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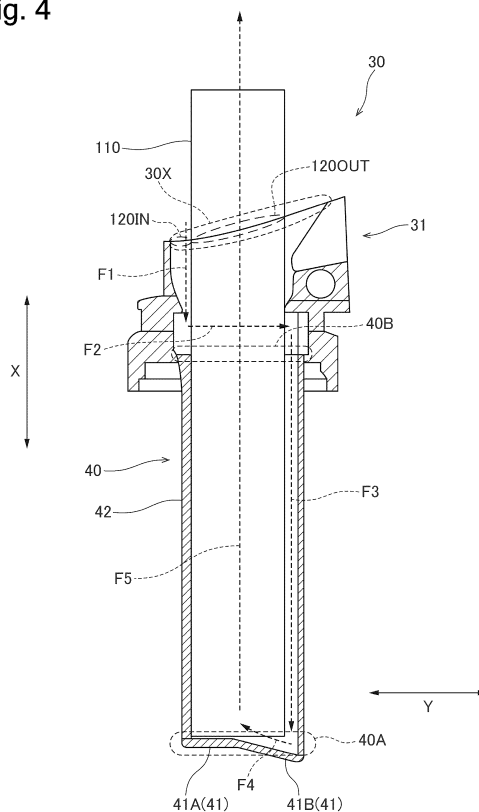
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(54) **HEATER ASSEMBLY AND FLAVOR INHALER**

(57) A heater assembly comprises a heater configured to atomize an aerosol source, an atomization chamber extending along a predetermined direction to form at least part of an aerosol channel through which aerosol passes, the aerosol being generated when the aerosol source is heated by the heater, and an intake channel configured to supply air from an inlet to the atomization chamber. The intake channel includes a first channel extending along the predetermined direction and leading to the inlet, a second channel extending from the first channel along an intersecting direction intersecting with the predetermined direction as viewed in a section of the heater assembly along the predetermined direction, and a third channel extending from the second channel along the predetermined direction.

Fig. 4



Description

TECHNICAL FIELD

[0001] The invention relates to heater assemblies and flavor inhalers.

BACKGROUND ART

[0002] There is a known flavor inhaler that heats a flavor generating article without burning. The flavor inhaler comprises a heater configured to atomize an aerosol source, an atomization chamber including at least part of a channel for aerosol that is generated when the aerosol source is heated by the heater, and an intake channel configured to supply air from an inlet to the atomization chamber (see Patent Literatures 1 to 3, for example).

CITATION LIST

PATENT LITERATURE

[0003]

PTL 1: Japanese Unexamined Patent Application Publication (Kohyo) No. 2001-521123

PTL 2: Japanese Unexamined Patent Application Publication (Kohyo) No. 2015-504667

PTL 3: Japanese Unexamined Patent Application Publication (Kohyo) No. 2006-505281

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] A first feature is a heater assembly comprising a heater configured to atomize an aerosol source, an atomization chamber extending along a predetermined direction to form at least part of an aerosol channel through which aerosol passes, the aerosol being generated when the aerosol source is heated by the heater, and an intake channel configured to supply air from an inlet to the atomization chamber. The intake channel includes a first channel extending along the predetermined direction and leading to the inlet, a second channel extending from the first channel along an intersecting direction intersecting with the predetermined direction as viewed in a section of the heater assembly along the predetermined direction, and a third channel extending from the second channel along the predetermined direction.

[0005] A second feature according to the first feature is that the third channel is located adjacent to the atomization chamber in the intersecting direction.

[0006] A third feature according to the first or second feature is that the second channel has a shape extending along an inner or outer periphery of the aerosol channel.

[0007] A fourth feature according to the third feature is

that the second channel includes a channel extending in a first direction along the inner or outer periphery of the aerosol channel, and a channel extending along the inner or outer periphery of the aerosol channel in a second direction that is opposite to the first direction.

[0008] A fifth feature according to the third feature is that the second channel has a shape extending in a spiral manner along the inner or outer periphery of the aerosol channel.

[0009] A sixth feature according to any one of the first to fifth features is that the heater assembly comprises a first end provided on a side where air flows from the intake channel into the atomization chamber, and a second end provided on a side where aerosol flows out of the atomization chamber; and that the third channel is provided at a position adjacent to the atomization chamber within an area between the first end and the second end.

[0010] A seventh feature according to any one of the first to sixth features is that the aerosol source is a columnar article having a column-like shape; and that the atomization chamber houses the columnar article and supports the columnar article at the first end provided on the side where air flows from the intake channel into the atomization chamber.

[0011] An eighth feature according to any one of the first to seventh features is that, when air is sucked in from the inlet, the atomization chamber guides the aerosol generated from the aerosol source in an opposite direction to an airflow direction in the third channel.

[0012] A ninth feature according to the seventh feature or the eighth feature referring to the seventh feature is that at least part of the second channel is formed by an outer lateral face of the columnar article with the columnar article inserted in the atomization chamber.

[0013] A 10th feature according to the seventh feature or the eighth feature referring to the seventh feature is that the heater assembly comprises a cylindrical member provided along an outer lateral face of the columnar member at a position adjacent to the second channel; and that at least part of the second channel is formed by an outer lateral face of the cylindrical member.

[0014] An 11th feature according to any one of the first to 10th features is that the inlet is provided side by side in the intersecting direction with an outlet from which the aerosol is guided out.

[0015] A 12th feature according to the 11th feature is that the heater assembly comprises a collar member including a hollow space that forms at least part of the aerosol channel.

[0016] A 13th feature according to the 12th feature is that at least part of the second channel is formed by the collar member.

[0017] A 14th feature according to the 12th or 13th feature is that hollow space of the collar member includes at least part of the aerosol channel and the first channel.

[0018] A 15th feature according to any one of the first to 14th features is that the heater assembly comprises a container with a hollow space including the atomization

chamber and the third channel.

[0019] A 16th feature is a flavor inhaler including the heater assembly according to any one of the first to 15th features.

BRIEF DESCRIPTION OF DRAWINGS

[0020]

Fig. 1 shows a flavor inhaler 100 according to an embodiment.

Fig. 2 shows the flavor inhaler 100 according to the embodiment.

Fig. 3 is a cross-sectional view of a generator 120 according to the embodiment.

Fig. 4 is a cross-sectional view of a heater assembly 30 according to the embodiment.

Fig. 5 is a cross-sectional view of a heater assembly 30 according to the embodiment.

Fig. 6 shows a collar member 31 according to the embodiment.

Fig. 7 shows a collar member 31 according to the embodiment.

Fig. 8 shows a container 40 according to the embodiment.

Fig. 9 shows a container 40 according to the embodiment.

Fig. 10 is a cross-sectional view of the container 40 according to the embodiment.

Fig. 11 shows a second channel 82 according to the embodiment.

Fig. 12 is a view for explaining leakage of aerosol according to the embodiment.

Fig. 13 is a view for explaining a cylindrical member 90 according to Modification Example 1.

Fig. 14 is a view for explaining the cylindrical member 90 according to Modification Example 1.

Fig. 15 is a view for explaining the cylindrical member 90 according to Modification Example 1.

Fig. 16 shows a second channel 82 according to Modification Example 1.

Fig. 17 is a view for explaining leakage of aerosol according to Modification Example 1.

DESCRIPTION OF EMBODIMENT

[0021] An embodiment will be discussed below. In the following description of the drawings, same or similar elements are provided with same or similar reference signs. It should be noted, however, that the drawings are schematic and that there is a possibility that dimensional ratios on the drawings differ from actual ones.

[0022] Concrete dimensions and the like therefore should be determined in consideration of the following explanation. Needless to say, there also might be a difference among the drawings in terms of dimensional relationship or ratios.

[Summary of Disclosure]

[0023] With respect to the flavor inhaler mentioned in Background Art, various inventive ideas can be seen in the arrangement of the intake channel and the heater. On the other hand, the flavor inhaler is not configured in view of an aspect that the aerosol generated when the aerosol source is heated by the heater leaks from the inlet, and there has been a demand for a solution to the aerosol leakage from the inlet.

[0024] A heater assembly according to the summary of disclosure comprises a heater configured to atomize an aerosol source, an atomization chamber extending along a predetermined direction to form at least part of an aerosol channel through which aerosol passes, the aerosol being generated when the aerosol source is heated by the heater, and an intake channel configured to supply air from an inlet to the atomization chamber. The intake channel includes a first channel extending along the predetermined direction and leading to the inlet, a second channel extending from the first channel along an intersecting direction as viewed in a section of the heater assembly along the predetermined direction, and a third channel extending from the second channel along the predetermined direction.

[0025] According to the summary of disclosure, the intake channel has a shape like a crank which includes the first channel, the second channel, and the third channel. With such a configuration, the intake channel is increased in resistance due to a curve from the third channel to the second channel and a curve from the second channel to the first channel, so that even if the aerosol flows backward from the atomization chamber toward the inlet, the aerosol flowing backward through the intake channel is decreased in temperature due to pressure loss.

[Embodiment]

(Flavor inhaler)

[0026] A flavor inhaler according to an embodiment will be discussed below. Figs. 1 and 2 show a flavor inhaler 100 according to the embodiment. Fig. 1 shows the flavor inhaler 100 with a columnar member 110 not inserted therein, and Fig. 2 shows the flavor inhaler 100 with the columnar 110 inserted therein.

[0027] As illustrated in Figs. 1 and 2, the flavor inhaler 100 includes the columnar member 110 that forms an aerosol source, and a generator 120 that generates aerosol from the columnar member 110. The flavor inhaler 100 generates aerosol without burning. The flavor inhaler 100 can be termed as a heating type or non-burning type flavor inhaler. The flavor inhaler 100 may be a portable inhaler.

[0028] The columnar member 110 is a member that at least forms a solid aerosol source and has a columnar shape extending along a predetermined direction X. For example, the columnar member 110 may comprise

shredded tobacco, a molded body formed by molding tobacco material into grains, a molded body formed by molding tobacco material into a sheet, and the like. The columnar member 110 may include wrapping material that is wrapped around the solid aerosol source. The columnar member 110 may include a filter.

[0029] The columnar member 110 may generate aerosol by being heated. To encourage the generation of aerosol, the columnar member 110 may include an aerosol source containing various kinds of polyols, such as glycerin, propylene glycol, and 1,3-butandiol. The columnar member 110 may comprise other plants (for example, mint, herbs or other like plants) than tobacco. The columnar member 110 may contain an aroma chemical, such as menthol.

[0030] The generator 120 includes an operating portion 210 that turns on a power source of the generator 120, and a lid body 220 that blocks an opening 30X provided in a heater assembly 30 mentioned later. The operating portion 210 may function to turn off the power source of the generator 120. The lid body 220 is configured in a slidable manner and exposes the opening 30X when the columnar member 110 is inserted. The lid body 220 may be configured in a rotatable manner. The generator 120 will be explained below in detail (see Fig. 3).

(Generator)

[0031] The generator according to the embodiment will be now discussed. Fig. 3 is a cross-section of the generator 120 according to the embodiment. Fig. 3 shows the cross-section along a line A-A in Fig. 1.

[0032] As illustrated in Fig. 3, the generator 120 includes a battery 10, a control circuit 20, and the heater assembly 30.

[0033] The battery 10 accumulates electric power used in the generator 120. For example, the battery 10 is a lithium ion battery. The battery 10 may be rechargeable using an external power source.

[0034] The control circuit 20 comprises a CPU, a memory, and the like. The control circuit 20 controls the behavior of the generator 120. The control circuit 20 begins to heat the columnar member 110 when the power source of the generator 120 is turned on by the operating portion 210. The control circuit 20 may stop heating the columnar member 110 after a predetermined time period of the heating. The control circuit 20 may stop heating the columnar member 110 when a predetermined number of times of puffing is performed after the heating begins. The control circuit 20 may stop heating the columnar member 110 when the power source of the generator 120 is turned off by the operating portion 210. The puffing may be detected by a sensor, not shown. The sensor may be provided in a bottom plate portion 41 (separated portion 41B, for example) which is discussed later.

[0035] The heater assembly 30 heats the columnar member 110 and thus generates aerosol. The heater assembly 30 includes the opening 30X, from which the co-

lumnar member 110 is inserted into the heater assembly 30. The heater assembly 30 includes a collar member 31, a container 40, and a heater 50. The heater assembly 30 may include a heat insulating member 60. The heat insulating member 60 does not necessarily have to be a part of the heater assembly 30. The collar member 31 and the container 40 will be discussed later in detail, so that the following explanation is mainly about the heater 50 and the heat insulating member 60.

[0036] The heater 50 is disposed in an outer lateral face of the container 40. Especially the heater 50 is disposed to cover at least part of the outer lateral face (peripheral surface) of the container 40. The heater 50 atomizes an aerosol source. Specifically, the heater 50 heats the columnar member 110 that is housed in the container 40. Fig. 3 shows as an example a case in which the heater 50 is disposed in the outer lateral face of the container 40. The heater 50 may comprise a heating element that is formed of a resistance heating element, such as a substrate formed of a film made of polyimide or the like, and metal. The heating element may be sandwiched between two substrates. The metal of which the heating element is made may be one or more kinds of metals selected among nickel alloy, chromium alloy, stainless steel, and platinum rhodium.

[0037] The heat insulating member 60 is disposed outside the heater 50 so as to cover the container 40. The heat insulating member 60 may be a vacuum insulating member having a double structure. The heat insulating member 60 may be made of a heat insulating material, such as aerogel and silicon.

(Heater assembly)

[0038] The heater assembly according to the embodiment will be discussed below. Figs. 4 and 5 are cross-sections showing the heater assembly 30 according to the embodiment. Fig. 4 is the cross-section of the heater assembly 30 along the line A-A in Fig. 1. Fig. 4 shows the heater assembly 30 with the columnar member 110 inserted therein. Fig. 5 is the cross-section of the heater assembly 30 along a line A-A in Fig. 2. Fig. 5 shows the heater assembly 30 with the columnar member 110 not inserted therein. The heater 50 and the heat insulating member 60 are omitted from Figs. 4 and 5.

[0039] As illustrated in Figs. 4 and 5, the heater assembly 30 includes the collar member 31 and the container 40.

[0040] The collar member 31 has a cylindrical shape and is made, for example, of synthetic resin having plasticity. The collar member 31 includes the opening 30X for receiving the columnar member 110. The opening 30X includes an inlet 120IN that guides air into the heater assembly 30 and an outlet 120OUT that guides aerosol out of the heater assembly 30, with the columnar member 110 inserted in the heater assembly 30.

[0041] According to the embodiment, aerosol passes through the columnar member 110, which means that

the outlet 120OUT is a portion that is occupied by the columnar member 110. The inlet 120IN is a portion that is not occupied by the columnar member 110. To facilitate the insertion of the columnar member 110, the opening 30X is larger than the inlet 120IN and the outlet 120OUT. The collar member 31 may function as an insertion guide for the columnar member 110.

[0042] According to the embodiment, the inlet 120IN is provided side by side with the outlet 120OUT in an intersecting direction Y intersecting with a predetermined direction X. The intersecting direction Y may be considered as, but not limited to, a direction with an angle ranging from -45 degrees to 45 degrees from a direction orthogonal to the predetermined direction X.

[0043] The container 40 has a shape extending along the predetermined direction X. The container 40 is a member that houses the columnar member 110 that is inserted into the container 40 through the collar member 31. The container 40 comprises a heat conductive member (for example, metal such as SUS (steel use stainless)). The container 40 includes a portion (hereinafter, referred to as an atomization chamber) occupied by the columnar member 110 when the columnar member 110 is inserted in the container 40.

[0044] The container 40 includes a first end 40A provided on a side where air flows from an intake channel (first to fourth channels 81 to 84 in Fig. 5) into the atomization chamber (fifth channel 85 in Fig. 5), and a second end 40B provided on a side where air flows out of the atomization chamber.

[0045] The container 40 includes the bottom plate portion 41 and a cylindrical portion 42. The bottom plate portion 41 blocks the first end 40A. In short, the container 40 has a cup-like shape comprising the bottom plate portion 41 and the cylindrical portion 42. The container 40 may be integrally formed by a method such as drawing applied to a metal sheet.

[0046] The bottom plate portion 41 includes a seat portion 41A and a separated portion 41B at the first end 40A. Specifically, the seat portion 41A contacts a bottom surface of the columnar member 110 with the columnar member 110 inserted, to thereby support the columnar member 110. The separated portion 41B has a shape bulging in a direction away from the bottom surface of the columnar member 110 and is separated from the bottom surface of the columnar member 110. Since the portion occupied by the columnar member 110 is the atomization chamber, the seat portion 41A may be considered to comprise part of the atomization chamber. The separated portion 41B may be considered to comprise part of the intake channel (fourth channel 84 in Fig. 5).

[0047] Under the condition above, the heater assembly 30 includes the first channel 81, the second channel 82, the third channel 83, the fourth channel 84, the fifth channel 85, and the sixth channel 86.

[0048] The first channel 81 is a channel extending along the predetermined direction X and leading to the inlet 120IN. The second channel is a channel extending

from the first channel 81 along the intersecting direction Y intersecting with the predetermined direction X as viewed in a section of the heater assembly 30 along the predetermined direction X. The third channel 83 is a channel extending from the second channel 82 along the predetermined direction X. The fourth channel 84 is a channel connecting the third channel 83 and the fifth channel 85. The fifth channel 85 and the sixth channel 86 are channels extending along the predetermined direction X and leading to the outlet 120OUT.

[0049] According to the embodiment, the first to fourth channels 81 to 84 form the intake channel for supplying air from the inlet 120IN to the atomization chamber (fifth channel 85 in Fig. 5). The fifth channel 85 and the sixth channel 86 form a channel for aerosol (hereinafter, referred to as an aerosol channel) which is generated when the aerosol source (namely, the columnar member 110 here) is heated by the heater 50. The fifth channel 85 forms the atomization chamber forming at least part of the aerosol channel.

[0050] As described above, according to the embodiment, since aerosol passes through the columnar member 110, the aerosol channel may be considered as the columnar member 110 itself. The atomization chamber is a portion of the aerosol channel to which the heating by the heater 50 contributes. The atomization chamber is therefore a portion occupied by the columnar member 110 in a hollow space of the container 40.

[0051] The third channel 83 is located adjacent to the atomization chamber (fifth channel in Fig. 5) in the intersecting direction Y. The third channel 83 is provided at a position adjacent to the atomization chamber within an area between the first end 40A and the second end 40B in the predetermined direction X. In other words, the third channel 83 may be provided all over the container 40 in the predetermined direction X. Since the atomization chamber may be considered as the columnar member 110 as already mentioned, the third channel 83 is a portion that is not occupied by the columnar member 110 in the hollow space of the container 40.

[0052] The following discussion explains a gas flow from the inlet 120IN to the outlet 120OUT. Firstly, air that flows from the inlet 120IN into the first channel 81 passes through the first channel 81 as an airflow F1 moving along the predetermined direction X. Secondly, air that flows from the first channel 81 into the second channel 82 passes through the second channel 82 as an airflow F2 moving along the intersecting direction Y. Thirdly, air that flows from the second channel 82 into the third channel 83 passes through the third channel 83 as an airflow F3 moving along the predetermined direction X. Fourthly, air that is guided from the third channel 83 to the fifth channel 85 passes through the fourth channel 84 as an airflow F4. Fifthly, air that flows into the fifth channel 85 is mixed with the aerosol generated from the columnar member 110 and then passes through the fifth and sixth channels 85 and 86 as an aerosol flow F5.

[0053] A direction of the aerosol flow F5 moving

through the fifth and sixth channels 85 and 86 is opposite from a direction of the airflow F3 moving through the third channel. When air is sucked in from the inlet 120IN, the atomization chamber (fifth channel 85) guides the aerosol generated from the columnar member 110 in the opposite direction from the airflow direction in the third channel.

(Collar member)

[0054] The collar member according to the embodiment will be now discussed. Figs. 6 and 7 show the collar member 31 according to the embodiment.

[0055] As illustrated in Figs. 6 and 7, the collar member 31 includes a hollow space 31X including the first channel 81, the second channel 82, and the sixth channel 86. The hollow space 31X is in communication with the opening 30X (namely, the inlet 120IN and the outlet 120OUT). The hollow space 31X is in communication with the third channel 83 and the fifth channel 85 (hollow space 40X mentioned later). The collar member 31 includes a protruding portion 32, a notch portion 33, and a wall body 34.

[0056] The protruding portion 32 is a portion protruding beyond the wall body 34 into the hollow space 31X. The protruding portion 32 is so provided as to come into contact with an outer lateral face of the columnar member 110 with the columnar member 110 inserted in the hollow space 31X. The present specification discusses as an example a case in which a protruding portion 32A and a protruding portion 32B are provided as the protruding portion 32. The protruding portion 32A stretches along an outer periphery of the hollow space 31X.

[0057] The notch portion 33 is provided between the protruding portion 32A and the protruding portion 32B. The notch portion 33 forms the first channel 81 through which the air entering from the inlet 120IN passes.

[0058] The wall body 34 has a cylindrical shape and forms at least part of the hollow space 31X. The wall body 34 is positioned closer to the container 40 than the protruding portion 32 and the notch portion 33. The wall body 34 is provided away from the outer lateral face of the columnar member 110. In other words, a gap is provided between an inner lateral face of the wall body 34 and the outer lateral face of the columnar member 110. The inner lateral face of the wall body 34 and the outer lateral face of the columnar member 110 form the second channel 82 through which the air entering from the notch portion 33 passes.

(Container)

[0059] The container according to the embodiment will be discussed below. Figs. 8 to 10 show the container 40 according to the embodiment. Fig. 10 shows a cross-section along a line B-B in Fig. 5.

[0060] As illustrated in Figs. 8 to 10, the container 40 includes a hollow space 40X including the third channel 83, the fourth channel 84, and the fifth channel 85. The

hollow space 40X is in communication with the hollow space 31X of the collar member 31. The container 40 includes the bottom plate portion 41 and the cylindrical portion 42.

[0061] The bottom plate portion 41 includes the seat portion 41A and the separated portion 41B at the first end 40A. The seat portion 41A contacts the bottom surface of the columnar member 110 with the columnar member 110 inserted in the hollow space 40X, which means that the seat portion 41A supports the columnar member 110. The separated portion 41B is separated from the bottom surface of the columnar member 110 with the columnar member 110 inserted in the hollow space 40X. The first end 40A does not necessarily have to have a structure as illustrated in the drawing and may have any structure as long as the first end 40A is capable of at least partially supporting the bottom surface of the columnar member 110 or a region in the vicinity thereof.

[0062] The cylindrical portion 42 sections off the hollow space 40X and includes a holding portion 42A and a separated portion 42B. The holding portion 42A contacts the outer lateral face of the columnar member 110 with the columnar member 110 inserted in the hollow space 40X. Since the atomization chamber is a chamber occupied by the columnar member 110 as already mentioned, the holding portion 42A may be considered as a member that defines the atomization chamber. The separated portion 42B is separated from the outer lateral face of the columnar member 110 with the columnar member 110 inserted in the hollow space 40X. In other words, a gap is provided between an inner lateral face of the separated portion 42B and the outer lateral face of the columnar member 110. The above-mentioned heater 50 may be at least provided in an outer lateral face (peripheral surface) of the cylindrical portion 42 at a place that corresponds to the holding portion 42A. The heater 50 may extend over the entire length or at least part of the length of the cylindrical portion 42 in the predetermined direction X.

[0063] The inner lateral face of the separated portion 42B of the cylindrical portion 42 and the outer lateral face of the columnar member 110 form the third channel 83 through which the air entering from the second channel 82 passes. The separated portion 41B of the bottom plate portion 41 forms the fourth channel 84 through which the air guided from the third channel 83 to the fifth channel 85 passes. Part of the bottom surface of the columnar member 110 and part of the separated portion 42B of the cylindrical portion 42 may be considered to also form the fourth channel 84. The seat portion 41A of the bottom plate portion 41 and the holding portion 42A of the cylindrical portion 42 form the fifth channel 85 (namely, the atomization chamber).

[0064] According to the embodiment, the hollow space 40X includes the third channel 83 and the fifth channel 85. The third channel 83 and the fifth channel 85 are sectioned off by the columnar member 110 being inserted into the hollow space 40X.

[0065] As stated above, the third channel 83 is a portion

that is not occupied by the columnar member 110 in the hollow space 40X, whereas the fifth channel 85 is a portion that is occupied by the columnar member 110 in the hollow space 40X.

(Second channel)

[0066] The second channel according to the embodiment will be now discussed. Fig. 11 shows the second channel 82 according to the embodiment. Fig. 11 is a cross-section along a line C-C in Fig. 5.

[0067] As illustrated in Fig. 11, the second channel 82 is a channel connecting the first channel 81 and the third channel 83. As noted above, the second channel 82 is a channel extending from the first channel 81 along the intersecting direction Y intersecting with the predetermined direction X as viewed in a section of the heater assembly 30 along the predetermined direction X (see Fig. 5, for example).

[0068] The second channel 82 is formed between the inner lateral face of the wall body 34 of the collar member 31 and the outer lateral face of the columnar member 110. The second end 40B of the container 40 may be considered to form at least part of the second channel 82.

[0069] In such a case, the second channel 82 has a shape extending along an outer periphery of the aerosol channel (namely, the columnar member 110 or the sixth channel 86). To be more specific, the second channel 82 includes a channel 82₁ extending in a first direction along an inner periphery of the aerosol channel and a channel 82₂ extending in a second direction that is opposite from the first direction along the inner periphery of the aerosol channel.

(Aerosol leakage)

[0070] The following discusses leakage of aerosol according to the embodiment. Fig. 12 is a view for explaining the leakage of the aerosol according to the embodiment. Fig. 12 is a perspective cross-section of the heater assembly 30.

[0071] When the aerosol leakage happens, the first channel 81, the second channel 82, and the third channel 83 function not as an intake channel but as an aerosol channel. For example, a considerable situation of aerosol leakage is where the user exhales air instead of inhaling air.

[0072] As illustrated in Fig. 12, the aerosol generated from the atomization chamber passes through the third channel 83 as an aerosol flow R3 moving along the predetermined direction X. Subsequently, the aerosol flowing from the third channel 83 into the second channel 82 passes through the second channel 82 as an aerosol flow R2 moving along the intersecting direction Y. The aerosol flowing from the second channel 82 into the first channel 81 passes through the first channel 81 as an aerosol flow R1 moving along the predetermined direction X. The aerosol thus leaks from the inlet 120IN.

[0073] In other words, the aerosol flowing backward through the intake channel repeatedly flows in a curve from the aerosol flow R3 to the aerosol flow R2 and flows in a curve from the aerosol flow R2 to the aerosol flow R1. Accordingly, the aerosol flowing backward through the intake channel can be decreased in temperature by pressure loss.

[0074] There is also a possibility that a turbulent flow generates when the aerosol flow R3 collides against the protruding portion 32 of the collar member 31. Such a turbulent flow encourages a thermal exchange with a wall surface of the collar member 31, so that a decrease in temperature of aerosol can be expected. There is another possibility that a turbulent flow generates when the aerosol flow R2 collides against the wall body 34 of the collar member 31. Such a turbulent flow is also likely to contribute to a decrease in the temperature of aerosol.

(Operation and advantageous effects)

[0075] According to the embodiment, the intake channel has a crank-like shape including the first channel 81, the second channel 82, and the third channel 83. With such a configuration, the curve from the third channel 83 to the second channel 82 and the curve from the second channel 82 to the first channel 81 increase resistance of the intake channel, so that even if the aerosol flows backward from the atomization chamber toward the inlet 120IN, the aerosol flowing backward through the intake channel is decreased in temperature due to pressure loss.

[Modification Example 1]

[0076] Modification Example 1 of the embodiment will be discussed below. The following discussion explains mainly differences from the embodiment. According to Modification Example 1, the heater assembly 30 includes a cylindrical member provided along the outer lateral face of the columnar member 110 at a position adjacent to the second channel 82.

(Cylindrical member)

[0077] The cylindrical member according to Modification Example 1 will be discussed. Figs. 13 to 15 are views for explaining a cylindrical member 90 according to Modification Example 1. Fig. 13 is a cross-section of the heater assembly 30. Figs. 14 and 15 are perspective views of the container 40. Figs. 14 and 15 show the cylindrical member 90 as well as the container 40.

[0078] As illustrated in Figs. 13 to 15, the heater assembly 30 includes the cylindrical member 90. The cylindrical member 90 may comprise a heat conductive member (for example, metal such as SUS (steel use stainless)). The cylindrical member 90 may comprise the same member as the container 40. The cylindrical member 90 is provided at a position adjacent to the second

channel 82. The cylindrical member 90 is provided along the outer lateral face of the columnar member 110. In other words, the cylindrical member 90 has an inner lateral face that partitions off the fifth channel 85.

[0079] The container 40 includes a tapered portion 43 that outwardly spreads toward the second end 40B. The tapered portion 43 is provided continuously to the holding portion 42A but not to the separated portion 42B in the predetermined direction X. The tapered portion 43 holds the cylindrical member 90 so that the inner lateral face of the cylindrical member 90 is aligned with an inner lateral face of the holding portion 42A. Accordingly, the cylindrical member 90 contacts the container 40 at the tapered portion 43.

[0080] At the same time, the cylindrical member 90 is located away from the separated portion 42B for the necessity of bringing the second and third channels 82 and 83 into communication. A gap is provided between the cylindrical member 90 and the separated portion 42B.

[0081] According to Modification Example 1, the cylindrical member 90 may include a portion overlapping the container 40 in the intersecting direction Y. For example, the cylindrical member 90 may include a portion overlapping part of the tapered portion 43 or a portion overlapping the separated portion 42B.

(Second channel)

[0082] The second channel according to Modification Example 1 will be now discussed. Fig. 16 shows the second channel 82 according to Modification Example 1. Fig. 16 is a cross-section along a line D-D in Fig. 13.

[0083] As illustrated in Fig. 16, the second channel 82 is a channel connecting the first channel 81 and the third channel 83. As already mentioned, the second channel 82 is a channel extending from the first channel 81 along the intersecting direction Y intersecting with the predetermined direction X as viewed in a section (see Fig. 13, for example) of the heater assembly 30 along the predetermined direction X.

[0084] At least part of the second channel 82 is formed by the outer lateral face of the cylindrical member 90. For example, the second channel 82 is formed between the inner lateral face of the wall body 34 of the collar member 31 and the outer lateral face of the cylindrical member 90. The second channel 82 may be formed between the inner lateral face of the holding portion 42A of the container 40 and the outer lateral face of the cylindrical member 90.

[0085] In the foregoing case, the second channel 82 has a shape extending along the outer periphery of the aerosol channel (namely, the cylindrical member 90). To be specific, the second channel 82 includes the channel 82₁ extending in the first direction along the inner periphery of the aerosol channel and the channel 82₂ extending along the inner periphery of the aerosol channel in the second direction that is opposite to the first direction.

(Aerosol leakage)

[0086] The following explains leakage of the aerosol according to Modification Example. Fig. 17 is a view for explaining the leakage of the aerosol according to Modification Example 1. Fig. 17 is a perspective cross-section of the heater assembly 30.

[0087] A mechanism of the aerosol leakage is basically the same as the one illustrated in Fig. 12. It should be noted, however, that the aerosol flowing backward through the second channel 82 (aerosol flow R2) passes outside the cylindrical member 90.

(Operation and advantageous effects)

[0088] According to Modification Example 1, at least part of the second channel 82 comprises the cylindrical member 90. With such a configuration, at least part of the second channel 82 is separated away from the columnar member 110, which improves an efficiency of cooling the aerosol flowing backward through the intake channel. The improvement of the cooling efficiency can be expected, for example, if the cylindrical member 90 is formed of a heat-conductive member.

[Other embodiments]

[0089] The invention has been explained by discussing the embodiment. It should be noted that the invention is not limited to the descriptions and drawings that are part of the present disclosure. Those skilled in the art will learn from the disclosure various alternative embodiments, examples, and operational technology.

[0090] According to the above-discussed embodiment and the like, the second channel 82 includes a channel extending in two directions (the channels 82₁ and 82₂) (see Figs. 11 and 16). The embodiment and the like, however, are not limited to the configuration mentioned above. The second channel 82 may include a channel extending in one direction (for example, either one of the channels 82₁ and 82₂).

[0091] Although not particularly mentioned in the embodiment and the like, the second channel 82 may have a shape extending in a spiral manner along the outer periphery of the aerosol channel (columnar member 110 or cylindrical member 90). With such a configuration, the second channel 82 is increased in channel length, which improves the efficiency of cooling the aerosol flowing backward through the intake channel.

[0092] According to the embodiment and the like, the second channel 82 has the shape extending along the outer periphery of the aerosol channel (columnar member 110 or cylindrical member 90). The embodiment, however, does not necessarily have to include the second channel 82 in such a shape. The second channel 82 may have a shape extending along the inner periphery of the aerosol channel. For example, the second channel 82 may be disposed in an inner side of the sixth channel

86 so that the second channel 82 is divided by the sixth channel 86 and a partition wall or the like.

[0093] Although not particularly mentioned in the embodiment and the like, the heater 50 may be provided only in the holding portion 42A of the container 40 without being provided in the separated portion 42B of the container 40. With such a configuration, the heater 50 is not disposed in a region that does not contribute to the heating of the columnar member 110 (a region adjacent to the third channel 83). This suppresses a decrease in efficiency of cooling the aerosol flowing backward through the third channel 83.

[0094] The embodiment and the like illustrate the case where the heater 50 is disposed in the outer lateral face of the container 40. However, the embodiment is not limited to the foregoing case. On the contrary, the heater 50 may be disposed in an inner lateral face of the container 40. The heater 50 also may have a shape that is insertable in the columnar member 110.

[0095] According to the embodiment and the like, the single hollow space 40X of the container 40 includes the third channel 83 and the fifth channel 85. The embodiment, however, is not limited to this configuration. The third channel 83 and the fifth channel 85 may be provided as separate hollow spaces partitioned by a partition wall or the like. Likewise, although the single hollow space 31X of the collar member 31 includes the first channel 81, the second channel 82, and the sixth channel 86, the embodiment is not limited to this configuration. The first channel 81, the second channel 82, and the sixth channel 86 may be provided as separate hollow spaces partitioned by partition walls or the like.

[0096] According to the embodiment and the like, the heater assembly 30 includes the single channel group as a channel group of the first channel 81, the second channel 82, and the third channel 83, albeit having a configuration that the second channel 82 is divided. The embodiment, however, is not limited to this configuration. For example, the heater assembly 30 may include two or more channel groups. In such a case, the two or more channel groups may be so configured as not to be connected to each other. The two or more channel groups also may share at least some channels. For example, the heater assembly 30 may include two or more first channels 81 and further include a second channel 82 connected to all of the two or more first channels 81. In such a case, the heater assembly 30 may include a single third channel 83 or two or more third channels 83.

[0097] The above-discussed embodiment and the like illustrate the case where the aerosol source is solid. The embodiment and the like, however, do not necessarily have to include such an aerosol source. The aerosol source may be liquid. For example, a liquid holding member, such as a wick, is disposed in the atomization chamber, and the aerosol source held by the liquid holding member is heated by a heater. In this case, a solid flavor source (tobacco source, for example) may be provided on a downstream side of aerosol generated from the liq-

uid aerosol source.

Claims

1. A heater assembly comprising:

a heater configured to atomize an aerosol source;
an atomization chamber extending along a predetermined direction to form at least part of an aerosol channel through which aerosol passes, the aerosol being generated when the aerosol source is heated by the heater, and
an intake channel configured to supply air from an inlet to the atomization chamber, the intake channel including:

a first channel extending along the predetermined direction and leading to the inlet;
a second channel extending from the first channel along an intersecting direction intersecting with the predetermined direction as viewed in a section of the heater assembly along the predetermined direction, and
a third channel extending from the second channel along the predetermined direction.

2. The heater assembly according to Claim 1, wherein the third channel is located adjacent to the atomization chamber in the intersecting direction.

3. The heater assembly according to Claim 1 or 2, wherein the second channel has a shape extending along an inner or outer periphery of the aerosol channel.

4. The heater assembly according to Claim 3, wherein the second channel includes a channel extending in a first direction along the inner or outer periphery of the aerosol channel, and a channel extending along the inner or outer periphery of the aerosol channel in a second direction that is opposite to the first direction.

5. The heater assembly according to Claim 3, wherein the second channel has a shape extending in a spiral manner along the inner or outer periphery of the aerosol channel.

6. The heater assembly according to any one of Claims 1 to 5, comprising:

a first end provided on a side where air flows from the intake channel into the atomization chamber, and
a second end provided on a side where aerosol flows out of the atomization chamber,

wherein the third channel is provided at a position adjacent to the atomization chamber within an area between the first end and the second end.

7. The heater assembly according to any one of Claims 1 to 6,

wherein the aerosol source is a columnar article having a column-like shape, and wherein the atomization chamber houses the columnar article and supports the columnar article at the first end provided on the side where air flows from the intake channel into the atomization chamber.

8. The heater assembly according to any one of Claims 1 to 7,

wherein, when air is sucked in from the inlet, the atomization chamber guides the aerosol generated from the aerosol source in an opposite direction to an airflow direction in the third channel.

9. The heater assembly according to Claim 7 or Claim 8 referring to Claim 7,

wherein at least part of the second channel is formed by an outer lateral face of the columnar article with the columnar article inserted in the atomization chamber.

10. The heater assembly according to Claim 7 or Claim 8 referring to Claim 7, comprising:

a cylindrical member provided along an outer lateral face of the columnar member at a position adjacent to the second channel, wherein at least part of the second channel is formed by an outer lateral face of the cylindrical member.

11. The heater assembly according to any one of Claims 1 to 10,

wherein the inlet is provided side by side in the intersecting direction with an outlet from which the aerosol is guided out.

12. The heater assembly according to Claim 11, comprising:

a collar member including a hollow space that forms at least part of the aerosol channel.

13. The heater assembly according to Claim 12, wherein at least part of the second channel is formed by the collar member.

14. The heater assembly according to Claim 12 or 13, wherein the hollow space of the collar member includes at least part of the aerosol channel and the

first channel.

15. The heater assembly according to any one of Claims 1 to 14, comprising:

a container with a hollow space including the atomization chamber and the third channel.

16. A flavor inhaler including the heater assembly according to any one of Claims 1 to 15.

Fig. 1

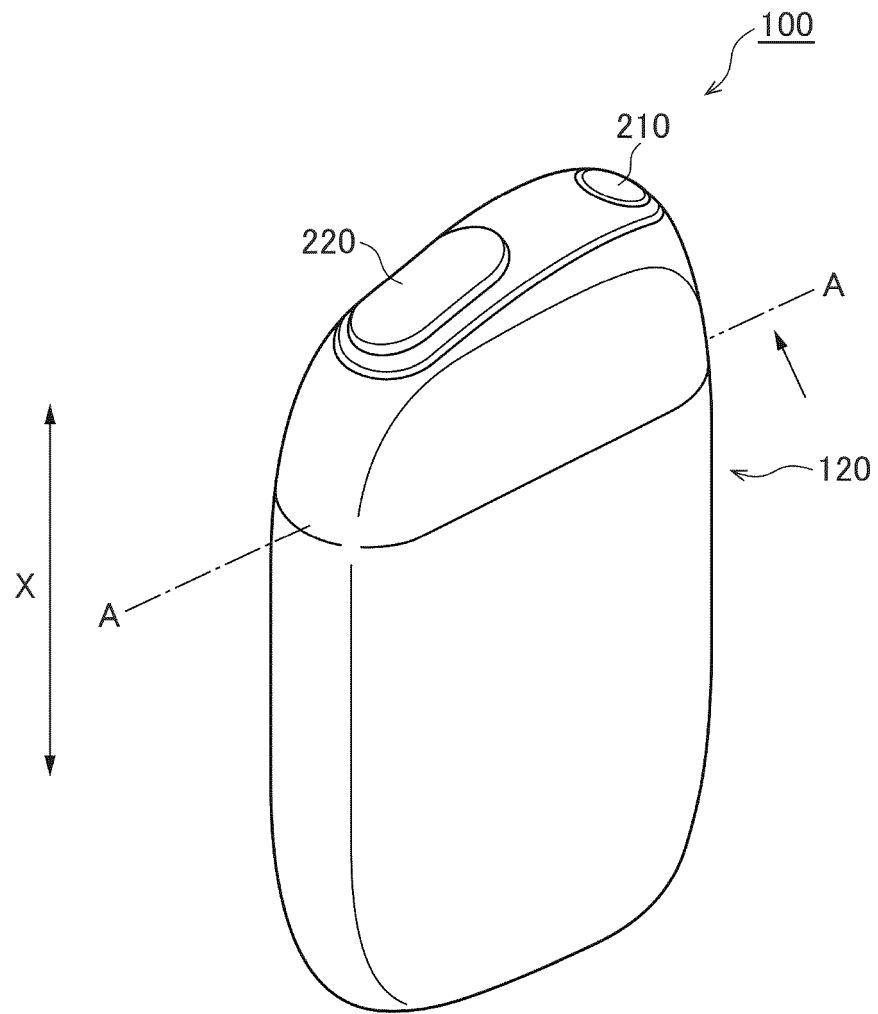


Fig. 2

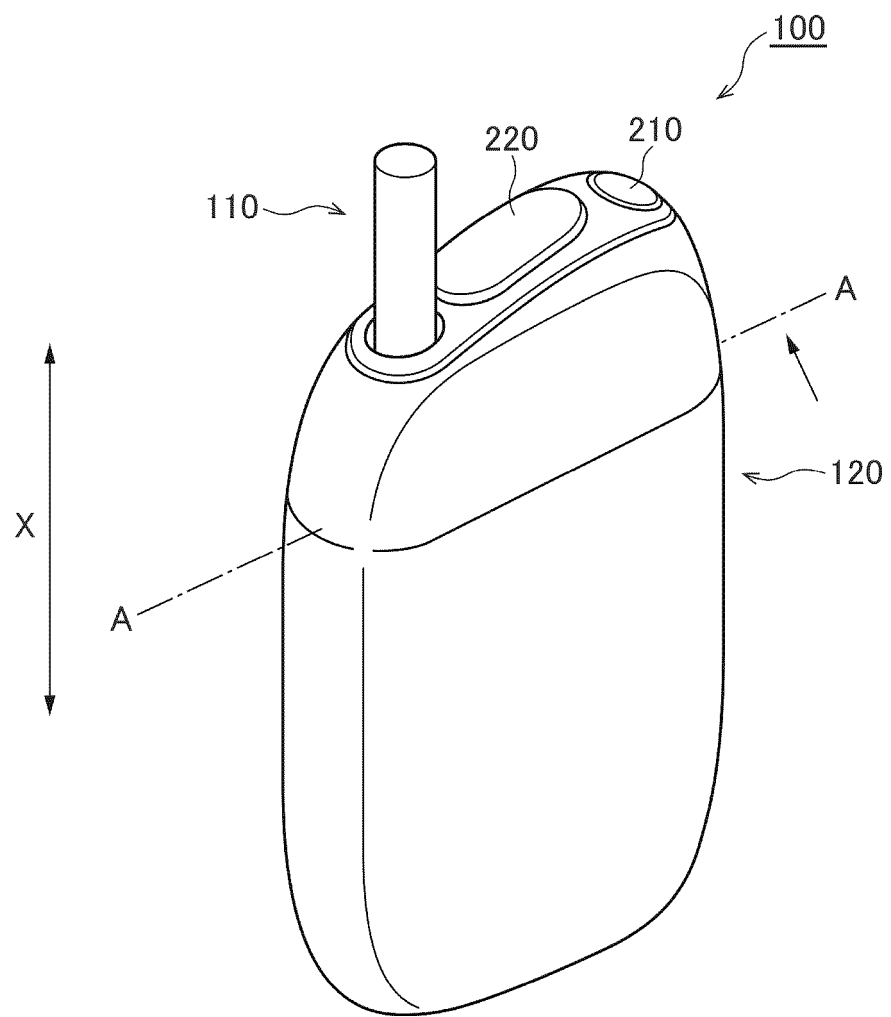


Fig. 3

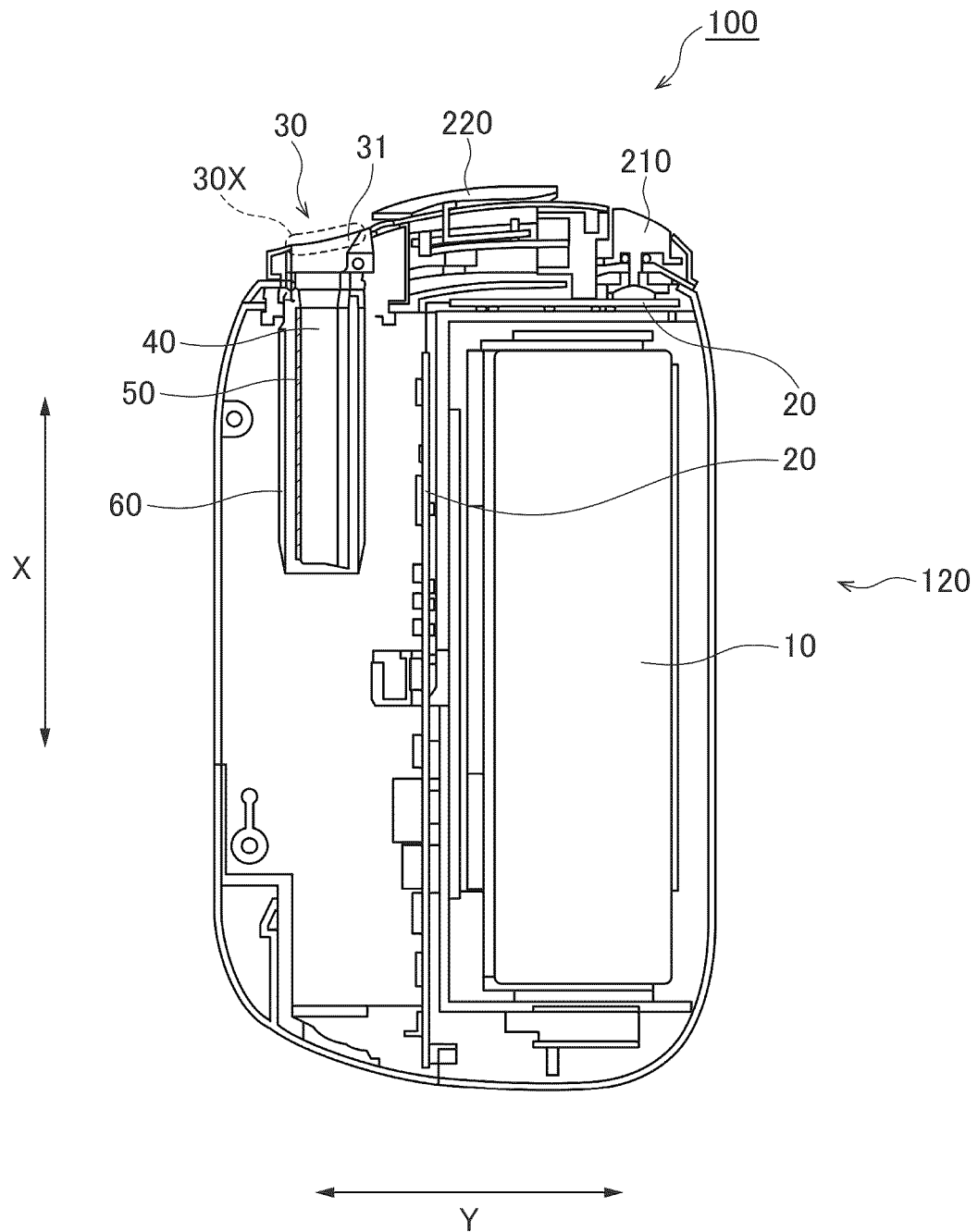


Fig. 4

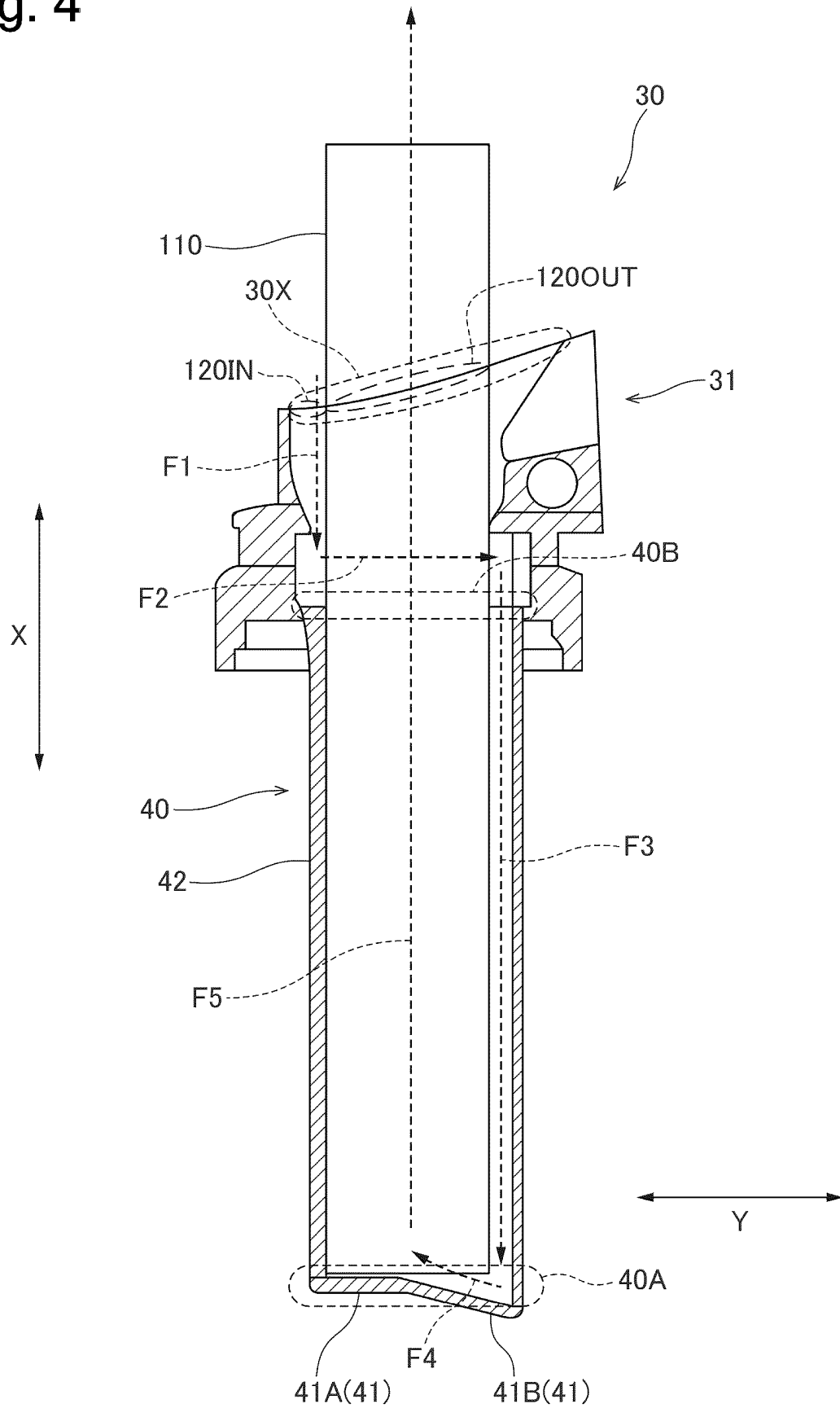


Fig. 5

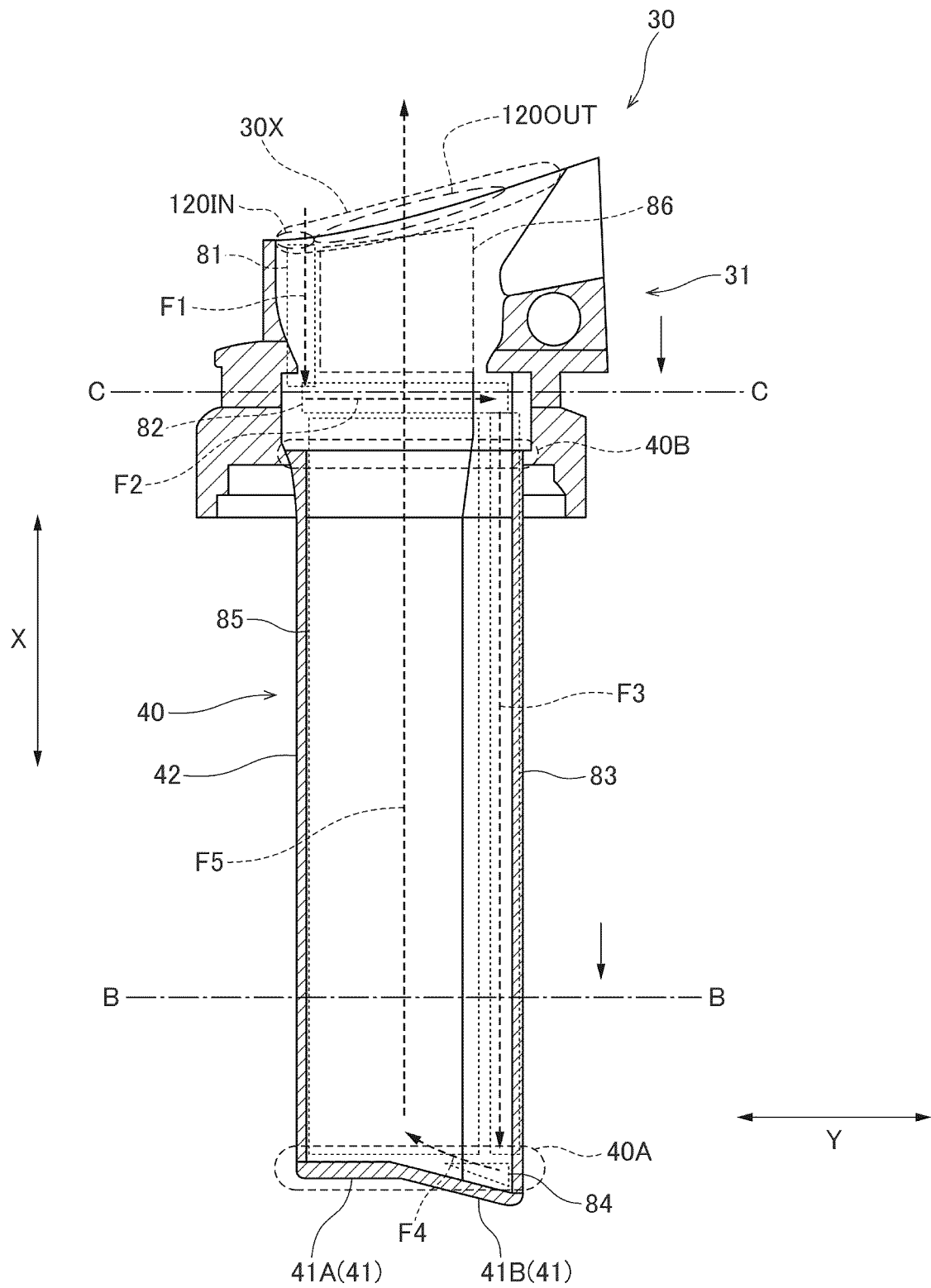


Fig. 6

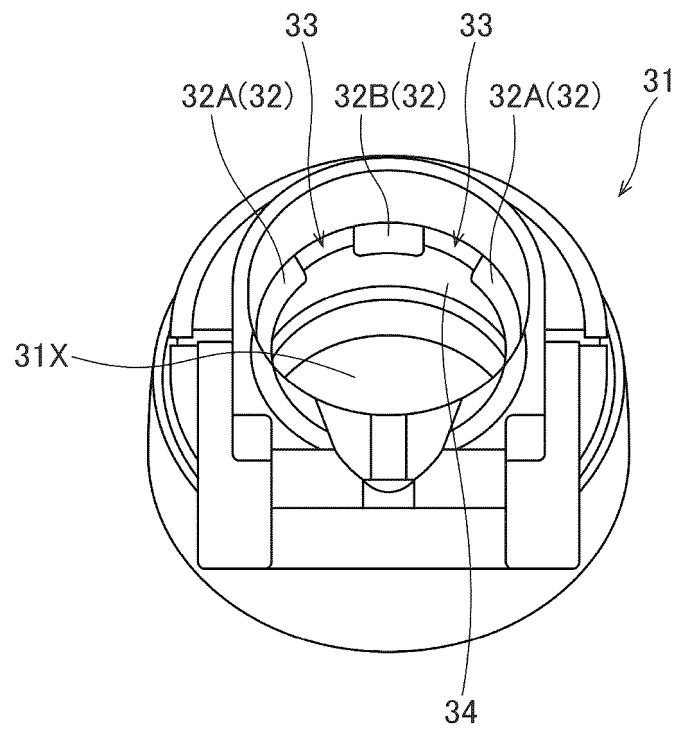


Fig. 7

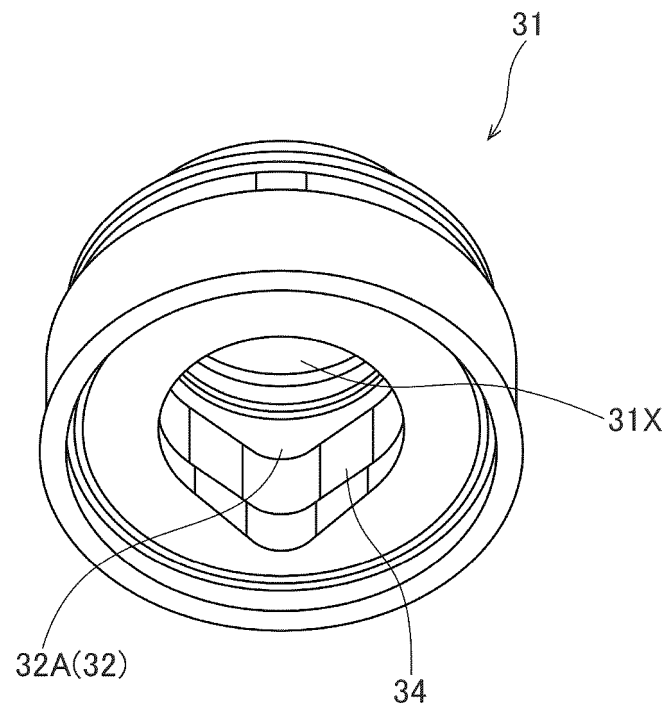


Fig. 8

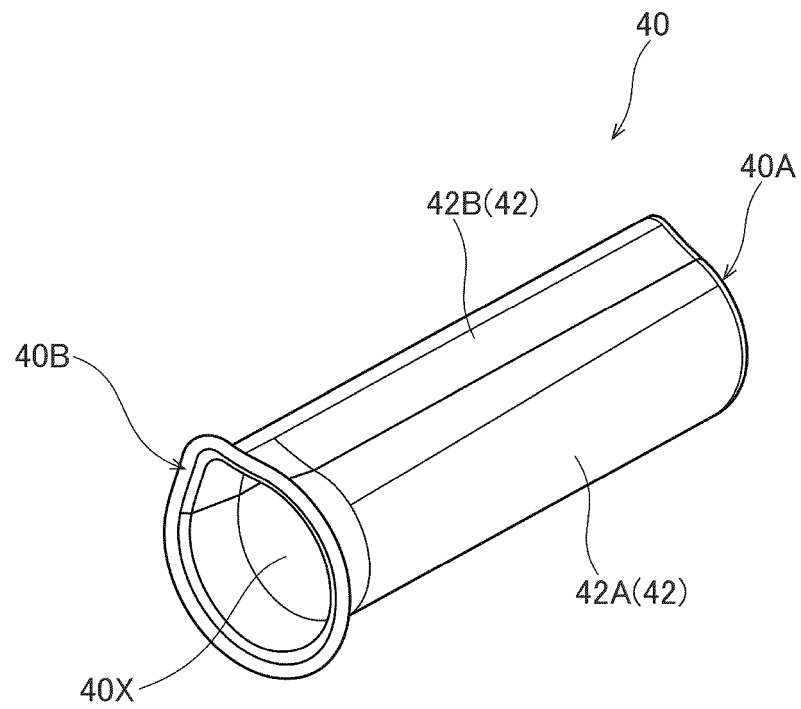


Fig. 9

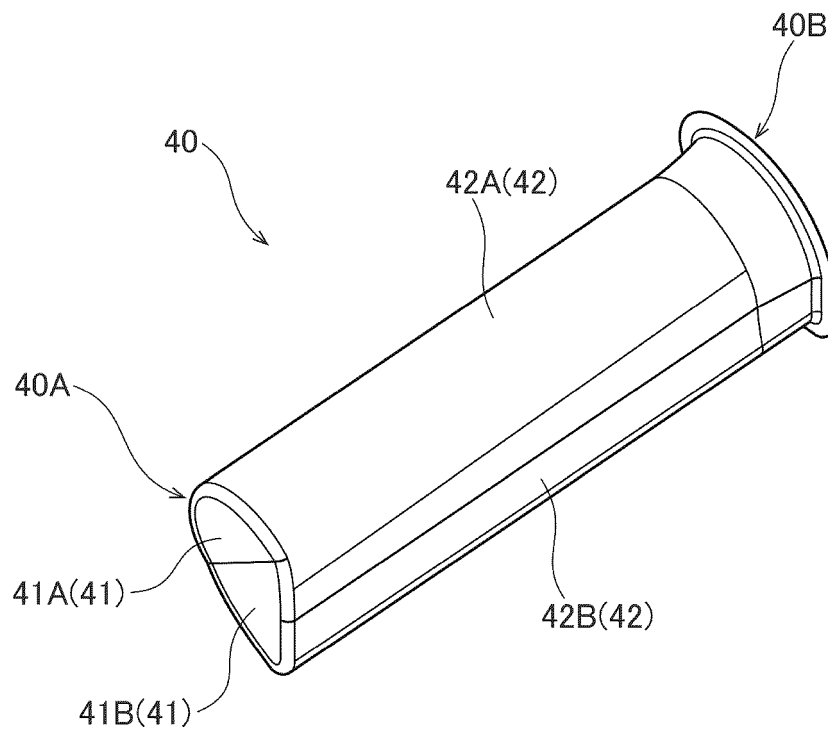


Fig. 10

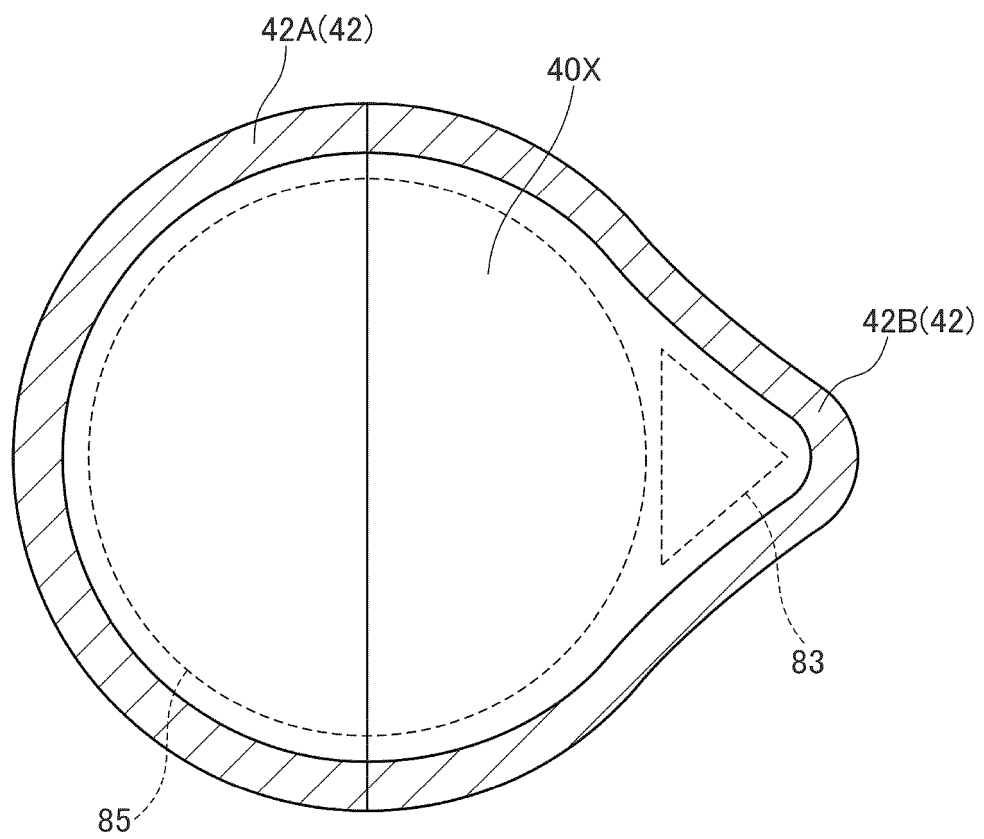


Fig. 11

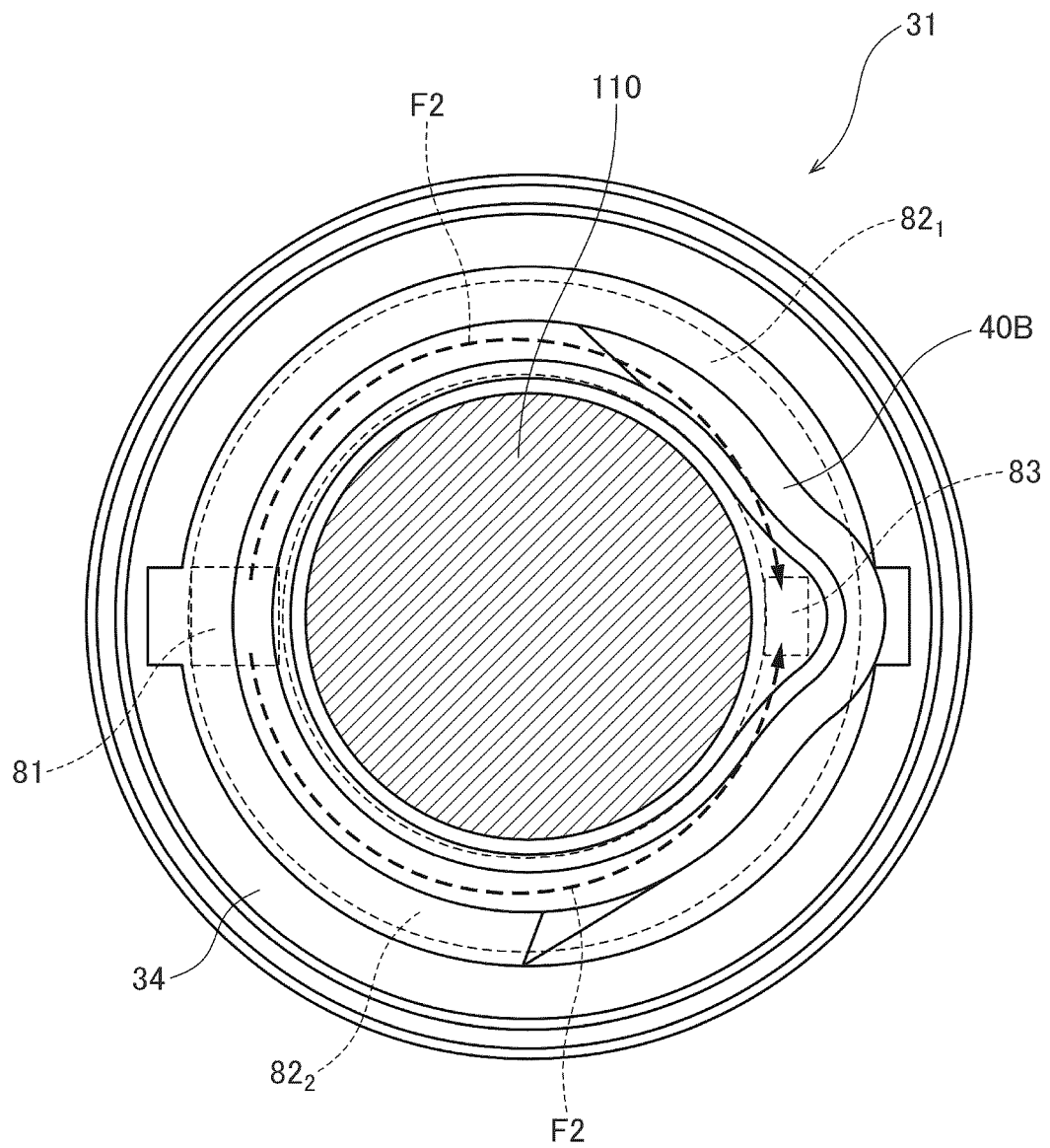


Fig. 12

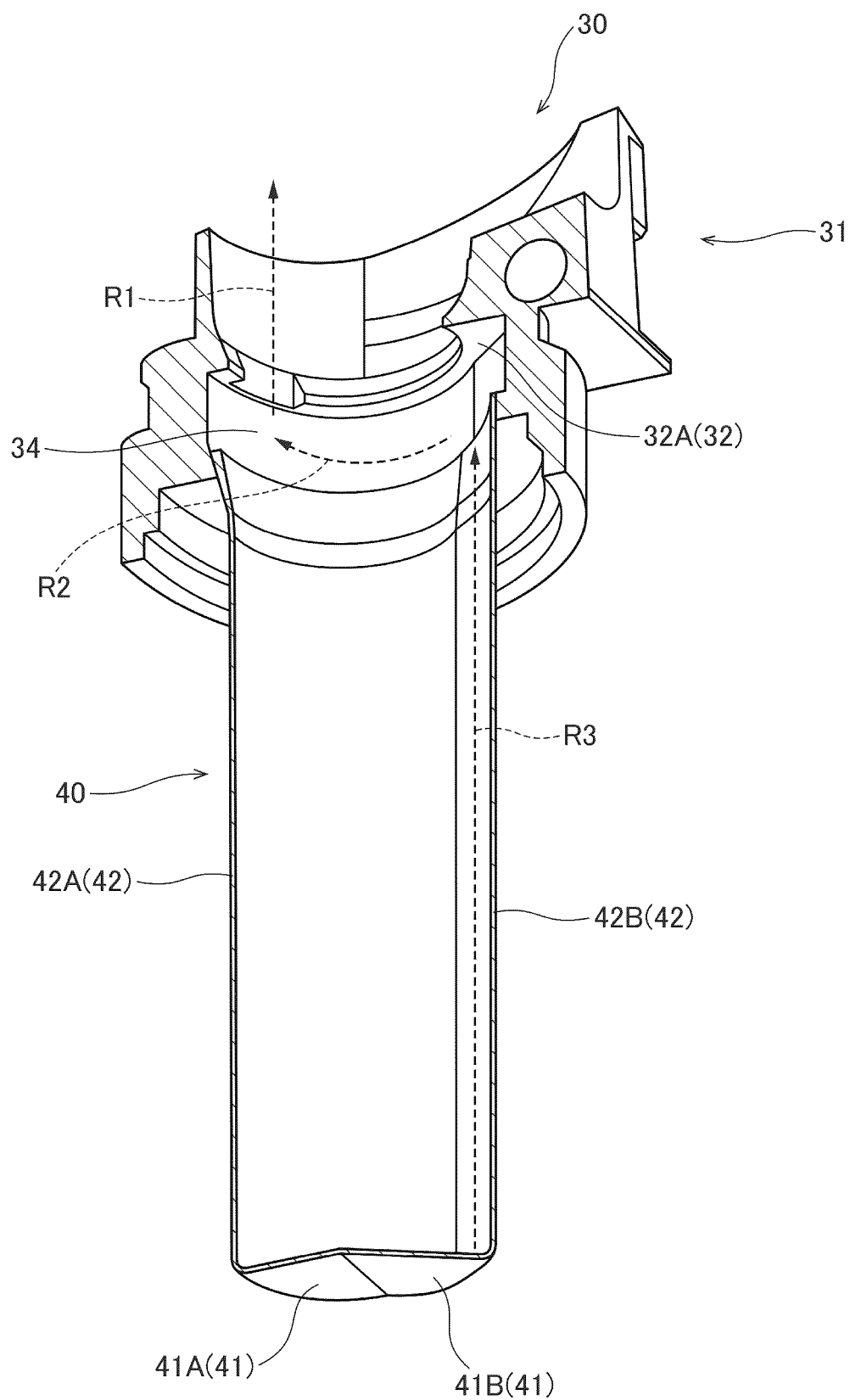


Fig. 13

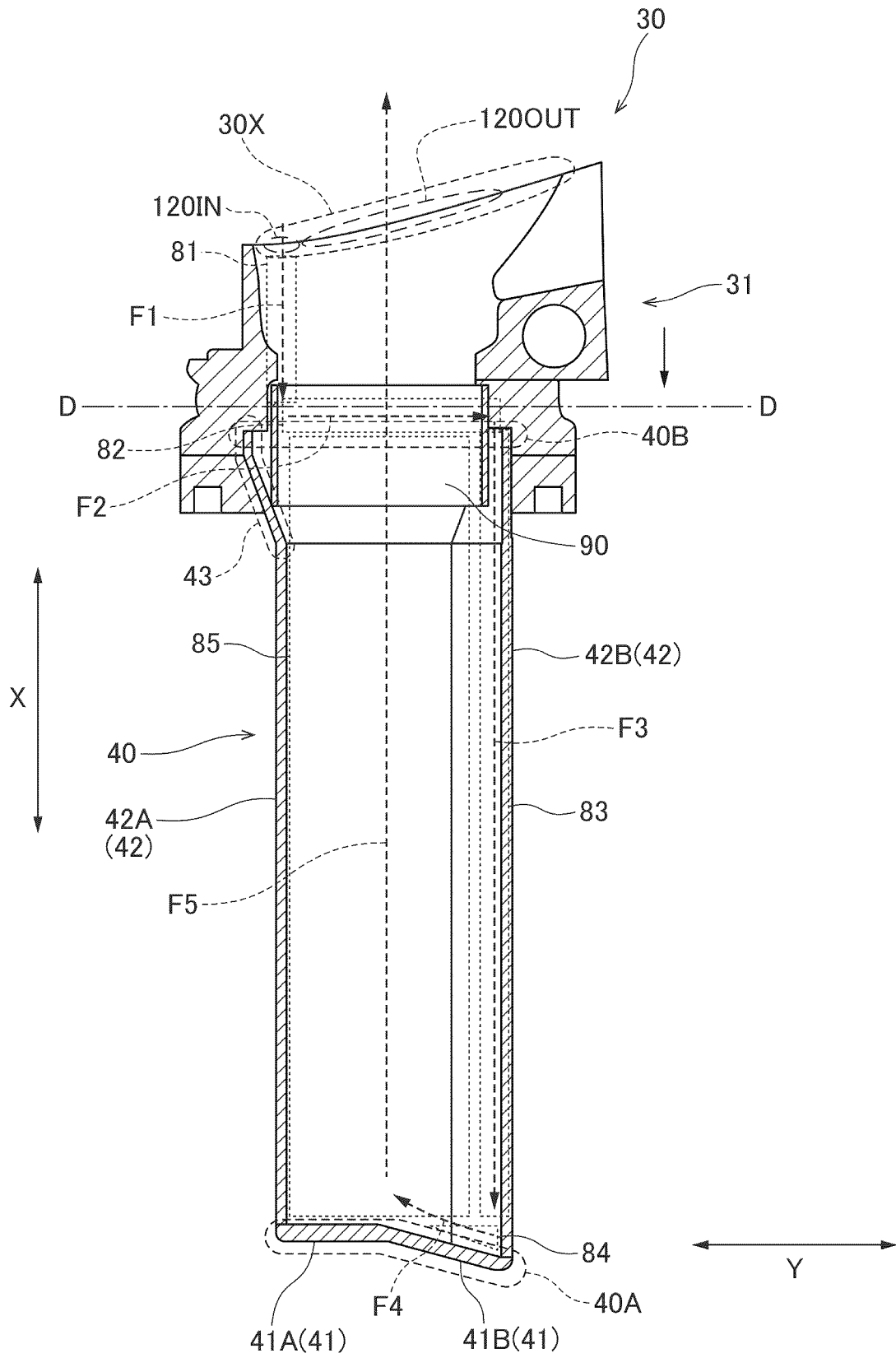


Fig. 14

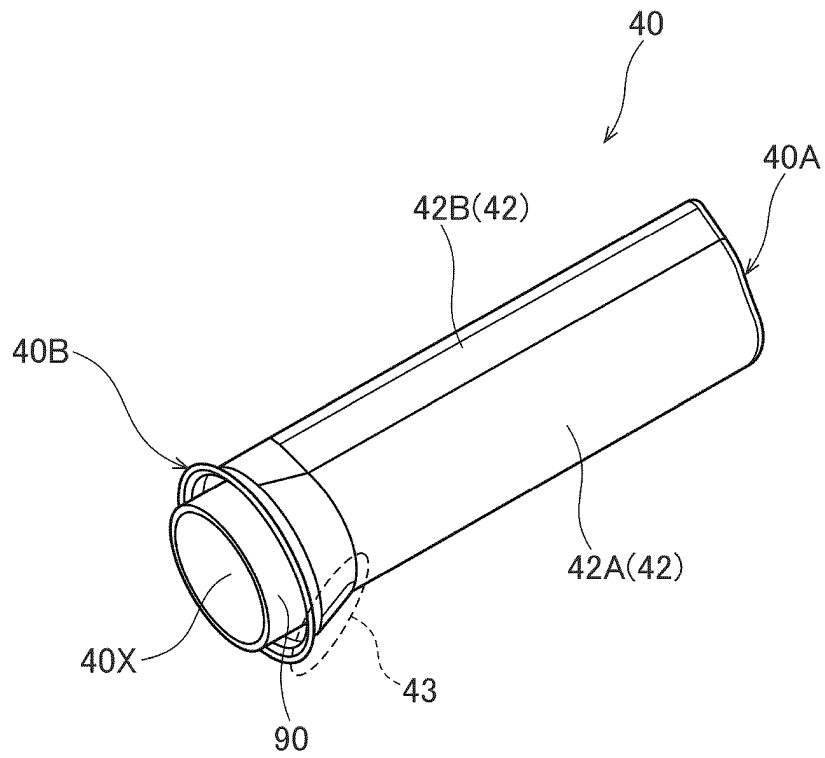


Fig. 15

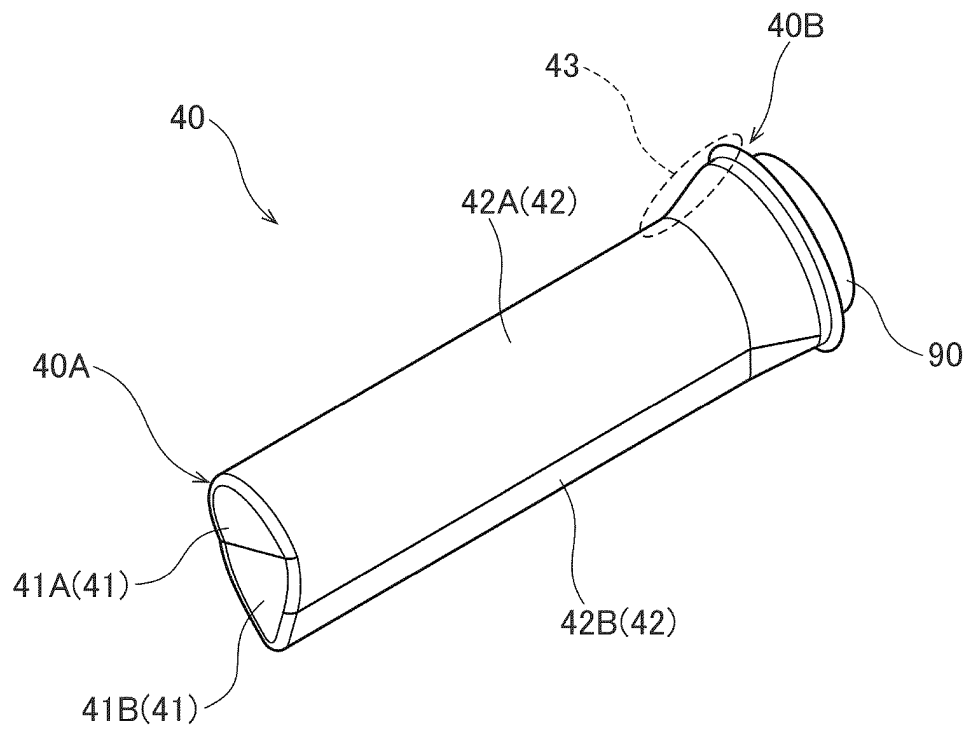


Fig. 16

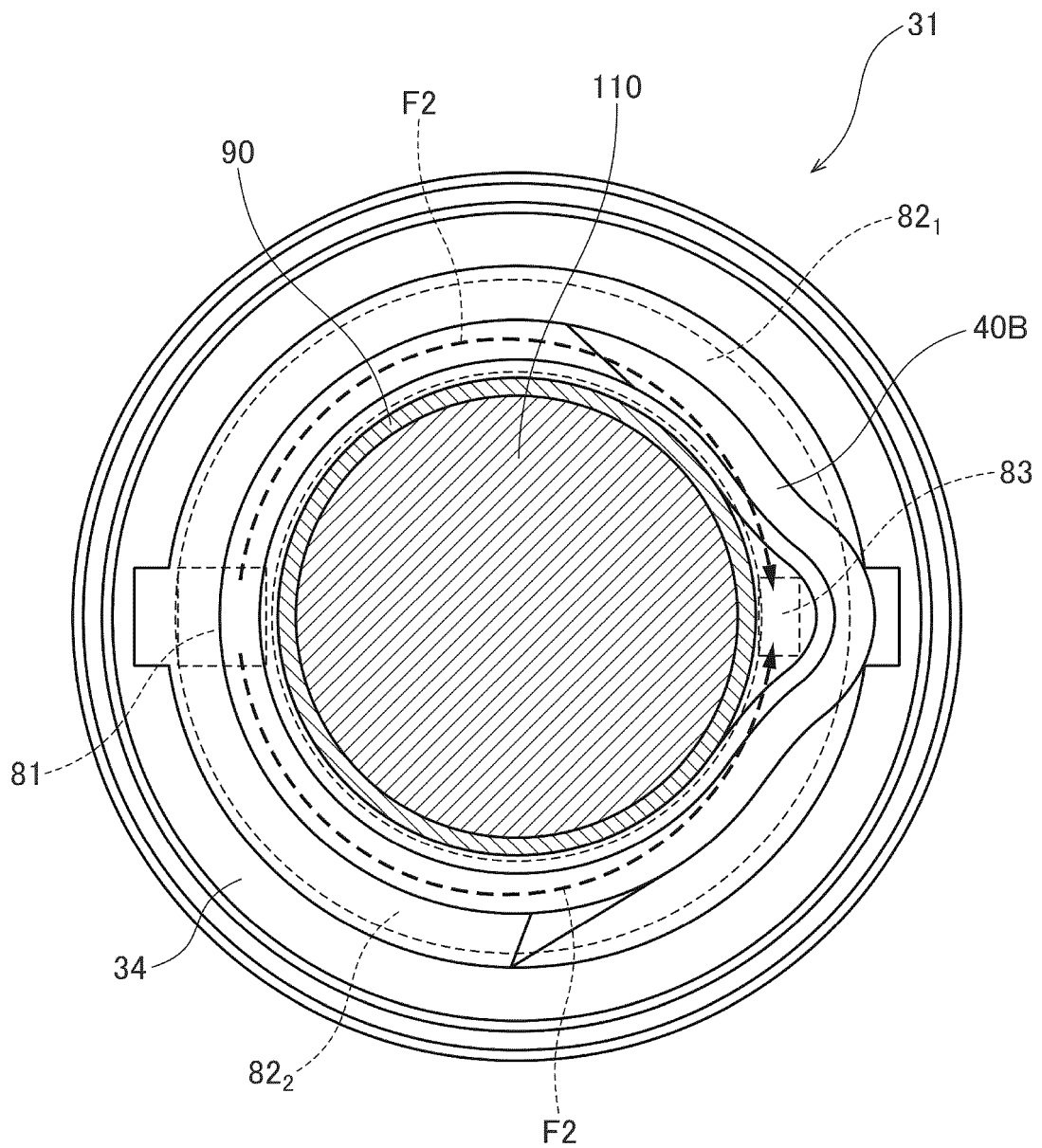
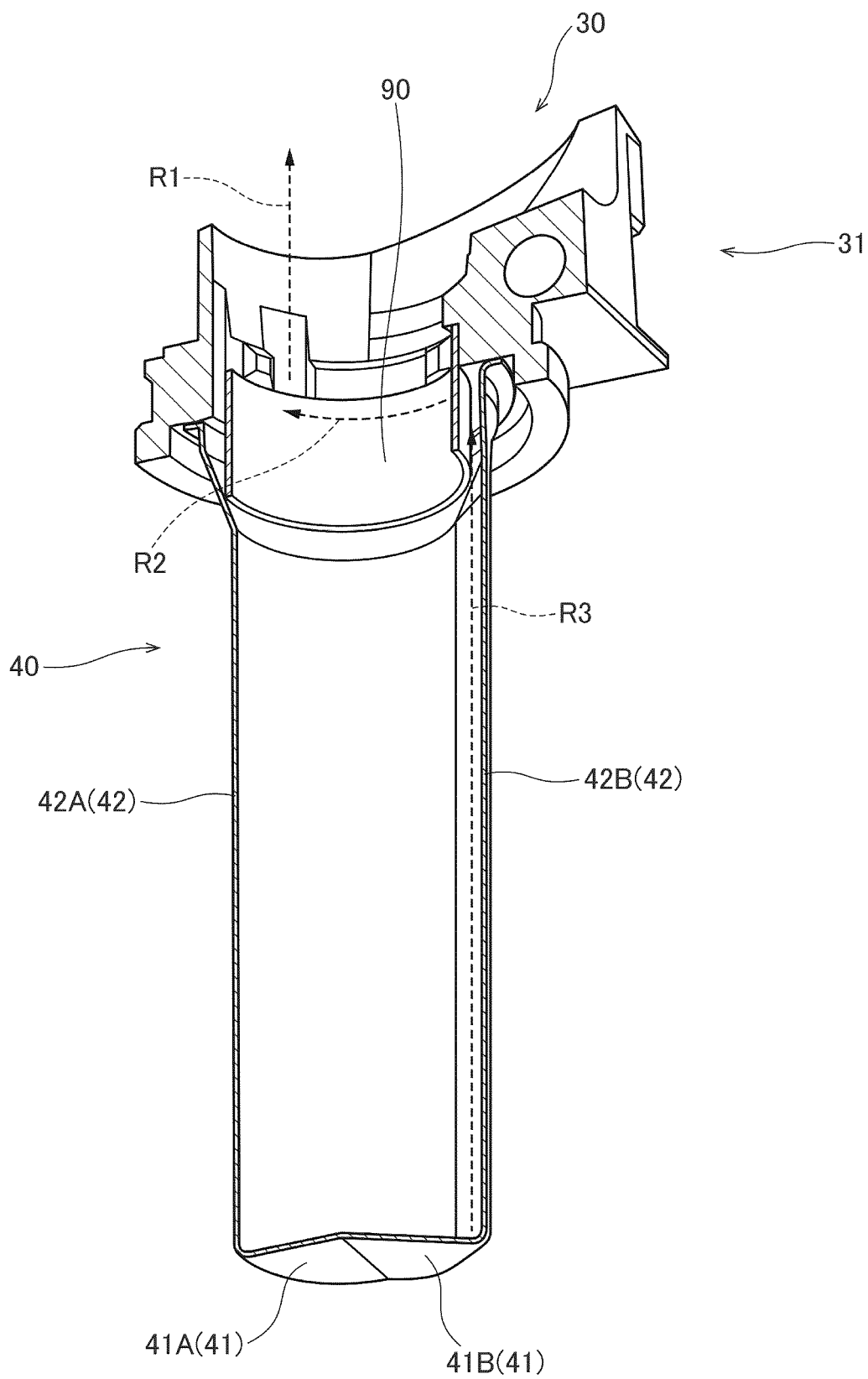


Fig. 17



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/026147

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. A24F47/00 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int. Cl. 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 1971-2019
Registered utility model specifications of Japan 1996-2019
Published registered utility model applications of Japan 1994-2019

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	CO., LTD.) 26 April 2018, paragraphs [0035]-	2, 6-8, 11-12
A	[0038], fig. 1, 2, 4 & WO 2016/150019 A1 & EP	3-5, 9-10, 13-
	3275319 A1, paragraphs [0036]-[0039], fig. 1, 2, 4	14
	& CN 104770878 A & KR 10-2017-0128354 A	
Y	JP 2015-504667 A (PHILIP MORRIS PRODUCTS S.A.) 16	2, 6-8, 11-12
	February 2015, paragraphs [0051]-[0054], fig. 1, 2	
	& US 2014/0338686 A1, paragraphs [0062]-[0065],	
	fig. 1, 2 & WO 2013/102609 A2 & EP 2800486 A2 & CN	
	104135881 A & KR 10-2014-0123487 A	



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search
11.09.2019

Date of mailing of the international search report
24.09.2019

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/026147

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Form PCT/ISA/210 (continuation of second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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- JP 2006505281 A [0003]