Fig. 5

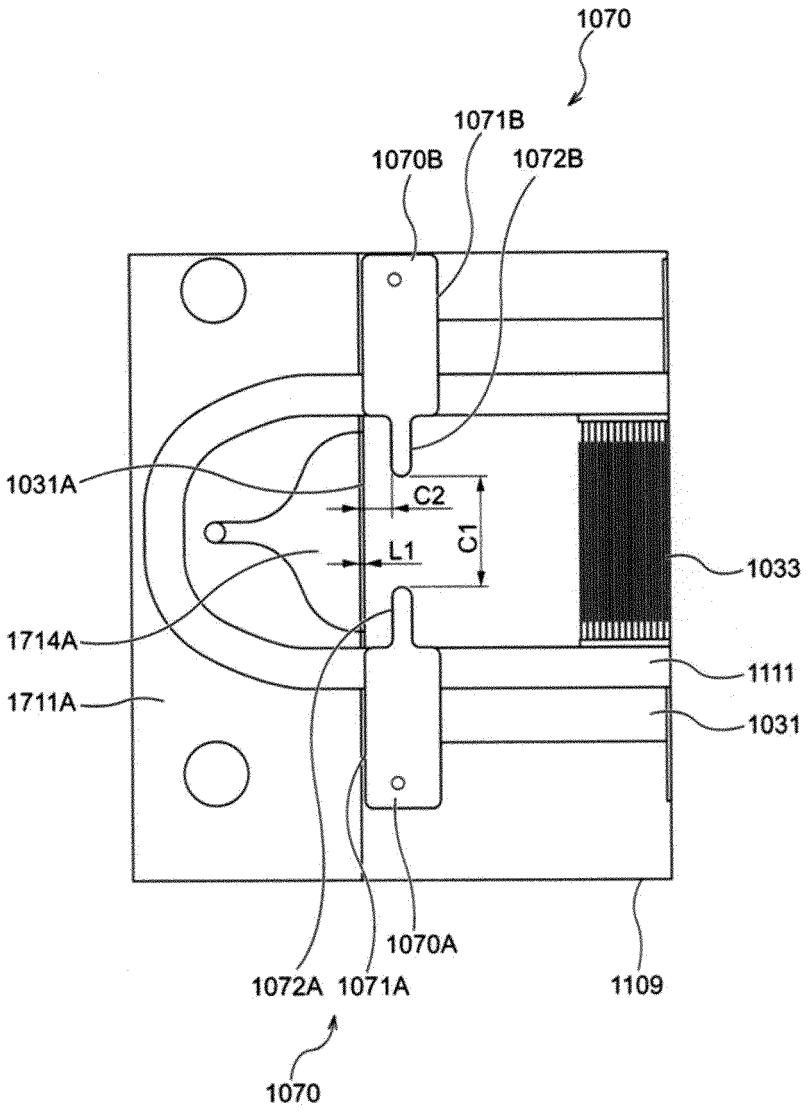
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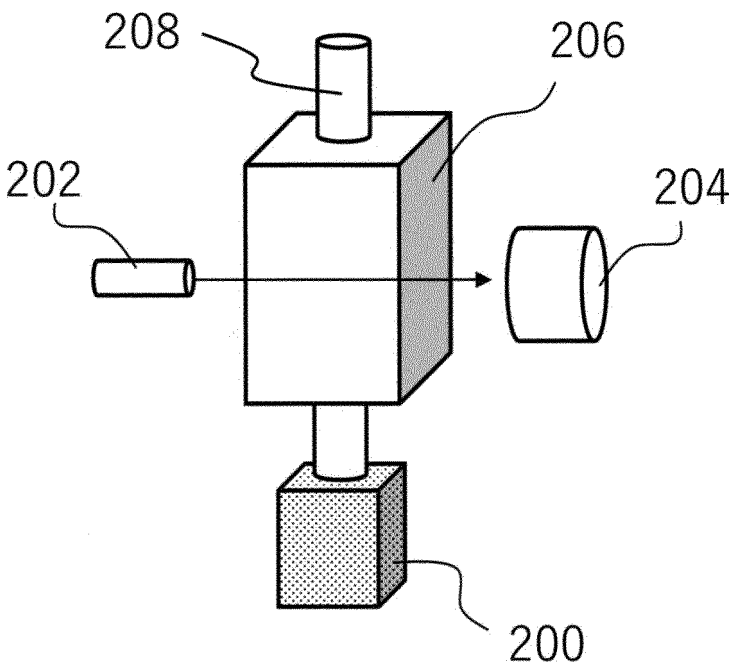
Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/030155

A. CLASSIFICATION OF SUBJECT MATTER
A61M 11/00(2006.01)i; A61M 15/00(2006.01)i; A61K 9/72(2006.01)i; A61K 47/14(2006.01)i; A24B 15/167(2020.01)i; A24B 15/32(2006.01)i; A24F 47/00(2020.01)i; A24F 40/10(2020.01)i
FI: A24B15/167; A61M11/00 300Z; A61K9/72; A61K47/14; A61M15/00 Z; A24B15/32; A24F47/00; A24F40/10
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)
A61M11/00; A61M15/00; A61K9/72; A61K47/14; A24B15/167; A24B15/32; A24F40/10; A24F47/00

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

Published examined utility model applications of Japan	1922–1996
Published unexamined utility model applications of Japan	1971–2020
Registered utility model specifications of Japan	1996–2020
Published registered utility model applications of Japan	1994–2020

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2015/0216237 A1 (E-NICOTINE TECHNOLOGY, INC.) 06 August 2015 (2015-08-06) paragraphs [0141], [0171]-[0186]	1-4, 6, 8 5, 7
Y	JP 2018-78902 A (ALTRIA CLIENT SERVICES INC.) 24 May 2018 (2018-05-24) paragraph [0105]	5, 7
Y	JP 2018-504927 A (TAN, William) 22 February 2018 (2018-02-22) paragraph [0034], fig. 1	7

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 October 2020 (12.10.2020)	27 October 2020 (27.10.2020)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2020/030155

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US 2015/0216237 A1	06 Aug. 2015	WO 2015/112750 A1 EP 3096636 A1 CN 106455705 A	
JP 2018-78902 A	24 May 2018	US 2013/0192620 A1 paragraph [0134] WO 2013/116558 A1 EP 2809182 A2 KR 10-2014-0125827 A CN 104284606 A	
JP 2018-504927 A	22 Feb. 2018	US 2016/0213866 A1 paragraph [0063], fig. 1 WO 2016/118941 A1 EP 3247435 A1 CN 107206198 A KR 10-2017-0108057 A	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2018078902 A **[0004]**
- US 2017064995 A **[0004]**
- JP 4526120 B **[0004]**
- JP 2019015377 W **[0025]**