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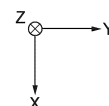
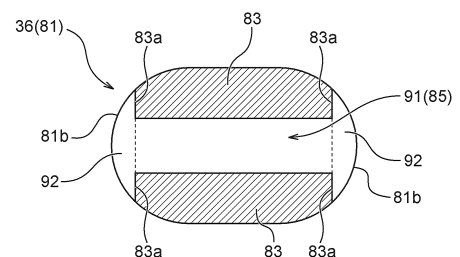
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(54) **FLAVOR INHALER**

(57) There is provided a flavor inhaler including an accommodating portion that houses a consumable, and a protruding portion that is disposed on a contact surface inside the accommodating portion, that demarcates, in a periphery of the contact surface, a first air passage that communicates with inside of the consumable, and that is capable of coming into contact with the consumable, where the first air passage passes through at least a part of a center part of the contact surface.

Fig. 8



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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a flavor inhaler.

BACKGROUND ART

[0002] When a consumable such as a stick is inserted in a flavor inhaler, smoking experience of a user may be made less pleasant if an air passage is blocked by chopped pieces from a tip end of the stick. Accordingly, the air passage is desirably secured at a bottom portion of an accommodating portion of the flavor inhaler. In PTL 1, a protruding portion is provided on a bottom portion of an accommodating portion of a flavor inhaler, and the protruding portion protrudes toward a center part of a stick to hold a tip end of the stick.

CITATION LIST

PATENT LITERATURE

[0003] PTL 1: International Publication No. WO 2020/074612

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] The present disclosure provides a flavor inhaler with which an air passage may be prevented from being blocked and an air passage that communicates with a consumable inside an accommodating portion may be secured.

SOLUTION TO PROBLEM

[0005] A first aspect of the present disclosure is a flavor inhaler including: an accommodating portion that houses a consumable; and a protruding portion that is disposed on a contact surface inside the accommodating portion, that demarcates, in a periphery of the contact surface, a first air passage that communicates with inside of the consumable, and that is capable of coming into contact with the consumable, where the first air passage passes through at least a part of a center part of the contact surface.

[0006] In the first aspect described above, the first air passage that communicates with inside of the consumable is formed in a periphery of a center of the contact surface inside the accommodating portion by the protruding portion that is capable of coming into contact with the consumable. Therefore, according to the first aspect, the consumable may be held by the protruding portion, and an air passage that communicates with the consumable inside the accommodating portion may be secured.

[0007] A second aspect of the present disclosure is the flavor inhaler according to the first aspect, where the first air passage includes a first region that communicates with the consumable, and a second region that is positioned upstream of the first region in the first air passage, and that is at least partially divided from the first region by the protruding portion, a length of the second region in a width direction that is orthogonal to a proceeding direction of the first air passage in a plan view projected on the contact surface being greater than the first region.

[0008] According to the second aspect described above, the first air passage is formed in a periphery of the contact surface inside the accommodating portion by the contact portion that is in contact with the consumable, the first air passage communicating with inside of the consumable through the second region and the first region and having a shape that is narrowed toward downstream. The second region on the upstream side with a great width is suitable for housing chopped pieces from the consumable, and also, air resistance desirable for smoking experience of a user may be obtained by the first air passage that has a tapered shape. Therefore, according to the first aspect, desirable air resistance may be obtained while securing an air passage.

[0009] A third aspect of the present disclosure is the flavor inhaler according to the second aspect, where the second region of the first air passage is formed on two end portions of the contact surface that face each other.

[0010] In the third aspect described above, the second region of the first air passage is formed on the two end portions of the contact surface of the contact surface that face each other, and air flows to the first region on the downstream by passing the center part of the contact surface through the two end portions. According to the structure, two second regions are present on the upstream with respect to the first region on the downstream that communicates with inside of the consumable, the two second regions facing each other. Therefore, according to the third aspect, because air flows into the consumable from two facing directions, air can be evenly supplied to the consumable.

[0011] A fourth aspect of the present disclosure is the flavor inhaler according to the second or third aspect, where the first region of the first air passage is located between two protruding portions that face each other.

[0012] In the fourth aspect described above, the two protruding portions that face each other are provided on the contact surface, and the first region that communicates with the consumable is formed between the two protruding portions. Therefore, according to the fourth aspect, the consumable may be stably held by the two protruding portions.

[0013] A fifth aspect of the present disclosure is the flavor inhaler according to the second to fourth aspects, where a region of the contact surface where the second region is formed is sloped relative to a region where the first region is formed.

[0014] In the fifth aspect described above, a lower sur-

face of the second region of the first air passage is sloped. Due to the sloping, a greater space may be obtained for the second region. Therefore, according to the fifth aspect, chopped pieces from the consumable may be appropriately housed in the second region on the upstream having a great capacity.

[0015] A sixth aspect of the present disclosure is the flavor inhaler according to the first aspect, where the protruding portion includes a boundary portion that passes through the center part of the contact surface, and the boundary portion of the protruding portion divides a space in the periphery of the contact surface into the protruding portion and the first air passage.

[0016] In the sixth aspect described above, the space in the periphery of the contact surface is divided into two, into the protruding portion and the first air passage, by a boundary of the protruding portion provided in the periphery of the center of the contact surface. Therefore, according to the sixth aspect, a large region capable of housing chopped pieces from the consumable may be obtained, an air passage may be prevented from being blocked, and a sufficient air passage may be secured.

[0017] A seventh aspect of the present disclosure is the flavor inhaler according to the first to sixth aspects, where the contact surface includes a transverse direction and a longitudinal direction, and the first air passage extends along the longitudinal direction.

[0018] In the seventh aspect described above, the first air passage that passes through the center part of the contact surface is formed along the longitudinal direction of the contact surface. According to the configuration, a long air passage may be formed in a space directly above the contact surface and having a limited outer edge. Therefore, according to the seventh aspect, the air passage may be prevented from being blocked by accumulated chopped pieces from the consumable thanks to air flowing through the long first air passage.

[0019] An eighth aspect of the present disclosure is the flavor inhaler according to the first to seventh aspects, where the contact surface is provided on a bottom portion of the accommodating portion.

[0020] According to the eighth aspect described above, the first air passage that communicates with inside of the consumable is formed in a periphery of a center of the bottom portion of the accommodating portion, by the protruding portion that is capable of coming into contact with the consumable. Furthermore, a longitudinal direction of the consumable that is inserted in the accommodating portion is perpendicular with respect to the protruding portion. Therefore, according to the eighth aspect, air is supplied from the first air passage formed in the periphery of the bottom portion of the accommodating portion to an end portion of the consumable in the longitudinal direction, and flavor may be extracted from entire inside of the consumable along the longitudinal direction, and flavor may be desirably obtained.

[0021] A ninth aspect of the present disclosure is the flavor inhaler according to the eighth aspect, where a

second air passage is formed between the consumable housed inside the accommodating portion and an inner side surface of the accommodating portion, the second air passage being positioned on an upstream side on the first air passage and communicating with the first air passage.

[0022] According to the ninth aspect described above, the second air passage that is on the upstream and that communicates with the first air passage on the downstream is formed inside the accommodating portion, between the consumable and the inner side surface of the accommodating portion. Therefore, according to the ninth aspect, an upstream air passage may be provided on a side wall of the accommodating portion (a so-called counter-flow structure), and thus, another passage for taking in air does not have to be provided at a part lower than a bottom surface of the consumable (a so-called bottom-flow structure), and the entire device may be miniaturized.

[0023] A tenth aspect of the present disclosure is the flavor inhaler according to the ninth aspect, where the inner side surface of the accommodating portion includes a pressing portion that presses a part of the consumable that is housed, and a non-pressing portion, and the second air passage is formed between the consumable that is housed inside the accommodating portion and the non-pressing portion.

[0024] According to the tenth aspect described above, the second air passage that is on the upstream and that communicates with the first air passage on the downstream is formed inside the accommodating portion, between the consumable and the non-pressing portion. Therefore, according to the tenth aspect, the air passage on the upstream may be formed on the side wall of the accommodating portion by a simple structure.

[0025] An eleventh aspect of the present disclosure is the flavor inhaler according to the ninth or tenth aspect citing the second aspect, where the first air passage and the second air passage communicate with each other in the second region.

[0026] According to the eleventh aspect described above, an air passage that extends through the second air passage, the second region and the first region and that communicates with inside of the consumable is formed inside the accommodating portion. Therefore, according to the eleventh aspect, an air passage that extends along the inner side surface and the bottom surface of the consumable to communicate with the consumable may be secured simply by inserting the consumable in the accommodating portion.

[0027] A twelfth aspect of the present disclosure is the flavor inhaler according to the eleventh aspect, where an outer edge of the contact surface is formed as a shape that is defined by two arcs that face each other, and two straight lines that connect end portions of the two arcs that face each other, and the second region of the first air passage is delineated by the arc and a line segment that is defined by an outer edge of the protruding portion

and that extends in a direction perpendicular to the straight line.

[0028] In the twelfth aspect described above, the second air passage on the upstream that is formed on the inner side surface of the consumable communicates with the second region that is formed near an arc-shaped end portion of the contact surface, and the second region extends through the center part of the contact surface and communicates with the consumable via the first region on the downstream. Therefore, according to the second aspect, a desirable natural passage may be secured in the flavor inhaler simply by inserting the consumable in the accommodating portion.

[0029] A thirteenth aspect of the present disclosure is the flavor inhaler according to the first to twelfth aspects, where the protruding portion includes a top surface that at least partially comes into contact with the consumable, and Formula (1) below is satisfied: $A1 > 0.5 \times A2$ (1), where in Formula (1), in a plan view projected on the contact surface, A1 is an area of a part of the top surface that is in contact with the consumable, and A2 is an area of an end surface of the consumable that is in contact with the top surface, the consumable being housed in the accommodating portion.

[0030] According to the thirteenth aspect described above, the area of the part of the top surface of the protruding portion that is in contact with the consumable is greater than a half of the area of the end surface of the consumable in the plan view projected on the contact surface. Therefore, according to the thirteenth aspect, a contact area between the protruding portion and the consumable may be sufficiently secured, and the protruding portion may stably hold a tip end of the consumable.

[0031] A fourteenth aspect of the present disclosure is the flavor inhaler according to the first to thirteenth aspects, where the protruding portion includes a top surface that at least partially comes into contact with the consumable, and Formula (2) below is satisfied: $0.8 \times A2 > A1$ (2), where in Formula (2), in a plan view projected on the contact surface, A1 is an area of a part of the top surface that is in contact with the consumable, and A2 is an area of an end surface of the consumable that is in contact with the top surface, the consumable being housed in the accommodating portion.

[0032] According to the fourteenth aspect described above, the area of the part of the top surface of the protruding portion that is in contact with the consumable is smaller than 0.8 times the area of the end surface of the consumable. Therefore, according to the fourteenth aspect, the first region of the first air passage that communicates with the consumable may be sufficiently secured.

BRIEF DESCRIPTION OF DRAWINGS

[0033]

[Fig. 1A] Fig. 1A is a schematic front view of a flavor inhaler according to the present disclosure.

[Fig. 1B] Fig. 1B is a schematic top view of the flavor inhaler according to the present disclosure.

[Fig. 1C] Fig. 1C is a schematic bottom view of the flavor inhaler according to the present disclosure.

[Fig. 2] Fig. 2 is a schematic cross-sectional side view of a consumable.

[Fig. 3] Fig. 3 is a cross-sectional view of the flavor inhaler taken along arrows 3-3 shown in Fig. 1B.

[Fig. 4A] Fig. 4A is a perspective view of a chamber.

[Fig. 4B] Fig. 4B is a cross-sectional view of the chamber taken along arrows 4B-4B shown in Fig. 4A.

[Fig. 5A] Fig. 5A is a cross-sectional view of the chamber taken along arrows 5A-5A shown in Fig. 4B.

[Fig. 5B] Fig. 5B is a cross-sectional view of the chamber taken along arrows 5B-5B shown in Fig. 4B.

[Fig. 6] Fig. 6 is a perspective view of the chamber and a heating unit.

[Fig. 7] Fig. 7 is a cross-sectional view shown in Fig. 5B, where the consumable is disposed at a desired position inside the chamber.

[Fig. 8] Fig. 8 is a top view of a bottom member.

[Fig. 9] Fig. 9 is a perspective view of the bottom member.

[Fig. 10] Fig. 10 is a schematic perspective view showing air passages inside the chamber.

[Fig. 11] Fig. 11 is a top view showing a first modification of the bottom member.

[Fig. 12] Fig. 12 is a top view showing a second modification of the bottom member.

[Fig. 13] Fig. 13 is a top view showing a third modification of the bottom member.

[Fig. 14] Fig. 14 is a cross-sectional view showing a fourth modification of the bottom member, taken along arrows 14-14 shown in Fig. 9.

DESCRIPTION OF EMBODIMENTS

[0034] Hereinafter, an embodiment of the present disclosure will be described with reference to the drawings. In the drawings described below, same or corresponding structural elements will be denoted by a same reference sign, and redundant description thereof will be omitted.

[0035] Fig. 1A is a schematic front view of a flavor inhaler 100 according to the present disclosure. Fig. 1B is a schematic top view of the flavor inhaler 100 according to the present disclosure. Fig. 1C is a schematic bottom view of the flavor inhaler 100 according to the present disclosure. In the drawings described in the present specification, an X-Y-Z orthogonal coordinate system may be added for the sake of description. In the coordinate system, a Z-axis faces vertically upward, an X-Y plane cuts the flavor inhaler 100 in a horizontal direction, and a Y-axis extends from a front surface to a back surface of the flavor inhaler 100. The Z-axis may also be said to be an insertion direction of a consumable that is to be housed in a chamber 50 of an atomizing unit 30 described later, or an axial direction of a heat insulating portion having a cylindrical shape. Furthermore, an X-axis may be said to

be a first direction that is orthogonal to the axial direction, and the Y-axis may be said to be a second direction that is orthogonal to the axial direction and the first direction. Moreover, an X-axis direction may be said to be a longitudinal direction of the flavor inhaler 100 on a plane that is orthogonal to the insertion direction of the consumable, and a Y-axis direction may be said to be a transverse direction of the flavor inhaler 100 on the plane that is orthogonal to the insertion direction of the consumable.

[0036] For example, the flavor inhaler 100 according to the present disclosure generates an aerosol including a flavor by heating a stick-shaped consumable including a flavor source including an aerosol source.

[0037] As shown in Figs. 1A to 1C, the flavor inhaler 100 includes an outer housing 101, a slide cover 102, and a switch unit 103. The outer housing 101 forms an outermost housing of the flavor inhaler 100, and has a size that can be fitted in a hand of a user. At the time of using the flavor inhaler 100, a user may hold the flavor inhaler 100 in the hand, and may inhale the aerosol. The outer housing 101 may be formed by assembling a plurality of members. For example, the outer housing 101 may be formed of polycarbonate, acrylonitrile-butadiene-styrene (ABS) resin, polyether ether ketone (PEEK), a polymer alloy containing a plurality of types of polymers, or metal such as aluminum.

[0038] The outer housing 101 includes an opening, not shown, for receiving a consumable, and the slide cover 102 is slidably attached to the outer housing 101 to close the opening. More specifically, the slide cover 102 is movable along an outer surface of the outer housing 101, between a close position of closing the opening in the outer housing 101 (a position shown in Figs. 1A and 1B) and an open position of opening the opening. For example, the slide cover 102 may be moved between the close position and the open position by the user manually operating the slide cover 102. The slide cover 102 may thus allow or restrict access of the consumable into the flavor inhaler 100.

[0039] The switch unit 103 is used to switch between on and off of operation of the flavor inhaler 100. For example, as described later, when a user operates the switch unit 103 in a state where the consumable is inserted in the flavor inhaler 100, power may be supplied from a power source 21 to a heating unit 40, and the consumable may be heated without being burnt. Additionally, the switch unit 103 may be a switch that is provided outside the outer housing 101, or may be a switch positioned inside the outer housing 101. In the case where the switch is positioned inside the outer housing 101, the switch is indirectly pressed when the switch unit 103 on a surface of the outer housing 101 is pressed. In the present disclosure, an example is described where the switch of the switch unit 103 is positioned inside the outer housing 101.

[0040] The flavor inhaler 100 may further include a terminal, not shown. The terminal may be an interface for connecting the flavor inhaler 100 to an external power

source, for example. In the case where the power source of the flavor inhaler 100 is a rechargeable battery, current may be supplied from the external power source to the power source and the power source may be charged when the external power source is connected to the terminal. Furthermore, data about operation of the flavor inhaler 100 may be transmitted to an external device by connecting a data transmission cable to the terminal.

[0041] Next, a consumable that is used with the flavor inhaler 100 according to the present disclosure will be described. Fig. 2 is a schematic cross-sectional side view of a consumable 110. In the present disclosure, a smoking system may be formed by the flavor inhaler 100 and the consumable 110. In the example shown in Fig. 2, the consumable 110 includes a smokable substance 111, a cylindrical member 114, a hollow filter portion 116, and a filter portion 115. The smokable substance 111 is wrapped with a first rolling paper 112. The cylindrical member 114, the hollow filter portion 116, and the filter portion 115 are wrapped with a second rolling paper 113 different from the first rolling paper 112. The second rolling paper 113 is also wrapped around a part of the first rolling paper 112 that is wrapped around the smokable substance 111. The cylindrical member 114, the hollow filter portion 116, and the filter portion 115 are thus joined to the smokable substance 111. Additionally, the second rolling paper 113 may be omitted, and the cylindrical member 114, the hollow filter portion 116, and the filter portion 115 may instead be joined to the smokable substance 111 using the first rolling paper 112. A lip release agent 117 is applied on an outer surface of the second rolling paper 113, around an end portion on the filter portion 115 side, to prevent lips of the user from sticking to the second rolling paper 113. The part of the consumable 110 where the lip release agent 117 is applied functions as a mouthpiece of the consumable 110.

[0042] The smokable substance 111 may include a flavor source, such as finely-cut or powdered tobacco, and an aerosol source, for example. Furthermore, the first rolling paper 112 wrapped around the smokable substance 111 may be a breathable sheet member. The cylindrical member 114 may be a paper tube or a hollow filter. In the example shown in Fig. 2, the consumable 110 includes the smokable substance 111, the cylindrical member 114, the hollow filter portion 116, and the filter portion 115, but the structure of the consumable 110 is not limited thereto. For example, the hollow filter portion 116 may be omitted, and the cylindrical member 114 and the filter portion 115 may be disposed next to each other.

[0043] Next, an internal structure of the flavor inhaler 100 will be described. Fig. 3 is a cross-sectional view of the flavor inhaler 100 taken along arrows 3-3 shown in Fig. 1B. As shown in Fig. 3, an inner housing 10 is provided inside the outer housing 101 of the flavor inhaler 100. For example, the inner housing 10 may be formed of polycarbonate (PC), acrylonitrile-butadiene-styrene (ABS) resin, PEEK, a polymer alloy containing a plurality of types of polymers, or metal such as aluminum, but the

material of the inner housing 10 is not particularly specified. A power source unit 20 and the atomizing unit 30 are provided in an internal space of the inner housing 10. A circuit unit, not shown, is also provided in the inner space of the inner housing 10.

[0044] The circuit unit includes a microprocessor, for example, and is capable of controlling supply of power from the power source unit 20 to the atomizing unit 30. The circuit unit may thus control heating of the consumable 110 by the atomizing unit 30.

[0045] The power source unit 20 includes the power source 21 that is electrically connected to the circuit unit. For example, the power source 21 may be a rechargeable battery or a non-rechargeable battery. The power source 21 is electrically connected to the atomizing unit 30 via the circuit unit. The power source 21 may thus supply power to the atomizing unit 30 so that the consumable 110 is appropriately heated.

[0046] As shown in Fig. 3, the atomizing unit 30 includes the chamber 50 extending in the insertion direction of the consumable 110 (the Z-axis direction), the heating unit 40 surrounding a part of the chamber 50, a heat insulating portion 32, and an insertion guide member 34 having a substantially cylindrical shape. The chamber 50 houses the consumable 110. The heating unit 40 is in contact with an outer circumferential surface of the chamber 50, and the heating unit 40 heats the consumable 110 that is housed in the chamber 50. As shown in Fig. 3, a bottom member 36 may be provided on a bottom portion of the chamber 50. The bottom member 36 may function as a stopper for positioning the consumable 110 that is inserted in the chamber 50. The bottom member 36 is uneven at a surface where the consumable 110 abuts against, and an air passage is formed between the surface where the consumable 110 abuts against and the bottom member 36. Details of the chamber 50, the heating unit 40, and the bottom member 36 will be given later. The chamber 50 is an example of an accommodating portion of the present disclosure.

[0047] The heat insulating portion 32 is substantially cylindrical as a whole, and is disposed to surround the chamber 50. For example, the heat insulating portion 32 may include an aerogel sheet. For example, the insertion guide member 34 is formed of a resin material such as PEEK, PC, or ABS, and is provided between the slide cover 102 in the close position and the chamber 50. When the slide cover 102 is in the open position, the insertion guide member 34 communicates with outside of the flavor inhaler 100, and guides insertion of the consumable 110 into the chamber 50 when the consumable 110 is inserted in the insertion guide member 34.

[0048] Next, a structure of the chamber 50 will be described. Fig. 4A is a perspective view of the chamber 50. Fig. 4B is a cross-sectional view of the chamber 50 taken along arrows 4B-4B shown in Fig. 4A. Fig. 5A is a cross-sectional view of the chamber 50 taken along arrows 5A-5A shown in Fig. 4B. Fig. 5B is a cross-sectional view of the chamber 50 taken along arrows 5B-5B shown in Fig.

4B. Fig. 6 is a perspective view of the chamber 50 and the heating unit 40. As shown in Figs. 4A and 4B, the chamber 50 may be a cylindrical member including an opening 52 through which the consumable 110 is inserted, and a cylindrical side wall portion 60 for housing the consumable 110. The chamber 50 includes, on inside, an accommodating space 68 for heating the consumable 110. A flange portion 52a is formed on an end portion of the chamber 50 demarcating the opening 52. The chamber 50 is desirably formed of a material that has heat resistance and that has small thermal expansion coefficient, and may be formed of metal such as stainless steel, resin such as PEEK, glass, ceramic or the like, for example. The consumable 110 may thus be efficiently heated in the chamber 50.

[0049] As shown in Figs. 4B and 5B, the side wall portion 60 includes a contact portion 62 and a separated portion 66. When the consumable 110 is disposed at a desired position inside the chamber 50, the contact portion 62 contacts or presses a part of the consumable 110, and the separated portion 66 is separate from the consumable 110. Additionally, in the present specification, "desired position inside the chamber 50" refers to a position where the consumable 110 is appropriately heated, a position of the consumable 110 when the user smokes, or a position where the consumable 110 contacts the bottom member 36 described later. The contact portion 62 includes an inner surface 62a and an outer surface 62b. The separated portion 66 includes an inner surface 66a and an outer surface 66b. As shown in Fig. 6, the heating unit 40 is disposed on the outer surface 62b of the contact portion 62. The heating unit 40 is desirably disposed on the outer surface 62b of the contact portion 62 with no gap in between. The contact portion 62 is an example of a pressing portion of the present disclosure. Furthermore, the separated portion 66 is an example of a non-pressing portion of the present disclosure.

[0050] As shown in Figs. 4A and 5B, the outer surface 62b of the contact portion 62 is flat. In the case where a strip-shaped electrode 48 is connected to the heating unit 40 disposed on the outer surface 62b of the contact portion 62 as shown in Fig. 6, because the outer surface 62b of the contact portion 62 is flat, the strip-shaped electrode 48 may be prevented from being warped. As shown in Figs. 4B and 5B, the inner surface 62a of the contact portion 62 is flat. Furthermore, as shown in Figs. 4B and 5B, a thickness of the contact portion 62 is uniform.

[0051] As shown in Figs. 4A, 4B, and 5B, the chamber 50 includes two contact portions 62 in a circumferential direction of the chamber 50, and the two contact portions 62 are parallel to each other. A distance between at least parts of the inner surfaces 62a of the two contact portions 62 is desirably smaller than a width of a part where the consumable 110 that is inserted in the chamber 50 is disposed between the contact portions 62.

[0052] As shown in Fig. 5B, the inner surface 66a of the separated portion 66 may have, as a whole, an arc-shaped cross-section on a plane orthogonal to a longi-

tudinal direction (the Z-axis direction) of the chamber 50. Furthermore, the separated portion 66 is disposed adjacent to the contact portions 62 in the circumferential direction.

[0053] As shown in Fig. 4B, the chamber 50 may include a hole 56a in a bottom portion 56 to allow the bottom member 36 shown in Fig. 3 to penetrate and be disposed inside the chamber 50. The bottom member 36 may be fixed on an inside of the bottom portion 56 of the chamber 50 by an adhesive or the like, and forms a bottom wall portion of the accommodating portion that houses the consumable 110. The bottom member 36 provided on the bottom portion 56 supports a part of the consumable 110 that is inserted in the chamber 50 in such a way that at least a part of an end surface of the consumable 110 is exposed. Furthermore, the bottom portion 56 may support a part of the consumable 110 in such a way that the end surface of the consumable 110 that is exposed communicates with a gap 67 described later (see Fig. 7). The bottom member 36 is uneven at the surface where the consumable 110 abuts against, and may, but not limited to, be formed of a resin material such as PEEK, metal, glass, or ceramic.

[0054] As shown in Figs. 4A and 4B, the chamber 50 desirably includes a cylindrical non-holding portion 54 between the opening 52 and the side wall portion 60. A gap may be formed between the non-holding portion 54 and the consumable 110 in a state where the consumable 110 is positioned at the desired position inside the chamber 50. Furthermore, as shown in Figs. 4A and 4B, the chamber 50 desirably includes a first guide portion 58 including a tapered surface 58a that connects an inner surface of the non-holding portion 54 and the inner surface 62a of the contact portion 62.

[0055] As shown in Fig. 6, the heating unit 40 includes a heating element 42. The heating element 42 may be a heating track, for example. The heating element 42 is desirably disposed to heat the contact portion 62 without coming into contact with the separated portion 66 of the chamber 50. In other words, the heating element 42 is desirably disposed only on the outer surface of the contact portion 62. As shown in Fig. 6, in addition to the heating element 42, the heating unit 40 desirably includes an electrically insulating member 44 that covers at least one surface of the heating element 42. In the present disclosure, the electrically insulating member 44 is disposed to cover both surfaces of the heating element 42.

[0056] Fig. 7 is a cross-sectional view shown in Fig. 5B, where the consumable 110 is disposed at the desired position inside the chamber 50. As shown in Fig. 7, when the consumable 110 is disposed at the desired position inside the chamber 50, the consumable 110 may be pressed by coming into contact with the contact portion 62 of the chamber 50. The gap 67 is formed between the consumable 110 and the separated portion 66. The gap 67 may communicate with the opening 52 in the chamber 50 and an air passage (an air passage A1 described later) between the end surface of the consumable 110 posi-

tioned inside the chamber 50 and the bottom member 36. Accordingly, air flowing in from the opening 52 in the chamber 50 may pass through the gap 67 and flow into the consumable 110. In other words, an air passage (an air passage A2 described later) is formed between the consumable 110 and the separated portion 66.

[0057] Next, a structure of the bottom member 36 according to the present disclosure, and the air passages in the flavor inhaler 100 of the present disclosure will be described in detail. Fig. 8 is a top view of the bottom member 36. Fig. 9 is a perspective view of the bottom member 36. The bottom member 36 includes an axial portion 36a and a flat plate portion 36b. As shown in Fig. 3, the axial portion 36a protrudes outside the chamber 50 through the hole 56a (see Fig. 4B) in the chamber 50. One end of the axial portion 36a is coupled with a substantially central part of one surface of the flat plate portion 36b. On a cross-section of the chamber 50 shown in Fig. 5B, the flat plate portion 36b has a shape that substantially coincides with an inner surface of the side wall portion 60 of the chamber 50 in plan view. More specifically, the flat plate portion 36b includes a flat surface portion 81 on an opposite side to the surface where the axial portion 36a is coupled, and the flat surface portion 81 includes a pair of linear portions 81a, and arc-shaped portions 81b that connect the pair of linear portions 81a. The flat surface portion 81 is an example of a contact surface of the present disclosure.

[0058] The flat plate portion 36b is disposed inside the chamber 50, and may be fixed to an inner surface of the bottom portion 56 of the chamber 50 by an adhesive, for example. Additionally, the bottom member 36 may be integrally formed with the chamber 50. In a state where the flat plate portion 36b of the bottom member 36 is fixed to the bottom portion 56 of the chamber 50, the flat surface portion 81 is disposed facing the opening 52 in the chamber 50. The bottom member 36 further includes a pair of ridge portions 83 on the flat surface portion 81. The pair of ridge portions 83 each extend substantially in parallel with the linear portion 81a of the flat surface portion 81, and are disposed away from each other. The pair of ridge portions 83 are an example of a protruding portion of the present disclosure.

[0059] In the example shown in Fig. 9, the pair of ridge portions 83 are each disposed on the linear portion 81a, and are each also partly disposed on the arc-shaped portions 81b. The pair of ridge portions 83 include end surfaces 83a in an extending direction, side surfaces 83b that face each other, and top surfaces 83c. Furthermore, in the present embodiment, the side surfaces 83b of the pair of ridge portions 83 are flat, and a linear groove portion 85 is formed between the side surfaces 83b. The groove portion 85 is open toward the accommodating space 68 in the chamber 50. The groove portion 85 demarcates a first air passage A1 that communicates with an end surface of the consumable 110 that is disposed at the desired position inside the chamber 50. The first air passage A1 extends along a bottom surface of the

accommodating portion formed by the chamber 50 and the bottom member 36. The first air passage A1 includes a first region 91 that is demarcated by the groove portion 85, and a second region 92 that is demarcated by the arc-shaped portion 81b, the end surfaces 83a, and the groove portion 85. The groove portion 85 is formed passing through a center part of the flat surface portion 81 of the bottom member 36. Additionally, in the present disclosure, the center part of the flat surface portion 81 refers to a region in a periphery of a center of the flat surface portion 81. The groove portion 85 is an example of a center part of the contact surface of the present disclosure.

[0060] More specifically, in the present disclosure, the center and the periphery of the center of the contact surface are determined in the following manner. In the case where the contact surface is a circular shape or a substantially circular shape, a center of the circle is the center of the contact surface. In the case where the contact surface is not a circle, the center is determined in the manner conforming to that of the circle. For example, in the case where the contact surface is an oval shape, an intersecting point of a long axis and a short axis of the oval is taken as the center of the contact surface. Furthermore, in the case where the contact surface includes a longitudinal direction and a transverse direction as in the case of the flat surface portion 81 of the present disclosure, an intersecting point of a longitudinal direction axis and a transverse direction axis is taken as the center of the contact surface.

[0061] The periphery of the center of the contact surface is determined in the following manner relative to the center of the contact surface defined based on the outer edge of the contact surface as described above. A line segment is assumed to be given within the contact surface. That is, any two points are taken along the outer edge of the contact surface, and a line segment connecting the two points is adopted. A longest line segment is adopted as a reference length. For example, in the case where the contact surface includes the longitudinal direction and the transverse direction as in the case of the flat surface portion 81 of the present disclosure, a length of a diagonal line defined by the longitudinal direction axis and the transverse direction axis is taken as the reference length. Moreover, $1/6$ of the reference length is defined as a radius ε , and inside of a circle having the radius ε around the center of the contact surface is taken as the periphery of the center of the contact surface.

[0062] Depending on an outer shape of the contact surface, the periphery of the center of the contact surface defined as described above may extend outside the contact surface. In the present disclosure, that "the first air passage passes through at least a part of a center part of the contact surface" indicates that the first air passage intersects the periphery of the center of the contact surface defined in the manner described above.

[0063] With the bottom member 36 according to the present disclosure, a blocking portion that blocks flow of

air passing through the first air passage A1 may be provided inside the groove portion 85.

[0064] Fig. 10 is a schematic perspective view showing the air passages inside the chamber 50. Fig. 10 shows a state where the consumable 110 is disposed at the desired position inside the chamber 50. As shown in Fig. 10, the end surface of the consumable 110 is in contact with the top surfaces 83c of the ridge portions 83 on the bottom member 36, and the consumable 110 is thereby positioned. The first air passage A1 and a second air passage A2 that pass through outside the consumable 110, and a third air passage A3 that passes inside the consumable 110 are formed inside the chamber 50. The top surface 83c of the ridge portion 83 is an example of a top surface of the contact portion of the present disclosure.

[0065] As described in relation to Fig. 7, when the consumable 110 is disposed at the desired position inside the chamber 50, the gap 67 is formed between the consumable 110 and the separated portion 66, and the second air passage A2 is formed between the consumable 110 and the separated portion 66. The second air passage A2 extends from the opening 52 in the chamber 50 to the flat surface portion 81 of the bottom member 36.

[0066] Air reaching a periphery of the flat surface portion 81 of the bottom member 36 after flowing in from the opening 52 in the chamber 50 and through the second air passage A2 passes through the second region 92 of the first air passage A1 and flows into the first region 91. Air passing through the first region 91 of the first air passage A1 enters inside the consumable 110 due to a puffing action of a user. The air entering inside the consumable 110 passes through the third air passage A3, and may reach inside of the mouth of the user together with an aerosol that is generated inside the consumable 110 and that includes a flavor.

[0067] In the present disclosure, the top surfaces 83c of the ridge portions 83 of the bottom member 36 hold the end surface of the consumable 110 and the consumable 110 is thereby positioned, and thus, a gap is formed between the consumable 110 and the flat surface portion 81 of the bottom member 36. Accordingly, even when an end portion of the consumable 110 is crushed, the smokeable substance 111 spilling from the consumable 110 is accommodated in the gap, and the first air passage A1 may be prevented from being blocked, and an air passage may be secured.

[0068] Particularly, as shown in Fig. 8, in the present disclosure, the second region 92 of the first air passage A1 on upstream is formed to have a wider width than the first region 91 on downstream. The second region 92 with a great width is suitable for accommodating chopped pieces from the consumable 110. Moreover, when air flows through the first air passage A1 that is reduced from the second region 92 to the first region 91, air resistance desirable for smoking experience of the user of the flavor inhaler is generated.

[0069] Additionally, in the present disclosure, the top

surfaces 83c of the ridge portions 83 desirably satisfy Formula 1 below. In Formula 1, A1 is a sum of areas of parts of the top surfaces 83c of the pair of ridge portions 83 that are in contact with the end portion of the consumable 110, and A2 is an area of the end surface of the consumable 110 that is housed in the accommodating portion.

$$A1 > 0.5 \times A2 \quad (\text{Formula 1})$$

[0070] When Formula 1 above is satisfied, a sufficient contact area may be secured between the top surfaces 83c of the ridge portions 83 and the end surface of the consumable 110, and the consumable 110 is more stably held by the top surfaces 83c of the ridge portions 83.

[0071] Furthermore, in the present disclosure, the top surfaces 83c of the ridge portions 83 desirably satisfy Formula 2 below.

$$0.8 \times A2 > A1 \quad (\text{Formula 2})$$

[0072] When Formula 2 above is satisfied, the first region 91 of the first air passage A1 that communicates with the consumable 110 may be sufficiently secured.

[0073] In the following, modifications of the bottom member 36 of the present disclosure will be described. Fig. 11 is a top view showing a first modification of the bottom member 36. Fig. 12 is a top view showing a second modification of the bottom member 36. Fig. 13 is a top view showing a third modification of the bottom member 36. Fig. 14 is a cross-sectional view showing a fourth modification of the bottom member 36, taken along arrows 14-14 shown in Fig. 9.

[0074] The bottom member 36 according to the first modification shown in Fig. 11 is different from the bottom member shown in Figs. 8 to 10 only with respect to the structure of the ridge portion 83. As shown in Fig. 11, one ridge portion 83 is provided on the flat surface portion 81 of the bottom member 36, and the side surface 83b of the ridge portion 83 extends along a straight line that substantially equally divides the flat surface portion 81 in the X-axis direction. With the bottom member 36 according to the first modification, the groove portion 85 is not provided, and a cutout 125 is formed instead. As a result, the structure of the first air passage A1 according to the first modification is different from that of the first air passage A1 shown in Figs. 8 to 10. The first air passage A1 according to the first modification includes the first region 91 that extends through the cutout 125 that is demarcated by the end surfaces 83a and the side surface 83b of the ridge portion 83, and the second region 92 that is demarcated by the arc-shaped portion 81b, the end surface 83a, and the cutout 125. Additionally, as shown in Fig. 11, the second region 92 of the first air passage A1 according to the first modification is substantially the same as the second region shown in Figs. 8 to 10. The cutout

125 according to the first modification is formed including the center part of the flat surface portion 81 of the bottom member 36.

[0075] The bottom member 36 according to the second modification shown in Fig. 12 is also different from the bottom member shown in Figs. 8 to 10 only with respect to the structure of the ridge portion 83. As shown in Fig. 12, one ridge portion 83 is provided on the flat surface portion 81 of the bottom member 36, and the side surface 83b of the ridge portion 83 extends along a straight line that substantially equally divides the flat surface portion 81 in the X-axis direction. With the bottom member 36 according to the second modification, the groove portion 85 is not provided, and a cutout 127 is formed instead. The ridge portion 83 of the second modification does not include the flat end surfaces 83a in the extending direction (see Figs. 8 and 9). End portions of the ridge portion 83 in the extending direction are formed along the arc-shaped portions 81b. That is, the side surface 83b of the ridge portion 83 according to the second modification divides a space directly above the bottom member 36 into the ridge portion 83 and the cutout 127. As a result, the structure of the first air passage A1 according to the second modification is different from that of the first air passage A1 shown in Figs. 8 to 10. The first air passage A1 according to the second modification is not formed from a combination of the second region on the upstream and the first region on the downstream, and is formed only from the first region 91 that is demarcated by the side surface 83b of the ridge portion 83. The side surface 83b of the ridge portion 83 according to the second modification is an example of a boundary portion of the present disclosure. The cutout 127 according to the second modification is formed including the center part of the flat surface portion 81 of the bottom member 36.

[0076] The bottom member 36 according to the third modification shown in Fig. 13 is also different from the bottom member shown in Figs. 8 to 10 only with respect to the structure of the ridge portion 83. As shown in Fig. 13, a pair of ridge portions 83 is provided on the flat surface portion 81 of the bottom member 36, but the ridge portions 83 do not include the flat end surfaces 83a (see Figs. 8 and 9) in the extending direction. End portions of the ridge portions 83 in the extending direction are formed along the arc-shaped portions 81b. Furthermore, as shown in Fig. 13, a distance between the pair of ridge portions 83 according to the second modification is greater than a distance between the side surfaces of the ridge portions in Fig. 8. As a result, the structure of the first air passage A1 according to the third modification is different from that of the first air passage A1 shown in Figs. 8 to 10. The first air passage A1 according to the third modification is not formed from a combination of the second region on the upstream and the first region on the downstream, and is formed only from the first region 91 passing through the groove portion 85 that is demarcated by the side surfaces 83b of the pair of ridge portions 83 and the arc-shaped portions 81b. As in the embodiment shown

in Fig. 8, the groove portion 85 according to the third modification is also formed passing through the center part of the flat surface portion 81 of the bottom member 36.

[0077] When compared with the bottom member shown in Figs. 8 to 10, a bottom member according to the fourth modification shown in Fig. 14 is the same with respect to the structure of the ridge portions 83, and is different only with respect to a top surface (a surface on a Z-axis positive direction side) of the bottom member 36. As described above, the bottom member 36 of the present disclosure includes the axial portion 36a and the flat plate portion 36b. The bottom member 36 according to the fourth modification shown in Fig. 14 includes a flat plate portion 36c and sloping portions 36d instead of the flat plate portion 36b. The flat plate portion 36c is the same as a part of the flat plate portion 36b where the pair of ridge portions 83 is provided on a top surface. The sloping portions 36d are connected to both ends of the flat plate portion 36c, and top surfaces thereof slope in a Z-axis negative direction side. In other words, the bottom member 36 according to the fourth modification is formed in such a way that slopes as shown in Fig. 14 are formed on top surfaces of regions of the flat plate portion 36b of the bottom member 36 shown in Figs. 8 and 9 where the second regions 92 of the first air passage A1 are formed. With the bottom member 36 according to the fourth modification, the second region 92 of the first air passage A1 on the upstream is wider than the first region 91 on the downstream, and also, the second region slopes downward. The second region 92 that is wide and that slopes downward is suitable for accommodating chopped pieces from the consumable 110.

[0078] The embodiment of the present disclosure describes that the ridge portions 83 are provided on the flat surface portion 81 of the bottom member 36 fixed to the bottom portion 56 of the chamber 50 of the flavor inhaler 100, and that positioning of the stick-shaped consumable 110 is achieved by the ridge portions 83 holding a vertically lower end portion of the consumable 110 that is inserted in the chamber 50. However, the consumable of the present disclosure is not limited to be stick-shaped, and the contact surface of the present disclosure is not limited to the bottom surface of the accommodating portion for the consumable. For example, a sheet-shaped consumable may be held by a contact portion provided on a side surface of the chamber.

[0079] Heretofore, the embodiment of the present disclosure has been described, but the present disclosure is not limited to the embodiment described above, and various modifications may be made within the scope of the technical idea described in the claims, the specification, and the drawings. Any shapes or materials not directly described in the specification and the drawings fall within the scope of the technical idea of the present disclosure as long as the advantageous effects of the present disclosure may be achieved by the same. For example, the flavor inhaler 100 of the present disclosure

includes a so-called counter-flow air passage with which air flowing in from the opening 52 in the chamber 50 is supplied to the end surface of the consumable 110, but such a case is not restrictive, and a so-called bottom-flow air passage with which air is supplied from the bottom portion 56 of the chamber 50 into the chamber 50 may instead be provided. Furthermore, the heating element 42 does not have to adopt resistance heating and may instead adopt induction heating. In this case, the heating element 42 may heat the chamber 50 by induction heating. Moreover, in the case where the consumable 110 includes a susceptor, the susceptor of the consumable 110 may be heated by the heating element 42 by induction heating.

REFERENCE SIGNS LIST

[0080]

- 10 inner housing
- 20 power source unit
- 21 power source
- 30 atomizing unit
- 32 heat insulating portion
- 34 insertion guide member
- 36 bottom member
- 36a axial portion
- 36b flat plate portion
- 36c flat plate portion
- 36d sloping portion
- 40 heating unit
- 42 heating element
- 44 electrically insulating member
- 48 electrode
- 50 chamber
- 52 opening
- 52a flange portion
- 54 non-holding portion
- 56 bottom portion
- 56a hole
- 58 first guide portion
- 58a tapered surface
- 60 side wall portion
- 62 contact portion
- 62a inner surface
- 62b outer surface
- 66 separated portion
- 66a inner surface
- 66b outer surface
- 67 gap
- 68 accommodating space
- 81 flat surface portion
- 81a linear portion
- 81b arc-shaped portion
- 83 ridge portion
- 83a end surface
- 83b side surface
- 83c top surface

85 groove portion
 91 first region
 92 second region
 100 consumable
 100 flavor inhaler
 101 outer housing
 102 slide cover
 110 consumable
 111 smokable substance
 112 first rolling paper
 113 second rolling paper
 114 cylindrical member
 115 filter portion
 116 hollow filter portion
 117 lip release agent
 125 cutout
 127 cutout
 A1 first air passage
 A2 second air passage
 A3 third air passage

Claims

1. A flavor inhaler comprising:

an accommodating portion that houses a consumable; and
 a protruding portion that is disposed on a contact surface inside the accommodating portion, that demarcates, in a periphery of the contact surface, a first air passage that communicates with inside of the consumable, and that is capable of coming into contact with the consumable, wherein
 the first air passage passes through at least a part of a center part of the contact surface.

2. The flavor inhaler according to claim 1, wherein the first air passage includes

a first region that communicates with the consumable, and
 a second region that is positioned upstream of the first region in the first air passage, and that is at least partially divided from the first region by the protruding portion, a length of the second region in a width direction that is orthogonal to a proceeding direction of the first air passage in a plan view projected on the contact surface being greater than the first region.

3. The flavor inhaler according to claim 2, wherein the second region of the first air passage is formed on two end portions of the contact surface that face each other.

4. The flavor inhaler according to claim 2 or 3, wherein

the first region of the first air passage is located between two protruding portions that face each other.

5. The flavor inhaler according to claims 2 to 4, wherein a region of the contact surface where the second region is formed is sloped relative to a region where the first region is formed.

6. The flavor inhaler according to claim 1, wherein

the protruding portion includes a boundary portion that passes through the center part of the contact surface, and
 the boundary portion of the protruding portion divides a space in the periphery of the contact surface into the protruding portion and the first air passage.

7. The flavor inhaler according to claims 1 to 6, wherein

the contact surface includes a transverse direction and a longitudinal direction, and
 the first air passage extends along the longitudinal direction.

8. The flavor inhaler according to any one of claims 1 to 7, wherein the contact surface is provided on a bottom portion of the accommodating portion.

9. The flavor inhaler according to claim 8, wherein a second air passage is formed between the consumable housed inside the accommodating portion and an inner side surface of the accommodating portion, the second air passage being positioned on an upstream side on the first air passage and communicating with the first air passage.

10. The flavor inhaler according to claim 9, wherein

the inner side surface of the accommodating portion includes a pressing portion that presses a part of the consumable that is housed, and a non-pressing portion, and
 the second air passage is formed between the consumable that is housed inside the accommodating portion and the non-pressing portion.

11. The flavor inhaler according to claim 9 or 10 citing claim 2, wherein the first air passage and the second air passage communicate with each other in the second region.

12. The flavor inhaler according to claim 11, wherein

an outer edge of the contact surface is formed as a shape that is defined by two arcs that face each other, and two straight lines that connect end portions of the two arcs that face each other,

and
the second region of the first air passage is de-
lineated by the arc and a line segment that is
defined by an outer edge of the protruding por-
tion and that extends in a direction perpendicular 5
to the straight line.

13. The flavor inhaler according to any one of claims 1
to 12, wherein

the protruding portion includes a top surface that
at least partially comes into contact with the con-
sumable, and Formula (1) below is satisfied:

$$A1 > 0.5 \times A2 \quad (1), \quad 15$$

where
in Formula (1), in a plan view projected on the
contact surface, A1 is an area of a part of the 20
top surface that is in contact with the consuma-
ble, and A2 is an area of an end surface of the
consumable that is in contact with the top sur-
face, the consumable being housed in the ac-
commodating portion. 25

14. The flavor inhaler according to any one of claims 1
to 13, wherein

the protruding portion includes a top surface that 30
at least partially comes into contact with the con-
sumable, and Formula (2) below is satisfied:

$$0.8 \times A2 > A1 \quad (2), \quad 35$$

where
in Formula (2), in a plan view projected on the
contact surface, A1 is an area of a part of the
top surface that is in contact with the consuma- 40
ble, and A2 is an area of an end surface of the
consumable that is in contact with the top sur-
face, the consumable being housed in the ac-
commodating portion.

45

50

55

Fig. 1A

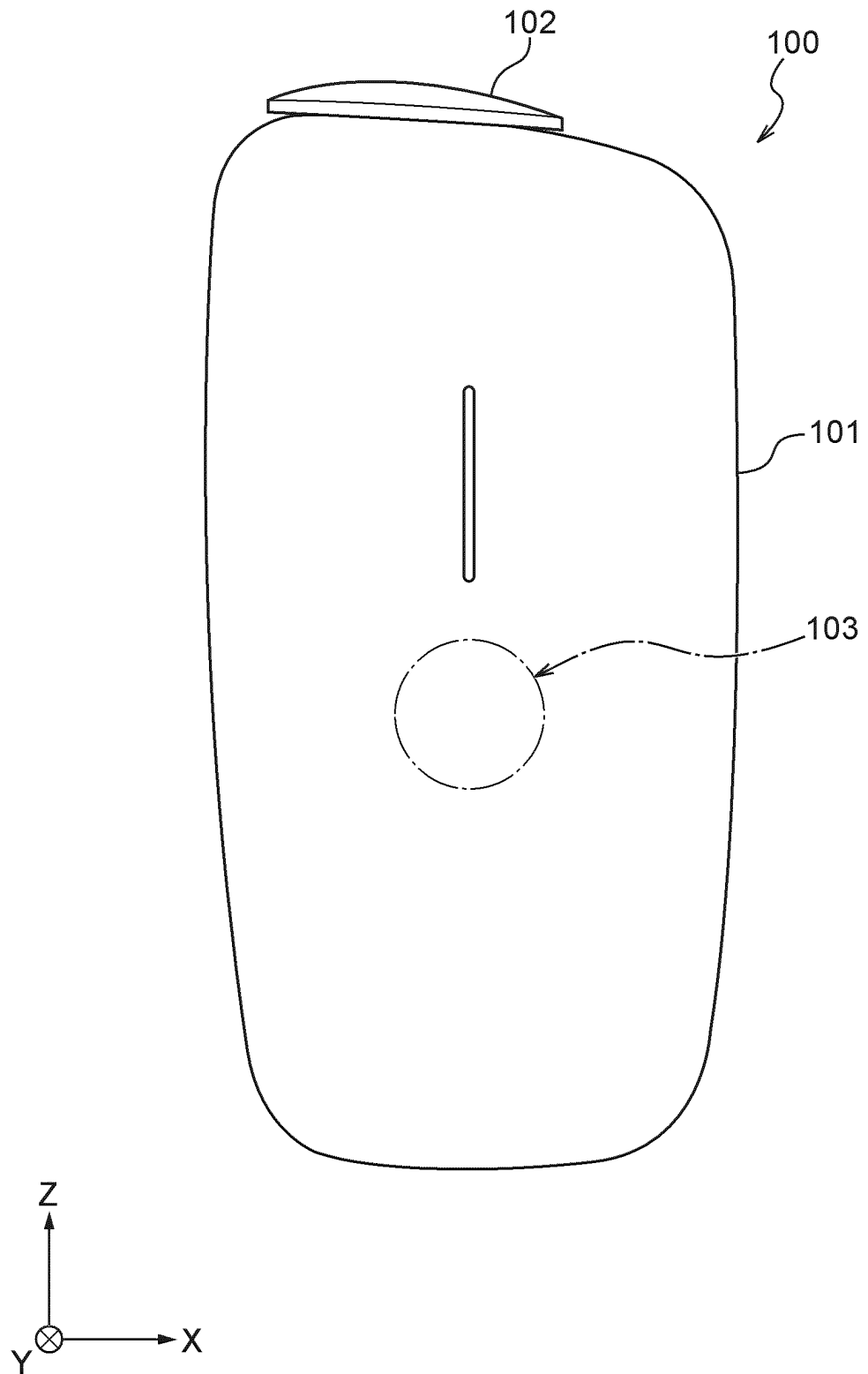


Fig. 1B

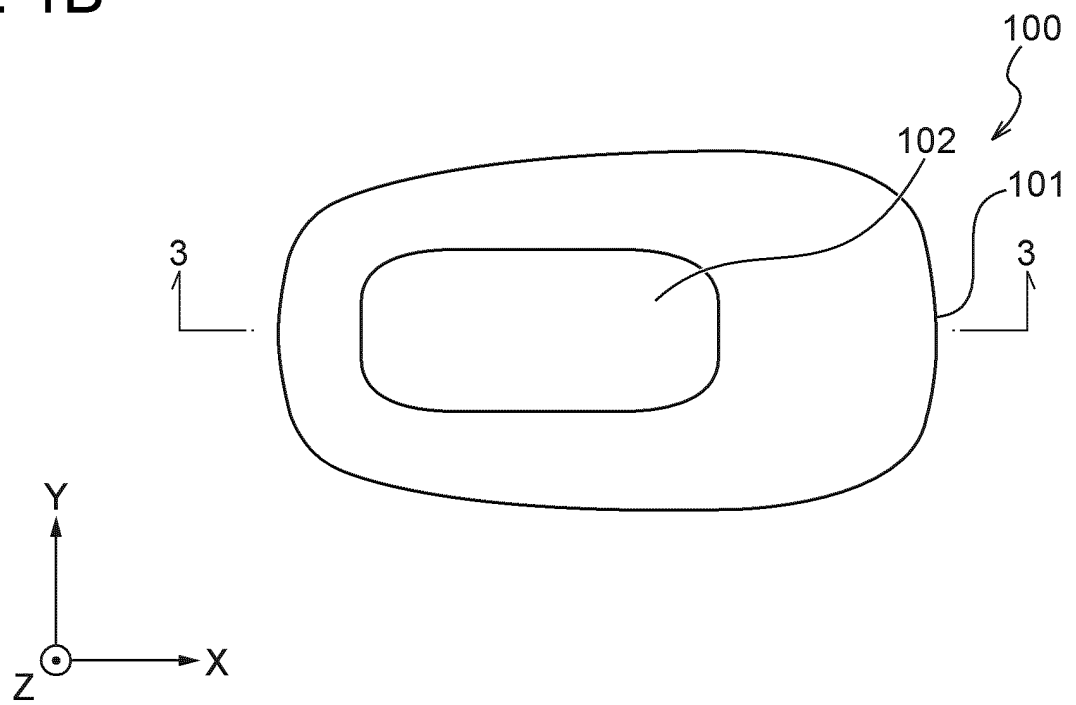


Fig. 1C

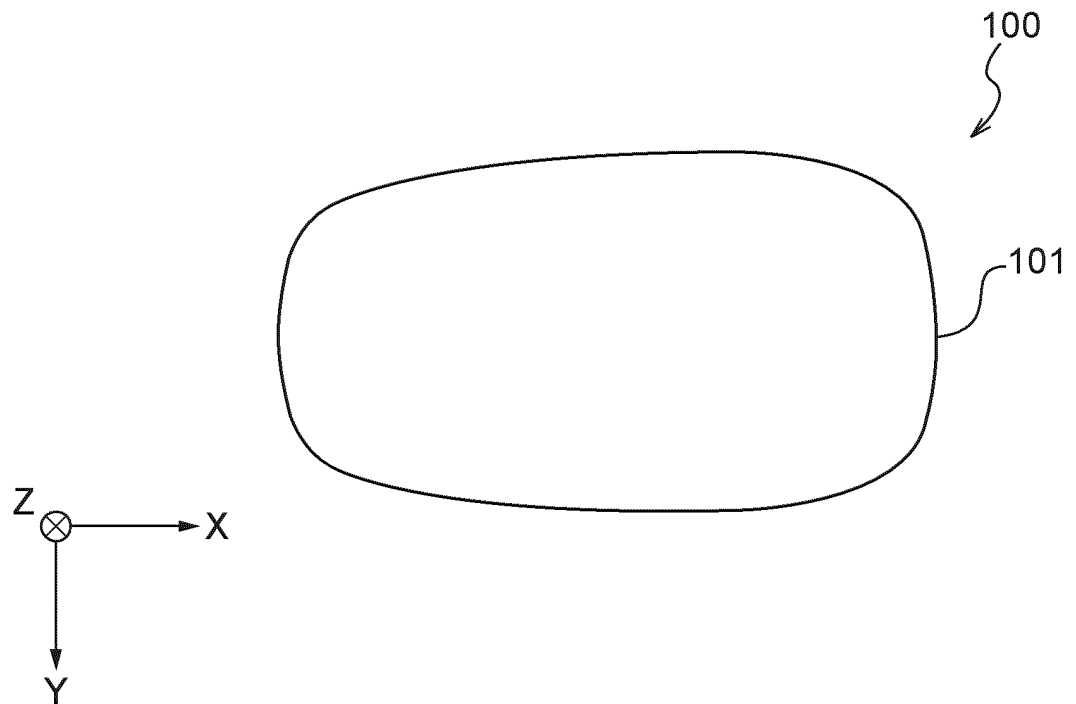


Fig. 2

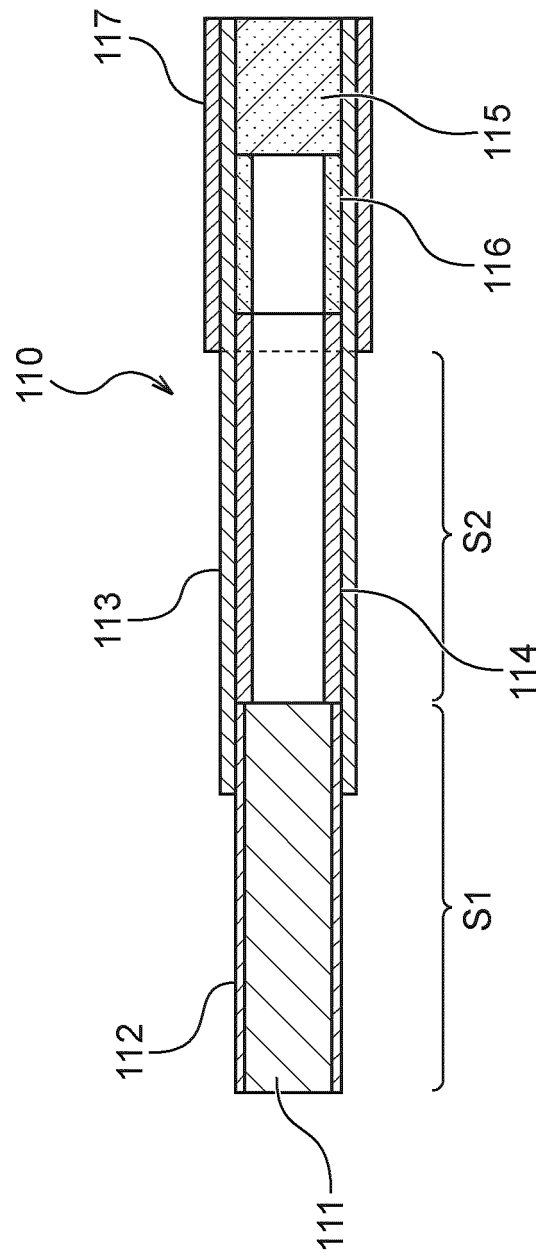


Fig. 3

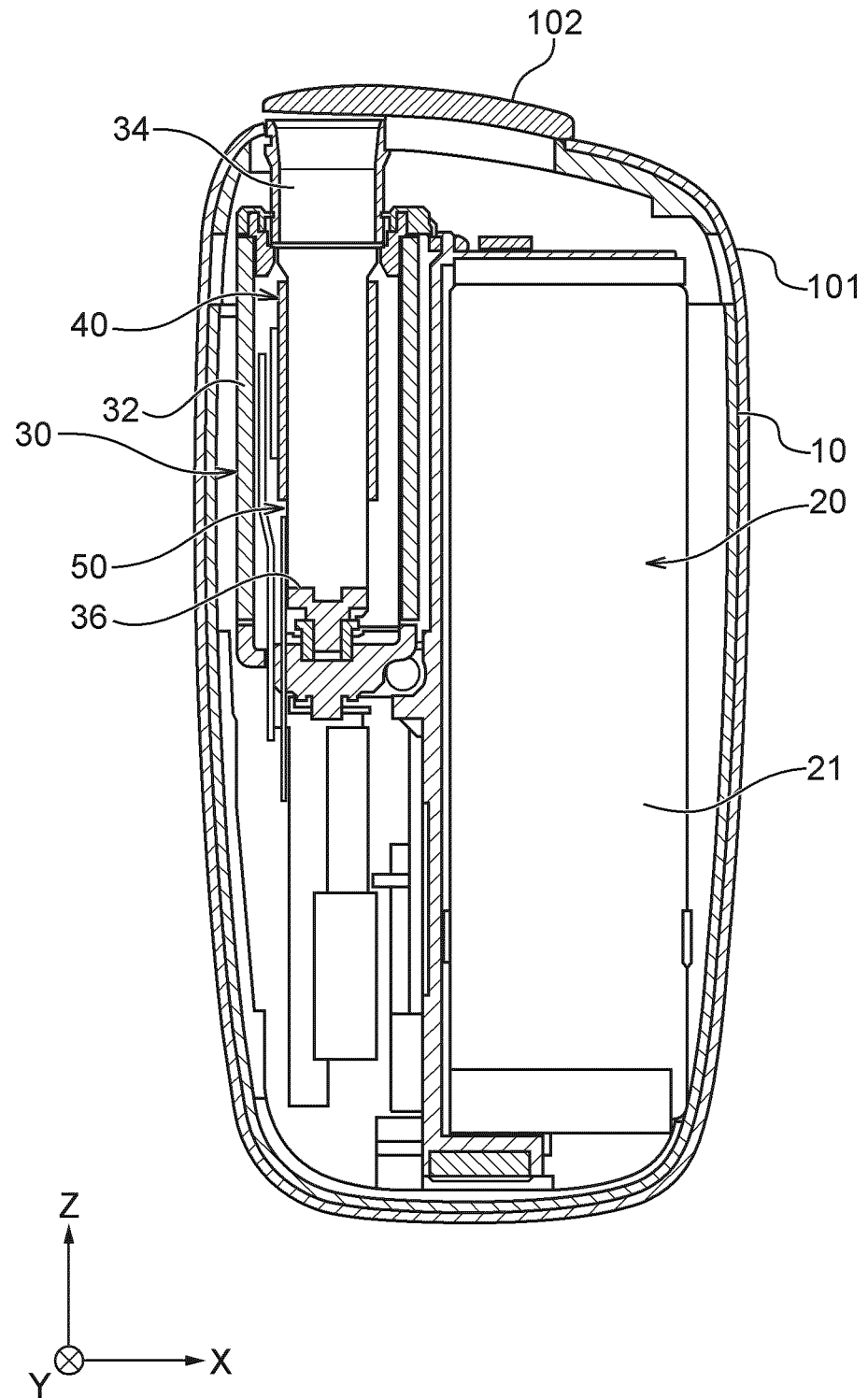


Fig. 4A

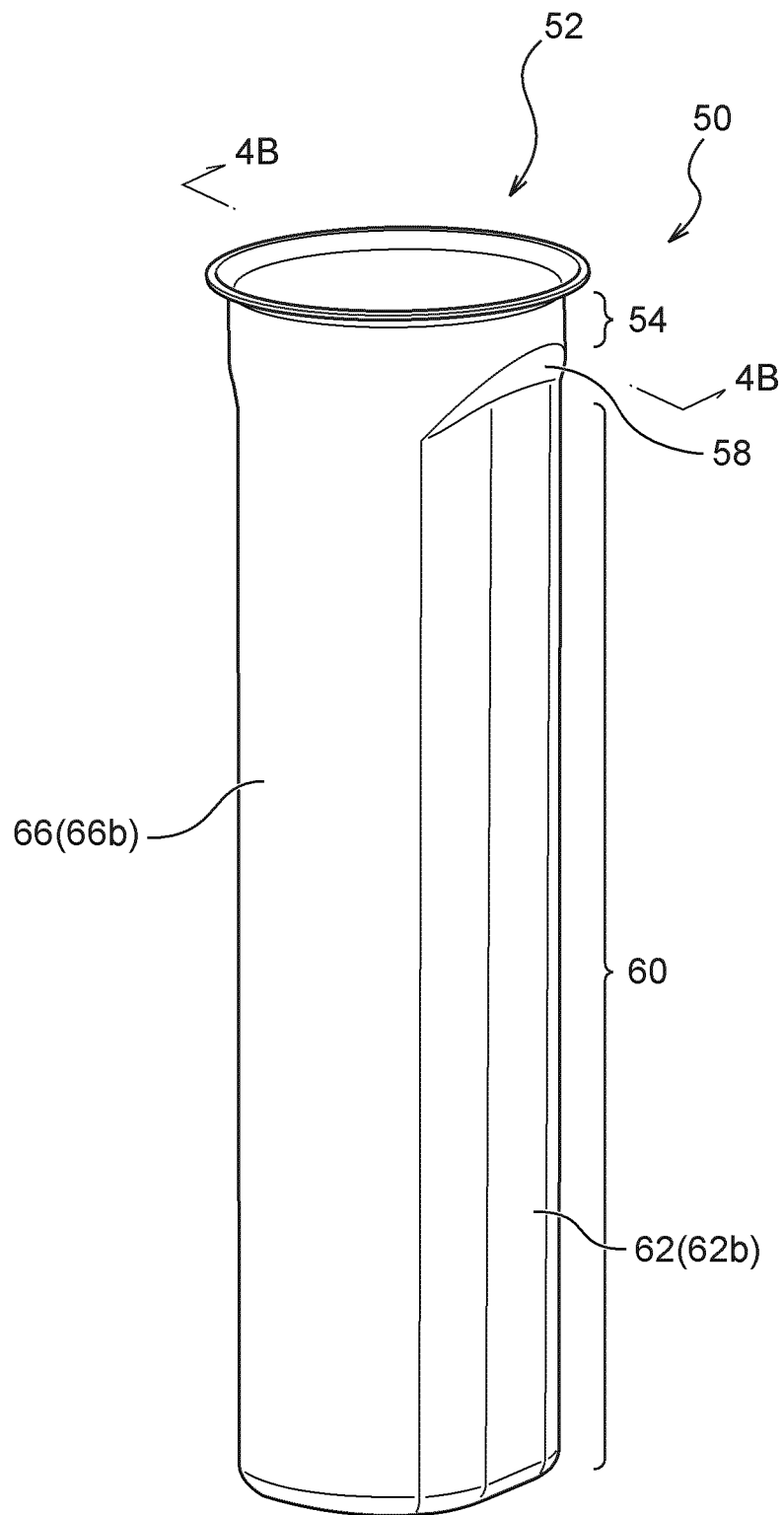


Fig. 4B

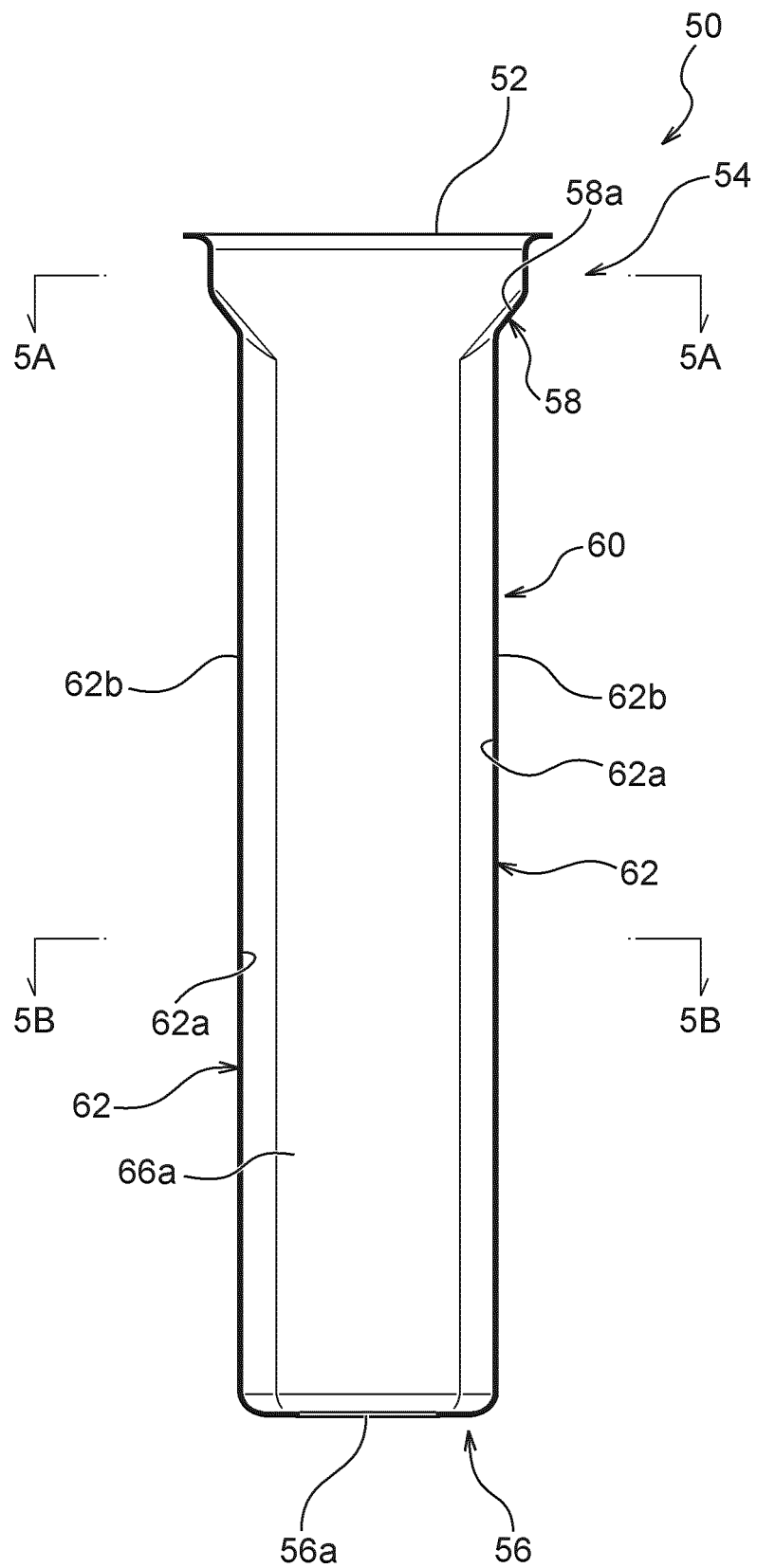


Fig. 5A

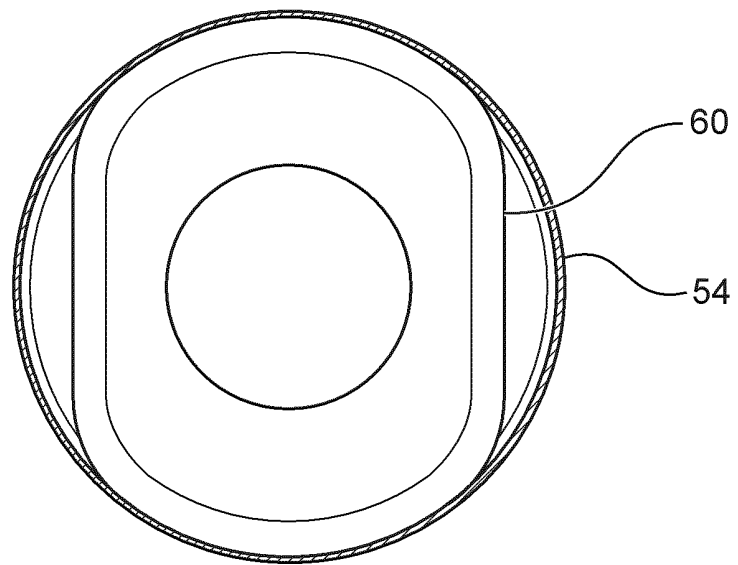


Fig. 5B

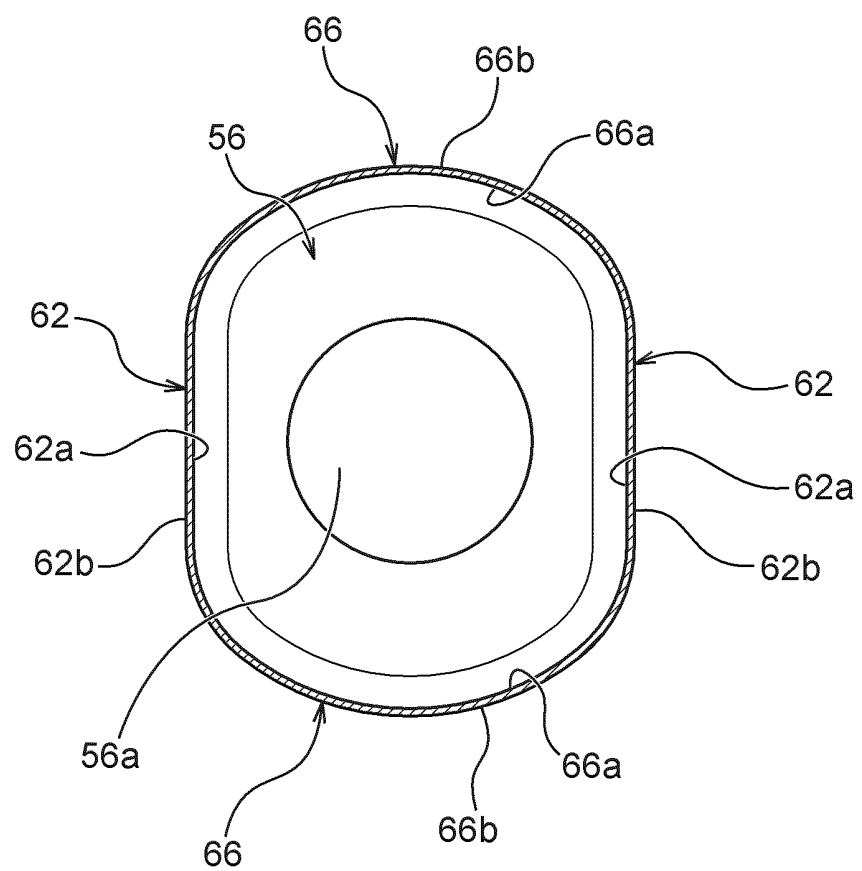


Fig. 6

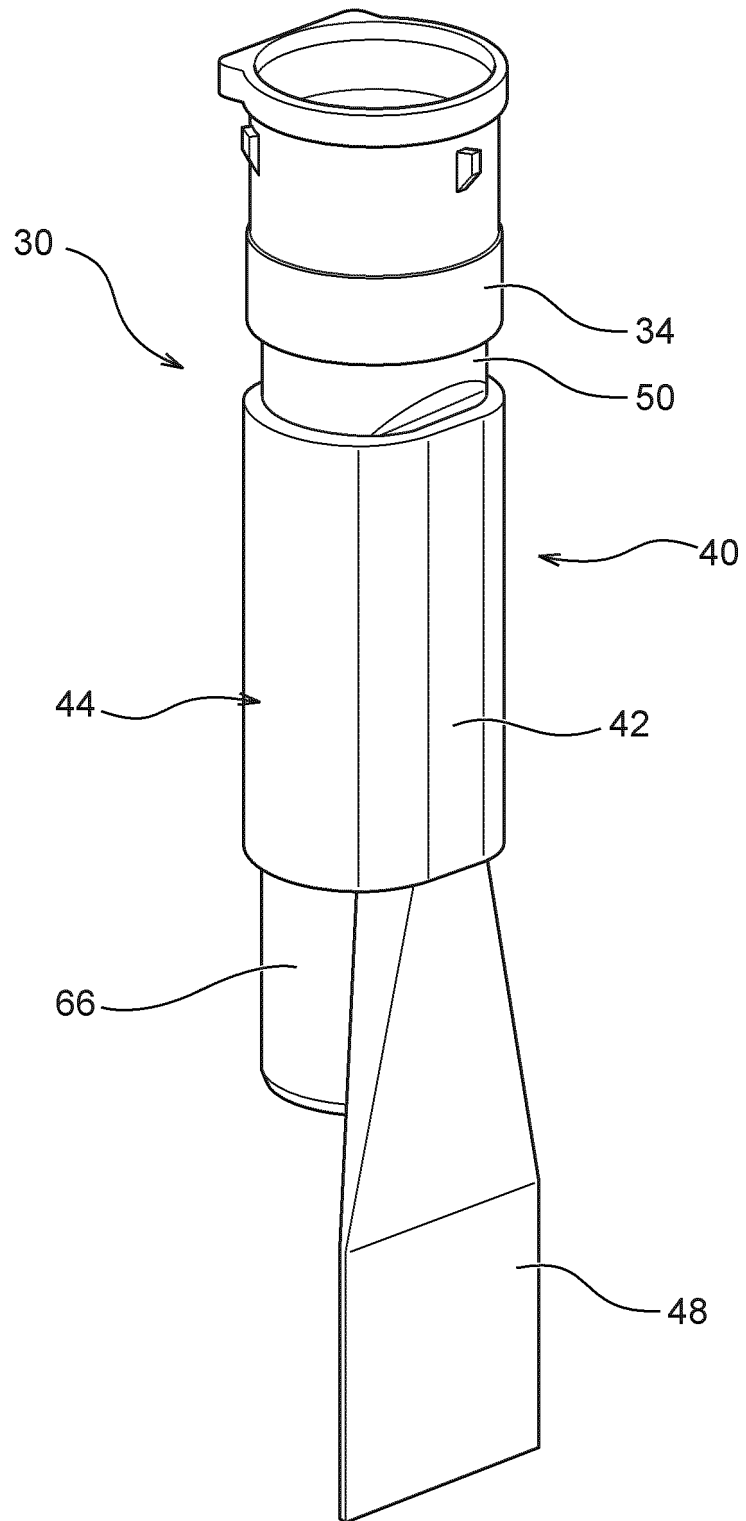


Fig. 7

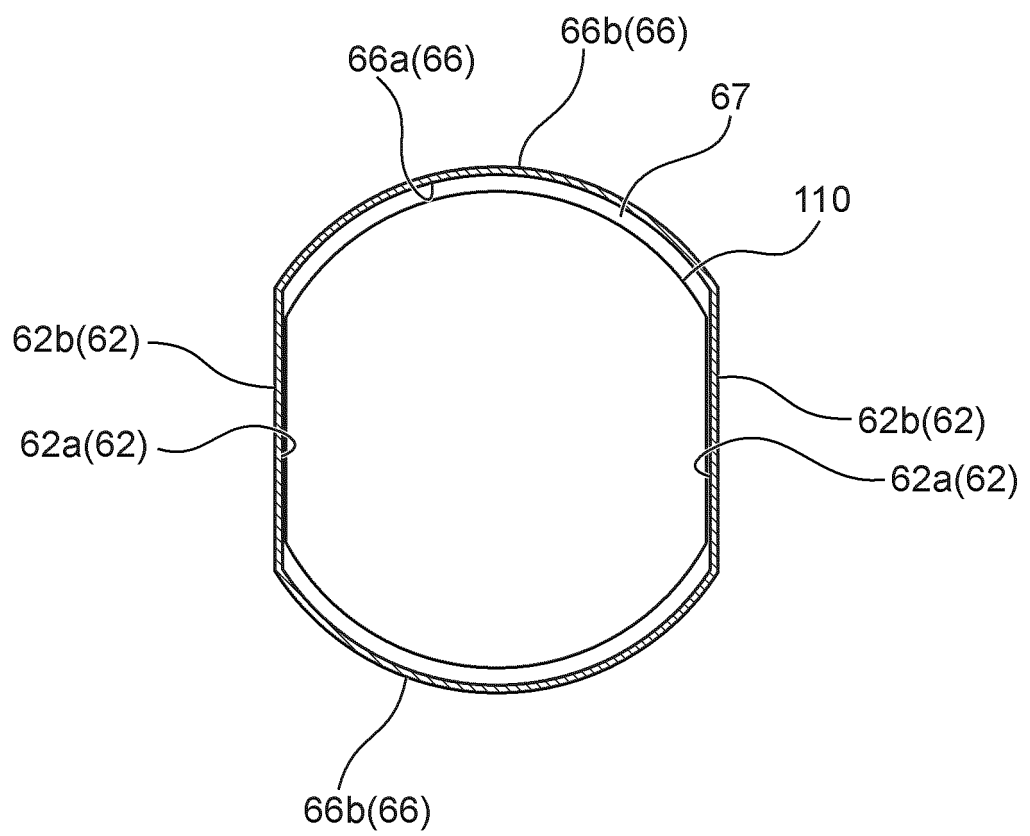


Fig. 8

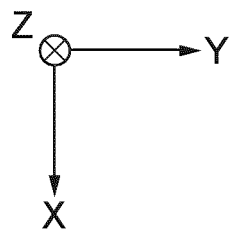
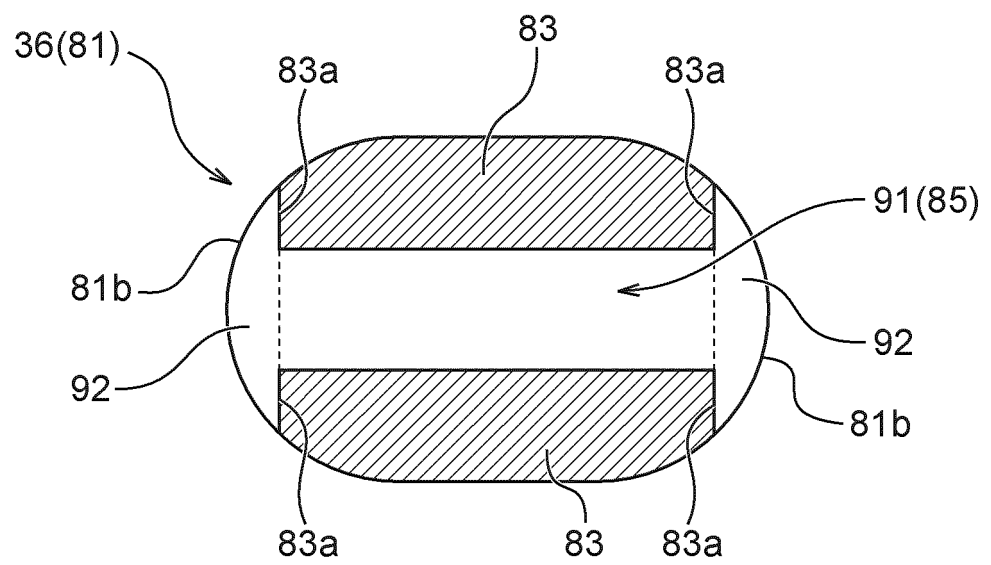


Fig. 9

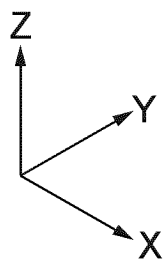
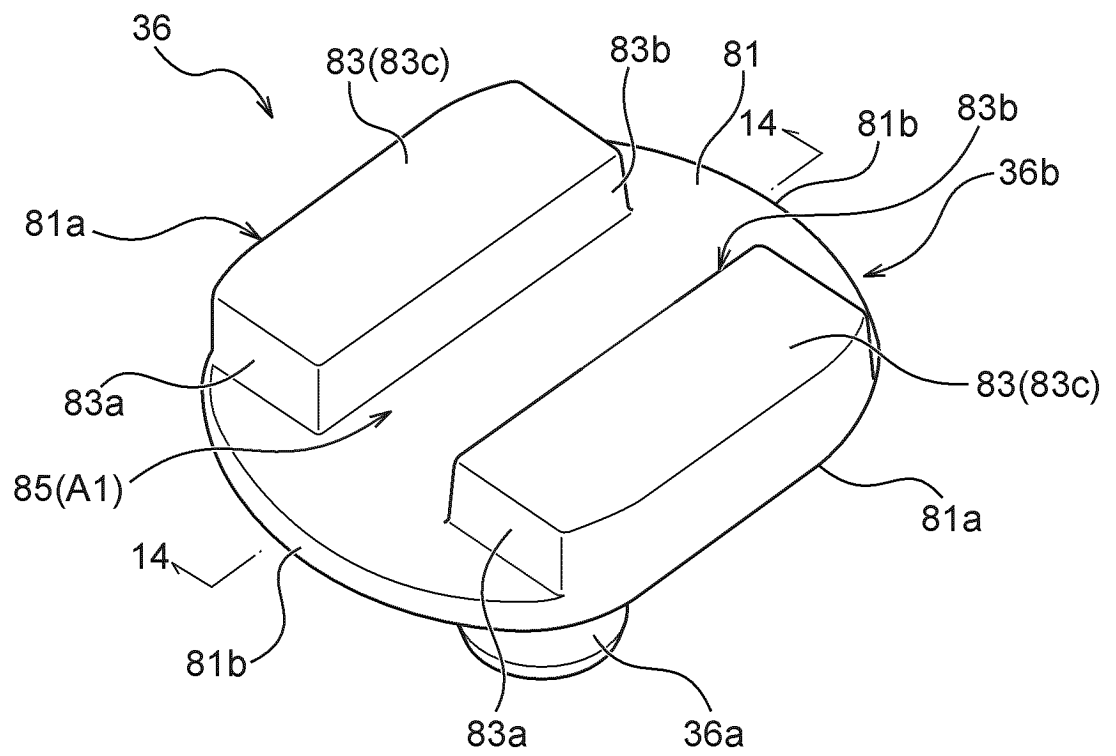


Fig. 10

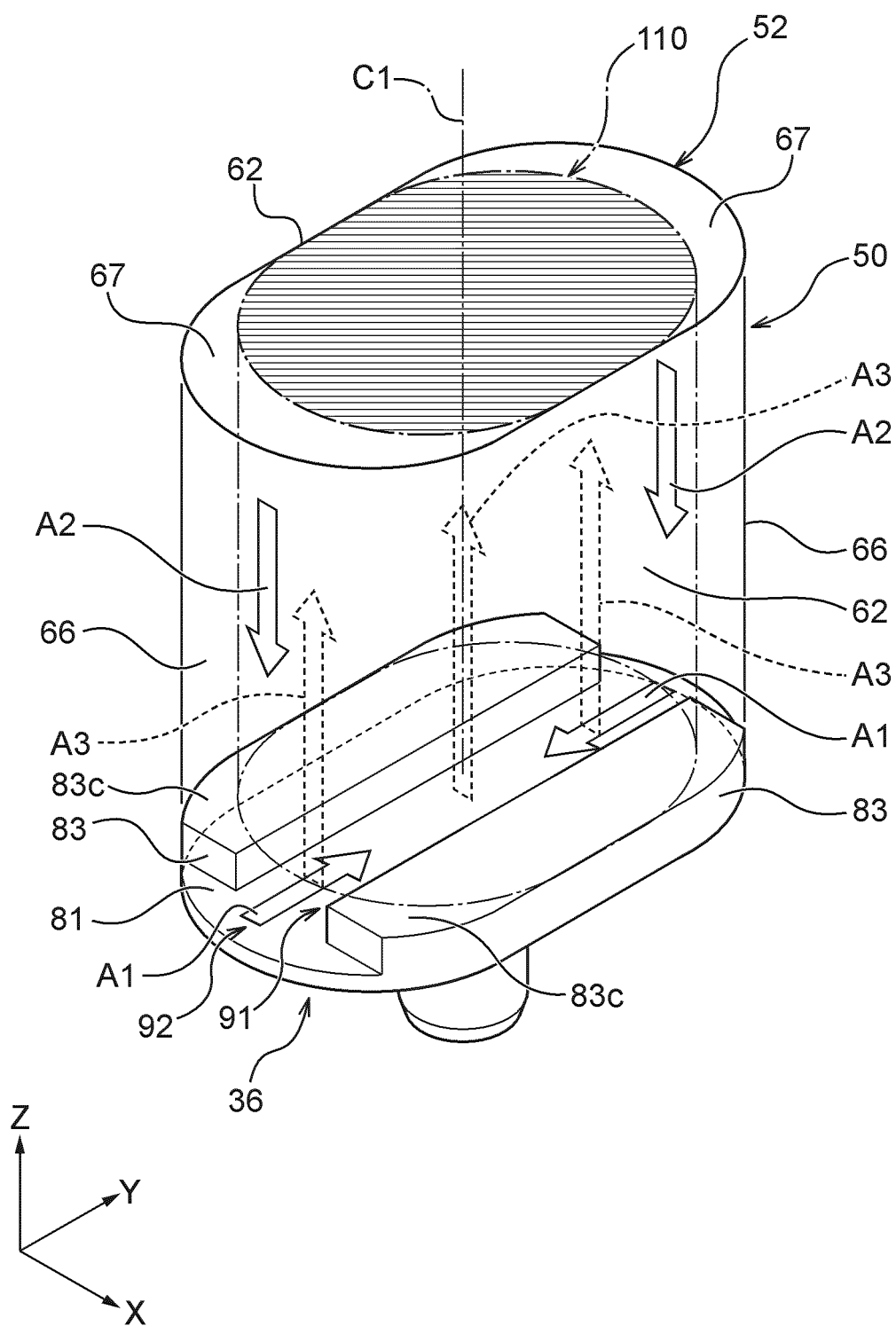


Fig. 11

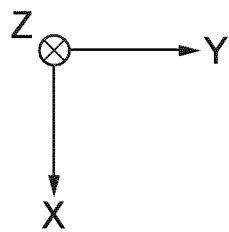
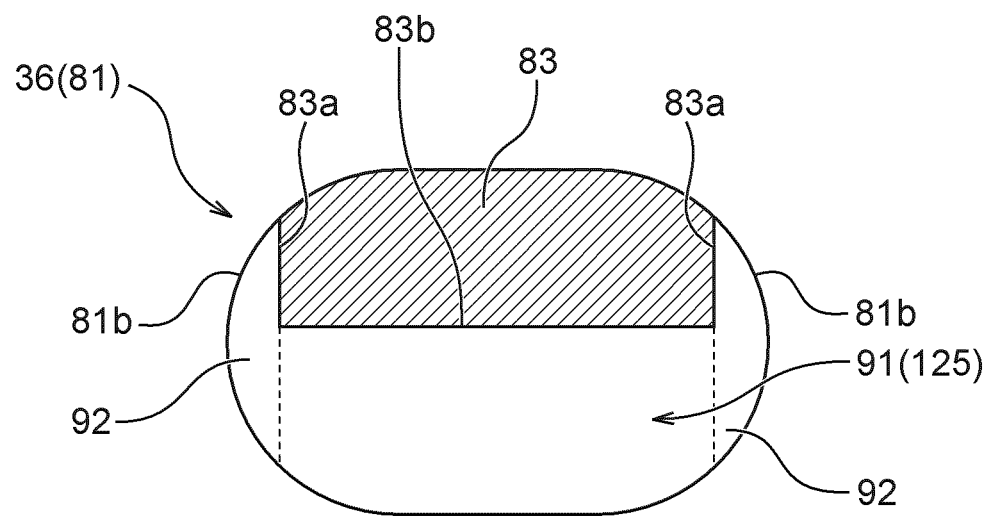


Fig. 12

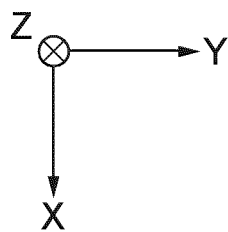
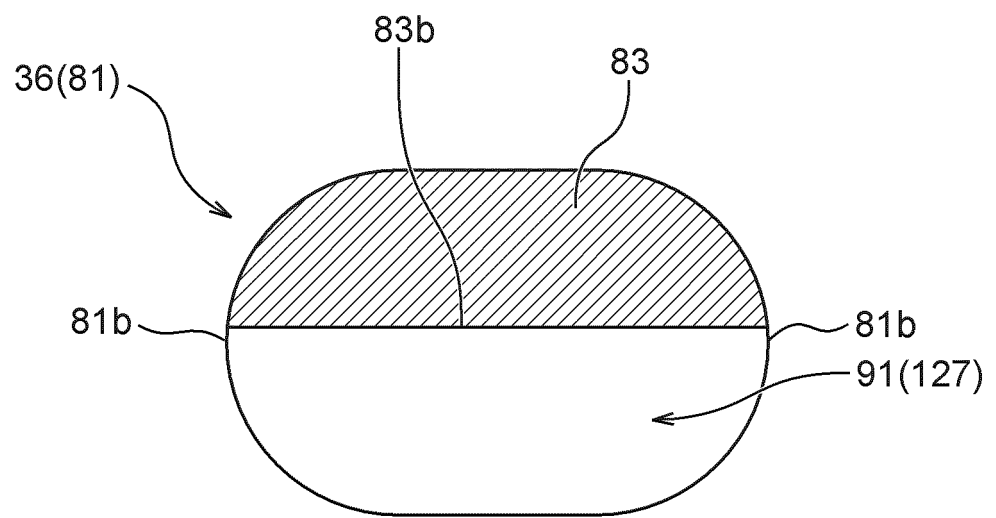


Fig. 13

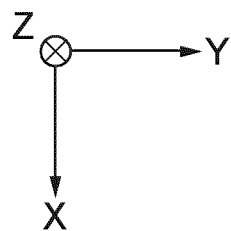
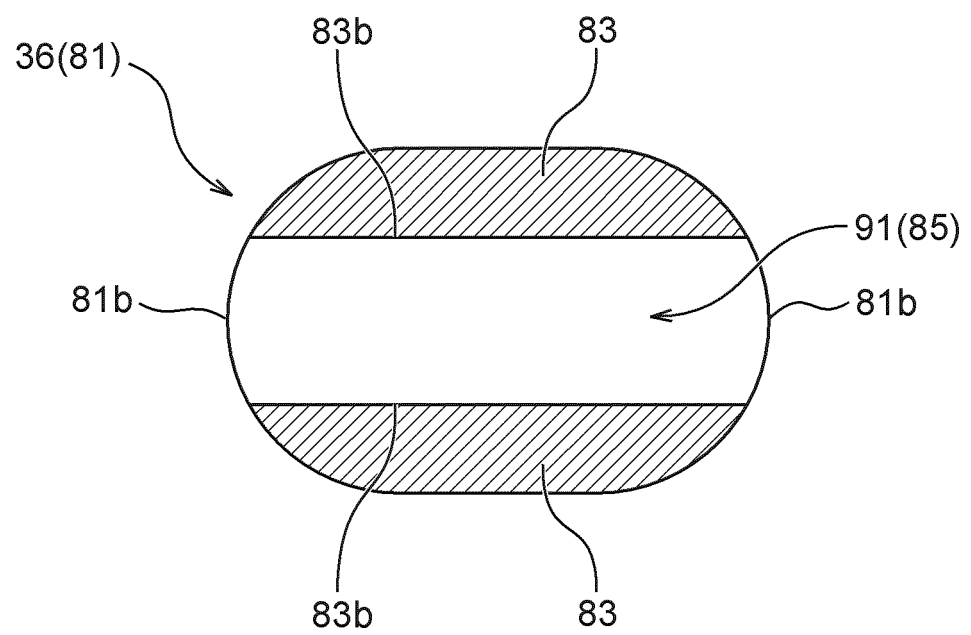
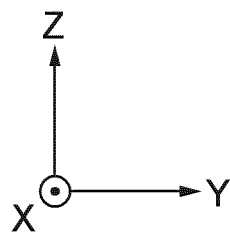
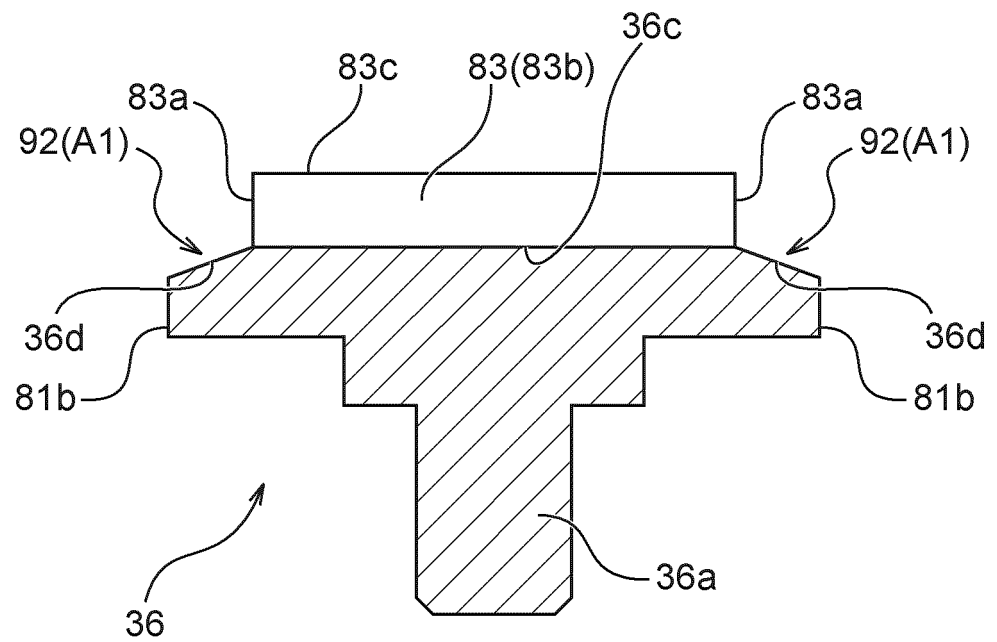


Fig. 14



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/046274

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/40 (2020.01) i

FI: A24F40/40

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)

A24F40/00-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 1971-2021

Registered utility model specifications of Japan 1996-2021

Published registered utility model applications of Japan 1994-2021

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	WO 2020/074612 A1 (JT INTERNATIONAL S.A.) 16 April 2020 (2020-04-16) columns 4-41, fig. 1-12	1, 6-8 2-5, 9-14
A	JP 2018-504134 A (PHILIP MORRIS PRODUCTS S.A.) 15 February 2018 (2018-02-15) entire text, all drawings	1-14



Further documents are listed in the continuation of Box C.



See patent family annex.

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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

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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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document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

04 January 2021 (04.01.2021)

Date of mailing of the international search report

19 January 2021 (19.01.2021)

Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/JP2020/046274

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
WO 2020/074612 A1	16 Apr. 2020	(Family: none)	
JP 2018-504134 A	15 Feb. 2018	US 2018/0049472 A1	
		entire text, all	
		drawings	
		EP 3253234 A1	
		CN 107205494 A	
		KR 10-2019-0029780 A	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2020074612 A [0003]