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

(11) EP 4 062 779 A1

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

(43) Date of publication:
28.09.2022 Bulletin 2022/39

(21) Application number: **19953352.2**

(22) Date of filing: **19.11.2019**

(51) International Patent Classification (IPC):
A24F 40/10 *(2020.01)* ***A24F 40/485*** *(2020.01)*

(52) Cooperative Patent Classification (CPC):
A24F 40/485; A24F 40/10; A24F 40/42

(86) International application number:
PCT/JP2019/045226

(87) International publication number:
WO 2021/100111 (27.05.2021 Gazette 2021/21)

(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

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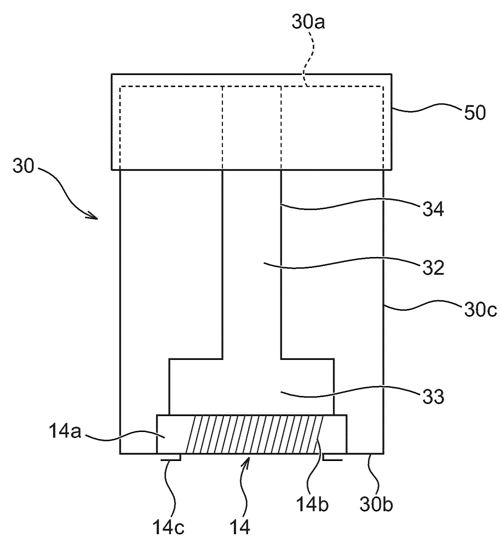
(54) **ATOMIZING UNIT AND NON-COMBUSTION-HEATING-TYPE FLAVOR INHALING MECHANISM**

(57) To prevent droplets formed by agglomeration of aerosol in an aerosol flow path from reaching the inside of a user's mouth. An atomizing unit comprises an atomizing section configured to atomize an aerosol source, a tank configured to hold the aerosol source, and a liquid holding section disposed at a front end of the tank. The tank includes a flow path wall that defines at least part of an aerosol flow path, through which aerosol generated by atomizing of the aerosol source passes, and which extends in a first direction. The atomizing unit further includes a liquid evacuation section disposed in the aerosol flow path. The liquid holding section is in communication with the liquid evacuation section.

Fig. 9



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Description

TECHNICAL FIELD

[0001] The present invention relates to an atomizing unit and a non-combustion heating-type flavor inhaler.

BACKGROUND ART

[0002] Flavor inhalers for inhaling a flavor without material combustion have been known. These flavor inhalers include one that supplies aerosol to a user's mouth, which is generated by atomization of liquid (aerosol source) containing a flavor or supplies aerosol to a user's mouth, which is generated by atomization of liquid containing no flavor, after making the aerosol pass through a flavor source (tobacco source, for example).

[0003] Such a flavor inhaler generally comprises an atomizing unit, a power source, a tank, an aerosol flow path, a mouthpiece, and the like. The atomizing unit includes a heating element that atomizes an aerosol source, and other elements. The power source is configured to supply electric power to the atomizing unit. The tank stores the aerosol source. The aerosol flow path is a flow path through the aerosol passes, which is generated when the atomizing unit atomizes the aerosol source. The aerosol, after passing through the aerosol flow path, reaches the inside of a user's mouth through the mouthpiece.

CITATION LIST

PATENT LITERATURE

[0004] PTL 1: European Patent No. 3158883

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] When the above-mentioned flavor inhaler is used, the aerosol generated from the atomizing unit may be sometimes agglomerated on the wall surface defining the aerosol flow path and then form droplets. If the flavor inhaler continues to be used, the droplets agglomerated in the aerosol flow path can be accumulated to form a pillar-like shape. The pillar-like droplets are liable to move toward the mouthpiece as the user inhales the flavor inhaler, reach the inside of the user's mouth, and provide an unpleasant feeling to the user.

[0006] Patent Literature 1 discloses an electronic cigarette for inhaling aerosol. In the electronic cigarette disclosed in Patent Literature 1, a porous element is arranged in the aerosol flow path to absorb the liquid agglomerated in the aerosol flow path.

[0007] The invention has been made in light of the above-discussed conventional problem. An object of the invention is to prevent droplets formed by aerosol agglomeration in an aerosol flow path from reaching the inside of a user's mouth.

SOLUTION TO PROBLEM

[0008] One embodiment of the invention provides an atomizing unit. The atomizing unit includes an atomizing section configured to atomize an aerosol source, a tank that holds the aerosol source, and a liquid holding section disposed at a front end of the tank. The tank includes a flow path wall that defines at least part of an aerosol flow path, through which aerosol generated by atomization of the aerosol source passes, and which extends in a first direction. The atomizing unit further includes a liquid evacuation section that is disposed in the aerosol flow path. The liquid holding section is in communication with the liquid evacuation section.

[0009] Another embodiment of the invention provides a non-combustion heating-type flavor inhaler. The non-combustion heating-type flavor inhaler includes the atomizing unit and a power source for supplying electric power to the atomizing section.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

Fig. 1 is an overall perspective view of a non-combustion heating-type flavor inhaler according to an embodiment of the invention.

Fig. 2 is an exploded perspective view of a cartridge shown in Fig. 1.
Fig. 3 is a schematic sectional side view of a tank shown in Fig. 2.
Fig. 4A is a top view of an inner wall of the tank shown in Fig. 3.
Fig. 4B is a sectional side view of the inner wall of the tank as viewed from arrow B-B in Fig. 4A.
Fig. 4C is a top view of an inner wall of a tank according to another embodiment.
Fig. 4D is a top view of an inner wall of a tank according to another embodiment.
Fig. 4E is a sectional side view of an inner wall of a tank according to another embodiment.
Fig. 4F is a sectional side view of an inner wall of a tank according to another embodiment.
Fig. 5A is a schematic sectional side view of a tank according to another embodiment.
Fig. 5B is a schematic sectional side view of a tank according to another embodiment.
Fig. 6 is a top view of an inner wall of a tank used in Experimental Example 1.
Fig. 7A is a schematic view of an inner wall having an outer shape that does not correspond to a shape of a second aerosol flow path and a liquid evacuation section.
Fig. 7B is a schematic view of an inner wall having an outer shape that does not correspond to the shape of the second aerosol flow path and the liquid evacuation section.
Fig. 7C is a schematic view of an inner wall having an outer shape corresponding to the shape of the second aerosol flow path and the liquid evacuation section.
Fig. 7D is a schematic view of an inner wall having an outer shape corresponding to the shape of the second aerosol flow path and the liquid evacuation section.
Fig. 8 is a graph showing evaluation results of Experimental Example 2.
Fig. 9 is a schematic sectional side view of a tank of a non-combustion heating-type flavor inhaler according to another embodiment.
Fig. 10A is a perspective view of a lid member.
Fig. 10B is a plan view of the lid member.
Fig. 10C is a sectional view as viewed from arrow 10C-10C in Fig. 10B.
Fig. 11 is a schematic sectional side view of a tank with a lid member according to another embodiment.
Fig. 12 is a schematic top view of a tank of a non-combustion heating-type flavor inhaler according to still another embodiment.

DESCRIPTION OF EMBODIMENTS

[0011] Embodiments of the invention will be discussed below with reference to the attached drawings. In the drawings discussed below, identical or corresponding constituent elements are provided with the same reference signs, and overlapping explanations are omitted.

[0012] Fig. 1 is an overall perspective view of a non-combustion heating-type flavor inhaler according to an embodiment of the invention. As shown in Fig. 1, a non-combustion heating-type flavor inhaler 100 includes a reusable power source portion 90 and a cartridge 10 that is installable in the power source portion 90. The power source portion 90 contains a power source 92. The power source 92 is configured to supply electric power to the cartridge 10 installed in the power source portion 90. The cartridge 10 includes a vent hole 12 at a front end thereof. A user can inhale from the vent hole 12 the aerosol which is generated in the non-combustion heating-type flavor inhaler 100.

[0013] Fig. 2 is an exploded perspective view of the cartridge 10 shown in Fig. 1. In the present application, an end of the cartridge 10 which faces the power source portion 90 when the cartridge 10 is installed in the power source portion 90 may be called a "rear end of the cartridge 10." An opposite side to the rear end of the cartridge 10 may be called a "front end of the cartridge 10." A direction in which the rear and front ends of the cartridge 10 are connected may be called a "first direction," and a direction orthogonal to the first direction may be called a "second direction."

[0014] The cartridge 10 includes a tank 30, an atomizing section 14, an atomizing section fixing member 16, a mouth-piece 18, and a cap 20. The tank 30 holds an aerosol source containing water, glycerin, propylene glycol, and the like. The tank 30 is provided with an atomizing chamber 33 at a position close to a rear end thereof in the first direction. The atomizing section 14 is configured to atomize the aerosol source supplied from the tank 30. According to the present embodiment, as later mentioned with reference to Fig. 3, the atomizing section 14 comprises a coil that is formed by winding a resistance heating element around an outer periphery of a cylindrical wick made of glass fiber or the like. The atomizing section 14 is provided with an electric contact point as later mentioned with reference to Fig. 3. When the cartridge 10 is installed in the power source portion 90, an electrode terminal of the power source portion 90 and the electric contact point of the atomizing portion 14 are electrically connected, which allows electric power to be supplied from the power source portion 90 to the atomizing section 14.

[0015] As the atomizing section 14 supplies the aerosol source to the resistance heating element, for example, a wick made of organic fiber (cellulose or the like) or a flat plate-like or cylindrical porous element made of ceramic or the like may be employed as a wick, instead of the cylindrical wick made of glass fiber or the like. The resistance heating element may be a metal, such as Nichrome and stainless steel, or a non-metal, such as carbon. If the wick has a cylindrical shape, the heating resistance element may be wound around the wick into a coil-like shape or arranged along the cylindrical wick. If the wick has a flat plate-like shape, the resistance heating element may be linearly or meanderingly arranged on a flat surface of the wick. The atomizing section 14 may be configured to atomize the aerosol source using ultrasonic waves or induction heat, instead of using the resistance heating element. The cartridge 10 may include a plurality of atomizing sections 14. The atomizing chamber 33 does not necessarily have to be located at the position close to the rear end of the tank 30 in the first direction but may be located at any position within the tank 30 or outside the tank 30. The atomizing chamber 33 may be defined by a member that is attachable to and detachable from the tank 30.

[0016] The cap 20 is attached to the rear end of the tank 30 in the first direction to protect the atomizing chamber 33 of the tank 30 and removed at the use of the cartridge 10. The atomizing section fixing member 16 is fixed within the atomizing chamber 33 of the tank 30 while holding the atomizing section 14. The wick of the atomizing section 14 therefore comes into a partial contact with the aerosol source held by the tank 30, and the aerosol source is supplied to the wick. The mouthpiece 18 is attached to a front end of the tank 30 in the first direction. The mouthpiece 18 is provided with the vent hole 12 shown in Fig. 1.

[0017] Fig. 3 is a schematic sectional side view of the tank 30 shown in Fig. 2. The atomizing section fixing member 16 shown in Fig. 2 is omitted from Fig. 3. As shown in the figure, the tank 30 includes an upper wall 30a at the front end in the first direction, a bottom wall 30b at the rear end in the first direction, and an outer wall 30c constituting an outer peripheral surface of the tank 30. The tank 30 includes an inner wall 34 (corresponding to an example of the wall) that defines at least part of an aerosol flow path 32. In other words, the inner wall 34 of the tank 30 defines the aerosol flow path 32 that extends in the first direction between the rear and front ends of the tank 30 at a substantial center of an interior portion of the tank 30. In the present application, the outer wall 30c and inner wall 34 of the tank 30 are walls that constitute a lateral surface of the tank 30 and may be referred to as a lateral wall of the tank 30. In the present application, the lateral wall of the tank 30 is a wall having a function of holding the aerosol source inside the tank 30 with the upper wall 30a and bottom wall 30b of the tank 30. The lateral wall of the tank 30 does not have to be formed integrally with the upper wall 30a or bottom wall 30b of the tank 30. According to the present embodiment, the inner wall 34 that defines the aerosol flow path 32 constitutes part of the lateral wall of the tank 30. Instead of such a configuration, at least part of the aerosol flow path 32 may be defined by a wall comprising a different member from the lateral wall of the tank 30.

[0018] As shown in the figure, the atomizing section 14 is fixed inside the atomizing chamber 33 of the tank 30. Specifically, the atomizing section 14 includes a cylindrical wick 14a and a coil 14b that is wound around the wick 14a. The atomizing section 14 is arranged in the atomizing chamber 33 so that the wick 14a extends in the second direction. The wick 14a absorbs and holds the aerosol source held in the tank 30. The atomizing section 14 further includes an electric contact point 14c for supplying electric power to the coil 14b. When the cartridge 10 is installed in the power source portion 90 shown in Fig. 1, a contact point of the power source portion 90 and the electric contact point 14c shown in Fig. 3 are electrically connected, and electric power is supplied from the power source portion 90 to the coil 14b.

[0019] When supplied with electric power, the coil 14b produces heat and atomizes the aerosol source that is held by the wick 14a, to thereby generate aerosol. Along with the user’s inhalation, the aerosol generated in the atomizing chamber 33 flows through the aerosol flow path 32 and passes through the vent hole 12 of the mouthpiece 18 to reach the inside of the user’s mouth. The tank 30 and the atomizing section 14 function as an atomizing unit that atomizes the aerosol source.

[0020] As mentioned above, when the non-combustion heating-type flavor inhaler 100 is used, the aerosol generated from the atomizing section 14 is sometimes agglomerated on a wall surface of the inner wall 34 defining the aerosol flow path 32 to form droplets. If the non-combustion heating-type flavor inhaler 100 then continues to be used, the droplets agglomerated in the aerosol flow path 32 are sometimes accumulated into a pillar-like shape. The pillar-like droplets are liable to move toward the mouthpiece 18 as the user inhales the non-combustion heating-type flavor inhaler 100, reach the inside of the user’s mouth, and provide an unpleasant feeling to the user.

[0021] To solve this problem, the non-combustion heating-type flavor inhaler 100 according to the present embodiment includes a liquid evacuation section, to which the droplets agglomerated on the inner wall 34 evacuate from the aerosol flow path 32. Fig. 4A is a top view of the inner wall 34 of the tank 30 shown in Fig. 3. Fig. 4B is a sectional side view of the inner wall 34 of the tank 30 as viewed from arrow B-B in Fig. 4A. Figs. 4A and 4B only show the inner wall 34 of the tank 30.

[0022] As shown in Figs. 4A and 4B, the aerosol flow path 32 defined by the inner wall 34 includes a first aerosol flow path 32a and a second aerosol flow path 32b connected to a downstream side (that is, front end) of the first aerosol flow path 32a. In other words, the inner wall 34 includes a first aerosol flow path wall 34a that defines at least part of the first aerosol flow path 32a and a second aerosol flow path wall 34b that defines at least part of the second aerosol flow path 32b. In the present embodiment, the first aerosol flow path wall 34a and the second aerosol flow path wall 34b each constitute part of the lateral wall of the tank 30. Instead of such a configuration, the second aerosol flow path wall 34b alone may constitute at least part of the lateral wall of the tank 30, and the first aerosol flow path wall 34a may comprise a separate wall member from the lateral wall of the tank 30 and be located outside the tank 30.

[0023] As shown in Fig. 4A, in the present embodiment, each of the first aerosol flow path 32a and the second aerosol flow path 32b has a circular section as viewed in the second direction. In the present embodiment, the first aerosol flow path 32a is identical to the second aerosol flow path 32b in sectional shape viewed in the second direction. Further in the present embodiment, the first aerosol flow path 32a and the second aerosol flow path 32b have a fixed sectional shape and sectional area in the first direction. In other words, neither the first aerosol flow path 32a nor the second aerosol flow path 32b changes in sectional shape and sectional area along a length direction thereof.

[0024] As shown in Fig. 4B, the inner wall 34 includes a planar portion 40 parallel with the second direction and a pair of slits 42 extending from the planar portion 40 toward a front end at a boundary between the first aerosol flow path 32a and the second aerosol flow path 32b. The planar portion 40 and the slits 42 are located on an outer side of the second aerosol flow path 32b in the second direction. As shown in Fig. 4A, in the present embodiment, the inner wall 34 is provided with the pair of slits 42 arranged across the second aerosol flow path 32b. Instead of such a configuration, the inner wall 34 may be provided with one or more than two slits 42. As shown in Fig. 4A, the inner wall 34 includes corners 42a that form the slit 42 as viewed from the first direction. As shown in Fig. 4A, the slit 42 has an open front end.

[0025] In the present application, as shown in Fig. 4A, width W refers to length including diameter ϕ of the second aerosol flow path 32b and depth of the pair of slits 42. Height H of the slit 42 refers to length of the slit 42 in thickness direction.

[0026] A sectional shape of the slit 42 in the second direction is not limited to the shape shown in Fig. 4A. Figs. 4C and 4D are top views of the inner wall 34 of the tank 30 according to another embodiment. In an example shown in Fig. 4C, each of the corners 42a of the slit 42 has a sectional shape like a letter R in the second direction. In other words, the corners 42a may have the R-like shape, instead of being formed with an angle of 90 degrees. In an example shown in Fig. 4D, a section of the slit 42 in the second direction has a semicircular shape. The slit 42 may have any sectional shape, such as a polygonal shape like a triangle, instead of the sectional shapes shown in Figs. 4A, 4C, and 4D.

[0027] When the non-combustion heating-type flavor inhaler 100 is used, the aerosol generated from the atomizing section 14 passes through the first aerosol flow path 32a and the second aerosol flow path 32b which are defined by the inner wall 34 shown in Figs. 4A and 4B. During this process, aerosol can be agglomerated on a wall surface of the first aerosol flow path wall 34a and the second aerosol flow path wall 34b to form droplets.

[0028] If the droplets continue to be agglomerated on the wall surface of the first aerosol flow path wall 34a and/or the second aerosol flow path wall 34b, the droplets are deposited and block the first aerosol flow path 32a. Consequently, the droplets can be formed into a pillar-like shape within the first aerosol flow path 32a. The pillar-like droplets move toward the mouthpiece 18, that is, toward the second aerosol flow path 32b as the user inhales the non-combustion heating-type flavor inhaler 100. When the pillar-like droplets reach the second aerosol flow path 32b, some of the droplets evacuate to a space that is defined by the planar portion 40 formed at the boundary between the first aerosol flow path 32a and the second aerosol flow path 32b. Air is less likely to flow into space near the planar portion 40, so that air passing by the planar portion 40 is smaller in flow rate than air passing through the second aerosol flow path 32b. The droplets that evacuate to the space defined by the planar portion 40 therefore become less likely to move toward the mouthpiece 18, which prevents the droplets from reaching the inside of the user's mouth. In short, the space defined by the planar portion 40 functions as part of the liquid evacuation section, to which the agglomerated droplets evacuate from the second aerosol flow path 32b.

[0029] The pillar-like droplets that reach the second aerosol flow path 32b also evacuate into the slit 42 extending from the planar portion 40. The droplets therefore lose the pillar-like shape and exist in the inside of the slit 42, or a space defined by the slit 42. Since the slit 42 includes the corners 42a as already mentioned, the droplets are held at the corners 42a of the slit 42 due to a capillary action. The slit 42 is located on the outer side of the first aerosol flow path 32a and the second aerosol flow path 32b in the second direction, so that air runs at a lower flow rate when passing through the slit 42 than when flowing through the second aerosol flow path 32b. Accordingly, the droplets that evacuate to the space defined by the slit 42 are less likely to move toward the mouthpiece 18 and prevented from reaching the inside of the user's mouth. In other words, the space defined by the slit 42 functions as the liquid evacuation section, to which the agglomerated droplets evacuate from the second aerosol flow path 32b.

[0030] One way to prevent the droplets from accumulating into the pillar-like shape in the aerosol flow path 32 is to increase the width or diameter of the aerosol flow path 32 over the entire length thereof. However, the aerosol flow path 32 may be so disposed as to extend at a lateral side or inner side of the tank 30 as in the present embodiment. In such a case, if the width or diameter of the aerosol flow path 32 is increased over the entire length of the aerosol flow path 32, a space for the tank 30 is accordingly decreased, and the tank 30 that stores the aerosol source is reduced in capacity. In contrast, the non-combustion heating-type flavor inhaler 100 according to the present embodiment is disposed in the second aerosol flow path 32b and includes the liquid evacuation section extending from the boundary between the first aerosol flow path 32a and the second aerosol flow path 32b in the downstream direction of the second aerosol flow path 32b. Specifically, in the present embodiment, the non-combustion heating-type flavor inhaler 100 includes the space defined by the planar portion 40 and the space defined by the slit 42, which is in particular the space defined by the corners 42a, as the liquid evacuation section. The space defined by the corners 42a particularly has an excellent liquid holding capacity due to the action of capillary force and prevents the liquid that once reaches the liquid evacuation section from being formed into the pillar-like droplets again within the first aerosol flow path 32a. It is then possible to suppress the decrease of capacity of the tank 30 and at the same time prevent the droplets from reaching the inside of the user's mouth, as compared to when the aerosol flow path 32 is increased in width or diameter over the entire length in the first direction of the inner wall 34. The present embodiment also prevents the droplets from reaching the inside of the user's mouth without providing an additional member to the tank 30. This suppresses the increase of component cost and the effect of providing an additional member.

[0031] Although the planar portion 40 is parallel with the second direction in the present embodiment, the planer surface 40 does not necessarily have to be arranged that way. Figs. 4E and 4F are sectional side views of the inner wall 34 of the tank 30 according to another embodiment. In examples shown in Figs. 4E and 4F, the planar portion 40 is so disposed as to be inclined to the second direction. To be specific, the planar portion 40 in Fig. 4B extends perpendicularly to the first aerosol flow path wall 34a, whereas the planar portion 40 in the example of Fig. 4E obliquely extends at an obtuse angle to the first aerosol flow path wall 34a. In other words, in the example of Fig. 4E, the planar portion 40 extends from the first aerosol flow path wall 34a toward the mouthpiece 18. In the example of Fig. 4F, the planar portion 40 obliquely extends at an acute angle to the first aerosol flow path wall 34a. In other words, in the example of Fig 4F, the planar portion 40 extends from the first aerosol flow path wall 34a toward an opposite side from the mouthpiece 18. In the example of Fig. 4F, the planar portion 40 and the slit 42 define a recessed space S1. The recessed space S1 constitutes part of the liquid evacuation section and has an excellent liquid holding capacity achieved by the action of capillary force. The recessed space S1 prevents the liquid that once reaches the space S1 from being formed into the pillar-like droplets again within the first aerosol flow path 32a.

[0032] In the present embodiment, the aerosol flow path 32 is configured to extend to a center of an interior portion of the tank 30. The aerosol flow path 32, however, does not necessarily have to be configured that way. The aerosol flow path 32 may be disposed at the lateral side of the tank 30, and the outer wall 30c of the tank 30 may function as a wall that defines at least part of the aerosol flow path 32. Figs. 5A and 5B are schematic sectional side views of the tank 30 according to another embodiment. In an example shown in Fig. 5A, the tank 30 and the atomizing section 14 are housed in a housing 60, and the aerosol flow path 32 is formed at one lateral side of the tank 30. In an example shown in Fig. 5B, the tank 30 and the atomizing section 14 are housed in the housing 60, and the aerosol flow path 32 is formed at each lateral side of the tank 30. Arrows A1 and A2 in Figs. 5A and 5B indicate the flows of air or aerosol passing through the housing 60.

<Experimental Example 1>

[0033] An experiment was conducted, which evaluated a reaching amount of droplets (amount of droplets that reached the inside of the user's mouth) according to shapes of the liquid evacuation section. Fig. 6 is a top view of the inner wall 34 of the tank 30 used in Experimental Example 1. In the experiment, a predetermined amount of liquid was injected into the first aerosol flow path 32a defined by the inner wall 34 according to each of Embodiments 1 to 9 shown in Fig. 6 so that the liquid was formed into a pillar-like shape. Amount of liquid was measured, which scattered from the second aerosol flow path 32b to a front end of the inner wall 34 when the user inhaled under predetermined conditions.

[0034] In the inner wall 34 according to each of Embodiments 1 to 9, the first aerosol flow path 32a had a length of 10 mm in the first direction, and the second aerosol flow path 32b and the slit 42 had a length of 20 mm in the first direction. The diameter ϕ of the first aerosol flow path 32a and that of the second aerosol flow path 32b were 2 mm each. The slit 42 and the second aerosol flow path wall 34b had width W as below, and the slit 42 had height H as below according to Embodiments 1 to 9, where the width W and the height H are defined as in Fig. 4A.

Embodiment 1 Width W=6 mm, Height H=2 mm
Embodiment 2 Width W=6 mm, Height H=1 mm
Embodiment 3 Width W=6 mm, Height H=0.6 mm
Embodiment 4 Width W=4 mm, Height H=2 mm
Embodiment 5 Width W=4 mm, Height H=1 mm
Embodiment 6 Width W=4 mm, Height H-0.6 mm
Embodiment 7 Width W=3 mm, Height H=2 mm
Embodiment 8 Width W=3 mm, Height H=1 mm
Embodiment 9 Width W=3 mm, Height H=0.6 mm

[0035] That is to say, the second aerosol flow path 32b and the liquid evacuation section (slit 42) according to Embodiments 1, 4 and 7 had a rectangular sectional shape as a whole in the second direction. In Embodiments 2, 3, 5, 6, 8 and 9, the height H of the slit 42 was less than the diameter ϕ of the second aerosol flow path 32b in the second direction.

[0036] The tank 30 including the inner wall 34 that was not provided with the liquid evacuation section was Comparative Example 1. The inner wall 34 of Comparative Example 1 had a similar shape to the inner wall 34 of Embodiments 1 to 9 except that the inner wall 34 of Comparative Example 1 was not provided with the slit 42 and the planar portion 40.

[0037] Conditions on inhalation were as listed below.

Inhalation capacity -- 2400 cc/min
Inhalation time -- 3 seconds
Number of puffs - 1 puff
N number (sample size) -- 3
Orientation of the tank 30 (angle in the first direction) -- Inclined at an angle of 45 degrees to a vertical plane
Composition of the liquid - Glycerin : Propylene glycol : Water=45 : 45 : 10
Liquid injection amount -- 40 μl

[0038] Table 1 shows results of the experiment conducted on the foregoing conditions.

[Table 1]

Sample Number	W(mm) × H(mm)	Liquid evacuation section area (mm^2)	Reaching amount of droplets (mg/1 puff)	(Liquid evacuation section area+Sectional area of 2nd aerosol flow path in 2nd direction) /Sectional area of 1 st aerosol flow path in 2nd direction
Comparative Example 1	-	0	27	1.0
Embodiment 1	6×2	8.86	0.9	3.8
Embodiment 2	6×1	4.08	0.5	2.3
Embodiment 3	6×0.6	2.42	0.6	1.8
Embodiment 4	4×2	4.86	1.0	2.5
Embodiment 5	4×1	2.08	0.5	1.7
Embodiment 6	4×0.6	1.22	6.9	1.4
Embodiment 7	3×2	2.86	1.7	1.9
Embodiment 8	3×1	1.08	12.1	1.3
Embodiment 9	3×0.6	0.62	19.5	1.2

[0039] In Table 1, the liquid evacuation section area is sectional area of the slit 42 in the second direction and does not include sectional area of the second aerosol flow path 32b. In Table 1, the item "(Liquid evacuation section area+Sectional area of 2nd aerosol flow path in 2nd direction)/Sectional area of 1st aerosol flow path in 2nd direction" indicates a ratio of sectional area of the second aerosol flow path 32b and the slit 42 in the second direction to sectional area of the first aerosol flow path 32a in the second direction. As shown in Table 1, the reaching amount of droplets is decreased in all Embodiments 1 to 9, as compared to the reaching amount of droplets of Comparative Example 1 in which the liquid evacuation section is not provided. In short, the reaching amount of droplets can be decreased by providing the liquid evacuation section to the inner wall 34. It is therefore apparent from the experiment that the reaching amount of droplets can be decreased when the ratio is larger than 1 and equal to or smaller than 4.0.

[0040] In Embodiment 1, the reaching amount of droplets is 0.9, which is much smaller than the reaching amount of droplets in Comparative Example 1. However, the liquid evacuation section area, or the sectional area of the slit 42 in the second direction is 8.86 mm^2, which is large as compared to Embodiments 2 to 9. The large liquid evacuation section area might affect the capacity of the tank 30. It is therefore apparent from the experiment that the above-mentioned ratio is preferably about 3 or smaller.

[0041] Referring to the reaching amount of droplets in Embodiments 1 to 9, Embodiments 1 to 5 and 7 significantly reduce the reaching amount of droplets, as compared to the other Embodiments. According to the experiment, it is particularly preferable that the above-mentioned ratio be 1.5 or larger.

[0042] The inner walls 34 shown in Fig. 6 have outer shapes with the same diameter for the convenience of the experiment. However, the outer shape of the inner wall 34 may be designed correspondingly to the shapes of the second aerosol flow path 32b and the liquid evacuation section. Figs. 7A and 7B are schematic views showing the inner wall

34 having an outer shape that does not correspond to the shapes of the second aerosol flow path 32b and the liquid evacuation section. Figs. 7C and 7D are schematic views showing the inner wall 34 having an outer shape corresponding to the shapes of the second aerosol flow path 32b and the liquid evacuation section. In an example shown in Fig. 7A, the outer shape of the inner wall 34 is a similarity shape (namely a circular shape) to the sectional shape of the second aerosol flow path 32b. The inner wall 34 shown in Fig. 7A has thickness that is relatively small in the vicinity of the liquid evacuation section (slit 42). For this reason, if the outer shape of the inner wall 34 is designed so that the inner wall 34 has sufficient strength in a thinnest portion thereof, the inner wall 34 partially has excessive thickness. In the example of Fig. 7A, the inner wall 34 is excessively thick in a portion (upper and lower portions in the figure) defining the second aerosol flow path 32b.

[0043] In an example shown in Fig. 7B, the inner wall 34 has a rectangular outer shape. In Fig. 7B, the outer shape of the inner wall 34 in Fig. 7A is shown by a broken line as reference. The inner wall 34 shown in Fig. 7B has a relatively small thickness in the vicinity of the liquid evacuation section (slit 42) as with the inner wall 34 shown in Fig. 7A. Therefore, if the outer shape of the inner wall 34 is designed so that the inner wall 34 has sufficient strength in the thinnest portion thereof, the inner wall 34 partially has excessive thickness. In the example of Fig. 7B, the inner wall 34 is excessively thick in a portion (upper and lower portion in the figure) defining the second aerosol flow path 32b.

[0044] In contrast, in an example shown in Fig. 7C, the inner wall 34 has an outer shape like an ellipse. In Fig. 7C, the outer shape of the inner wall 34 of Fig. 7A is shown by a broken line as reference. The inner wall 34 in Fig. 7C is designed so that a portion near the liquid evacuation section (slit 42) and portions (upper and lower portions in the figure) defining the second aerosol flow path 32b have close thickness values. Accordingly, area of the outer shape of the inner wall 34 shown in Fig. 7C (area of the ellipse in Fig. 7C) is smaller than area of the outer shape of the inner wall 34 shown in Fig. 7A (area of the circle shown by a broke line in Fig. 7C). The tank 30 including the inner wall 34 shown in Fig. 7C therefore can be increased in capacity, as compared to the tank 30 including the inner wall 34 shown in Fig. 7A.

[0045] In an example shown in Fig. 7D, the outer shape of the inner wall 34 is a similarity shape of the second aerosol flow path 32b and the liquid evacuation section (slit 42). In Fig. 7D, the outer shape of the inner wall 34 in Fig. 7A is shown by a broke line as reference. In Fig. 7D, too, the area of the outer shape of the inner wall 34 is smaller than the area of the outer shape of the inner wall 34 in Fig. 7A (area of the circle shown by the broken line in Fig. 7C). This means that the tank 30 including the inner wall 34 in Fig. 7D can be increased in capacity, as compared to the tank 30 including the inner wall 34 in Fig. 7A. As shown in Figs. 7C and 7D, therefore, the shape corresponding to the shape of the second aerosol flow path 32b and the liquid evacuation section is the shape having sectional area that is smaller than the sectional area of the outer shape similar to the sectional shape of the second aerosol flow path 32b in Fig. 7A.

<Experimental Example 2>

[0046] An experiment was conducted, which evaluated the reaching amount of droplets according to lengths of the liquid evacuation section. In the experiment, the inner wall 34 in which the slit 42 had a width W of 3.0 mm and a height H of 1.5 mm (Embodiments 10 and 11) and the inner wall 34 in which the slit 42 had a width W of 4.5 mm and a height H of 0.75 mm (Embodiments 12 and 13) were prepared. In Embodiments 10 and 11, the inner wall 34 had the slit 42 with a length of 0 mm, 5 mm, 10 mm, 15 mm, and 20 mm. In Embodiments 12 and 13, the inner wall 34 had the slit 42 with a length of 10 mm, 15 mm, and 20 mm. These inner walls 34 were subjected to the experiment under inhalation conditions below. In the experiment, a predetermined amount of liquid was injected into the first aerosol flow path 32a defined by the inner wall 34 according to each of Embodiments 10 to 13 so that the liquid was formed into the pillar-like shape. Amount of liquid was measured, which scattered from the second aerosol flow path 32b to the front end of the inner wall 34 when the user inhales on predetermined conditions. In Embodiments 10 to 13, the first aerosol flow path 32a and the second aerosol flow channel 32b had a length of 30 mm in the first direction.

The inhalation conditions were as below.

[0047]

Inhalation capacity -- 2400 cc/min
Inhalation time - 3 seconds
Number of puffs - 1 puff (Embodiments 11 and 13), 5 puffs (Embodiments 10 and 12)
Inhalation interval - 20 seconds
N number (sample size) -- 3
Orientation of the tank 30 (angle in the first direction) -- Inclined at an angle of 45 degrees to a vertical plane
Composition of the liquid -- Glycerin : Propylene glycol : Water=45 : 45 : 10
Liquid injection amount -- 20 μl

[0048] Fig. 8 is a graph showing evaluation results of Experimental Example 2. In Fig. 8, a plot in which lengths of the liquid evacuation sections of Embodiments 10 and 11 are 0 mm indicates evaluation results for the inner walls 34 that are not provided with the liquid evacuation sections. The reaching amount of droplets in Embodiment 10 in which the liquid evacuation section had a length of 0 mm was about 19.2 mg. The reaching amount of droplets in Embodiment 11 in which the liquid evacuation section had a length of 0 mm was about 13.3 mg. Embodiments 10 and 11 in which the liquid evacuation sections had a length of 5 mm decreased a higher reaching amount of droplets than Embodiments 10 and 11 in which the liquid evacuation sections had a length of 0 mm. To be specific, the reaching amount of droplets according to Embodiment 10 in which the liquid evacuation section had a length of 5 mm was about 14.3 mg, and the reaching amount of droplets according to Embodiment 11 in which the liquid evacuation section had a length of 5 mm was about 6.4 mg. The experiment shows that the reaching amount of droplets can be decreased by the presence of the liquid evacuation section.

[0049] The reaching amounts of droplets according to Embodiments 1 to 4 in which the liquid evacuation sections each had a length of 10 mm were about 2.7 mg, about 1.3 mg, about 3.3 mg, and about 3.6 mg, respectively. When the liquid evacuation section had a length of 10 mm, the reaching amount of droplets was decreased much more than when the liquid evacuation section had a length of 5 mm. The reaching amounts of droplets according to Embodiments 1 to 4 in which the liquid evacuation sections each had a length of 15 mm were about 1.2 mg, about 0.7 mg, about 2.8 mg, and about 0.6 mg, respectively. The reaching amounts of droplets according to Embodiments 1 to 4 in which the liquid evacuation sections each had a length of 20 mm were about 1.1 mg, about 0.7 mg, about 0.4 mg, and about 0.5 mg, respectively. The reaching amount of droplets was further decreased when the liquid evacuation section had a length equal to or more than 10 mm.

[0050] In view of the above experiment results, it is preferable that the length of the liquid evacuation section be in a range between 10 mm and 20 mm, inclusive, from a perspective of decrease of the reaching amount of droplets. In other words, a ratio of the length of the liquid evacuation section (slit 42) in the first direction to the length (30 mm) of the first aerosol flow path 32a and the second aerosol flow path 32b is preferably not less than 1/3 and not more than 2/3.

[0051] The non-combustion heating-type flavor inhaler 100 according to another embodiment will be now discussed. The non-combustion heating-type flavor inhaler 100 according to another embodiment differs from the non-combustion heating-type flavor inhaler 100 explained with reference to Figs. 1 to 8 in that the non-combustion heating-type flavor inhaler 100 according to another embodiment includes a liquid holding section at the front end of the tank 30. The liquid holding section is in communication with the liquid that evacuates to the liquid evacuation section. Fig. 9 is a schematic sectional side view of the tank 30 of the non-combustion heating-type flavor inhaler 100 according to another embodiment. The tank 30 shown in Fig. 9 may have the same configuration as the tank 30 shown in Fig. 3. In an example shown in Fig. 9, the tank 30 is provided with a lid member 50 that covers an upper wall 30a of the front end of the tank 30.

[0052] Fig. 10A is a perspective view of the lid member 50. Fig. 10B is a plan view of the lid member 50. Fig. 10C is a sectional view as viewed from arrow 10C-10C in Fig. 10B. The lid member 50, as shown in the figures, includes a top panel 52 formed into a substantially rectangular plate-like shape according to the shape of the tank 30 and a substantially cylindrical side panel 54 extending from the top panel 52. An opening 56 is provided at a substantially central portion of the top panel 52. The opening 56 is in communication with the aerosol flow path 32 of the tank 30, which allows aerosol from the aerosol flow path 32 to pass through the opening 56. The opening 56 is formed in the lid member 50 so that when the lid member 50 is mounted on the tank 50, a center of the opening 56 substantially coincides with a center of the aerosol flow path 32 of the tank 30 in the second direction. One or more ridges 58 extending in the second direction are disposed in a surface of the top panel 52 which faces the upper wall 30a of the tank 30. A concave-convex portion is then formed in the surface of the top panel 52 which faces the upper wall 30a of the tank 30. When the lid member 50 is mounted on the tank 30, the concave-convex portion comes into communication with the liquid evacuation section of the tank 30.

[0053] As shown in Fig. 10B, it is preferable that the ridges 58 be so configured that intervals therebetween decrease with distance from the aerosol flow path 32 (or the opening 56) in the second direction. It is also preferable, as shown in Fig. 10C, that the ridges 58 be so configured that intervals therebetween decrease with distance from the top panel 52 in the first direction. In other words, in a state where the lid member 50 is attached to the tank 30, it is preferable that the ridges 58 be so configured that intervals therebetween decrease with distance from the upper wall 30a (front end) of the tank 30 in the first direction. The intervals between the ridges 58 in the second direction may have any length and may be regular, for example.

[0054] As already mentioned, aerosol can be agglomerated on the wall surface of the inner wall 34 that defines the aerosol flow path 32 to form the pillar-like droplets. The pillar-like droplets move toward the mouthpiece 18 and evacuate to the liquid evacuation section, that is, the planar portion 40 or the slit 42 as the user inhales the non-combustion heating-type flavor inhaler 100. If the non-combustion heating-type flavor inhaler 100 then continues to be used, there is a possibility that the droplets that evacuate to the liquid evacuation section might reach the front end of the liquid evacuation section or that the liquid evacuation section is filled with the droplets. In either case, the droplets are liable to move from the liquid evacuation section and reach the inside of the user’s mouth.

[0055] To solve the above problem, according to the present embodiment, the lid member 50 includes the concave-convex portion (which is an example of the liquid holding section) that is in communication with the liquid evacuation section. The droplets that reach the front end of the liquid evacuation section are held by the concave-convex portion of the lid member 50 due to a capillary action. The droplets that reach the front end of the liquid evacuation section also can be held in a gap between the top panel 52 of the lid member 50 and the upper wall 30a of the tank 30 due to the capillary action. This prevents the liquid that evacuates to the liquid evacuation section from reaching the inside of the user's mouth. According to the present embodiment, since the intervals between the ridges 58 decrease with distance from the aerosol flow path 32 in the second direction, the liquid is encouraged to move in a direction away from the aerosol flow path 32 in the second direction due to a capillary phenomenon. According to the present embodiment, furthermore, since the intervals between the ridges 58 decrease with distance from the upper wall 30a of the tank 30 in the first direction, the liquid is encouraged to move in a direction away from the tank 30 in the first direction due to the capillary phenomenon.

[0056] According to the present embodiment, a plurality of ridges 58 are provided for forming the concave-convex portion. However, the concave-convex portion does not necessarily have to be formed by the plurality of ridges 58. The concave-convex portion may have any form as long as the concave-convex portion is capable of holding the liquid due to the capillary action. For example, a plurality of convex portions, a plurality of concave portions or the like may be employed. Instead of or in addition to the concave-convex portion, a liquid holding member (which is an example of the liquid holding section) comprising a porous member, fiber or the like may be disposed between the top panel 52 of the lid member 50 and the upper wall 30a of the tank 30. The porous member, fiber or the like includes, for example, cellulosic non-woven fabric, glass fiber non-woven fabric, paper, sponge, ceramic, a glass porous element and the like. The lid member 50 may be attached to and detached from the tank 30 by the user or may be undetachably fixed to the tank 30.

[0057] The concave-convex portion of the present embodiment is located on a radially outer side of the aerosol flow path 32. The present embodiment thus prevents the aerosol passing through the aerosol flow path 32 from reaching the concave-convex portion and suppresses condensation of the aerosol in the concave-convex portion. If the liquid holding member comprising a porous member, fiber or the like is disposed between the top panel 52 of the lid member 50 and the upper wall 30a of the tank 30, the liquid holding member is preferably disposed away from the aerosol flow path 32 on the radially outer side of the aerosol flow path 32.

[0058] According to the present embodiment, a plurality of ridges 58 are provided to form the concave-convex portion. However, the lid member 50 does not necessarily have to include the ridges 58 as long as the lid member 50 is capable of holding liquid due to the capillary action. Fig. 11 is a schematic sectional side view of the tank 30 provided with the lid member 50 according to another embodiment. Although the lid member 50 shown in Fig. 11 does not include the ridges 58, the droplets that reach the front end of the liquid evacuation section are held in the gap (which is an example of the liquid holding section) between the top panel 52 of the lid member 50 and the upper wall 30a of the tank 30 due to the capillary action. According to the embodiment shown in the figure, the lid member 50 is so formed that distance between a tank 30-side surface of the top panel 52 of the lid member 50 and the upper wall 30a of the tank 30 decreases with distance away from the aerosol flow path 32 in the second direction. The droplets that reach the front end of the liquid evacuation section are therefore first held in the relatively large gap between the top panel 52 of the lid member 50 and the upper wall 30a of the tank 30. According to the embodiment shown in the figure, the droplets held in the relatively large gap are encouraged to move away from the opening 56 in the second direction due to the capillary action.

[0059] Distance between the tank 30-side surface of the top panel 52 of the lid member 50 and the upper wall 30a of the tank 30 may be constant. It is also possible to provide the ridges 58 shown in Figs. 10A to 10C to the lid member 50 shown in Fig. 11.

[0060] Fig. 12 is a schematic top view of the tank 30 of the non-combustion heating-type flavor inhaler 100 according to still another embodiment. As shown in the figure, one or more ridges 36 are formed in a front end surface of the tank 30. Accordingly, the concave-convex portion (which is an example of the liquid holding section) is formed in a front end-side end surface of the upper end 30a of the tank 30. The concave-convex portion is in communication with the liquid evacuation section of the tank 30.

[0061] As shown in Fig. 12, the ridges 36 are preferably configured so that intervals therebetween decrease with distance from the aerosol flow path 32 in the second direction. The ridges 36 are also preferably configured so that intervals therebetween decrease with distance from the upper wall 30a in the first direction as with the ridges 58 shown in Fig. 10C. The intervals between the ridges 36 may have any length and may be regular, for example.

[0062] Since the tank 30 includes the concave-convex portion in communication with the liquid evacuation section, the droplets that reach the front end of the liquid evacuation section are held by the concave-convex portion of the tank 30 due to the capillary action. The liquid that evacuates to the liquid evacuation section is thus prevented from reaching the inside of the user's mouth. In the present embodiment, furthermore, since the intervals between the ridges 36 decrease with distance from the aerosol flow path 32 in the second direction, the liquid is encouraged to move in a direction away from the aerosol flow path 32 in the second direction due to the capillary phenomenon. If the ridges 36 are configured so that the intervals therebetween decrease with distance from the front end of the tank 30, or the upper wall 30a of the tank 30 in the first direction, the liquid is encouraged to move in a direction away from the upper wall 30a of the tank 30 in the first direction due to the capillary phenomenon.

[0063] In the present embodiment, the plurality of ridges 58 are provided to form the concave-convex portion. However, the concave-convex portion does not necessarily have to be formed by the plurality of ridges 58. The concave-convex portion may have any form as long as the concave-convex portion is capable of holding the liquid due to the capillary action. For example, a plurality of convex portions, a plurality of concave portions or the like may be employed. Instead of or in addition to the concave-convex portion, a liquid holding member (which is an example of the liquid holding section) comprising a porous member, fiber or the like may be disposed in the upper wall 30a of the tank 30. The porous member, fiber or the like includes, for example, cellulosic non-woven fabric, glass fiber non-woven fabric, paper, sponge, ceramic, a glass porous element and the like. The lid member 50 shown in Figs. 10A to 10C or Fig. 11 may be mounted on the front end of the tank 30 shown in Fig. 12.

[0064] The invention is not limited to the embodiments discussed above and may be modified in various ways within the scope of technical idea described in the claims, description, and drawings. Any shape or material that is not directly mentioned in the description and drawings is also in the scope of technical idea of the invention if it provides operation and advantages of the invention.

[0065] Modes disclosed in the present description will be explained below.

[0066] A first mode provides an atomizing unit. The atomizing unit comprises an atomizing section configured to atomize an aerosol source, a tank configured to hold the aerosol source, and a liquid holding section disposed at a front end of the tank.

[0067] The tank includes a flow path wall that defines at least part of an aerosol flow path, through which aerosol generated by atomization of the aerosol source passes, and which extends in a first direction. The atomizing unit further comprises a liquid evacuation section disposed in the aerosol flow path. The liquid holding section is in communication with the liquid evacuation section.

[0068] In a second mode according to the first mode, the atomizing unit includes a lid member disposed at the front end of the tank, and the liquid holding section is disposed between the front end of the tank and the lid member.

[0069] In a third mode according to the second mode, the liquid holding section includes a first concave-convex portion that is formed in a surface of the lid member which faces the front end of the tank, the first concave-convex portion being in communication with the liquid evacuation section and capable of holding the aerosol source.

[0070] In a fourth mode according to the second or third mode, the lid member includes an opening which is in communication with the aerosol flow path to allow aerosol to pass through the opening.

[0071] In a fifth mode according to the third or fourth mode, the first concave-convex portion includes first ridges extending in a second direction orthogonal to the first direction.

[0072] In a sixth mode according to the fifth mode, gaps formed by the first ridges become smaller with distance from the aerosol flow path in the second direction.

[0073] In a seventh mode according to the fifth or sixth mode, gaps formed by the first ridges become larger with distance from a surface of the lid member which faces the front end of the tank in the first direction.

[0074] In an eighth mode according to the second to seventh modes, distance between a surface of the lid member which faces the front end of the tank and the front end of the tank becomes smaller with distance from the aerosol flow path in a second direction orthogonal to the first direction.

[0075] In a ninth mode according to the first to eighth modes, the liquid holding section includes a second concave-convex portion formed in a front end surface of the tank.

[0076] In a 10th mode according to the ninth mode, the second concave-convex portion includes second ridges extending in a second direction orthogonal to the first direction.

[0077] In an 11th mode according to the 10th mode, gaps formed by the second ridges become smaller with distance from the aerosol flow path in the second direction.

[0078] In a 12th mode according to the 10th or 11th mode, gaps formed by the second ridges become smaller with distance from the front end of the tank in the first direction.

[0079] In a 13th mode according to any one of the first to 12th modes, the aerosol flow path includes a first aerosol flow path and a second aerosol flow path in communication with a downstream side of the first aerosol flow path, and the liquid evacuation section is disposed in the second aerosol flow path and extends downstream of the second aerosol flow path from a boundary between the first aerosol flow path and the second aerosol flow path.

[0080] A 14th mode provides a non-combustion heating-type flavor inhaler. The non-combustion heating-type flavor inhaler includes the atomizing unit according to any one of the first to 13th modes, and a power source for supplying electric power to the atomizing section.

REFERENCE SIGNS LIST

[0081]

10: Cartridge
14: Atomizing section
30: Tank
30a: Upper wall
30b: Bottom wall
30c: Outer wall
32: Aerosol flow path
32a: First aerosol flow path
32b: Second aerosol flow path
34: Inner wall
34a: First aerosol flow path wall
34b: Second aerosol flow path wall
36: Ridge
40: Planar portion
42: Slit
42a: Corner
50: Lid member
56: Opening
58: Ridge
92: Power source
100: Non-combustion heating-type flavor inhaler

Claims

1. An atomizing unit comprising:

an atomizing section configured to atomize an aerosol source;
a tank configured to hold the aerosol source, and
a liquid holding section disposed at a front end of the tank,
the tank including a flow path wall that defines at least part of an aerosol flow path, through which aerosol generated by atomization of the aerosol source passes, and which extends in a first direction,
the atomizing unit further comprising a liquid evacuation section disposed in the aerosol flow path, and
the liquid holding section being in communication with the liquid evacuation section.

2. The atomizing unit according to Claim 1,

wherein the atomizing unit includes a lid member disposed at the front end of the tank, and
wherein the liquid holding section is disposed between the front end of the tank and the lid member.

3. The atomizing unit according to Claim 2,
wherein the liquid holding section includes a first concave-convex portion that is formed in a surface of the lid member which faces the front end of the tank, the first concave-convex portion being in communication with the liquid evacuation section and capable of holding the aerosol source.

4. The atomizing unit according to Claim 2 or 3,
wherein the lid member includes an opening which is in communication with the aerosol flow path to allow aerosol to pass through the opening.

5. The atomizing unit according to Claim 3 or 4,
wherein the first concave-convex portion includes first ridges extending in a second direction orthogonal to the first direction.

6. The atomizing unit according to Claim 5,
wherein gaps formed by the first ridges become smaller with distance from the aerosol flow path in the second direction.

7. The atomizing unit according to Claim 5 or 6, wherein gaps formed by the first ridges become larger with distance from a surface of the lid member which faces the front end of the tank in the first direction.

8. The atomizing unit according to any one of Claims 2 to 7,
wherein distance between a surface of the lid member which faces the front end of the tank and the front end of the tank becomes smaller with distance from the aerosol flow path in a second direction orthogonal to the first direction.

9. The atomizing unit according to any one of Claims 1 to 8,
wherein the liquid holding section includes a second concave-convex portion formed in a front end surface of the tank.

10. The atomizing unit according to Claim 9,
wherein the second concave-convex portion includes second ridges extending in a second direction orthogonal to the first direction.

11. The atomizing unit according to Claim 10,
wherein gaps formed by the second ridges become smaller with distance from the aerosol flow path in the second direction.

12. The atomizing unit according to Claim 10 or 11,
wherein gaps formed by the second ridges become smaller with distance from the front end of the tank in the first direction.

13. The atomizing unit according to any one of Claims 1 to 12,

wherein the aerosol flow path includes a first aerosol flow path and a second aerosol flow path in communication with a downstream side of the first aerosol flow path, and
wherein the liquid evacuation section is disposed in the second aerosol flow path and extends downstream of the second aerosol flow path from a boundary between the first aerosol flow path and the second aerosol flow path.

14. A non-combustion heating-type flavor inhaler comprising:

the atomizing unit according to any one of Claims 1 to 13, and
a power source for supplying electric power to the atomizing section.

Fig. 1

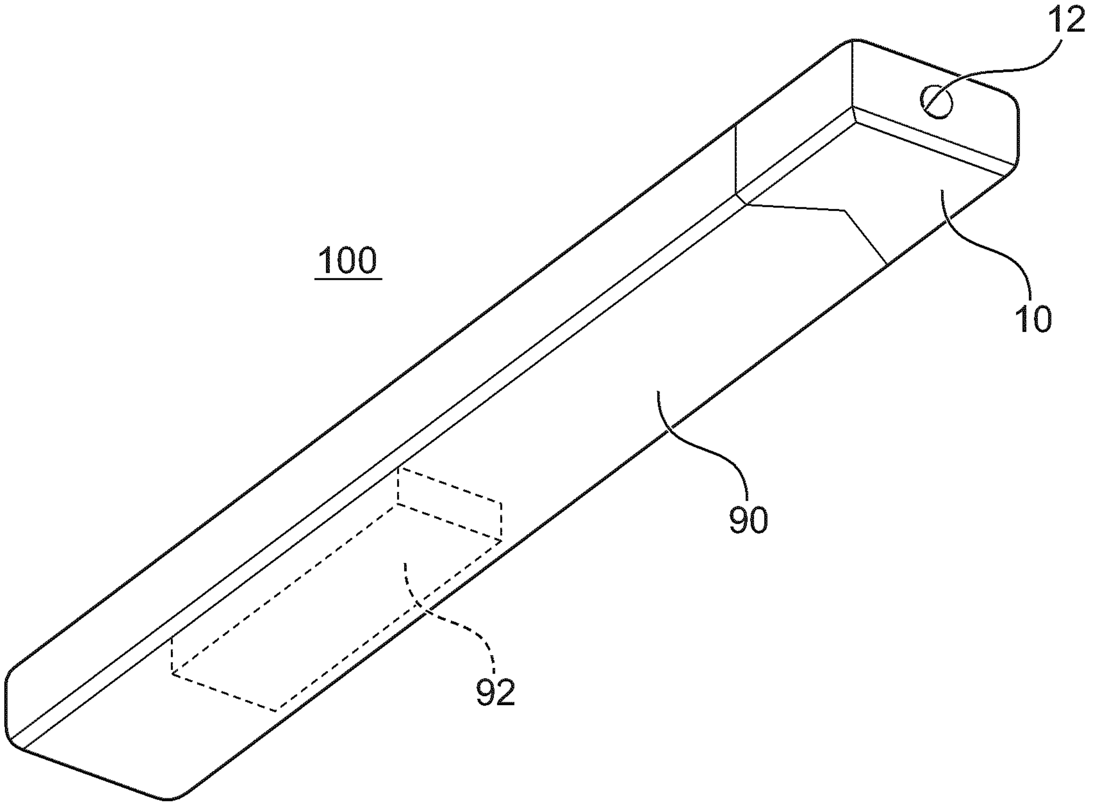


Fig. 2

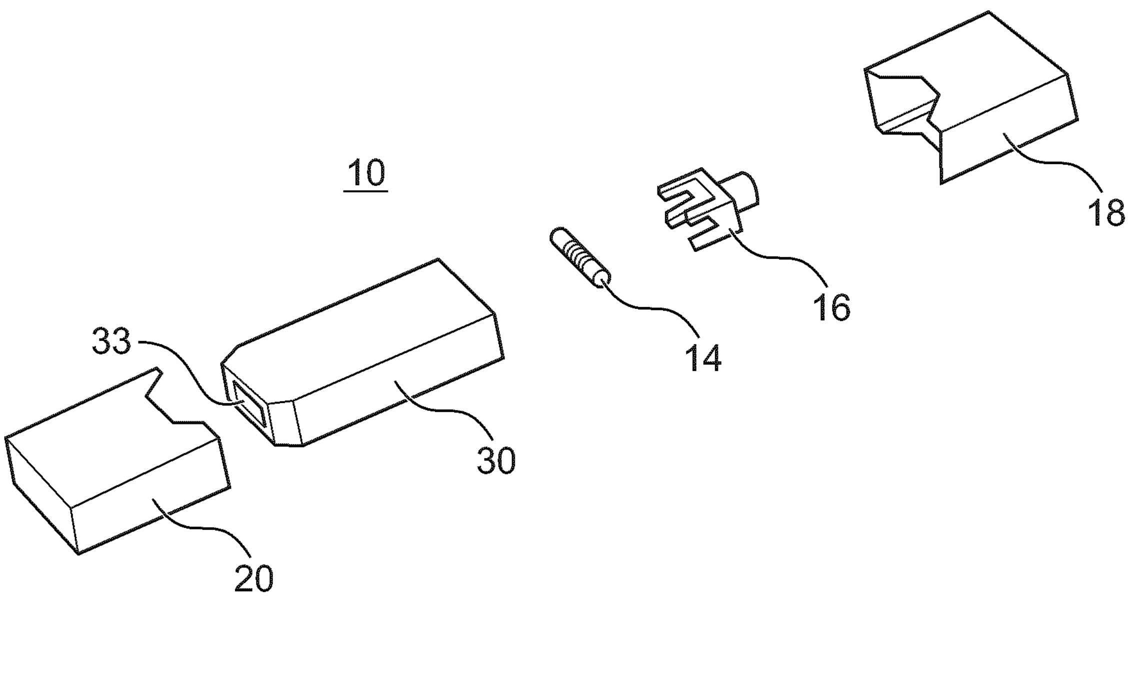


Fig. 3

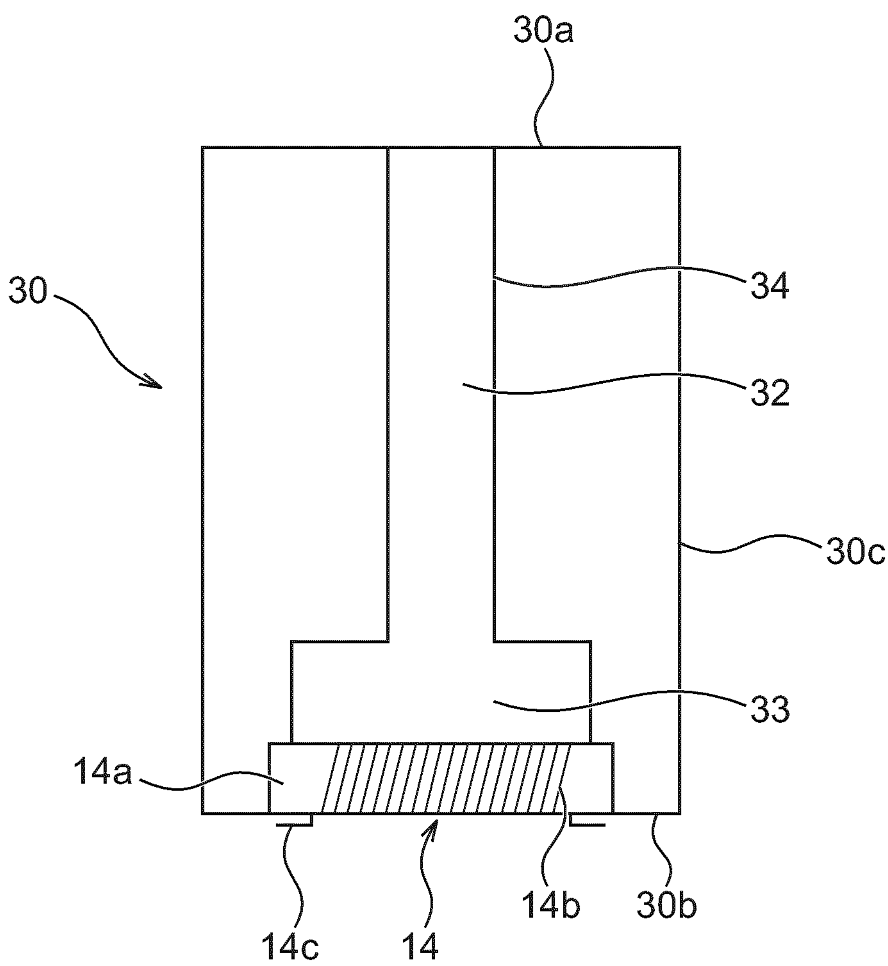


Fig. 4A

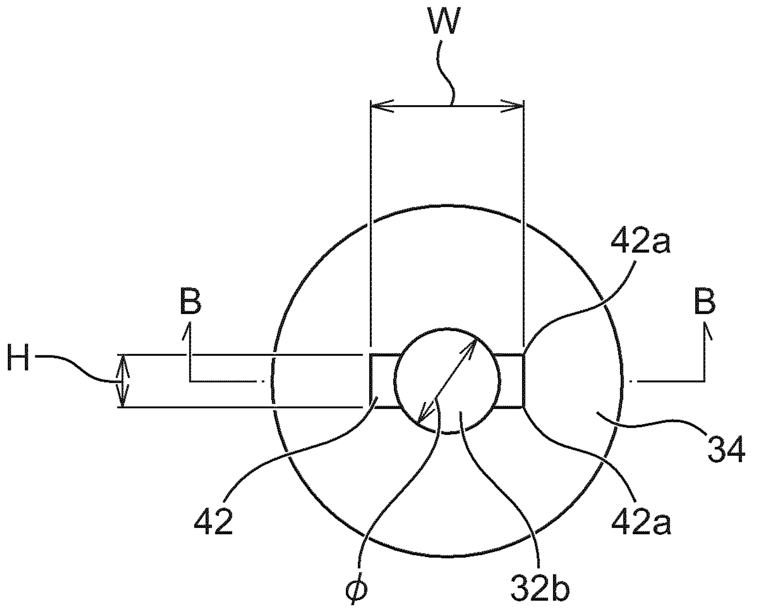


Fig. 4B

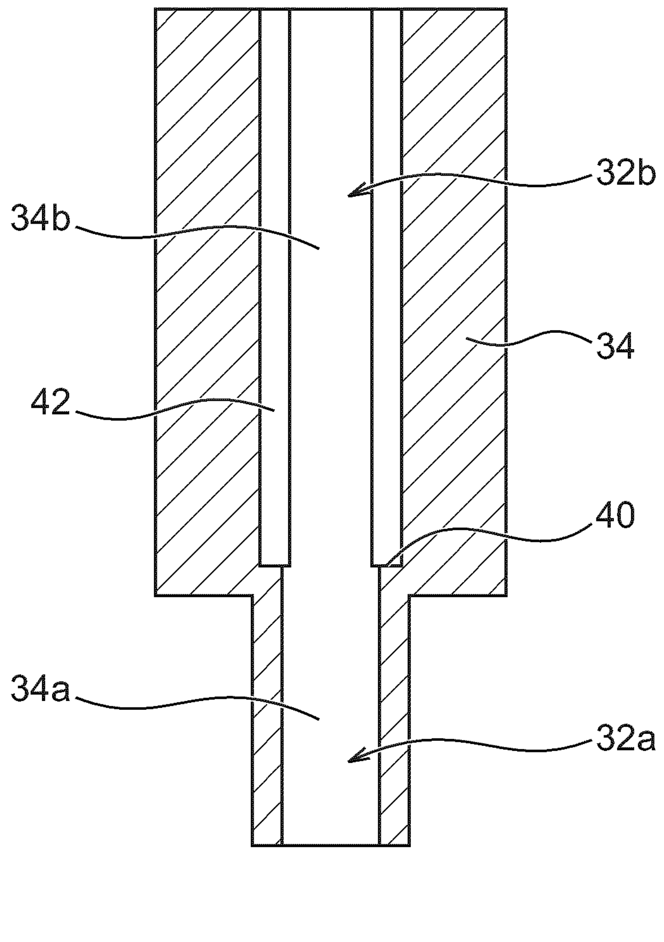


Fig. 4C

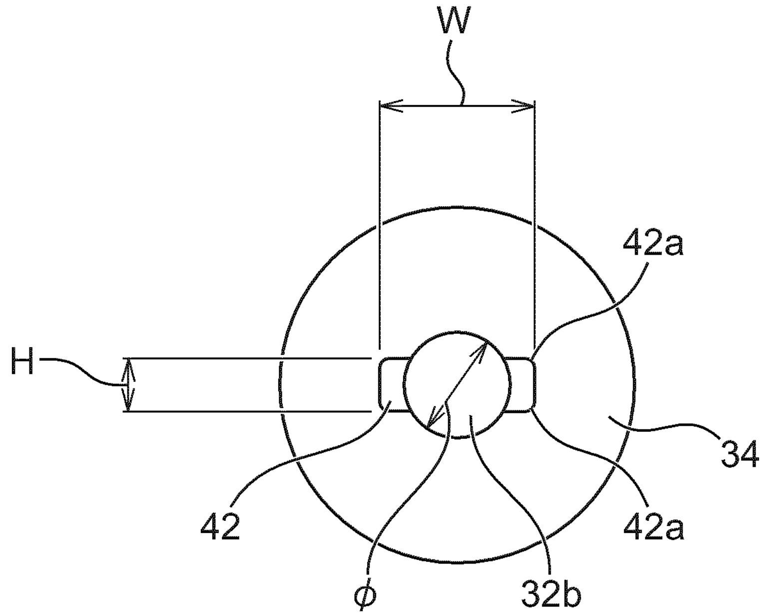


Fig. 4D

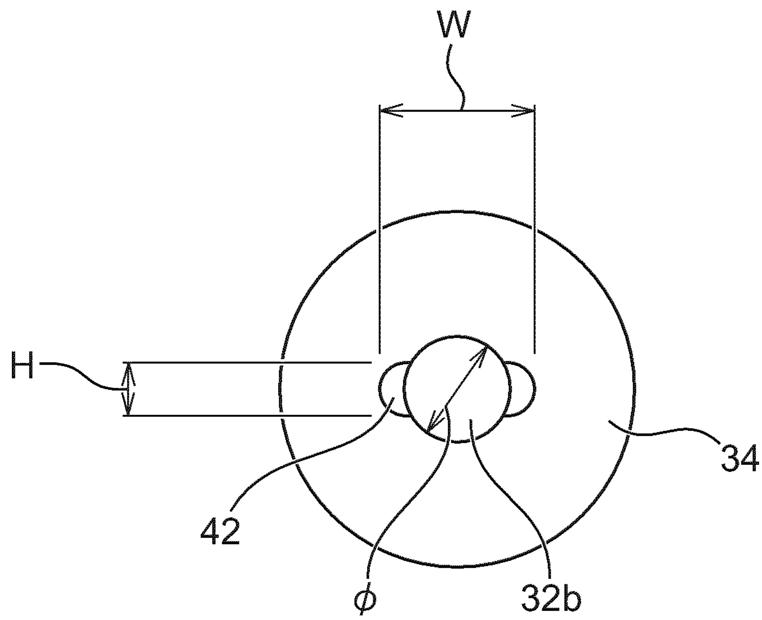


Fig. 4E

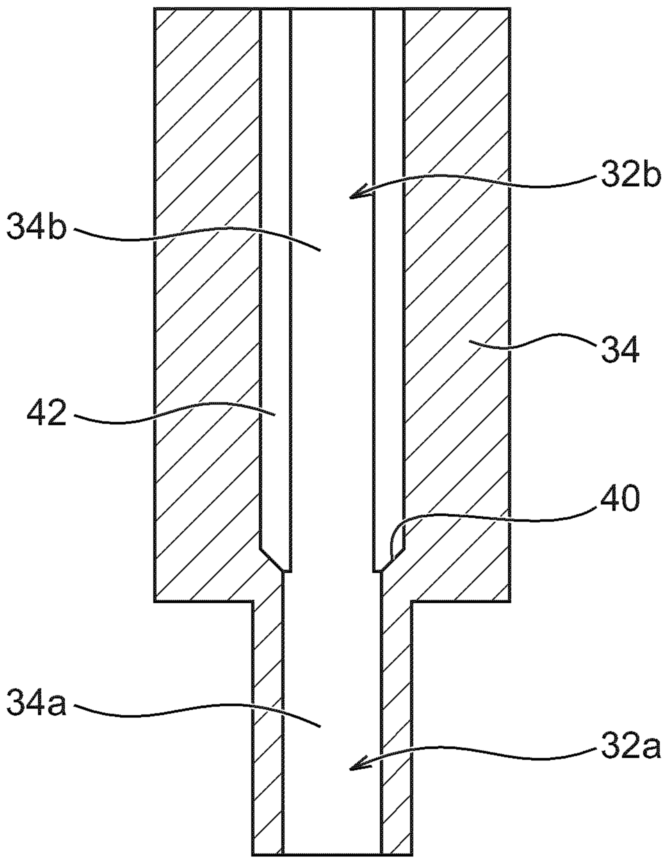


Fig. 4F

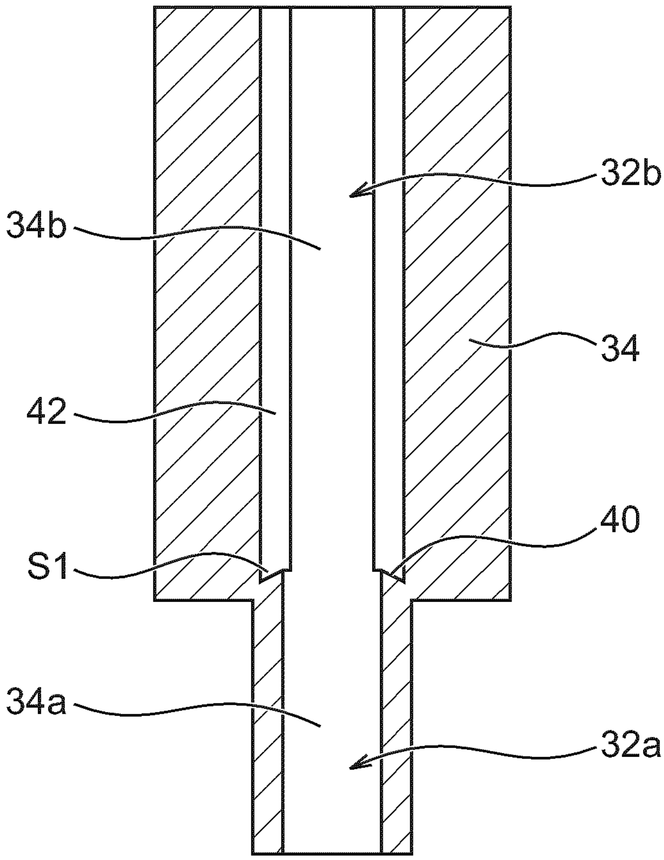


Fig. 5A

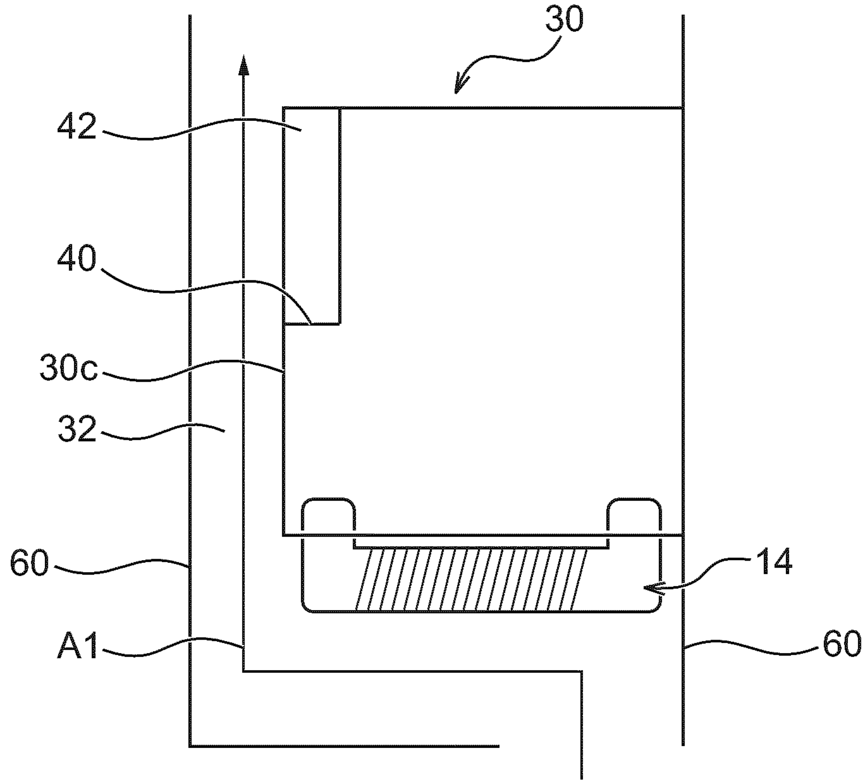


Fig. 5B

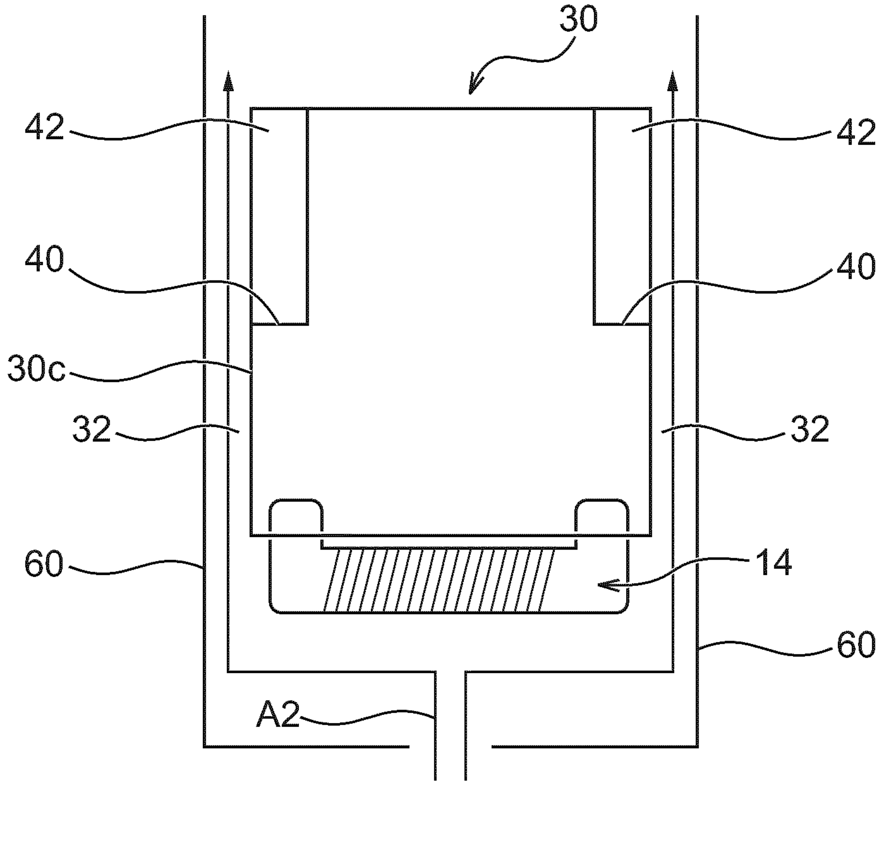


Fig. 6

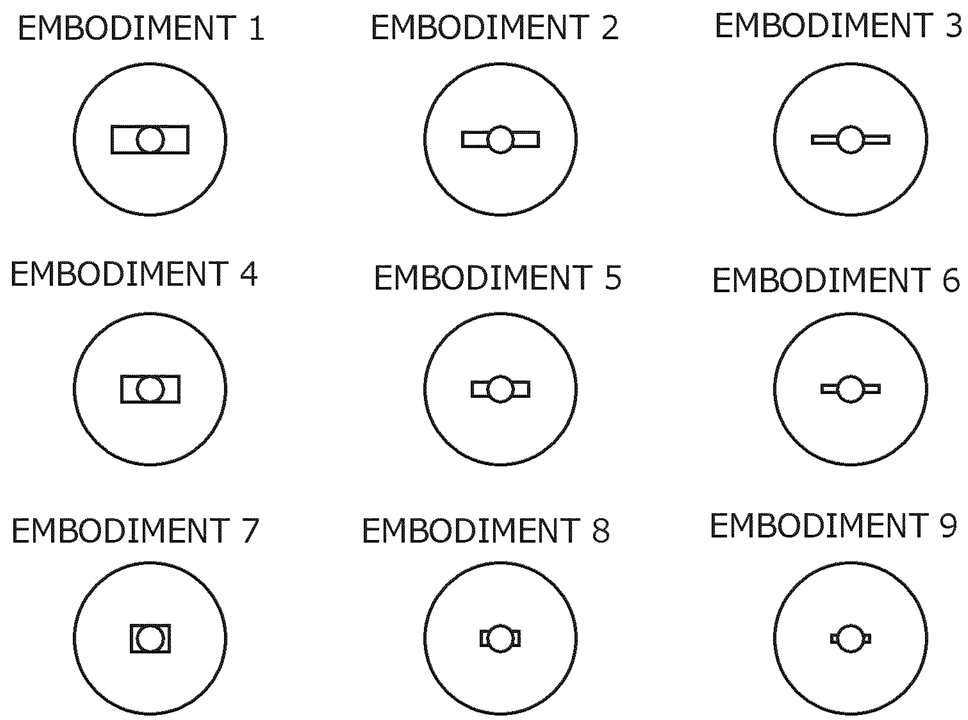

EMBODIMENT 1
EMBODIMENT 2
EMBODIMENT 3
EMBODIMENT 4
EMBODIMENT 5
EMBODIMENT 6
EMBODIMENT 7
EMBODIMENT 8
EMBODIMENT 9

Fig. 7A

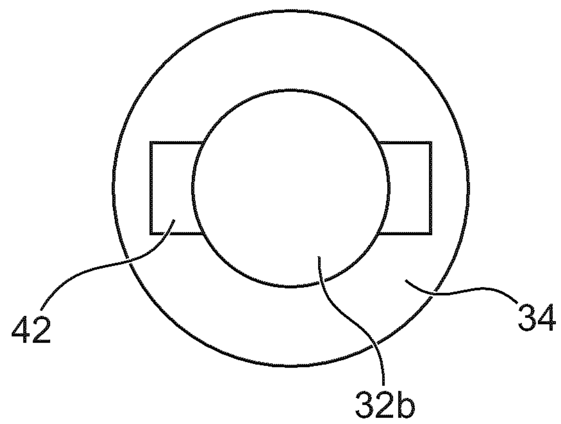


Fig. 7B

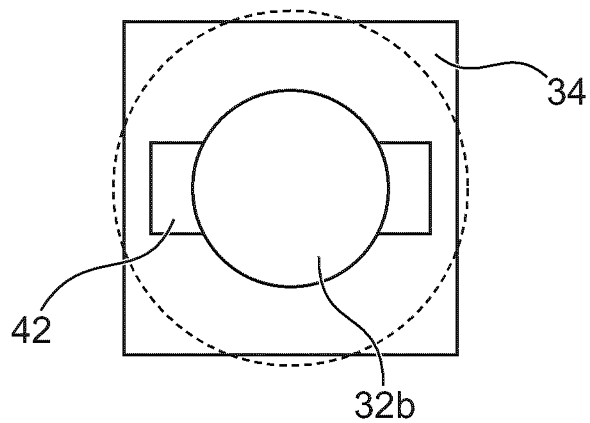


Fig. 7C

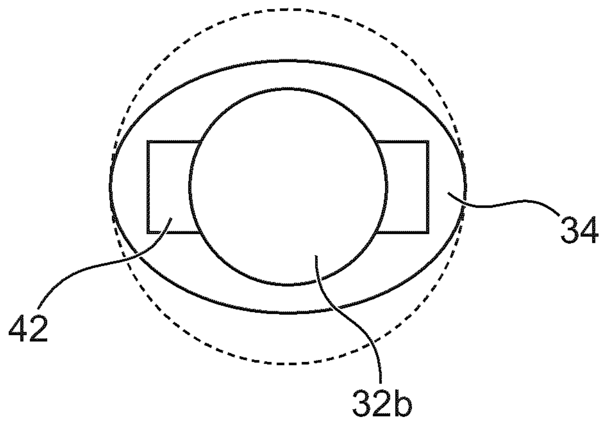


Fig. 7D

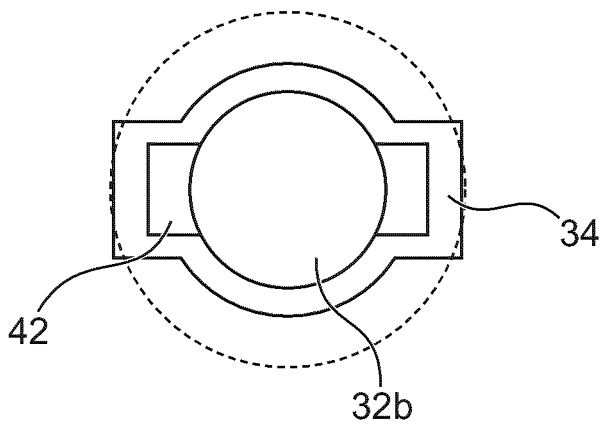


Fig. 8

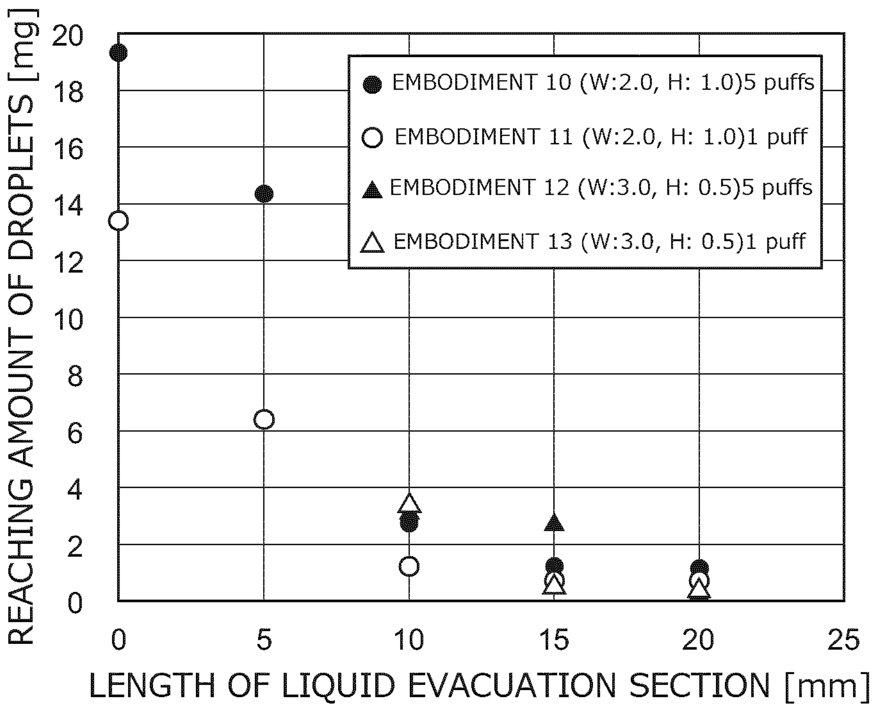

REACHING AMOUNT OF DROPLETS [mg]
20
18
16
14
12
10
8
6
4
2
0
0
5
10
15
20
25
LENGTH OF LIQUID EVACUATION SECTION [mm]
EMBODIMENT 10 (W:2.0, H: 1.0)5 puffs
EMBODIMENT 11 (W:2.0, H: 1.0)1 puff
EMBODIMENT 12 (W:3.0, H: 0.5)5 puffs
EMBODIMENT 13 (W:3.0, H: 0.5)1 puff

Fig. 9

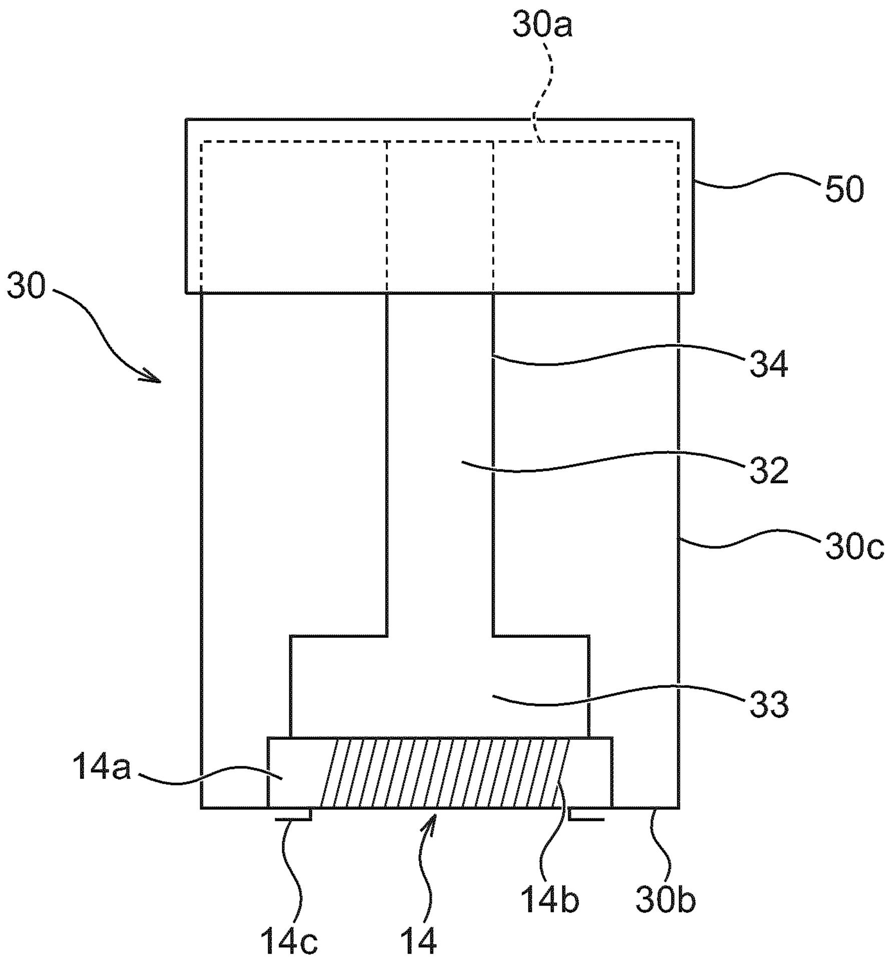


Fig. 10A

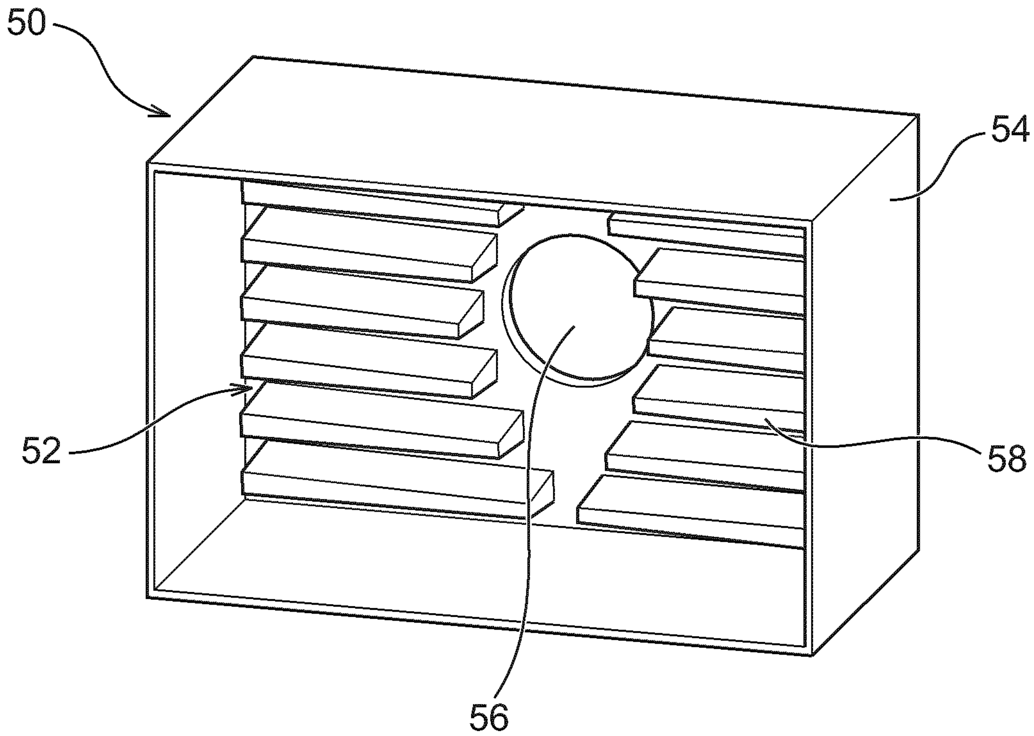


Fig. 10B

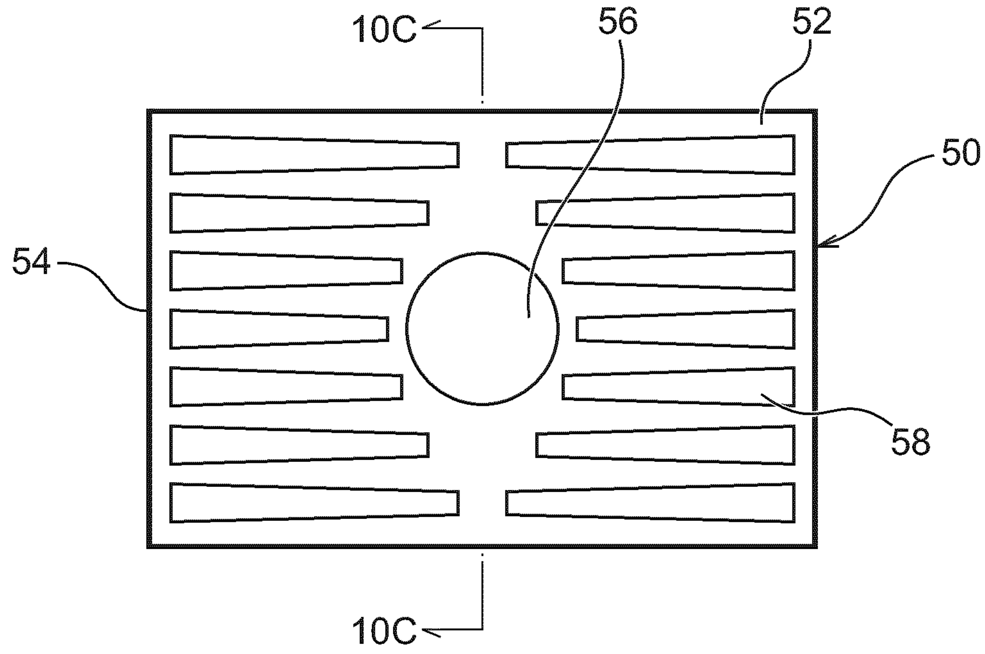


Fig. 10C

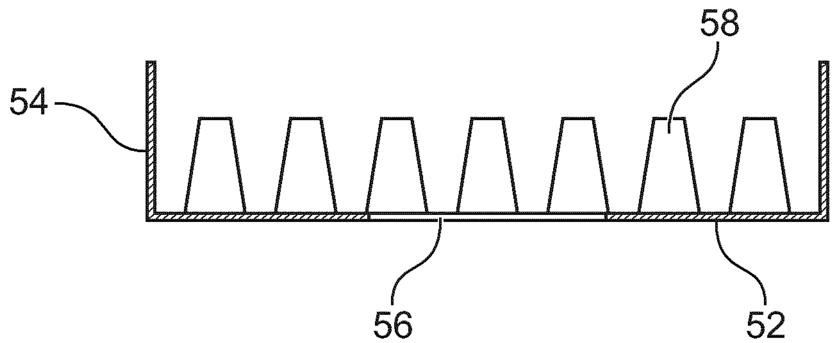


Fig. 11

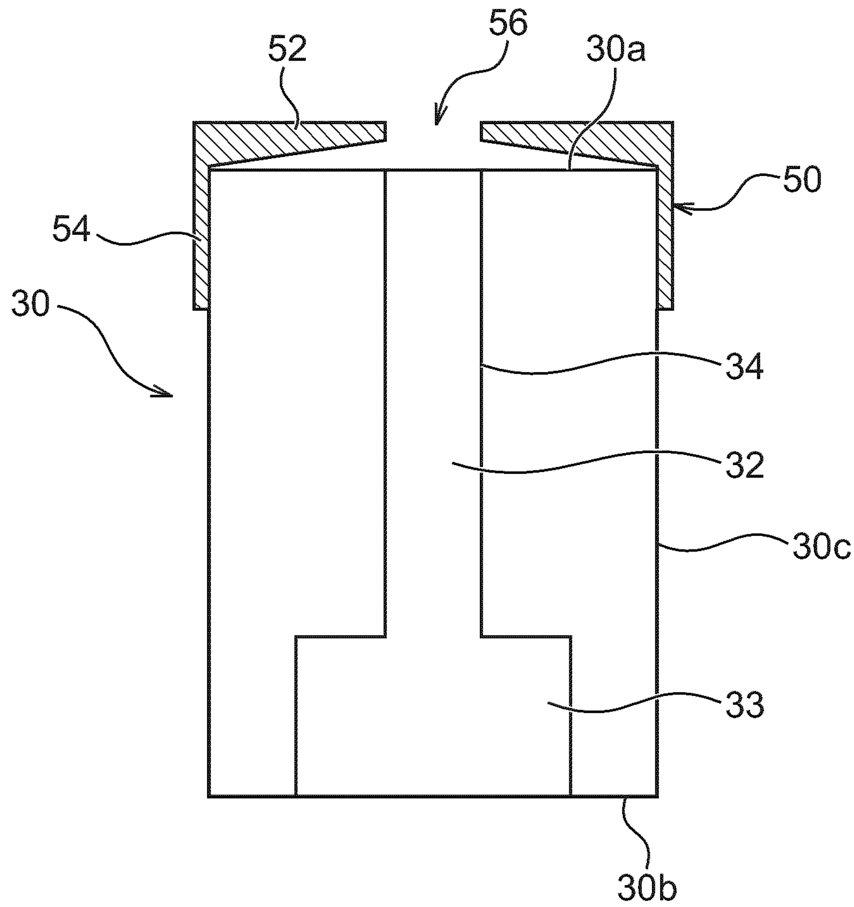
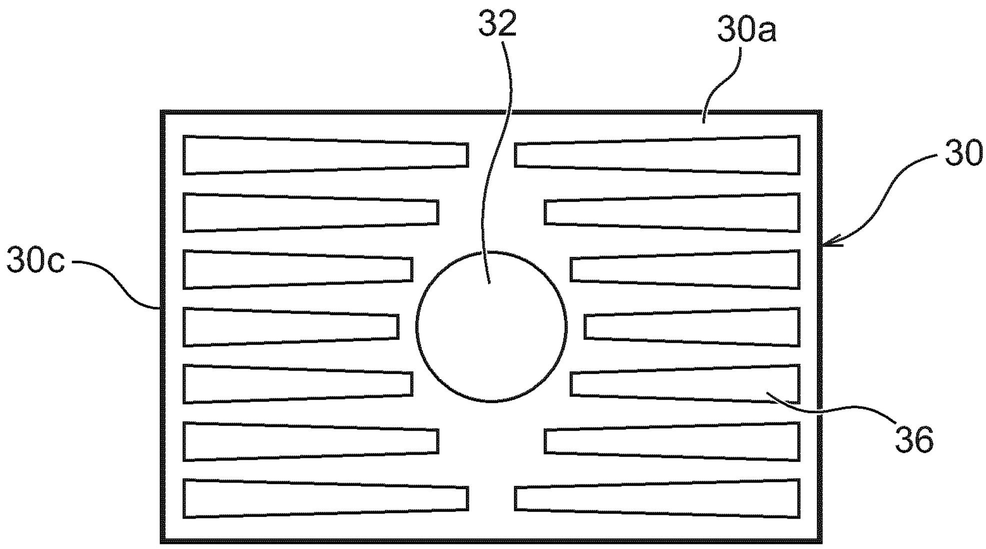


Fig. 12



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2019/045226

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. A24F40/10(2020.01)i, A24F40/485(2020.01)i
FI: A24F47/00

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)
Int. Cl. A24F40/10, A24F40/485

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 A	JP 2018-113955 A (CHOI KYOUNG SOO) 26 July 2018, paragraphs [0028]-[0045], fig. 4-11	1-4, 13-14 5-12
A	JP 2019-528749 A (NICOVENTURES HOLDINGS LTD.) 17 October 2019, entire text	1-14
A	JP 6525228 B1 (JAPAN TOBACCO INC.) 05 June 2019, entire text	1-14
A	JP 47-013435 Y1 (MORISHOKU KK) 16 May 1972, entire text	1-14
A	JP 2017-506502 A (BATMARK LTD.) 09 March 2017, entire text	1-14

☒ 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
03.02.2020	10.02.2020

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

International application No. PCT/JP2019/045226

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2018/0084830 A1 (XU, Yongjie James) 29 March 2018, entire text	1-14

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2019/045226

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
JP 2018-113955 A	26.07.2018	KR 10-2018-0085236 A paragraphs [0035]-[0052], fig. 3-7	
JP 2019-528749 A	17.10.2019	WO 2018/060675 A1 entire text US 2019/0223508 A1 EP 3518696 A1	
JP 6525228 B1	05.06.2019	(Family: none)	
JP 47-013435 Y1	16.05.1972	(Family: none)	
JP 2017-506502 A	09.03.2017	WO 2015/114328 A1 entire text US 2017/027225 A1 EP 3099190 A1	
US 2018/0084830 A1	29.03.2018	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 3158883 A **[0004]**