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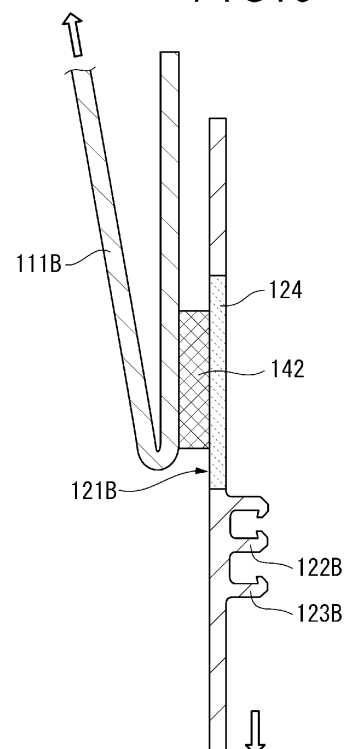
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(54) **ZIPPER TAPE CONTAINER**

(57) There is provided a container with a zipper tape including: a container body in which a containing space is defined between first and second surfaces opposed to each other; and a zipper tape including a first base bonded to the first surface, a first engagement portion protruding from the first base, a second base bonded to the second surface, and a second engagement portion protruding from the second base and engageable with the first engagement portion. A bonded region between the second base and the second surface includes a first bonded region in which the second base is bonded to the second surface at a part other than a low bonding strength layer, and a second bonded region in which the second base is bonded to the second surface only at the low bonding strength layer, and a minimum distance from a center of the containing space to the first bonded region is equal to or longer than a minimum distance from the center of the containing space to the second bonded region.

FIG. 5



EP 4 434 910 A1

Description

TECHNICAL FIELD

5 **[0001]** The present invention relates to a container with a zipper tape.

BACKGROUND ART

10 **[0002]** Conventionally, there are widely used bag-shaped containers that are configured to house food or the like and usable for cooking. Patent Literature 1 describes such a bag-shaped container that includes a moisture vapor vent mechanism configured to prevent excessive expansion and consequent rupture of the container during cooking. The moisture vapor vent mechanism provided for the bag-shaped container described in Patent Literature 1 includes a weakened seal portion whose periphery is weakly sealed to a bag body to close a circular cutout provided near a side seal portion of the bag body. The moisture vapor vent mechanism is configured as follows: when internal pressure is increased to some degree by moisture vapor generated during cooking, the weakened seal portion is peeled off to release the moisture vapor through the cutout. The bag body is thus prevented from the excessive expansion and consequent rupture.

15 **[0003]** However, when the weakened seal portion is used as the moisture vapor vent mechanism as described in Patent Literature 1, the internal pressure at which the release of moisture vapor starts fluctuates depending on the bonding strength of the weakened seal portion. Further, when the bonding strength of the weakened seal portion is non-uniform, the weakened seal portion may be partially peeled off to reduce the amount of the moisture vapor released. In view of the above, Patent Literature 2 describes a technique as follows. A low bonding strength layer is provided at a part of a zipper tape bonded to a film of a bag body, the film is bonded to the low bonding strength layer at a predetermined part in a longitudinal direction of the zipper tape, and the film is bonded to a part other than the low bonding strength layer of the zipper tape at any other part than the predetermined part. This makes it easy to provide a vapor outlet through which moisture vapor is stably released. Patent Literature 3 describes a technique in which such a vapor outlet is provided in a section that is eccentric with respect to a longitudinal center of a zipper tape.

CITATION LIST

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PATENT LITERATURE(S)

[0004]

35 Patent Literature 1: JP 2013-46644 A
 Patent Literature 2: International Publication No. WO2017/119449
 Patent Literature 3: JP 2021-024602 A

SUMMARY OF THE INVENTION

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PROBLEM(S) TO BE SOLVED BY THE INVENTION

45 **[0005]** However, when a zipper tape is attached to a bag-shaped container used for cooking as described in Patent Literature 2, large force may be applied to an irregular-shaped cross-sectional portion of the zipper tape due to the vapor pressure within the container at the time of cooking. The zipper tape may be disengaged by the force before the vapor outlet is formed. In that case, the zipper tape is already opened when vapor pressure decreases at the end of cooking, which may make users feel uneasy. Although Patent Literature 3 has solved the problem that the zipper tape unexpectedly opens by providing the vapor outlet eccentrically, vapor possibly fails to be stably released due to a flexure of a container as shown in a photograph of Fig. 12.

50 **[0006]** In view of the above, an object of the invention is to provide a container with a zipper tape in which a vapor outlet, through which vapor can be stably released, can be provided at the time of heating the contents.

MEANS FOR SOLVING THE PROBLEM(S)

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[0007]

[1] A container with a zipper tape, including: a container body having at least a first surface and a second surface opposed to each other, a containing space being defined between the first surface and the second surface; and a

zipper tape provided between the first surface and the second surface to define one side of the containing space, the zipper tape including a first base bonded to the first surface, a first engagement portion protruding from the first base, a second base bonded to the second surface, and a second engagement portion protruding from the second base and being engageable with the first engagement portion, in which a low bonding strength layer, a bonding strength of which to the container body is lower than the bonding strength of a part other than the low bonding strength layer of the zipper tape, is provided on a part of the second base facing the second surface, a bonded region between the second base and the second surface includes a first bonded region in which the second base is bonded to the second surface at the part other than the low bonding strength layer, and a second bonded region in which the second base is bonded to the second surface only at the low bonding strength layer, and a minimum distance from a center of the containing space to the first bonded region is equal to or longer than a minimum distance from the center of the containing space to the second bonded region.

[2] The container with the zipper tape according to [1], in which the low bonding strength layer is provided, with respect to a width direction of the zipper tape, in an intermediate portion of the second base between a root of the second engagement portion and an end opposite the containing space, the first bonded region is provided opposite the containing space with respect to the low bonding strength layer, and the second bonded region is provided by a part of the bonded region protruding toward the containing space.

[3] A container with a zipper tape, including: a container body having at least a first surface and a second surface opposed to each other, a containing space being defined between the first surface and the second surface; and a zipper tape provided between the first surface and the second surface to define one side of the containing space, the zipper tape including a first base bonded to the first surface, a first engagement portion protruding from the first base, a second base bonded to the second surface, and a second engagement portion protruding from the second base and being engageable with the first engagement portion, in which the second base includes a part formed from a second resin composition and facing the second surface, the second resin composition being different from a first resin composition forming the first base and a rest of the second base, a bonded region between the second base and the second surface includes a first bonded region in which the second base is bonded to the second surface at a part formed from the first resin composition, and a second bonded region in which the second base is bonded to the second surface only at the part formed from the second resin composition, and a minimum distance from a center of the containing space to the first bonded region is equal to or longer than a minimum distance from the center of the containing space to the second bonded region.

[4] The container with the zipper tape according to any one of [1] to [3], in which the second bonded region does not overlap with a longitudinal center of the zipper tape.

[5] The container with the zipper tape according to any one of [1] to [4], in which the second bonded region is formed in a first section in a longitudinal direction of the zipper tape, and a ratio Y/X of a distance Y from a longitudinal center of the zipper tape to a longitudinal middle part of the first section to a length X that is half an opening width of the container with the zipper tape is 0.15 or more.

[6] The container with the zipper tape according to any one of [1] to [5], in which the second bonded region includes a plurality of second bonded regions arranged in a longitudinal direction of the zipper tape.

[7] The container with the zipper tape according to any one of [1] to [6], in which a peel strength between the second base and the second surface in the second bonded region is 30 N/50mm or less.

[8] The container with the zipper tape according to any one of [1] to [7], in which at least a part of the second bonded region is located inside a circumference of a circle centered on the center of the containing space and touching the first bonded region.

[9] The container with the zipper tape according to any one of [1] to [8], in which a side of the second bonded region close to the containing space is stretched toward a longitudinal center of the zipper tape.

[10] The container with the zipper tape according to any one of [1] to [9], in which the second base is bonded to the second surface through the bonded region only at a side opposite the containing space with respect to a position of the second engagement portion in a width direction.

[11] The container with the zipper tape according to any one of [1] to [10], in which the container body has a bag shape.

[0008] In the above arrangement, since the minimum distance from the center of the containing space to the first bonded region is equal to or longer than the minimum distance from the center of the containing space to the second bonded region, the vapor pressure applied to the first bonded region at the time of heating the contents is not more than the vapor pressure applied to at least a part of the second bonded region. Thus, a vapor outlet can be provided by breaking the second bonded region before the second base is pulled with strong force through the first bonded region, allowing vapor to be released stably.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

Fig. 1 is a plan view of a bag with a zipper tape according to a first exemplary embodiment of the invention.
 Fig. 2A is a cross-sectional view of the bag with the zipper tape taken along a line II-II in Fig. 1.
 Fig. 2B is a cross-sectional view of the bag with the zipper tape taken along the line II-II in Fig. 1 when contents of the bag are heated.
 Fig. 3 is a cross-sectional view of the bag with the zipper tape taken along a line III-III in Fig. 1.
 Fig. 4 illustrates an arrangement of bonded regions in the first exemplary embodiment of the invention.
 Fig. 5 illustrates a method for measuring a peel strength.
 Fig. 6 depicts an exemplary arrangement of a vapor outlet in the first exemplary embodiment of the invention.
 Fig. 7 depicts a modification of the arrangement of the bonded regions in the first exemplary embodiment of the invention.
 Fig. 8 depicts a modification of a shape of the bonded region in the first exemplary embodiment of the invention.
 Fig. 9 is a plan view of a bag with a zipper tape according to a second exemplary embodiment of the invention.
 Fig. 10A is a cross-sectional view of the bag with the zipper tape taken along a line X-X in Fig. 9.
 Fig. 10B is a cross-sectional view of the bag with the zipper tape taken along the line X-X in Fig. 9 when contents of the bag are heated.
 Fig. 11 is a cross-sectional view of the bag with the zipper tape taken along a line XI-XI in Fig. 9.
 Fig. 12 is a photograph of flexure of a conventional container, where the container is filled with air to increase the internal pressure to simulate the same condition as when the container is microwaved.

DESCRIPTION OF EMBODIMENT(S)

[0010] Referring to the accompanying drawings, preferred exemplary embodiments of the invention are described in detail. Components having substantially the same function(s) and structure(s) are denoted by the same reference numerals herein and in the drawings, omitting redundant description thereof.

[0011] Fig. 1 is a plan view of a bag with a zipper tape according to a first exemplary embodiment of the invention. Figs. 2A, 2B and 3 are cross-sectional views of the bag with the zipper tape taken along the lines II-II and III-III in Fig. 1. As illustrated in those figures, a bag with a zipper tape 100 (hereinafter also referred to as a zipper-tape bag 100) includes a bag-shaped container body defined by a film 110 having a first surface 111A and a second surface 111B opposed to each other and a zipper tape 120 disposed between the first surface 111A and the second surface 111B of the film 110. As described later, at least a part in a width direction of the zipper tape 120 is bonded to the first surface 111A and the second surface 111B over an entire length of the zipper tape 120, thereby defining one side of a containing space SP defined between the first surface 111A and the second surface 111B of the film 110 to house contents C.

[0012] The film 110 is formed, for instance, from a single-layered or multi-layered thermoplastic resin. More specifically, the film 110 may include low density polyethylene (LDPE), linear low density polyethylene (LLDPE), or polypropylene (PP). PP may be a polypropylene homopolymer (HPP), a polypropylene random copolymer (RPP), or a polypropylene block copolymer (BPP). When the film 110 is a multi-layered film, biaxially oriented polypropylene (OPP), biaxially oriented polyethylene terephthalate (OPET), or biaxially oriented nylon (ONy) may be used for a surface base. Those resin are not necessarily derived from fossil fuel, and may be, for instance, eco-friendly bioplastics (e.g. polyolefin resins derived from biomass such as bio-polyethylene and bio-polypropylene) or mixtures of fossil fuel-derived resins and biomass plastics. Further, the film 110 may include a layer of an inorganic material formed through vapor deposition of aluminum, lamination of aluminum foils, or the like.

[0013] In the present exemplary embodiment, two films 110 are mutually bonded at a bottom seal 112 and side seals 113 to provide the container body having the first surface 111A and the second surface 111B. In another exemplary embodiment, a single film 100 may be folded back at a part corresponding to the side seal 113 to define the first surface 111A and the second surface 111B. Alternatively, the film may be folded inward at a part(s) corresponding to the bottom seal 112 and/or the side seal(s) 113 in the example of Fig. 1, thereby forming a so-called gusset. In this case, the gusset may be provided by the film(s) 110 or by another film bonded to the film(s) 110. The zipper-tape bag 100 may be a stand up pouch capable of standing upright on the gusset provided at a bottom thereof. Further, the shape of the containing space SP defined in the zipper-tape bag 100, which is substantially square in the illustrated example, is not particularly limited. For instance, the shape of the containing space SP may be vertically long (i.e. a dimension in a direction from a mouth 101 to the bottom seal 112 is long) or horizontally long (i.e. a dimension between the side seals 113, that is, a dimension in a longitudinal direction of the zipper tape 120 is long), preferably horizontally long.

[0014] In the present exemplary embodiment, the mouth 101 of the zipper-tape bag 100 is defined by providing the bottom seal 112 and the side seals 113 and not providing a top seal. In another exemplary embodiment, the top seal

may be provided in addition to the bottom seal 112 and the side seals 113, and the mouth 101 may be provided afterward in the zipper-tape bag 100 by cutting between the top seal and the zipper tape 120. In still another embodiment, a bag with a zipper tape may be provided without the bottom seal 112, that is, with the containing space SP not sealed at a side opposite the zipper tape 120. In this case, the bottom seal 112 is provided after contents are put in the containing space SP. The invention is applicable to any other bags with zipper tapes having a variety of known structures other than the above.

[0015] The zipper tape 120 is a long component of which cross section includes a first base 121A bonded to the first surface 111A, a second base 121B bonded to the second surface 111B, and engagement portions 122A, 123A and engagement portions 122B, 123B that respectively protrude from mutually facing surfaces of the first base 121A and the second base 121B and are engageable with each other. The zipper tape 120 is formed, for instance, from a polyolefin resin. More specifically, the zipper tape 120 may be formed from low density polyethylene (LDPE), linear low density polyethylene (LLDPE), or polypropylene (PP). PP may be a polypropylene homopolymer (HPP), a polypropylene random copolymer (RPP), or a polypropylene block copolymer (BPP). The polyolefin resin is not necessarily derived from fossil fuel, and may be, for instance, eco-friendly bioplastics (e.g. polyolefin resins derived from biomass such as bio-polyethylene and bio-polypropylene) or mixtures of fossil fuel-derived resins and biomass plastics. Known additive(s) such as a stabilizer, antioxidant, lubricant, antistatic agent, and coloring agent may be added to the material of the zipper tape 120 as necessary.

[0016] The engagement portions provided for the zipper tape 120 include the male-shaped engagement portion 122A, the female-shaped engagement portion 122B, and the hook-shaped engagement portions 123A and 123B in the illustrated example. The engagement portions, however, are not necessarily configured as illustrated, but may be engagement portions of known various zipper tapes (e.g. a combination of a claw-shape, hook-shape, and/or knob-shape). Further, although two pairs of engagement portions are provided in the illustrated example, a single pair or three or more pairs of engagement portions are optionally provided. Furthermore, although the engagement portions of different shapes (the male, female, and hook shapes) are each provided in a pair in the illustrated example, two or more pairs of the engagement portions of the same shape (e.g. the male and female shapes) are optionally provided. The engagement portions 122A, 123A and the engagement portions 122B, 123B allow the zipper-tape bag 100 to be sealed, opened, and re-sealed.

[0017] In the present exemplary embodiment, a low bonding strength layer 124 is provided, as a part of the second base 121B facing the second surface 111B, at a side near the mouth 101 with respect to the engagement portions 122B, 123B (i.e. a side opposite the containing space SP). The low bonding strength layer 124 is a layer of which bonding strength with the film 110 is lower than that of other parts of the zipper tape 120. Specifically, for instance, the bonding strength of the low bonding strength layer 124 with the film 110 can be lower than the bonding strength of the other parts of the zipper tape 120 with the film 110 by forming the other parts of the zipper tape 120 from polypropylene and forming the low bonding strength layer 124 from polyethylene or a mixture of polyethylene and polypropylene (e.g. a mixture of LLDPE, LDPE, and high-density polyethylene (HDPE), or a mixture of LDPE and polypropylene).

[0018] The low bonding strength layer 124 has the same thickness as that of the second base 121B in the illustrated example. In another example, preferably, the low bonding strength layer 124 thinner than the second base 121B is provided only at the side of the second base 121B near the second surface 111B. In this case, a bonding layer is preferably provided between the second base 121B and the low bonding strength layer 124. The bonding layer is formed, for instance, from a resin composition described later. Alternatively, the low bonding strength layer 124 may be laminated on the side of the second base 121B near the second surface 111B, the side having the same thickness as that of the other parts. The zipper tape 120 including the low bonding strength layer 124 is produced, for instance, through coextrusion of a resin material for forming the low bonding strength layer 124 and a resin material for forming the other parts of the zipper tape 120. Alternatively, the low bonding strength layer 124 may be formed as follows. After a part including the second base 121B is formed through extrusion, a material resin of the low bonding strength layer 124 is applied to a predetermined area of the side of the second base 121B near the second surface 111B. Further, although the low bonding strength layer 124 is located at the side near the mouth 101 with respect to the engagement portions in the illustrated example, the low bonding strength layer 124 may extend to a side opposite the mouth 101, that is, to a side near the containing space SP.

[0019] A resin composition forming the above-described low bonding strength layer 124 is different from a resin composition forming the second base 121B. For instance, combination examples as listed in Table 1 allow the bonding strength between the second surface 111B and the low bonding strength layer 124 to be lower than the bonding strength between the second surface 111B and the other parts of the second base 121B. In the examples of Table 1, the resin composition forming the second base 121B (simply referred to as "Base" in Table 1) is polypropylene and the resin composition forming the low bonding strength layer 124 is polyethylene. In these examples, the bonding layer is provided between the second base 121B and the low bonding strength layer 124 as described above.

Table 1

Base	Low Bonding Strength Layer	Bonding Layer
HPP	LDPE	HPP
BPP		BPP
RPP	HDPE	RPP
		LLDPE
		Mixture of PP/PE
Table 1: Examples of Combinations of Resin Compositions		

[0020] Alternatively, exemplary combinations of the resin compositions as listed in Table 2 allow the bonding strength between the second surface 111B and the low bonding strength layer 124 to be lower than the bonding strength between the second surface 111B and the other parts of the second base 121B. It should be noted that T_m in Table 2 refers to a melting point.

Table 2

Base	Low Bonding Strength Layer
HPP (T _m :160°C)	Mixture of LD/PP (T _m :109°C/137°C)
HPP (T _m :160°C)	Mixture of LL/PP (T _m :123°C/140°C)
RPP (T _m :134°C)	m-LL (T _m :95°C)
Table 2: Examples of Combinations of Resin Compositions	

[0021] In the present exemplary embodiment, the first base 121A is bonded to the first surface 111A over the entire length of the zipper tape 120. Since no low bonding strength layer is provided for the first base 121A, the first base 121A is bonded to the first surface 111A in any desired area. Although the second base 121B is also bonded to the second surface 111B over the entire length of the zipper tape 120, a bonded region 140 where the second base 121B is bonded to the second surface 111B through heat sealing or ultrasonic sealing includes a first bonded region 141 and a second bonded region 142, as depicted in Fig. 1. In the first bonded region 141, the second base 121B is bonded to the second surface 111B at a part other than the low bonding strength layer 124, as depicted in Fig. 3. It should however be noted that the low bonding strength layer 124 of the second base 121B may also be bonded to the second surface 111B in the first bonded region 141. In the second bonded region 142, the second base 121B is bonded to the second surface 111B only at the low bonding strength layer 124, as depicted in Fig. 2A. Specifically, in the second bonded region 142, the bonded region of the low bonding strength layer 124 and the second surface 111B faces both the containing space SP and a space near the mouth 101 (i.e. a space opposite the containing space SP).

[0022] More specifically, the low bonding strength layer 124 is provided, with respect to the width direction of the zipper tape 120, in an intermediate portion of the second base 121B between a root of the engagement portion 122B and an end near the mouth 101 (i.e. an end opposite the containing space SP). Thus, an area that is not the low bonding strength layer 124 is present at a side near the mouth 101 with respect to the low bonding strength layer 124. As depicted in Fig. 1, the first bonded region 141 of the bonded region 140 is provided near the containing space SP with respect to the low bonding strength layer 124 and the second bonded region 142 of the bonded region 140 is provided to protrude toward the side opposite the mouth 101, i.e. toward the containing space SP.

[0023] According to the above arrangement, when the vapor pressure inside the containing space SP is increased by heating the contents C, a part of the film 110 with the smallest bonding strength between the second surface 111B and the first surface 111A (i.e. the second bonded region 142 where the second base 121B is bonded to the second surface 111B only through the low bonding strength layer 124) is broken, as depicted in Fig. 2B. When the second bonded region 142 is broken, the second base 121B is separated from the second surface 111B to bring the containing space SP into communication with the outside, allowing vapor to be discharged. According to the above arrangement, a vapor outlet through which vapor can be stably released at the time of heating the contents can be provided in the present exemplary embodiment.

[0024] In the present exemplary embodiment, the second base 121B is attached to the second surface 111B of the film 110 in a so-called one-side-released fashion through the first bonded region 141 and the second bonded region 142, as depicted in Figs. 2A, 2B, and 3. Specifically, the second base 121B is bonded to the second surface 111B of the film 110 through the first bonded region 141 and the second bonded region 142 only at the side opposite the containing

space SP with respect to positions of the engagement portions 122B and 123B in the width direction. According to the above arrangement, when the vapor pressure inside the containing space SP increases at the time of heating the contents, force in a shear direction acts on between the first base 121A and the second base 121B along the width direction thereof, as indicated by arrows in Fig. 2B. The force in this direction strengthens the engagement between one of the claws of the female-shaped engagement portion 122B and the male-shaped engagement portion 122A and the engagement between the hook-shaped engagement portions 123A and 123B, so that the engagement portions are not likely to be disengaged due to the effect of vapor pressure. Further, this makes it easier for the vapor pressure in the containing space SP not only to act on the engagement portions but also to disperse and act on between the second base 121B and the second surface 111B.

[0025] Fig. 4 illustrates an arrangement of the bonded regions in the first exemplary embodiment of the invention. As illustrated, a minimum distance d_1 from a center SP_C of the containing space SP to the first bonded region 141 is equal to or longer than a minimum distance d_2 from the center SP_C of the containing space SP to the second bonded region 142 in the present exemplary embodiment. The center SP_C of the containing space SP can be specified herein as, for instance, an intersection of diagonal lines in a substantially rectangular planar shape of the containing space SP, as illustrated. In the present exemplary embodiment, since the containing space SP is surrounded by the bottom seal 112, the side seals 113, and the bonded region 140 where the second base 121B of the zipper tape 120 is bonded to the second surface 111B of the film 110, the center SP_C can be specified by drawing diagonal lines as described above from intersections of these bonded regions facing the containing space SP.

[0026] The bonded region between the first base 121A of the zipper tape 120 and the first surface 111A of the film 110 is formed in any desired shape as above. The center SP_C in the present exemplary embodiment is defined in association with the bonded region 140 of the second base 121B (specifically, the arrangement of the first bonded region 141 and the second bonded region). The center SP_C is thus set based on the bonded region 140 of the second base 121B, not based on the bonded region of the first base 121A. Further, a folded portion(s) of the film 110 is optionally provided instead of the side seals 113, for instance. In this case, the center SP_C can be specified by drawing diagonal lines from intersections of the folded portion(s) with the bottom seal 112 and the bonded region 140. Furthermore, when a gusset is provided by folding the film inward at the part(s) corresponding to the bottom seal 112 and/or the side seals 113, the center SP_C is specified based on a planar shape of an outer edge of the containing space SP not including the portion(s) folded inward.

[0027] Thus, a constant pressure line SC indicating the vapor pressure inside the containing space SP can be schematically assumed to be a circle around the center SP_C of the containing space SP. Thus, a constant pressure line SC indicating the vapor pressure inside the containing space SP can be schematically assumed to be a circle around the center SP_C of the containing space SP. Fig. 4 illustrates the constant pressure line SC centered on the center SP_C and having a radius d_1 . As described above, the radius d_1 is also the minimum distance from the center SP_C to the first bonded region 141. The vapor pressure applied to the first bonded region 141 at the time of heating the contents is thus not more than the vapor pressure corresponding to the constant pressure line SC in the illustrated example.

[0028] The minimum distance d_2 from the center SP_C of the containing space SP to the second bonded region 142 is not more than the minimum distance d_1 to the first bonded region 141. Thus, at least a part of the second bonded region 142 is located on or inside the constant pressure line SC with the radius d_1 . The constant pressure line SC herein is defined as a circumference of the circle centered on the center SP_C and touching the first bonded region 141. This makes the vapor pressure applied to at least a part of the second bonded region 142 at the time of heating the contents equal to or more than the vapor pressure corresponding to the constant pressure line SC. When the vapor pressure exceeds the bonding strength between the second base 121B and the second surface 111B in the second bonded region 142, the second bonded region 142 is broken to form a vapor outlet as illustrated in Fig. 2B. Since vapor is discharged through this vapor outlet, a further increase in vapor pressure within the containing space SP is prevented.

[0029] For instance, assuming that the minimum distance d_2 from the center SP_C of the containing space SP to the second bonded region 142 exceeds the minimum distance d_1 to the first bonded region 141. In this case, the vapor pressure applied to the first bonded region 141 at the time of heating the contents exceeds the vapor pressure applied to the second bonded region 142. The first bonded region 141, where the second base 121B is bonded to the second surface 111B at a part other than the low bonding strength layer 124, is not broken even under the increased vapor pressure. However, when the second base 121B is pulled with strong force through the first bonded region 141, the engagement portions 122A, 122B and the engagement portions 123A, 123B are possibly disengaged to break the second bonded region 142. The zipper tape 120 may thus open before the vapor outlet is formed.

[0030] In the present exemplary embodiment, the distance d_2 is equal to or shorter than the distance d_1 as described above. This makes the vapor pressure applied to the first bonded region 141 at the time of heating the contents equal to or less than the vapor pressure applied to at least a part of the second bonded region 142. Accordingly, the vapor outlet can be provided by breaking the second bonded region 142 before the second base 121B is pulled with strong force through the first bonded region 141, preventing unexpected opening of the zipper tape 120 due to the vapor pressure.

[0031] In order to prevent the unexpected opening of the zipper tape 120 due to the vapor pressure, it is also effective to reduce the peel strength between the second base 121B and the second surface 111B in the second bonded region 142. Assuming that the engagement portions 122A, 122B and the engagement portions 123A, 123B are typical engagement portions used for a zipper tape, the peel strength between the second base 121B and the second surface 111B in the second bonded region 142 is preferably 30 N/50mm or less, more preferably 20 N/50mm or less, still more preferably 15 N/50mm or less, and still further more preferably 10 N/50mm or less. The lower limit of the peel strength is not particularly limited, and is, for instance, 1 N/50mm. In order to set the peel strength within the above range, for instance, components of the resin composition for the low bonding strength layer 124 and/or a sealing temperature in forming the bonded region 140 are optionally adjustable. With the peel strength set as described above, the second bonded region 142 is broken at a lower vapor pressure to provide the vapor outlet, further reliably preventing the unexpected opening of the zipper tape 120 due to the vapor pressure.

[0032] The peel strength can be calculated by: cutting the zipper tape 120 and the film 110 into pieces of 50 mm width; leaving the pieces at a temperature of 23 degrees C and humidity of 50% for about 24 hours; pulling the pieces at a pulling speed of 300 mm/min, a temperature of 23 degrees C, and humidity of 50% along the width direction of the second base 121B in mutually opposite directions at an angle of approximately 180 degrees as illustrated in Fig. 5; and measuring a maximum strength of stress when the second bonded region 142 is broken to peel the second base 121B off from the second surface 111B. Pulling force is optionally measured by, for instance, a digital force gauge manufactured by IMADA Co., Ltd., but not necessarily limited thereto.

[0033] Fig. 6 depicts an exemplary arrangement of the vapor outlet in the first exemplary embodiment of the invention. In the present exemplary embodiment, a first section S_1 in the longitudinal direction of the zipper tape 120, in which the second bonded region 142 is provided, may be arranged eccentrically with respect to a longitudinal center 120C. An eccentricity ratio is represented by a ratio Y/X of a distance Y from the longitudinal center 120C to a longitudinal middle part of the first section S_1 to a length X that is half an opening width of the zipper-tape bag 100. Herein, the opening width is an entire length of the zipper tape 120 minus portions sealed by the side seals 113. When the first section S_1 is eccentric from the longitudinal center 120C of the zipper tape 120, $Y > 0$ is satisfied. Y/X is thus greater than 0. Y/X is preferably 0.15 or more, more preferably 0.20 or more, still more preferably 0.40 or more, still further more preferably 0.60 or more, and yet still further more preferably 0.80 or more. The upper limit is not particularly limited, and less than 1. When the section for the vapor outlet to be formed includes a plurality of sections that are eccentric similarly as the above-described first section S_1 , the above conditions relating to Y/X should be satisfied with the maximum one of the distances from longitudinal middle parts of the plurality of sections to the longitudinal center 120C of the zipper tape 120 being defined as the distance Y .

[0034] Further, in the above example, a ratio W/X of a length W of the first section S_1 in the longitudinal direction of the zipper tape 120 (substantially equal to the width of the formed vapor outlet) to the length X that is half the opening width of the zipper-tape bag 100 is preferably 0.04 or more, more preferably 0.05 or more, still more preferably 0.10 or more, and still further more preferably 0.15 or more. The upper limit is not particularly limited and may be adjusted as necessary depending on the properties of food or other product used, for instance, 0.6. This is because an excessively narrow width of the vapor outlet results in a large deformation at a center part in the longitudinal direction of the zipper tape 120. When the section for the vapor outlet to be formed includes a plurality of sections that are eccentric similarly as the above-described first section S_1 , the above conditions relating to W/X should be satisfied with respect to the length W of one of the plurality of sections.

[0035] Fig. 7 depicts a modification of the arrangement of the bonded regions in the first exemplary embodiment of the invention. In the example illustrated in Fig. 7, a plurality of second bonded regions 142A and 142B are provided in the longitudinal direction of the zipper tape 120. In the example illustrated, a minimum distance from the center of the containing space SP to each of the second bonded regions 142A and 142B is equal to or shorter than a minimum distance from the center of the containing space SP to the first bonded region 141. With the plurality of second bonded regions 142A and 142B being provided, a plurality of vapor outlets are formed at the time of heating the contents C, allowing vapor to be released more stably. This reduces an increase in vapor pressure inside the containing space SP and more securely prevents the unexpected opening of the zipper tape 120 that may otherwise be caused by vapor pressure. Although two second bonded regions 142A and 142B are provided in the illustrated example, three or more second bonded regions are optionally provided. Further, in the illustrated example, neither the second bonded regions 142A nor 142B overlaps with a longitudinal center of the zipper tape 120. However, one of the second bonded regions may overlap with the longitudinal center of the zipper tape 120.

[0036] Fig. 8 depicts a modification of a shape of the bonded region in the first exemplary embodiment of the invention. In the example illustrated in Fig. 8, the second bonded region 142 is asymmetric with respect to the longitudinal direction of the zipper tape 120. More specifically, a side close to the containing space SP of the second bonded region 142 is stretched toward a longitudinal center of the zipper tape 120. For instance, when the position of the vapor outlet is determined in advance, the shape of the second bonded region 142 may be stretched along a line connecting the vapor outlet and the center SP_C of the containing space SP.

[0037] Making an angle at the end close to the containing space SP of the stretched second bonded region 142 acute concentrates stress at the end when vapor pressure increases, allowing the second bonded region 142 to be peeled off easily. In contrast, when a shape of the end close to the containing space SP of the second bonded region 142 is obtuse or rounded, the minimum distance d2 from the center SP_C to the second bonded region 142 is prevented from greatly

varying due to misalignment at the time of forming the bonded region. The shape of the end close to the containing space SP of the second bonded region 142 is determined in consideration of the above factors in the present modification. **[0038]** The second bonded region 142 shaped as above allows, for instance, an arrangement where the vapor outlet is provided at a position away from the longitudinal center of the zipper tape 120. This is because the side close to the containing space SP of the second bonded region 142 is located close to the center of the containing space SP, making the distance d2 equal to or shorter than the distance d1. Accordingly, at the time of heating the contents, the side close to the containing space SP of the second bonded region 142 is first peeled off to form the vapor outlet before the vapor pressure applied to the first bonded region 141 increases, so that the zipper tape 120 can be prevented from being unexpectedly opened.

Second Exemplary Embodiment

[0039] Fig. 9 is a plan view of a bag with a zipper tape according to a second exemplary embodiment of the invention. Figs. 10A, 10B and 11 are cross-sectional views of the bag with the zipper tape taken along the lines X-X and XI-XI in Fig. 9. Referring to those figures, the structure of the bag with the zipper tape according to the present exemplary embodiment will be described below.

[0040] As illustrated in those figures, a bag with a zipper tape 200 (hereinafter also referred to as a zipper-tape bag 100) includes a bag-shaped container body defined by a film 110 having a first surface 111A and a second surface 111B opposed to each other and a zipper tape 220 disposed between the first surface 111A and the second surface 111B of the film 110. As described later, at least a part in a width direction of the zipper tape 220 is bonded to the first surface 111A and the second surface 111B over an entire length of the zipper tape 220, thereby defining one side of a containing space SP defined between the first surface 111A and the second surface 111B of the film 110 to house contents C. Since the structure of the film 110 is the same as that in the first exemplary embodiment, the description therefor is omitted here.

[0041] The zipper tape 220 is a long component of which cross section includes a first base 221A bonded to the first surface 111A, a second base 221B bonded to the second surface 111B, and engagement portions 222A and 222B that respectively protrude from mutually facing surfaces of the first base 221A and the second base 221B and are engageable with each other. The zipper tape 220 is formed, for instance, by extrusion molding of a polyolefin resin. More specifically, the zipper tape 220 may be formed from low density polyethylene (LDPE), linear low density polyethylene (LLDPE), or polypropylene (PP). PP may be a polypropylene homopolymer (HPP), a polypropylene random copolymer (RPP), or a polypropylene block copolymer (BPP). The polyolefin resin is not necessarily derived from fossil fuel, and may be, for instance, eco-friendly bioplastics (e.g. polyolefin resins derived from biomass such as bio-polyethylene and bio-polypropylene) or mixtures of fossil fuel-derived resins and biomass plastics. Known additive(s) such as a stabilizer, antioxidant, lubricant, antistatic agent, and coloring agent may be added to the material of the zipper tape 220 as necessary.

[0042] The engagement portions 222A and 222B are not necessarily shaped as illustrated but are optionally shaped as in engagement portions of known various zipper tapes (e.g. a combination of a claw-shape, hook-shape, or knob-shape). Further, although a pair of engagement portions 222A and 222B are provided in the illustrated example, multiple pairs of the engagement portions 222A and 222B are optionally provided. The engagement portions 222A and 222B allow the zipper-tape bag 200 to be sealed, opened, and re-sealed.

[0043] In the present exemplary embodiment, the cross section of the zipper tape 220 includes a first portion 225 formed from a first resin composition and a second portion 226 formed from a second resin composition. The first portion 225 is formed from the first resin composition and the second portion 226 is formed from the second resin composition. More specifically, the second portion 226 includes a part (illustrated as a surface 221B1) of the second base 221B facing the second surface 111B. The first portion 225 includes an entirety of the first base 221A, the engagement portion 222A, and the engagement portion 222B and the rest of the second base 221B including a surface (illustrated as a surface 221B2) facing the second surface 111B.

[0044] The second resin composition forming the second portion 226 is different from the first resin composition forming the first portion 225. For instance, with the combination examples as listed in Table 1, the bonding strength between the first portion 225 and the second portion 226 is lower than the bonding strength between the first portion 225 and the first and second surfaces 111A, 111B and between the second portion 226 and the second surface 111B at the time of heating the contents. In the example of Table 1, the first resin composition is polypropylene and the second resin composition is polyethylene. Specifically, the bonding strength between the second portion 226 and the second surface 111B is increased, for instance, by providing a third portion (not illustrated) formed from a third resin composition between the second surface 111B and the second portion 226 or providing an adhesive between the second surface 111B and

the second portion 226, so that the bonding strength between the first portion 225 and the second portion 226 is lower than the bonding strength between the second portion 226 and the second surface 111B.

Table 3

First Resin Composition	Second Resin Composition	Third Resin Composition
HPP	LDPE	HPP
BPP		BPP
RPP	HDPE	RPP
		LLDPE
		Mixture of PP/PE
Table 3: Examples of Combinations of Resin Compositions		

[0045] Alternatively, the bonding strength between the first portion 225 and the second portion 226 may be lower than the bonding strength between the first portion 225 and the first and second surfaces 111A, 111B and between the second portion 226 and the second surface 111B at the time of heating the contents by employing combination examples of resin compositions as listed in Table 2. It should be noted that T_m in Table 2 refers to a melting point.

Table 4

First Resin Composition	Second Resin Composition
HPP (T _m :160°C)	Mixture of LD/PP (T _m :109°C/137°C)
HPP (T _m :160°C)	Mixture of LL/PP (T _m :123°C/140°C)
RPP (T _m :134°C)	m-LL (T _m :95°C)
Table 4: Examples of Combinations of Resin Compositions	

[0046] In the present exemplary embodiment, the first base 221A is bonded to the first surface 111A over the entire length of the zipper tape 220. Since the entirety of the first base 221A is provided by the first portion 225 formed from the first resin composition, the first base 221A is bonded to the first surface 111A in any desired area. Although the second base 221B is also bonded to the second surface 111B over the entire length of the zipper tape 220, a bonded region 240 where the second base 221B is bonded to the second surface 111B through heat sealing or ultrasonic sealing includes a first bonded region 241 and a second bonded region 242. In the first bonded region 241, the first portion 225 (the surface 221B2) is bonded to the second surface 111B, as depicted in Fig. 11. It should however be noted that the second portion 226 may also be bonded to the second surface 111B in the first bonded region 241. In the second bonded region 242, the second base 221B is bonded to the second surface 111B only at the second portion 226 (the surface 221B1), as depicted in Fig. 10A. Specifically, in the second bonded region 142, the bonded region of the second portion 226 (the surface 221B1) and the second surface 111B faces both the containing space SP and a space near the mouth 101 (i.e. a space opposite the containing space SP).

[0047] More specifically, the second portion 226 is provided, with respect to the width direction of the zipper tape 220, in an intermediate portion of the second base 221B between a root of the engagement portion 222B and an end near the mouth 101 (i.e. an end opposite the containing space SP). Thus, the first portion 225 is present at a side near the mouth 101 with respect to the second portion 226. As depicted in Fig. 9, the first bonded region 241 of the bonded region 240 is provided in the first portion 225 located near the containing space SP with respect to the second portion 226 and the second bonded region 242 of the bonded region 240 is provided to protrude toward the side opposite the mouth 101, i.e. toward the containing space SP.

[0048] According to the above arrangement, when the vapor pressure inside the containing space SP is increased by heating the contents C, a part of the film 110 with the smallest bonding strength between the second surface 111B and the first surface 111A (i.e. the bonded region of the zipper tape 220 between the first portion 225 and the second portion 226) is broken, as depicted in Fig. 10B. When the above-described bonded region is broken, the second portion 226 (a portion including the surface 221B1) of the second base 221B is separated from the first portion 225 (the rest of the second base 221B including the surface 221B2) to bring the containing space SP into communication with the outside, allowing vapor to be discharged. According to the above arrangement, a vapor outlet through which vapor can be stably released at the time of heating the contents can be provided in the present exemplary embodiment.

[0049] In the present exemplary embodiment, the second base 221B is attached to the second surface 111B of the film 110 in a so-called one-side-released fashion through the first bonded region 241 and the second bonded region

242, as depicted in Figs. 10A, 10B, and 11. Specifically, the second base 221B is bonded to the second surface 111B of the film 110 through the first bonded region 241 and the second bonded region 242 only at the side opposite the containing space SP with respect to the position of the engagement portion 222B in the width direction. According to the above arrangement, when the vapor pressure inside the containing space SP increases at the time of heating the contents, force in a shear direction acts on between the first base 221A and the second base 221B along the width direction thereof, as indicated by arrows in Fig. 10B. The force in this direction strengthens the engagement between one of the claws of the female-shaped engagement portion 222B and the male-shaped engagement portion 122A, so that the engagement portions are not likely to be disengaged due to the effect of vapor pressure. Further, this makes it easier for the vapor pressure in the containing space SP not only to act on the engagement portions but also to disperse and act on between the second base 221B and the second surface 211B.

[0050] Similar to the example described with reference to Figs. 1 and 8, a minimum distance from the center of the containing space SP to the first bonded region 241 is equal to or longer than a minimum distance from the center of the containing space SP to the second bonded region 242 in the present exemplary embodiment. The center of the containing space SP is defined similarly to that described in the first exemplary embodiment. Arranging the first bonded region 241 and the second bonded region 242 as described above makes the vapor pressure applied to the first bonded region 241 at the time of heating the contents C equal to or less than the vapor pressure applied to at least a part of the second bonded region 242. Accordingly, the vapor outlet can be provided by breaking the bonding between the first portion 225 and the second portion 226 in second bonded region 242 before the second base 221B is pulled with strong force through the first bonded region 241, preventing unexpected opening of the zipper tape 220 due to the vapor pressure.

[0051] Also in the present exemplary embodiment, the peel strength between the first portion 225 and the second portion 226 may be preferably 20 N/50mm or less, more preferably 15 N/50mm or less, and still more preferably 10 N/50mm or less. The lower limit of the peel strength, which is not particularly limited, is, for instance, 1 N/50mm. In order to set the peel strength within the above range, for instance, components of the resin compositions for the first portion 225 and the second portion 226 are optionally adjustable. With the peel strength set as described above, the bonding between the first portion 225 and the second portion 226 is broken at a lower vapor pressure to provide the vapor outlet, further reliably preventing the unexpected opening of the zipper tape 220 due to the vapor pressure. The modifications of the arrangement and shape of the bonded region(s) described in the first exemplary embodiment with reference to Figs. 6, 7 and 8 are also applicable to the second exemplary embodiment.

[0052] Preferred exemplary embodiments of the invention have been described above in detail with reference to the accompanying drawings, but the invention is not limited thereto. It is apparent that a skilled person in the art of the invention can arrive at various alterations and modifications within the scope of the technical idea recited in the appended claims, and it is understood that such alterations and modifications naturally fall within the technical scope of the invention.

EXPLANATION OF CODES

[0053] 100...a bag with a zipper tape (zipper-tape bag), 101...mouth, 110...film, 111A...first surface, 111B...second surface, 112...bottom seal, 113...side seal, 120...zipper tape, 121A...first base, 121B...second base, 122A, 122B, 123A, 123B...engagement portion, 124...low bonding strength layer, 140...bonded region, 141...first bonded region, 142, 142A, 142B...second bonded region, 200...a bag with a zipper tape (zipper-tape bag), 220...zipper tape, 221A...first base, 221B...second base, 222A, 222B...engagement portion, 225...first portion, 226...second portion, 240...bonded region, 241...first bonded region, 242...second bonded region, C...contents, SC...constant pressure line, SP...containing space SP_C...center, d1, d2...minimum distance.

Claims

1. A container with a zipper tape, comprising:

a container body comprising at least a first surface and a second surface opposed to each other, a containing space being defined between the first surface and the second surface; and
a zipper tape provided between the first surface and the second surface to define one side of the containing space, the zipper tape comprising a first base bonded to the first surface, a first engagement portion protruding from the first base, a second base bonded to the second surface, and a second engagement portion protruding from the second base and being engageable with the first engagement portion, wherein
a low bonding strength layer, a bonding strength of which to the container body is lower than the bonding strength of a part other than the low bonding strength layer of the zipper tape, is provided on a part of the second base facing the second surface,
a bonded region between the second base and the second surface comprises a first bonded region in which

the second base is bonded to the second surface at the part other than the low bonding strength layer, and a second bonded region in which the second base is bonded to the second surface only at the low bonding strength layer, and

a minimum distance from a center of the containing space to the first bonded region is equal to or longer than a minimum distance from the center of the containing space to the second bonded region.

2. The container with the zipper tape according to claim 1, wherein

the low bonding strength layer is provided, with respect to a width direction of the zipper tape, in an intermediate portion of the second base between a root of the second engagement portion and an end opposite the containing space,

the first bonded region is provided opposite the containing space with respect to the low bonding strength layer, and

the second bonded region is provided by a part of the bonded region protruding toward the containing space.

3. A container with a zipper tape, comprising:

a container body comprising at least a first surface and a second surface opposed to each other, a containing space being defined between the first surface and the second surface; and

a zipper tape provided between the first surface and the second surface to define one side of the containing space, the zipper tape comprising a first base bonded to the first surface, a first engagement portion protruding from the first base, a second base bonded to the second surface, and a second engagement portion protruding from the second base and being engageable with the first engagement portion, wherein

the second base comprises a part formed from a second resin composition and facing the second surface, the second resin composition being different from a first resin composition forming the first base and a rest of the second base,

a bonded region between the second base and the second surface comprises a first bonded region in which the second base is bonded to the second surface at a part formed from the first resin composition, and a second bonded region in which the second base is bonded to the second surface only at the part formed from the second resin composition, and

a minimum distance from a center of the containing space to the first bonded region is equal to or longer than a minimum distance from the center of the containing space to the second bonded region.

4. The container with the zipper tape according to any one of claims 1 to 3, wherein the second bonded region does not overlap with a longitudinal center of the zipper tape.

5. The container with the zipper tape according to any one of claims 1 to 4, wherein

the second bonded region is formed in a first section in a longitudinal direction of the zipper tape, and a ratio Y/X of a distance Y from a longitudinal center of the zipper tape to a longitudinal middle part of the first section to a length X that is half an opening width of the container with the zipper tape is 0.15 or more.

6. The container with the zipper tape according to any one of claims 1 to 5, wherein the second bonded region includes a plurality of second bonded regions arranged in a longitudinal direction of the zipper tape.

7. The container with the zipper tape according to any one of claims 1 to 6, wherein a peel strength between the second base and the second surface in the second bonded region is 30 N/50mm or less.

8. The container with the zipper tape according to any one of claims 1 to 7, wherein at least a part of the second bonded region is located inside a circumference of a circle centered on the center of the containing space and touching the first bonded region.

9. The container with the zipper tape according to any one of claims 1 to 8, wherein a side of the second bonded region close to the containing space is stretched toward a longitudinal center of the zipper tape.

10. The container with the zipper tape according to any one of claims 1 to 9, wherein the second base is bonded to the second surface through the bonded region only at a side opposite the containing space with respect to a position of the second engagement portion in a width direction.

11. The container with the zipper tape according to any one of claims 1 to 10, wherein the container body has a bag shape.

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FIG. 1

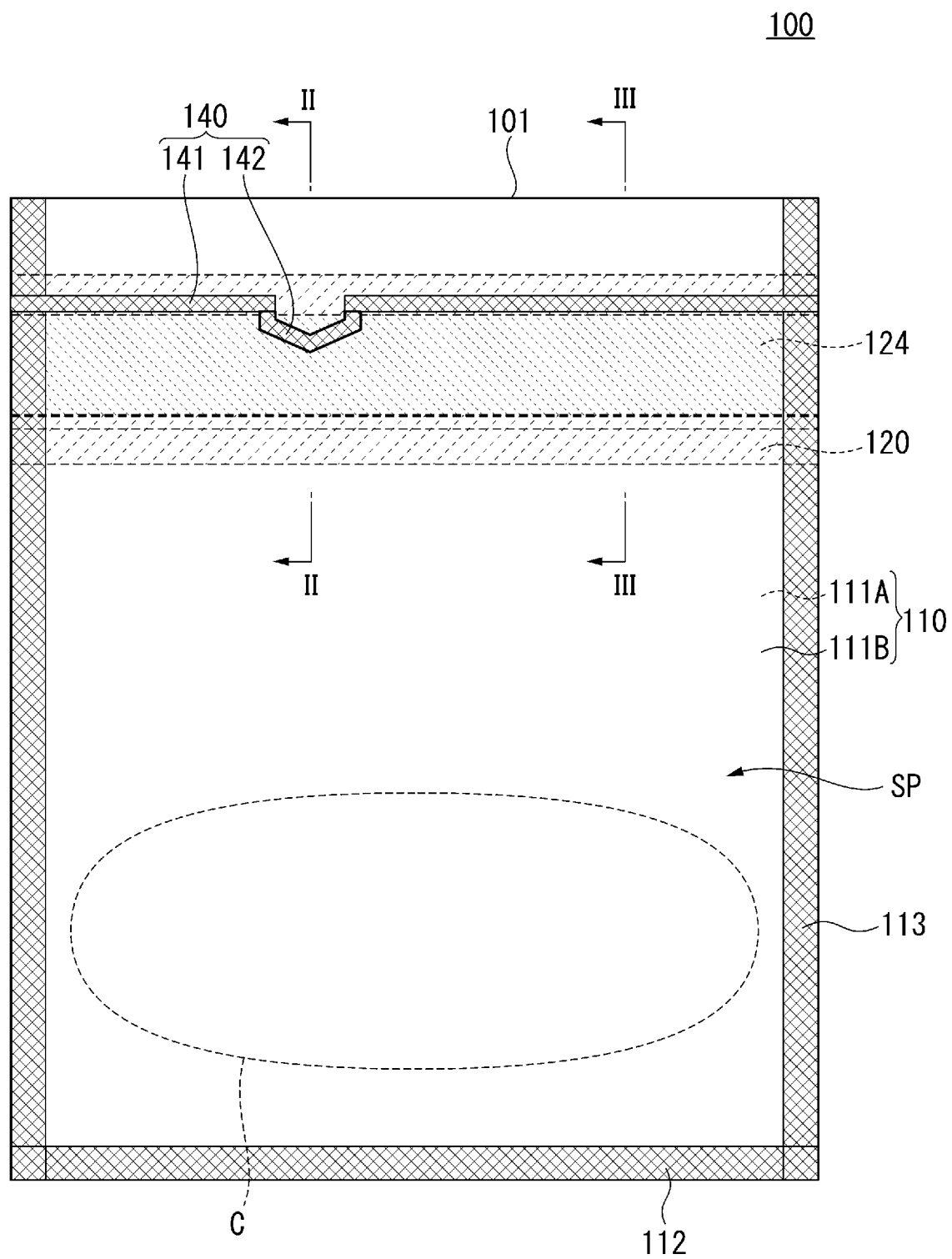


FIG. 2A

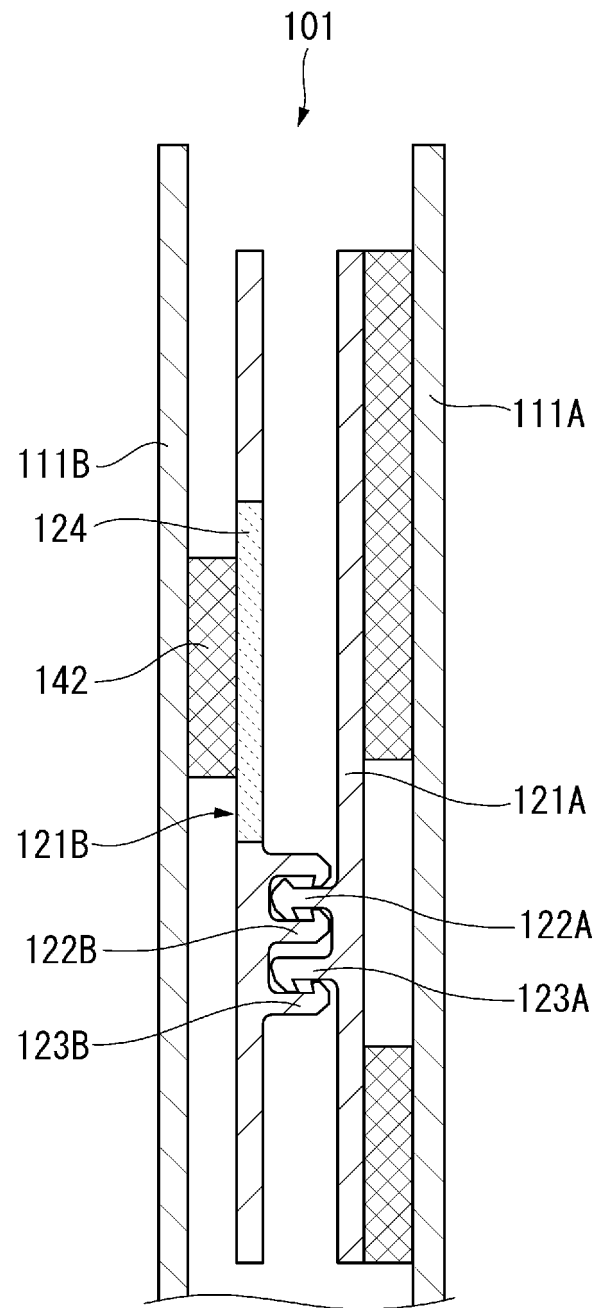


FIG. 2B

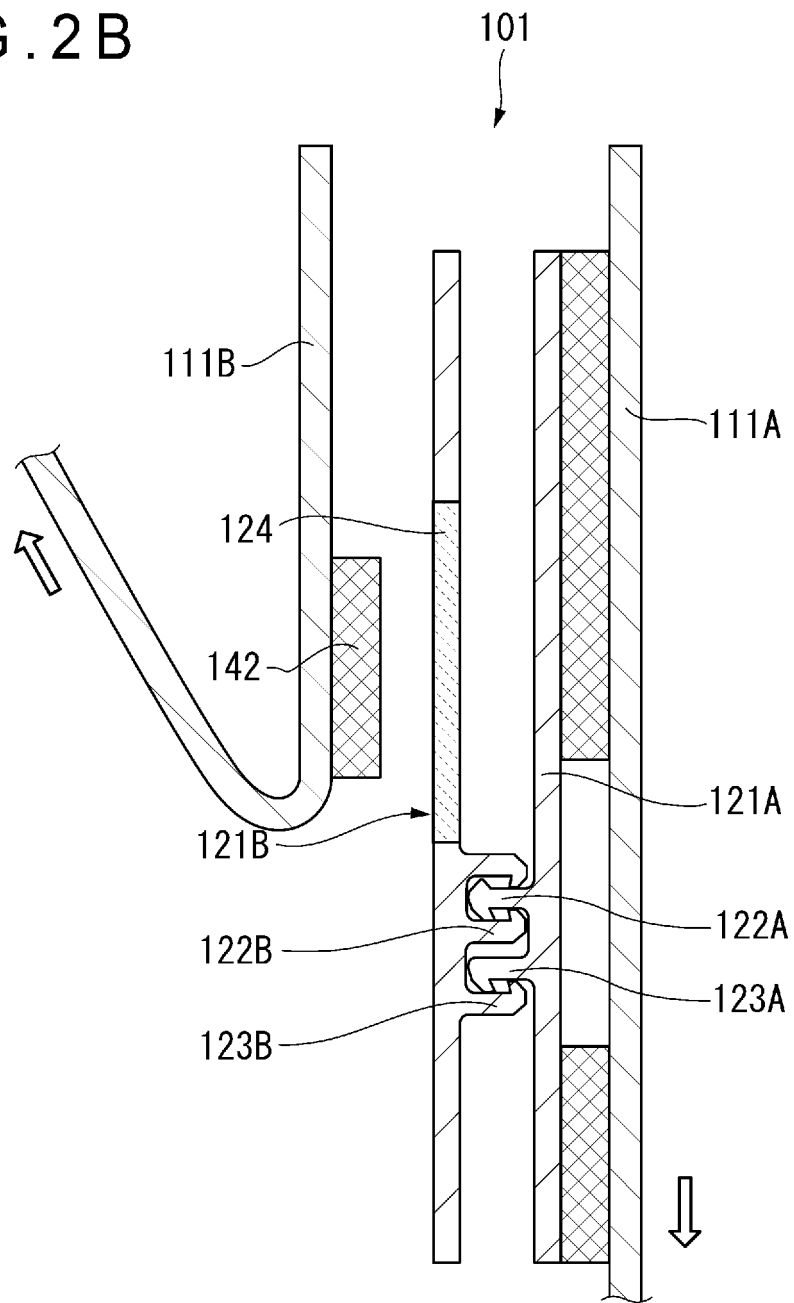


FIG. 3

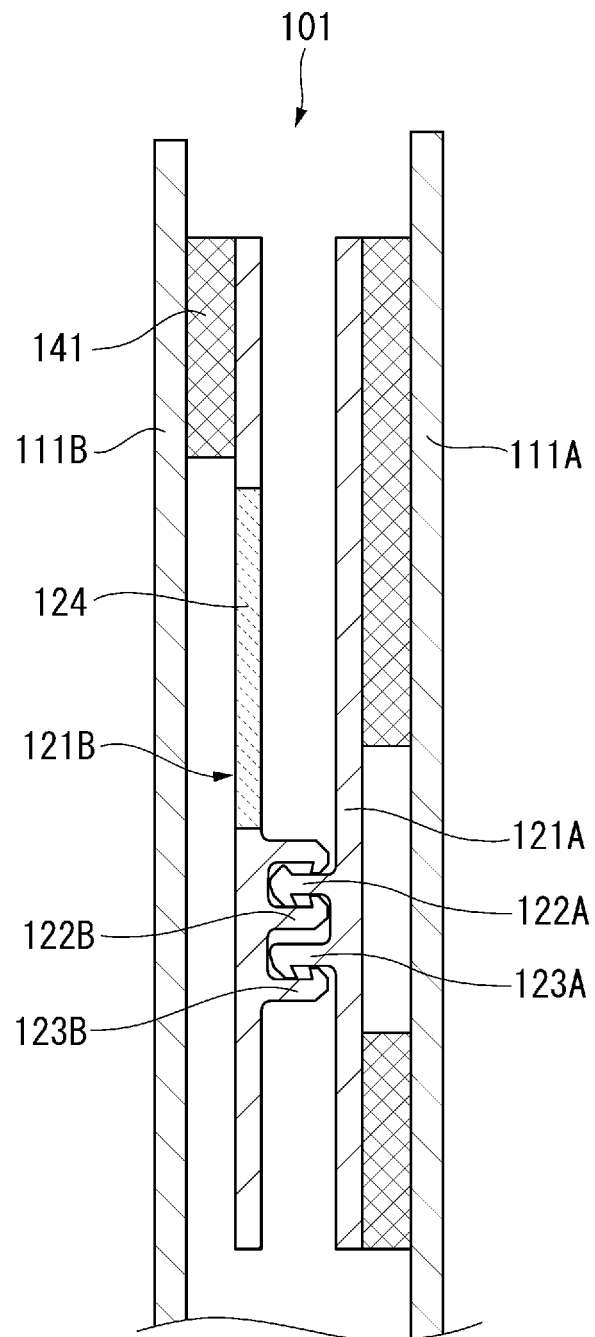


FIG. 4

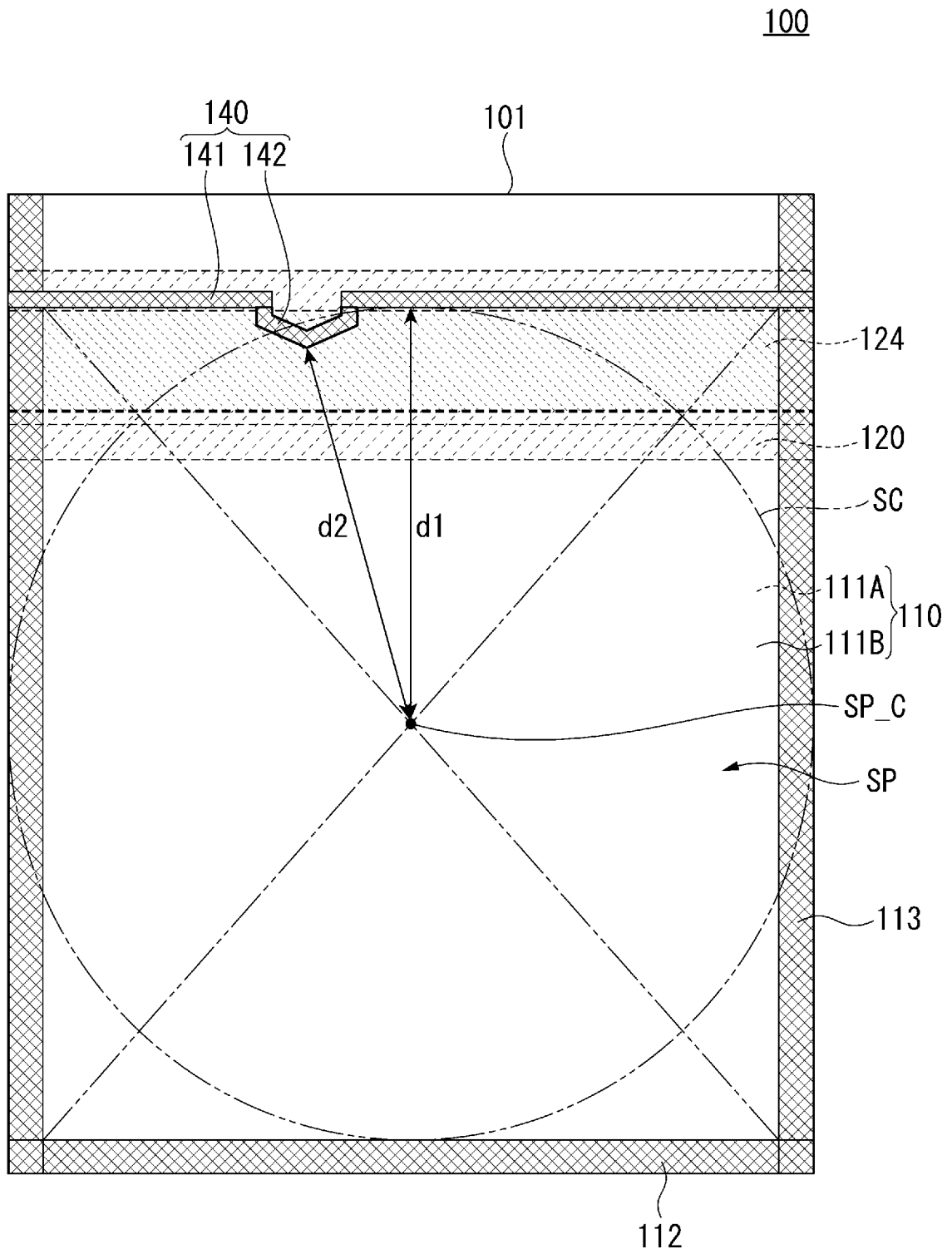


FIG. 5

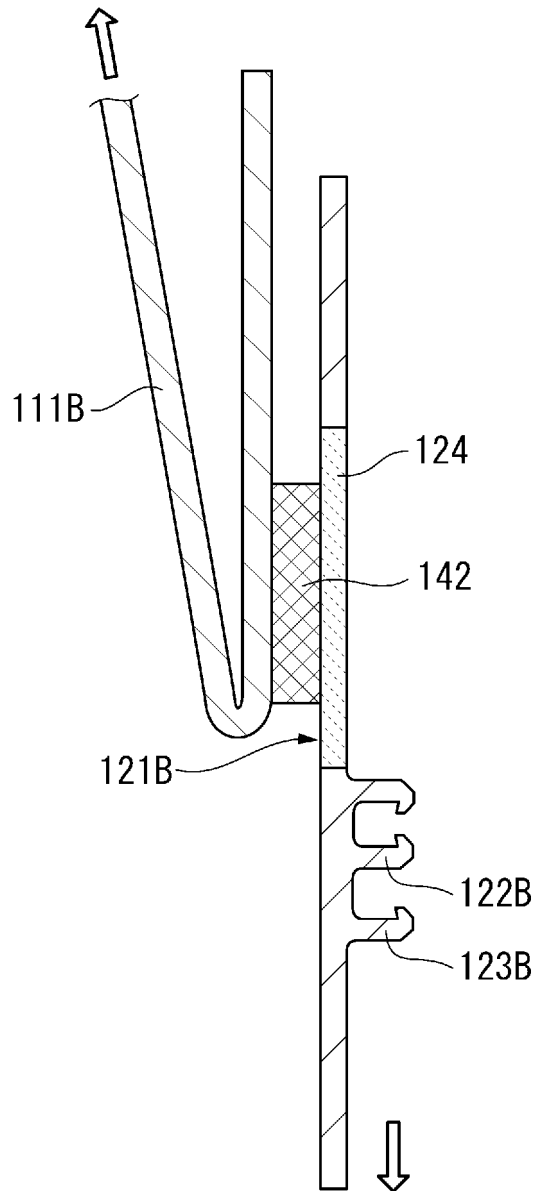


FIG. 6

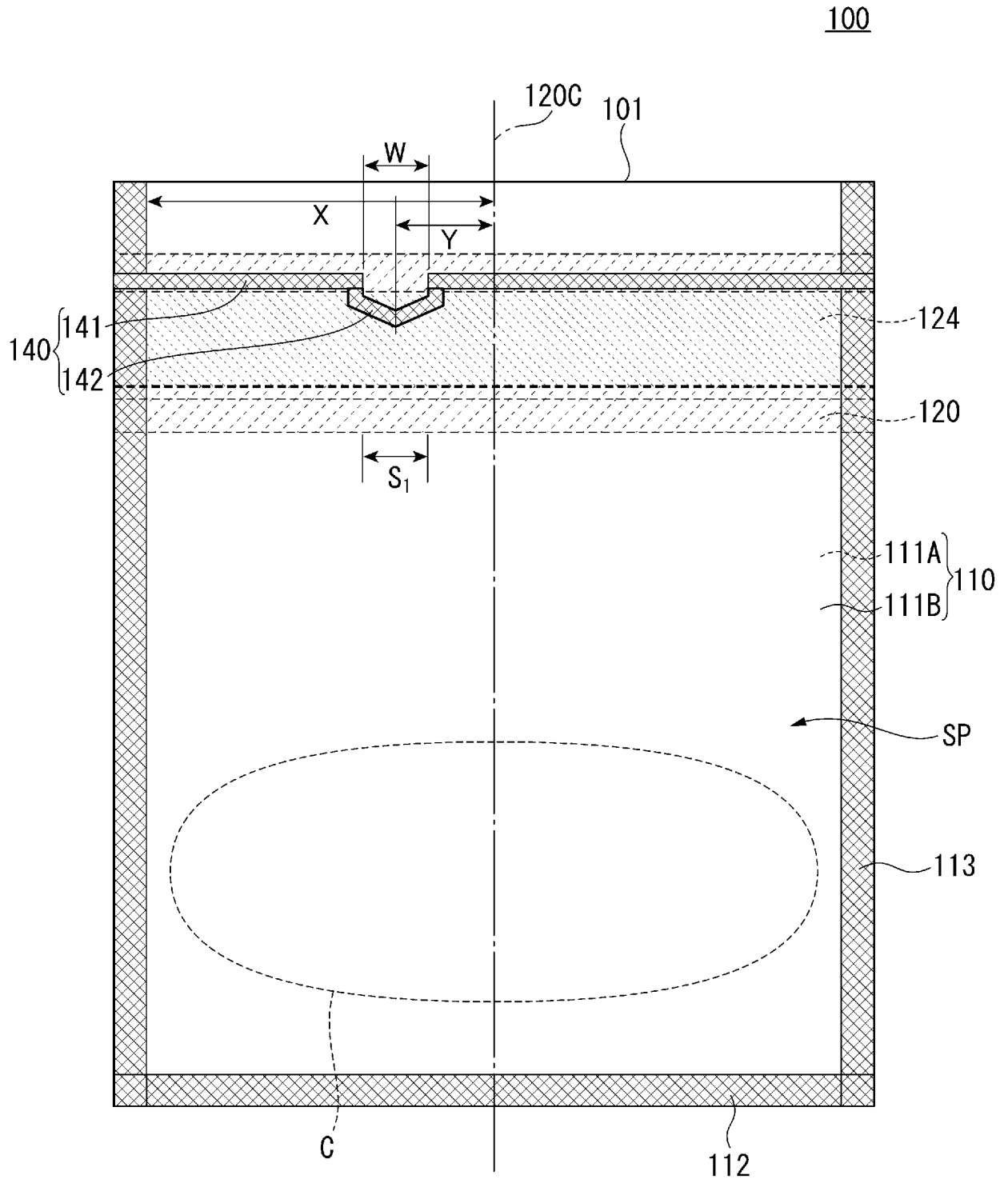


FIG. 7

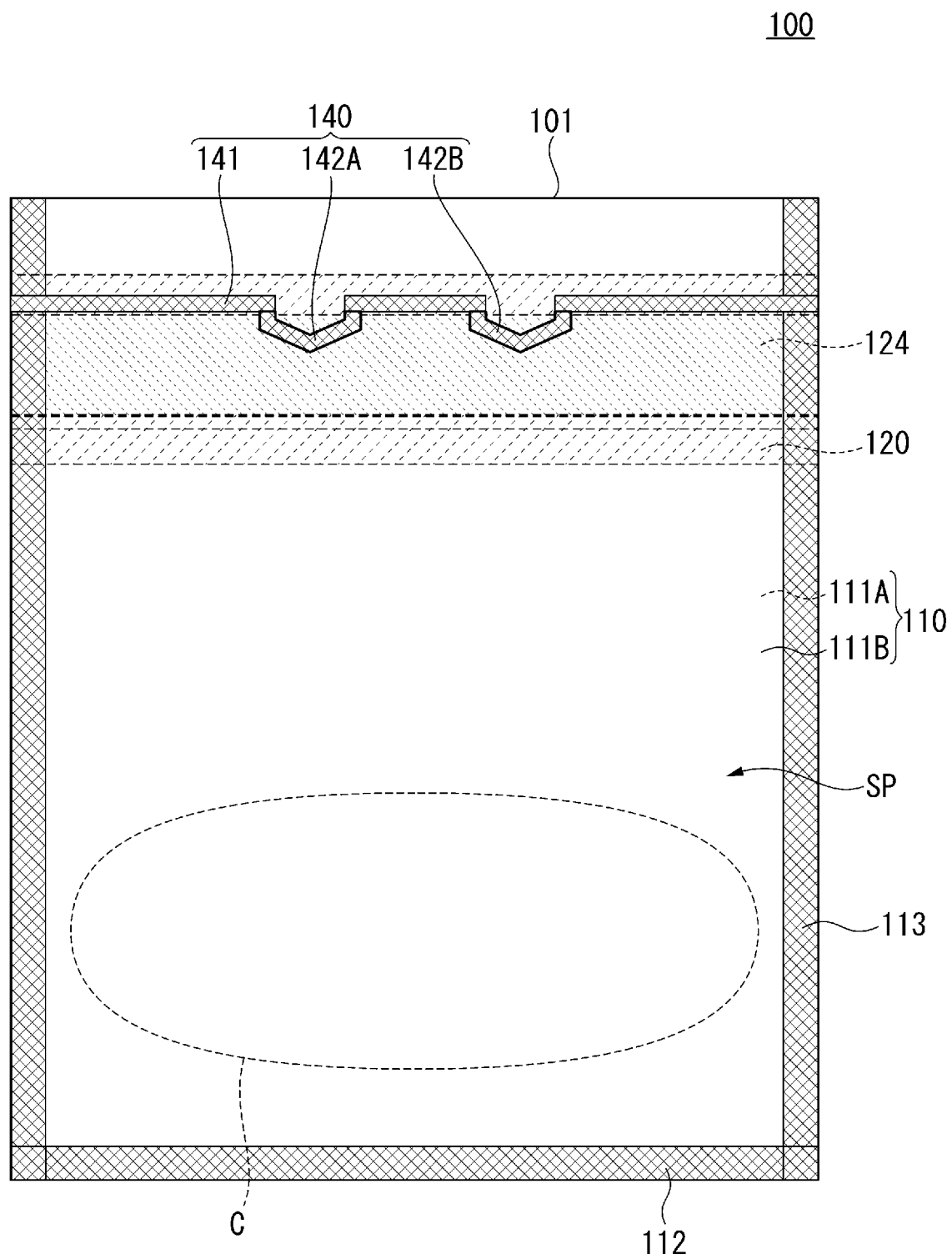


FIG. 8

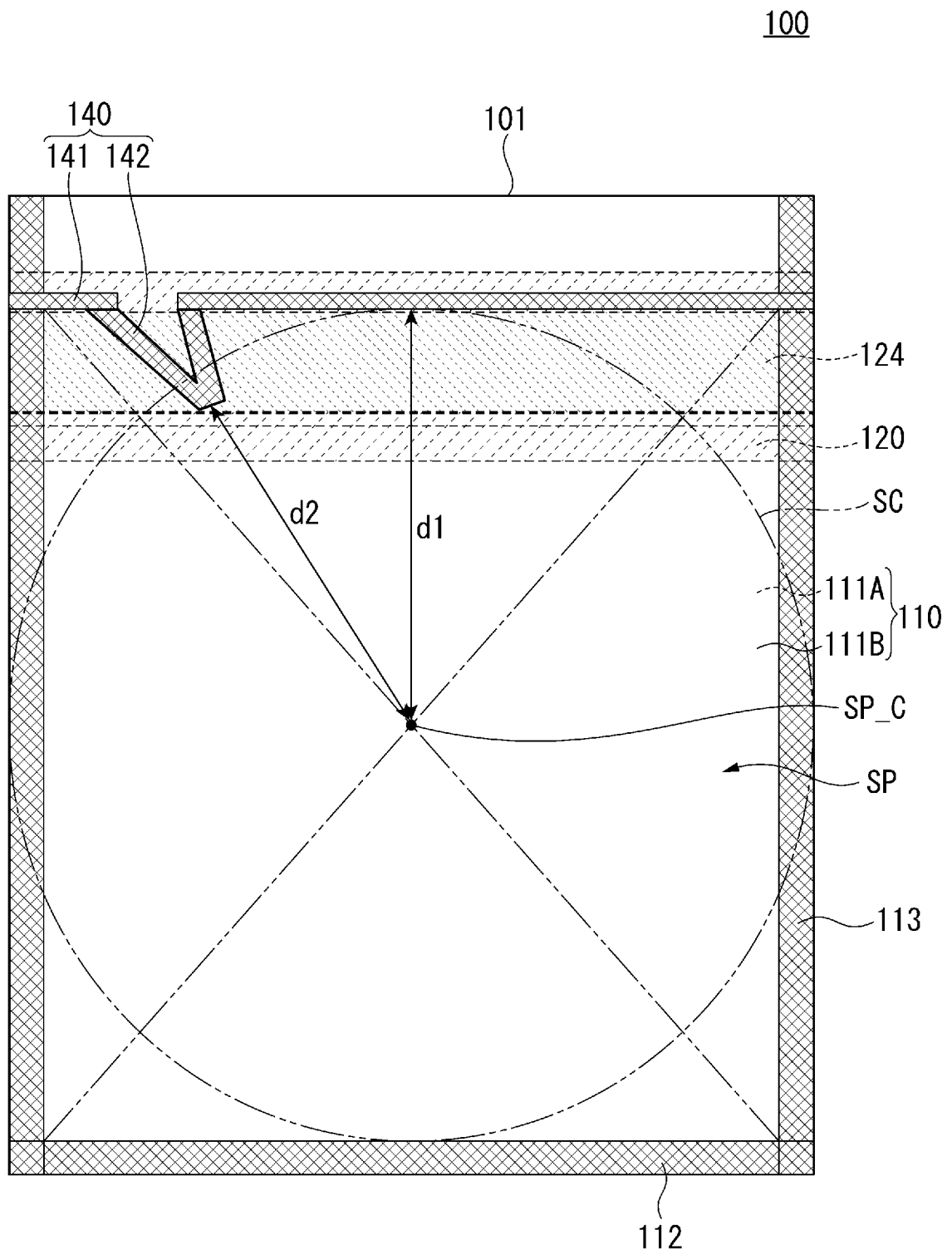


FIG. 9

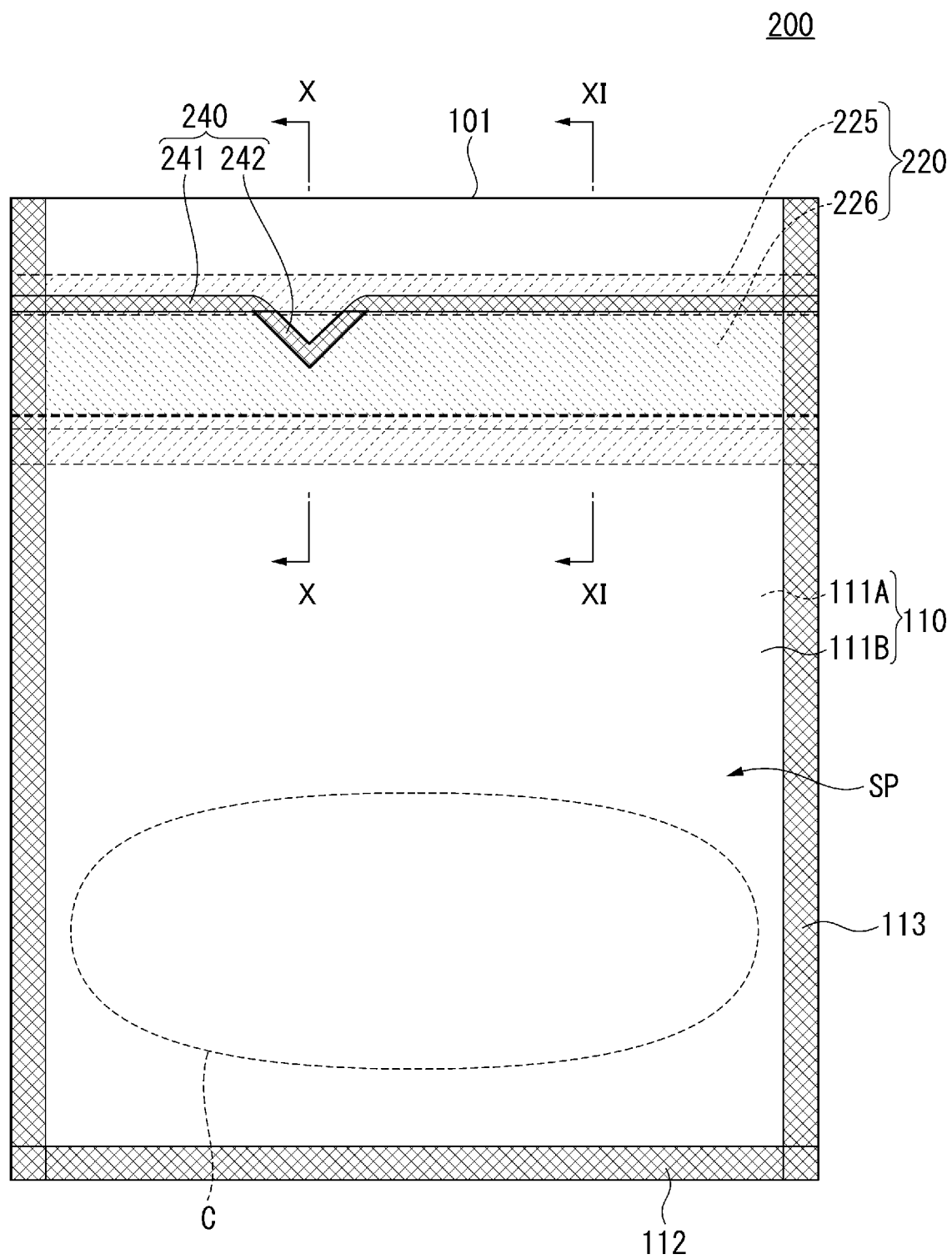


FIG. 10A

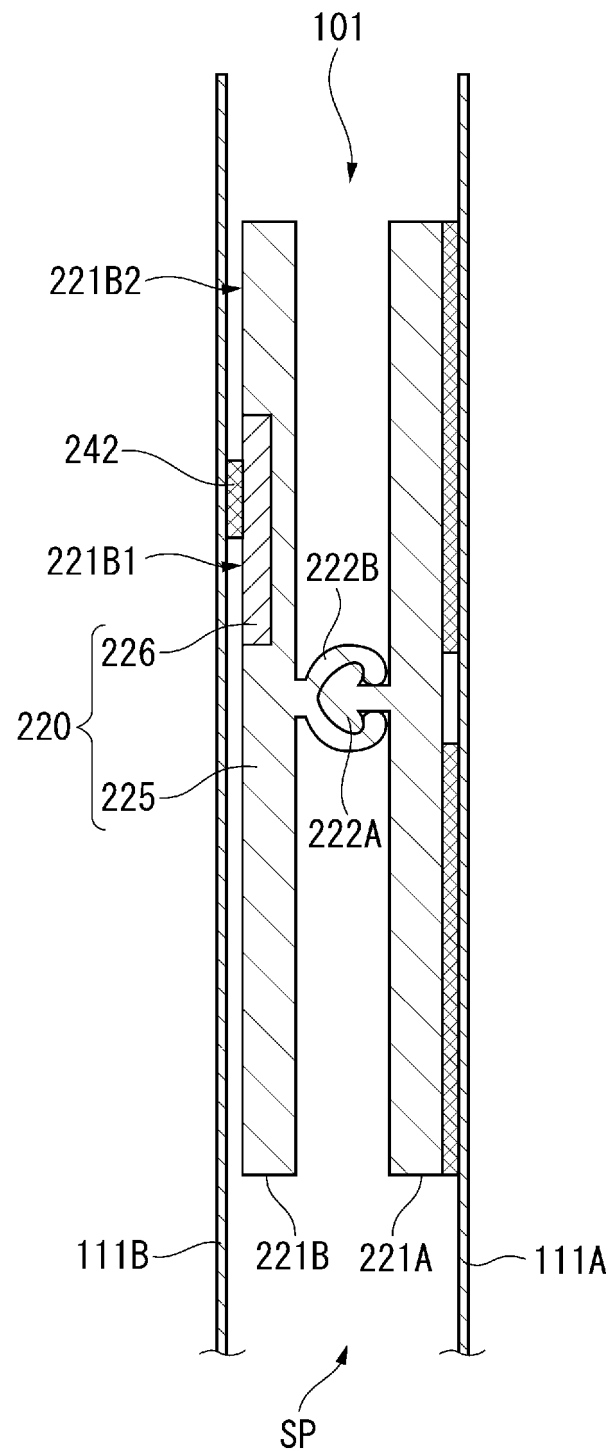


FIG. 10B

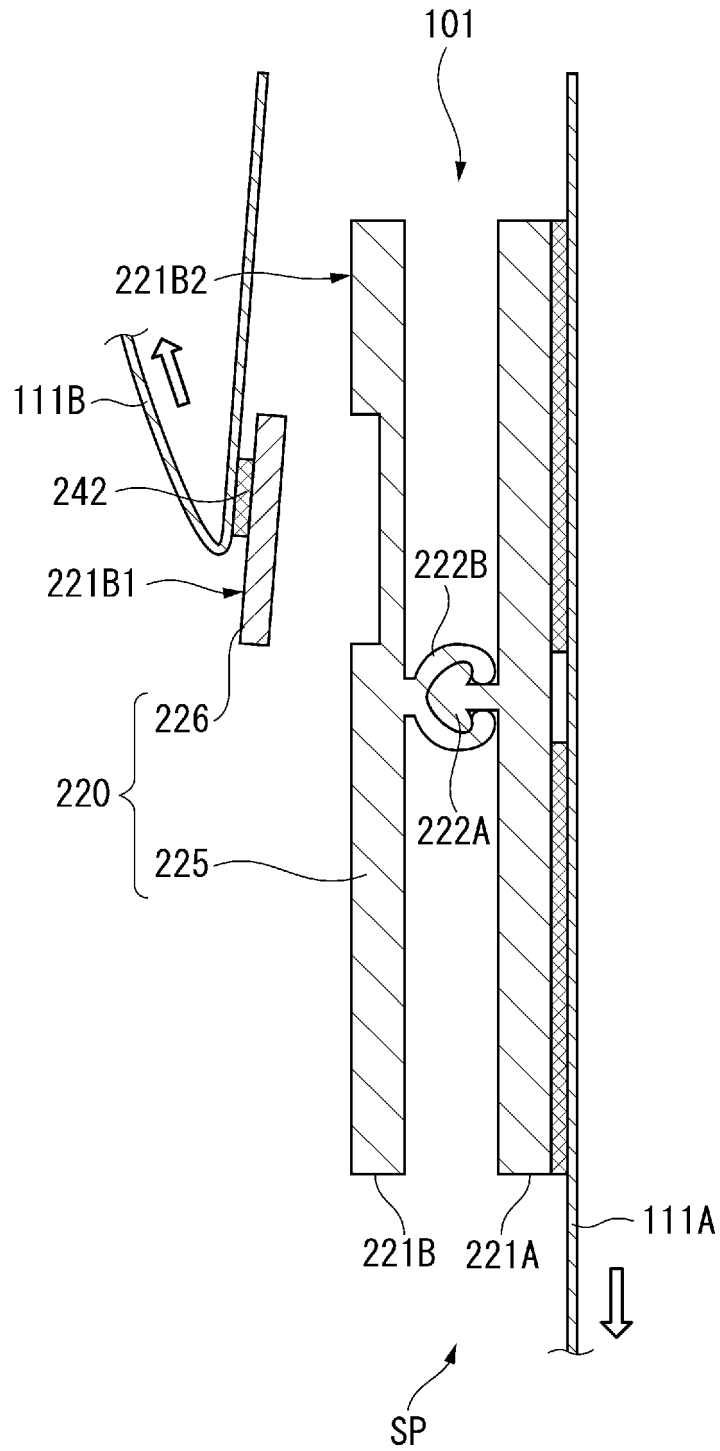


FIG. 11

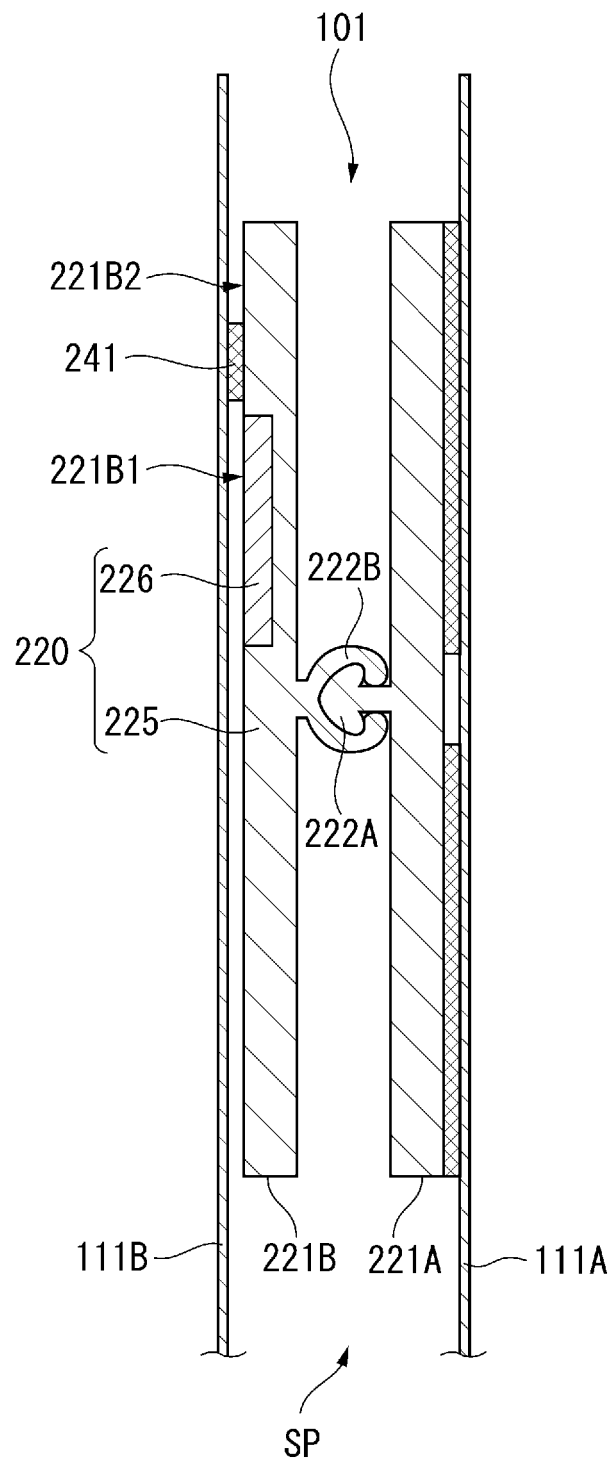
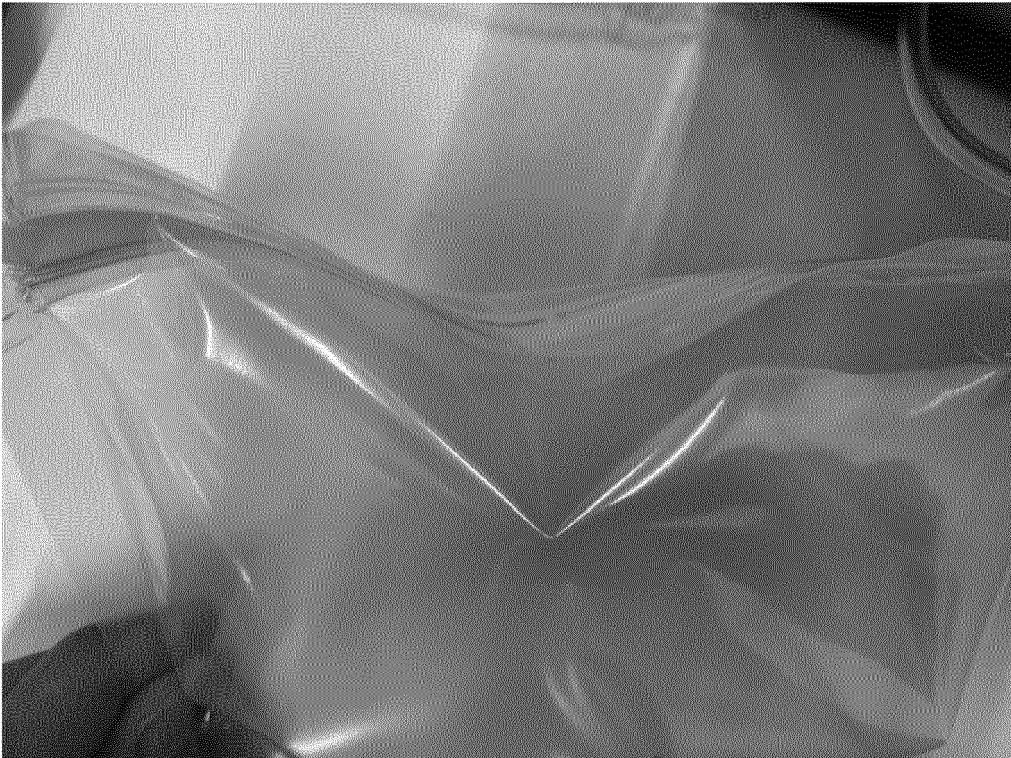


FIG. 12



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/042791

A. CLASSIFICATION OF SUBJECT MATTER

B65D 33/25(2006.01)i; *B65D 81/34*(2006.01)i

FI: B65D81/34 U; B65D33/25 A

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)

B65D33/25; B65D81/34

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 1971-2022

Registered utility model specifications of Japan 1996-2022

Published registered utility model applications of Japan 1994-2022

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	JP 2021-24602 A (IDEMITSU UNITECH CO LTD) 22 February 2021 (2021-02-22) paragraphs [0016]-[0030], fig. 1-5	1-8, 10-11
Y		9
Y	WO 2021/206150 A1 (TOPPAN PRINTING CO LTD) 14 October 2021 (2021-10-14) paragraphs [0042]-[0046], fig. 2, 5	9

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

* Special categories of cited documents:

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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

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

“&” document member of the same patent family

Date of the actual completion of the international search

12 December 2022

Date of mailing of the international search report

20 December 2022

Name and mailing address of the ISA/JP

Japan Patent Office (ISA/JP)
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/JP2022/042791

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2021-24602 A	22 February 2021	(Family: none)	
WO 2021/206150 A1	14 October 2021	JP 2021-165170 A	
		JP 2021-167214 A	

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2013046644 A [0004]
- WO 2017119449 A [0004]
- JP 2021024602 A [0004]