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(54) **RESIN MADE CONTAINER**

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(57) **ABSTRACT**

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A resin made container includes a spout portion acting as an outlet for contents, a shoulder portion continuous with the spout portion, a body portion continuous with the shoulder portion and closing a lower end of the body portion. The body portion includes a plurality of approximately quadrangular shaped panel portions each having an upper side and a lower side thereof displaced; and between adjacent panel portions, a chevron-shaped rib is provided. Also, there is provided an annular recessed rib which is recessed to the inner side of the resin made container and which extends in a circumferential direction of the resin made container. The recessed rib includes a plurality of protruding ribs protruding in a direction intersecting the extending direction of the recessed rib, the protruding ribs being recessed from the surface of the resin made container.

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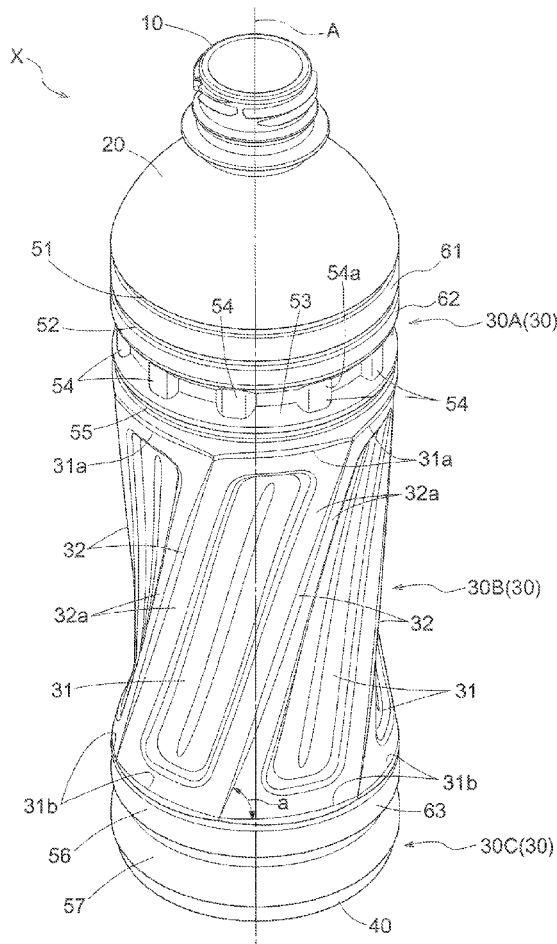
§ 371 (c)(1),

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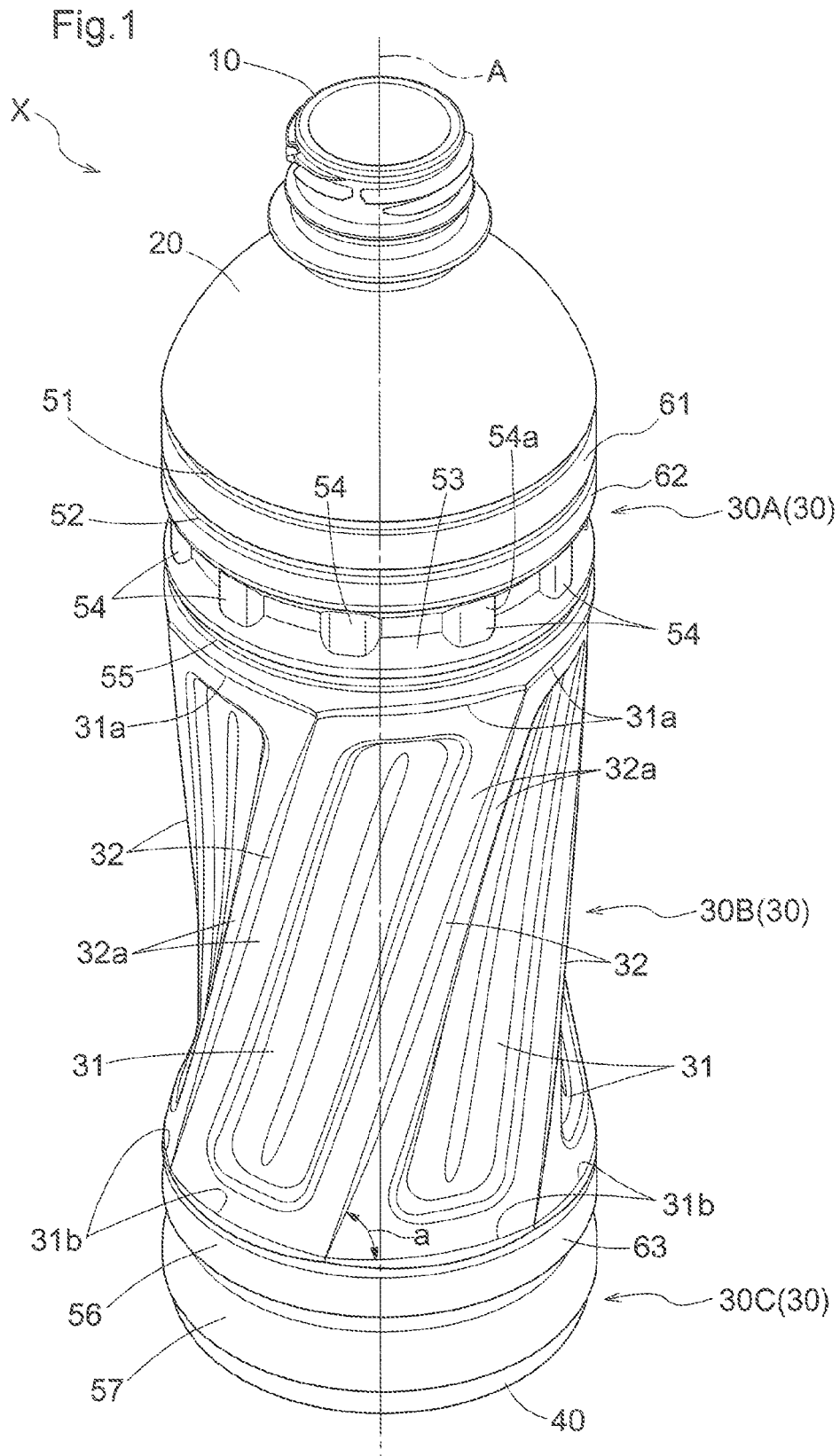


Fig.2

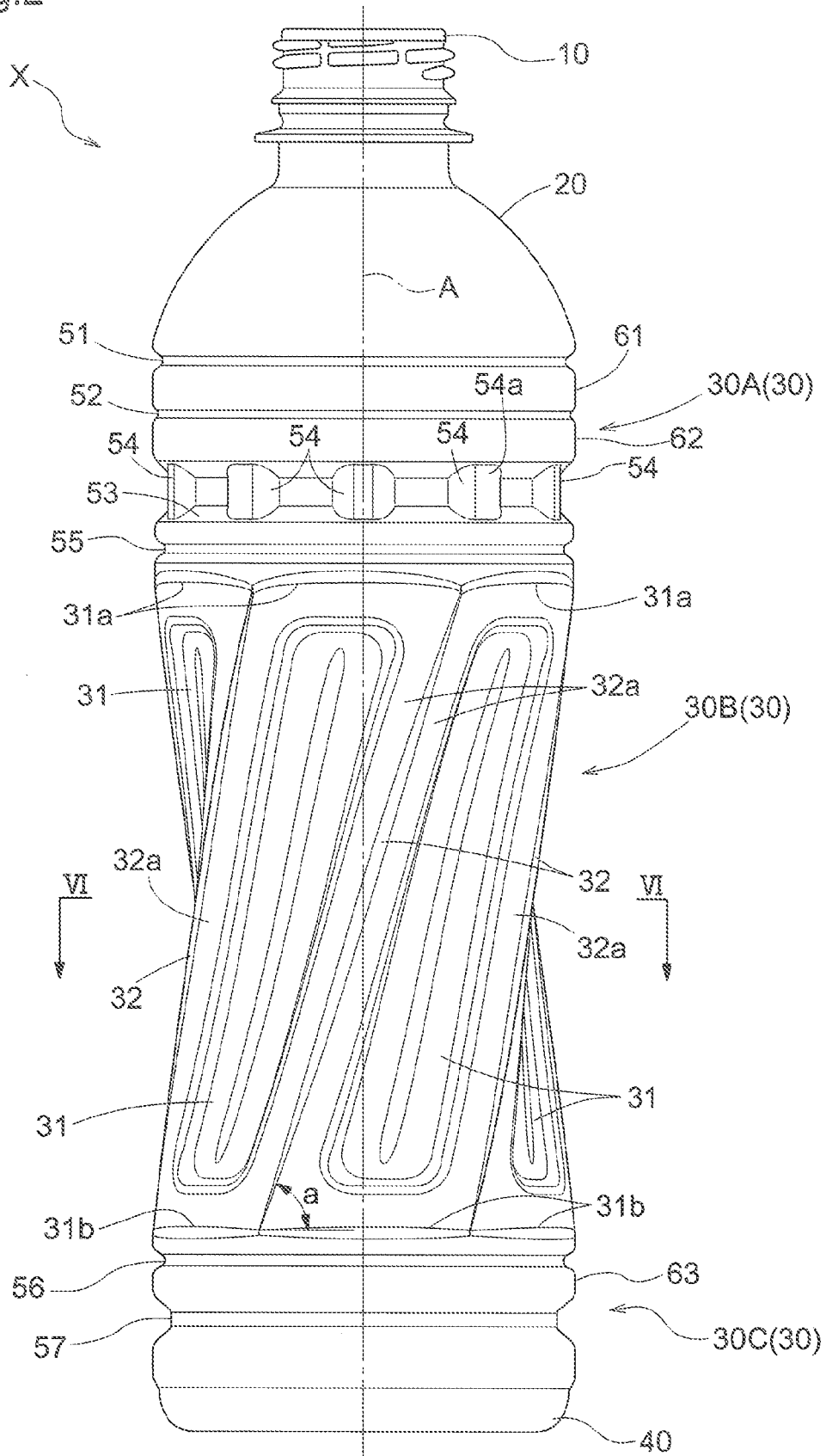


Fig.3

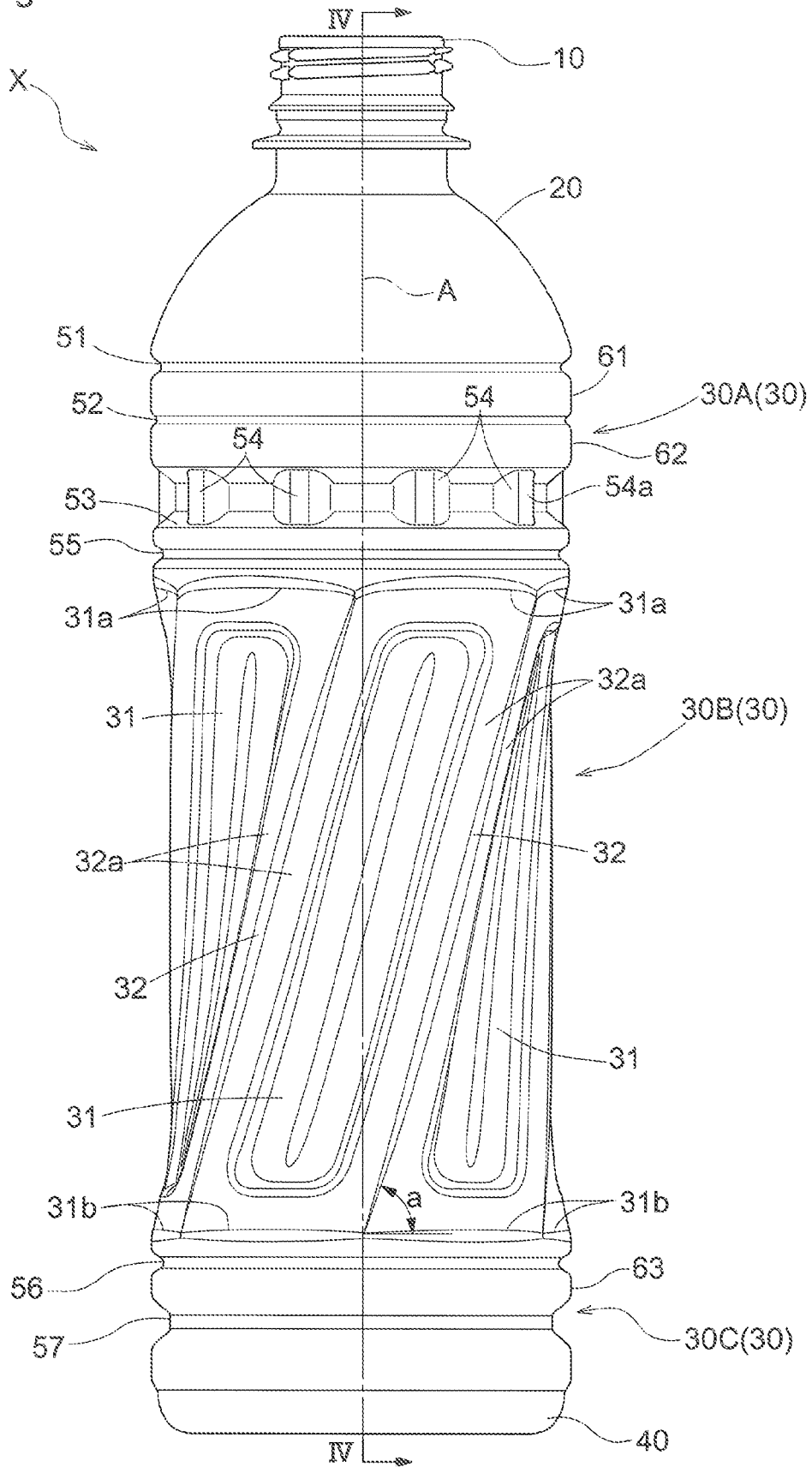


Fig.4

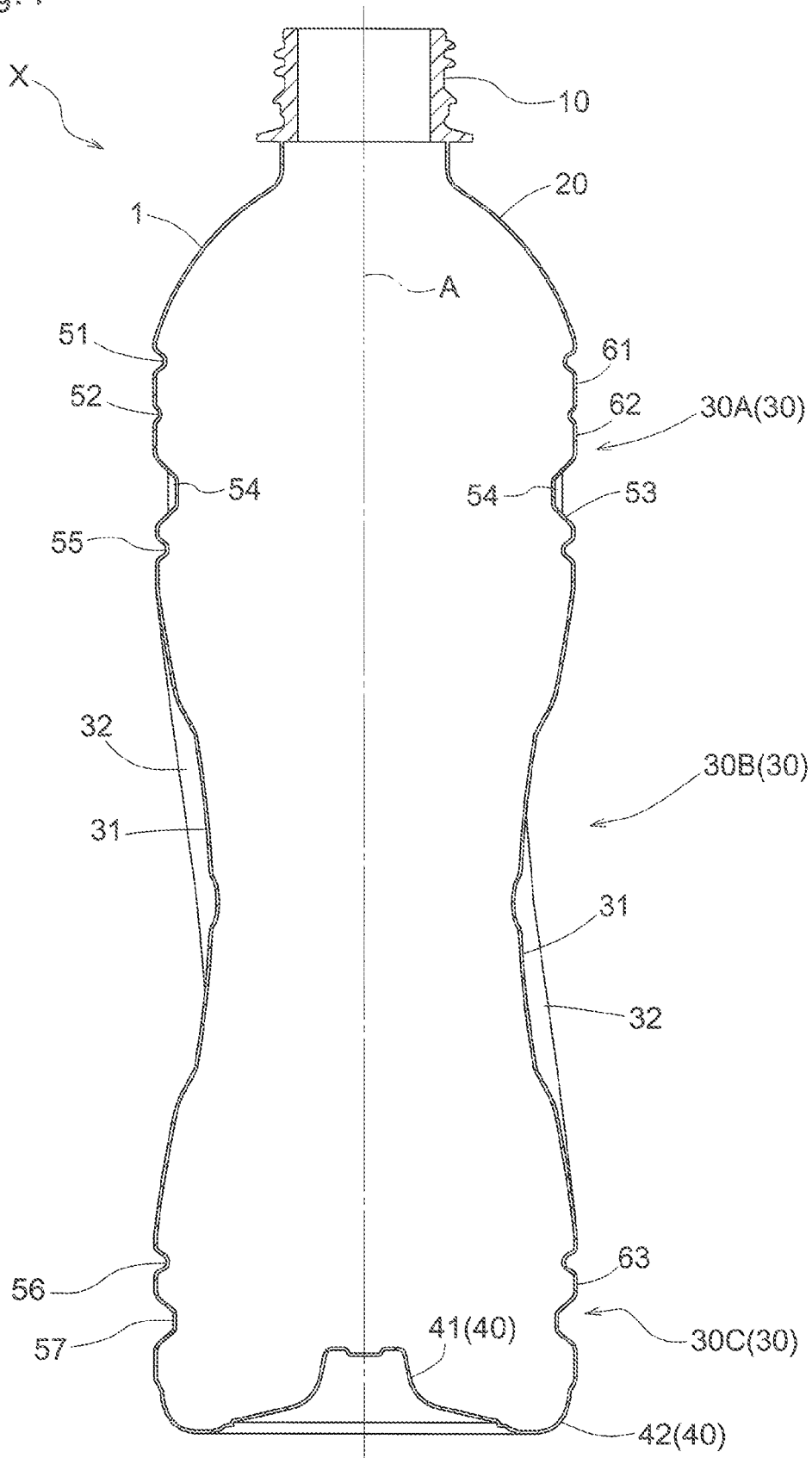


Fig.5

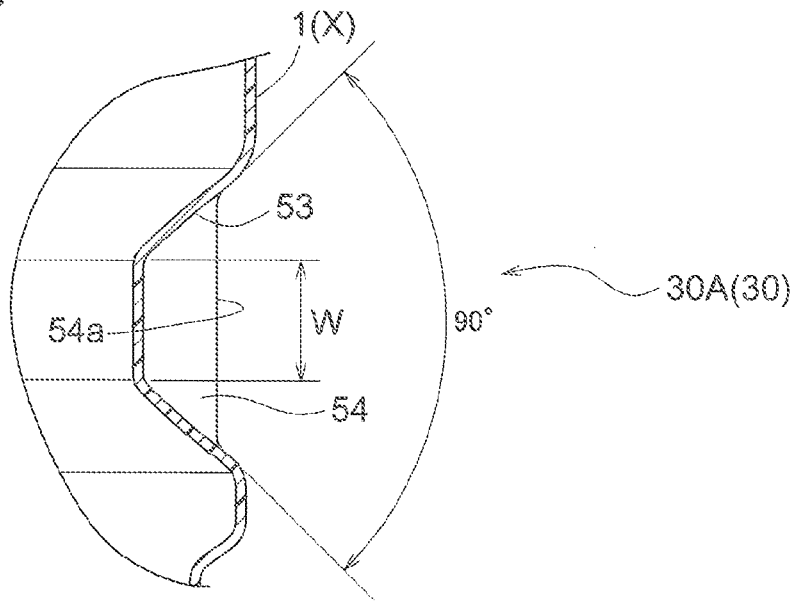


Fig.6

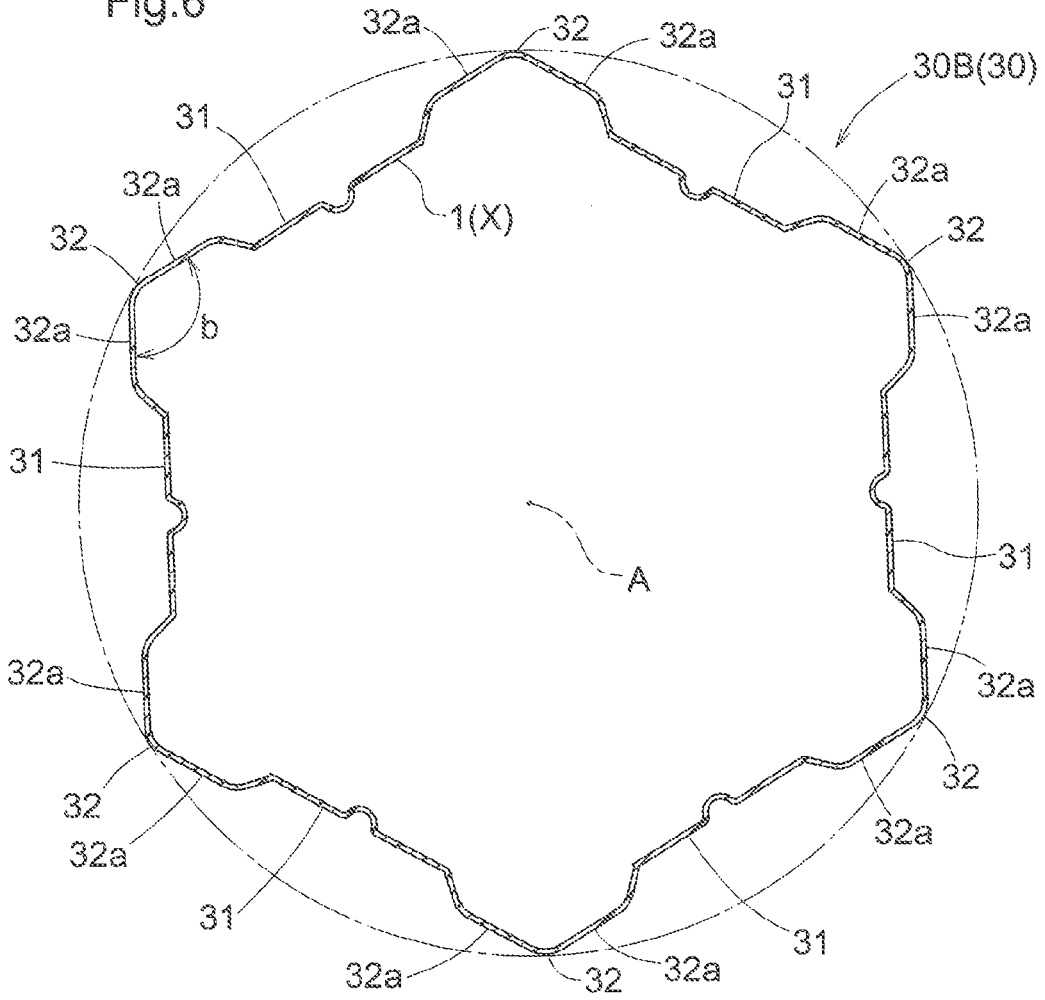
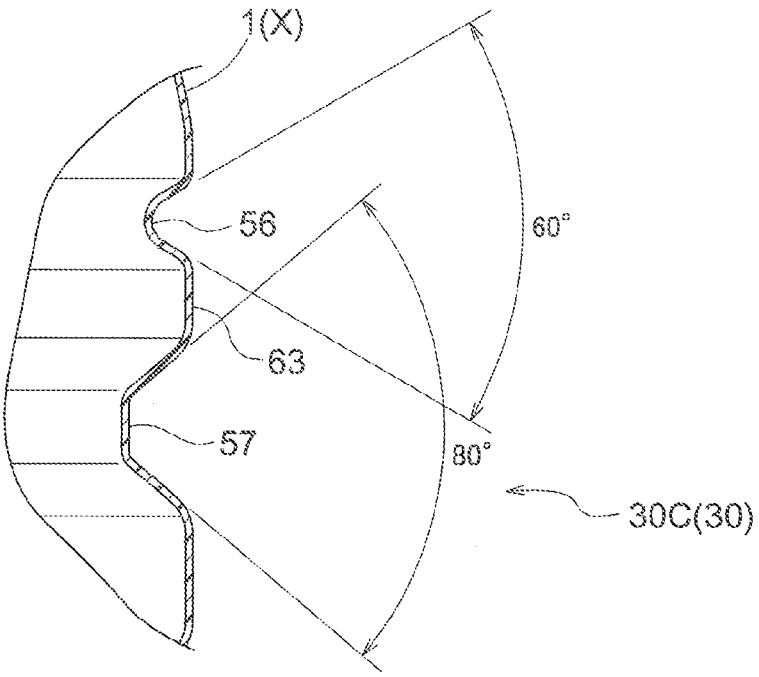


Fig.7



## RESIN MADE CONTAINER

### FIELD

**[0001]** This invention relates to a resin made container including a spout portion acting as an outlet for contents, a shoulder portion continuous with the spout portion, a body portion continuous with the shoulder portion and a bottom portion continuous with the body portion and closing a lower end of the body portion.

### BACKGROUND ART

**[0002]** Resin made containers made of thermoplastic resin such as polyethylene, polypropylene, polyethylene terephthalate, etc., as its principal material, are light-weighted and easy to handle and have good storage stability for its contents and they are also cost effective. Thus, they are being used in variety of applications, such as for beverages, food products, cosmetics, etc.

**[0003]** As such resin made containers, in order to cope with high temperature filling in which contents such as tea etc. are filled under a heated high-temperature state thereof, there are known containers having vacuum absorbing panels at their body portions (see e.g. Patent Document 1). Namely, when the spout portion is closed with a cap after the container has been filled with contents at a high temperature, in association with subsequent cooling of the contents, a pressure drop occurs inside the resin made container, thus inviting risk of significant deformation at the body portion. Then, with provision of the vacuum absorbing panels, as such depressurization inside the resin made container is absorbed through deformation of the vacuum absorbing panels, significant deformation of the body portion as a whole can be effectively prevented.

**[0004]** Further, a resin made container disclosed in Patent Document 2 includes a neck portion, a tubular lower body portion connected with the neck portion via an upper body portion having a frustum shape or a rotary body like shape, and a bottom portion connected to the lower end of the lower body portion. Between the lower body portion and the upper body portion, there are formed recessed ribs for providing buffering action at the time of heating and cooling.

### BACKGROUND ART DOCUMENTS

#### Patent Documents

**[0005]** Patent Document 1: Japanese Unexamined Patent Application Publication No. 2016-159941.

**[0006]** Patent Document 2: Japanese Unexamined Patent Application Publication No. Hei. 7-309320

### SUMMARY OF THE INVENTION

#### Problem to be Solved by Invention

**[0007]** In the resin made container disclosed in Patent Document 1, at its body portion, a plurality of vacuum absorbing panels are formed and these respective vacuum absorbing panels are provided in the form of plates which are recessed to the inner side of the body portion. As such vacuum absorbing panel, there is disclosed one whose upper side shape and lower side shape are made different from each other. With this shape arrangement, when the resin made container is exposed to an excessive stress at the time of e.g. its conveying via a conveyor or the like, there is a risk

of such stress being concentrated at a certain local part of the container, which would invite the risk of eventual buckling of the resin made container starting from such part.

**[0008]** Further, in the case of the resin made container disclosed in Patent Document 2, its upper body portion continuous from the neck portion presents a smooth shape. With this shape, if an excessive stress is applied to the resin made container e.g. during its conveyance via a conveyor or the like or when a plurality of such resin made containers are stacked as being laid sideways, a dent or warp tends to occur at e.g. the upper body portion continuous with the neck portion, and such dent may remain disadvantageously.

**[0009]** Therefore, an object of the present invention is to provide a resin made container with improved buckling resistance.

**[0010]** A further object of the present invention is to provide a resin made container with improved flexibility that can suppress occurrence of dent or warping even when an excessive stress is applied to the resin made container.

### Solution

**[0011]** For accomplishing the above-noted object, according to a first characterizing feature of a resin made container relating to the present invention, a resin made container comprises:

**[0012]** a spout portion acting as an outlet for contents;

**[0013]** a shoulder portion continuous with the spout portion;

**[0014]** a body portion continuous with the shoulder portion; and

**[0015]** a bottom portion continuous with the body portion and closing a lower end of the body portion;

**[0016]** wherein the body portion includes a plurality of approximately quadrangular shaped panel portions each having an upper side and a lower side thereof displaced; and

**[0017]** between adjacent panel portions, a chevron-shaped rib is provided.

**[0018]** With the above-described arrangement, the body portion includes a plurality of approximately quadrangular shaped panel portions each having an upper side and a lower side thereof displaced. So, the panel portion can be square-shaped. Thus, compared with the conventional resin made container using vacuum absorbing panels having an upper side and a lower side shaped differently from each other, a portion where local stress concentration would occur will be less likely to be present. Thus, even if an excessive stress is applied to the resin made container during conveyance thereof via a conveyor or the like, buckling of the container will occur less likely. Therefore, the resin made container of the present invention is a resin made container with improved buckling resistance.

**[0019]** Further, since the body portion can be provided with a twisted shape with the lower side of the panel portion being twisted with its rotation about a center axis of the resin made container relative to the upper side of the same, significant deformation of the resin made container can be avoided even when depressurization occurs within the resin made container.

**[0020]** According to a second characterizing feature of the resin made container relating to the present invention, the respective panel portion has a parallelogram shape and widths of the respective panel portions are made equal.

**[0021]** With the above-described arrangement, at the panel portion, no wide or narrow part is formed. Thus, the part in

the vacuum absorbing portion which would be formed wide in the conventional resin made container having the upper side and lower side with different shapes can now be formed narrow. So, deformation of the panel portion can be suppressed.

**[0022]** Moreover, since the plurality of chevron-shaped ribs formed between the respective adjacent panel portions can be disposed equidistantly, a part where stress concentration would occur in each chevron shaped rib will be less likely provided. Accordingly, deformation of the resin made container will occur less likely even when an excessive stress is applied to the resin made container, as described above.

**[0023]** According to a third characterizing feature of the resin made container relating to the present invention, the chevron-shaped rib has an angle ranging from 90 to 160 degrees.

**[0024]** With the above described arrangement, the strength of the chevron-shaped rib can be set appropriately. Accordingly, deformation of the resin made container will occur less likely even when an excessive stress is applied to the resin made container, as described above.

**[0025]** According to a fourth characterizing feature of the resin made container relating to the present invention, the chevron shaped rib has a sloped face which extends with a uniform width from the upper side to the lower side of the resin made container.

**[0026]** With the above-described arrangement, a part where stress concentration would occur in each chevron-shaped rib will be less likely provided. Accordingly, buckling of the resin made container will occur less likely even when an excessive stress is applied to the resin made container, as described above.

**[0027]** According to a fifth characterizing feature of the resin made container relating to the present invention, the panel portion includes, in at least one of its upper and lower parts, an annular receded rib which is receded to the inner side of the resin made container and which extends in a circumferential direction of the resin made container.

**[0028]** With the above described arrangement, the strength of the circumferential edge of the body portion having the panel portions can be improved. Accordingly, buckling of the resin made container will occur less likely even when an excessive stress is applied to the resin made container, as described above.

**[0029]** According to a further aspect of the present invention, there is provided a resin made container including: a spout portion acting as an outlet for contents: a shoulder portion continuous with the spout portion;

**[0030]** a body portion continuous with the shoulder portion; and a bottom portion continuous with the body portion and closing a lower end of the body portion.

**[0031]** According to a sixth characterizing feature of the invention:

**[0032]** the resin made container comprises an annular receded rib which is receded to the inner side of the resin made container and which extends in a circumferential direction of the resin made container; and

**[0033]** the receded rib includes a plurality of protruding ribs protruding in a direction intersecting the extending direction of the receded rib, the protruding ribs being receded from the surface of the resin made container.

**[0034]** With the above-described arrangement, it is possible to improve the buckling resistance of the resin made

container including an annular receded rib which is receded to the inner side of the resin made container and which extends in a circumferential direction of the resin made container.

**[0035]** Further, if the receded rib includes a plurality of protruding ribs protruding in a direction intersecting the extending direction of the receded rib, the flexibility of the resin made container around those portions where the plurality of protruding ribs are provided can be improved. Namely, if an excessive stress is applied to the resin made container at its upper portion (the portion where the plurality of protruding ribs are provided) e.g. during its conveyance via a conveyor or the like or when a plurality of such resin made containers are stacked as being laid sideways, thus leading to occurrence of a dent or warp at the portion of the stress concentration, with improved property to return to its original shape, such occurred dent or warp will be resolved easily.

**[0036]** Moreover, with the further arrangement of the protruding ribs being receded from the surface of the resin made container, when the resin made containers come into contact with each other during their conveyance via e.g. a conveyor or the like, no contact will occur between the protruding ribs of one container with the protruding ribs of the other container. Thus, damage to the protruding ribs or damage to the other resin made container can be avoided. Normally, if a resin made container is formed light-weighted, this container will be more vulnerable to occurrence of dent or warp due to stress application thereto. However, with use of the above-described inventive arrangement, occurrence of dent or warp can be effectively suppressed even when the resin made container is formed light-weighted.

**[0037]** According to a seventh characterizing feature of the resin made container relating to the present invention, the container includes from eight to twelve of the protruding ribs.

**[0038]** With the above-described arrangement, the protruding ribs can be disposed over the circumferential face of the receded rib with an appropriate spacing that can maintain the flexibility of the resin made container.

**[0039]** According to an eighth characterizing feature of the resin made container relating to the present invention, the occupancy of the protruding ribs in the receded rib ranges from 30 to 60%.

**[0040]** With the above-described arrangement, the protruding ribs can be disposed over the circumferential face of the receded rib with an appropriate spacing that can maintain the flexibility of the resin made container.

**[0041]** According to a ninth characterizing feature of the resin made container relating to the present invention, the bottom of the receded rib has a width of less than or equal to 15 mm.

**[0042]** With the above-described arrangement, the bottom of the receded rib can be provided with an appropriate width that can maintain the flexibility of the resin made container.

**[0043]** According to a tenth characterizing feature of the resin made container relating to the present invention, the amount of recession of the protruding ribs from the surface of the resin made container ranges from 0.3 to 3 mm.

**[0044]** With the above-described arrangement, the amount of recession of the protruding ribs from the surface of the resin made container can be such an amount of recession that can maintain the flexibility of the resin made container.

[0045] According to an eleventh characterizing feature of the resin made container relating to the present invention, the receded rib and the protruding ribs are provided in either upper half of the resin made container.

[0046] When the resin made containers are conveyed via a conveyor or the like, contact can occur between upper portions of the resin made containers due to e.g. pivotal displacement of the resin made containers. In such case, if the receded rib and the protruding ribs are provided in either upper half of the resin made container as provided in the above-described arrangement, even when a dent or warp has occurred at portion of stress concentration resulting from application of an excessive stress to that portion, such occurred dent or warp will be resolved easily.

[0047] According to a twelfth characterizing feature of the resin made container relating to the present invention, at the connecting portion between the body portion and the bottom portion, there are provided two annular bottom face side receded ribs that are receded to the inner side of the resin made container and that extend in the circumferential direction of the resin made container.

[0048] With the above-described arrangement, with provision of two bottom face side receded ribs, it is possible to improve the buckling resistance on the lower side of the body portion (the lower side of the resin made container). Thus, in the course of conveyance via a conveyor or the like or in the case of stacking the resin made containers being laid sideways, even if an excessive stress is applied to the lower side of the resin made container (the portion where the bottom face side receded ribs are provided), buckling of the lower side of the resin made container will occur less likely.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0049] FIG. 1 is a perspective schematic view showing a resin made container according to the present invention,

[0050] FIG. 2 is a side schematic view showing the resin made container according to the present invention,

[0051] FIG. 3 is a side schematic view showing the resin made container according to the present invention,

[0052] FIG. 4 is a sectional schematic view showing the resin made container according to the present invention,

[0053] FIG. 5 is a schematic view of principal portions showing a connecting portion between a shoulder portion and a body portion, which is on the upper side of the body portion,

[0054] FIG. 6 is a section along VI-VI in FIG. 2 showing an intermediate portion of the body portion, and

[0055] FIG. 7 is a schematic view of principal portions showing a connecting portion between the body portion and a bottom portion, which is on the lower side of the body portion.

#### EMBODIMENTS

[0056] Next, embodiments of the present invention will be explained with reference to the accompanying drawings.

[0057] As shown in FIGS. 1 through 7, an inventive resin made container X includes a spout portion 10 acting as an outlet for contents, a shoulder portion 20 continuous with the spout portion 10, a body portion 30 continuous with the shoulder portion 20 and a bottom portion 40 continuous with the body portion 30 and closing a lower end of the body portion 30.

[0058] In the inventive resin made container X, the body portion 30 includes a plurality of approximately quadrangular shaped panel portions 31 each having an upper side 31a and a lower side 31b thereof displaced; and between adjacent panel portions 31, a chevron-shaped rib 32 is provided.

[0059] The resin made container X can be made of thermoplastic resin such as polyethylene, polypropylene, polyethylene terephthalate, etc. as its principal material, via a conventional molding method such as the biaxial stretching blow molding technique.

[0060] The content (liquid) to be filled in the resin made container X is not particularly limited. As examples thereof, drinks such as beverage, tea, juice, coffee, cocoa, soft drink, alcoholic drink, milk based drink, soup, liquid seasoning such as sauce, soy sauce, etc. can be cited. Further, the content volume of the resin made container X is also not particularly limited. Depending on the kind of content to be filled therein, it can be appropriately set from a relatively small volume in the order of a few hundreds of milliliters, to a relatively large volume in the order to a few liters.

[0061] When the resin made container X is used as a beverage bottle, its content volume should preferably range from 320 to 550 mL, but it is not limited to such range. In the instant embodiment, there will be explained an example in which the content volume is set to 455 mL. In this case, a height from the spout portion 10 to the bottom portion 40 is set to about 211 mm and the maximum diameter of the body portion 30 is set to about 64 mm. However, the sizes are not limited thereto.

[0062] The spout portion 10 is a part which is formed of a cylinder having an opened upper end and serves as an outlet for the content. In the outer circumferential face of the spout portion 10, male threads are formed. So that, an unillustrated cap may be adapted to be detachably fixedly threaded thereto, thus allowing repeated sealing and opening.

[0063] The shoulder portion 20 is a part which is provided with an approximately conical shape whose diameter progressively increases from its upper end to the lower side thereof. Advantageously, the vertical cross sectional shape of the shoulder portion 20 may be a gentle arc which is formed convex to the outer side of the container. However, the shape is not limited thereto.

[0064] The body portion 30 is a part having an approximately cylindrical shape connected to the lower end of the shoulder portion 20. The body portion 30 includes a connecting portion 30A between the shoulder portion 20 and the body portion 30, as an upper portion of the body portion 30, an intermediate portion 30B as the intermediate portion of the body portion 30, and a connecting portion 30C between the body portion 30 the bottom portion 40, as a lower portion of the body portion 30.

[0065] In the instant embodiment, there will be explained an exemplary case in which in the connecting portion 30A between the shoulder portion 20 and the body portion 30, as an upper portion of the body portion 30, there are provided annular two groove portions 51, 52 which are receded to the inner side of the resin made container X and which extend in the circumferential direction of the resin made container X. The number of such groove portions is not limited to two, but can be one or three or more. Between the groove portions 51, 52, there is provided an annular protruding rib 61 which

protrudes to the outer side of the resin made container X and which extends in the circumferential direction of the resin made container X.

[0066] With provision of two groove portions 51, 52 in the connecting portion 30A as provided in the above-described arrangement, the top load of the connecting portion 30A which is upwardly of the body portion 30 (upper side of the resin made container X) can be improved.

[0067] Further, in this connecting portion 30A, there is also provided an annular recessed rib 53 recessed to the inner side of the resin made container X and extending in the circumferential direction of the resin made container X. In this recessed rib 53, there are provided a plurality of protruding ribs 54 which protrude in the direction intersecting the extending direction of the recessed rib 53, with the protruding ribs 54 being recessed from a surface 1 of the resin made container X (FIGS. 3-5). Between the groove portion 52 and the recessed rib 53, there is provided an annular protruding rib 62 which protrudes to the outer side of the resin made container X and which extends in the circumferential direction of the resin made container X.

[0068] The recessed rib 53 provided in the instant embodiment is configured such that the rib is recessed by an amount of from 2 to 5 mm to the inner side of the resin made container X and the width of the rib progressively increases toward the outer side of the resin made container X (FIG. 5). In the instant embodiment, there will be explained a case in which the recessed rib 53 has an opening angle of 90 degrees. However, the angle is not limited thereto. In the instant embodiment, the protruding rib 54 has an angular shape having a rib outer face 54a as a face facing the outer side of the resin made container X. However, the rib is not limited thereto, but the rib can have a roundish shape not having such rib outer face 54a. The width of the portion of the protruding rib 54 which portion comes into contact with the recessed rib 53 can be set to 9 mm approximately. However, the width is not limited thereto.

[0069] With provision of the annular recessed rib 53 extending in the circumferential direction of the resin made container X as provided in the above-described arrangement, the top load of the connecting portion 30A which is upwardly of the body portion 30 (upper side of the resin made container X) can be improved.

[0070] Further, if the recessed rib 53 is provided with the plurality of protruding ribs 54 protruding in the direction intersecting the extending direction of the recessed rib 53, the flexibility of the resin made container X around its portion where the protruding ribs 54 are provided is improved. More particularly, in the course of conveyance via a conveyer or the like or when the resin made containers X are stacked sideways, if an excessive stress occurs to the upper portion of the resin made container X (the portion where the plurality of protruding ribs 54 are provided), thus leading to occurrence of a dent or warp at such portion exposed to excessive stress application, thanks to improved property of returning to its original shape, such occurred dent or warp can be resolved easily.

[0071] Moreover, if the protruding rib 54 is configured to be recessed from the surface of the resin made container X, even if the resin made containers come into contact with each other during e.g. conveyance via a conveyer or the like, since no contact will occur between the protruding ribs 54 and the protruding ribs 54 of other resin made container X,

damage to the protruding ribs 54 or damage to other resin made container X can be avoided.

[0072] In the instant embodiment, there will be explained a case in which the disposing position of the recessed rib 53 is downwardly of the groove portion 52. However, the position is not limited thereto.

[0073] The number of the protruding ribs 54 is not particularly limited. Advantageously, however, from 8 to 12 of them can be provided preferably equidistantly. In the instant embodiment, there will be explained a case in which ten such protruding ribs 54 are provided.

[0074] With the instant arrangement, the protruding ribs 54 can be disposed over the circumferential face of the recessed rib 53 at an appropriate spacing that allows to maintain the flexibility of the resin made container X.

[0075] Incidentally, if the number of the protruding ribs 54 were smaller than eight, it would become difficult to maintain the flexibility of the resin made container X. Conversely, if the number of the protruding ribs 54 were greater than or equal to thirteen, this would make the structure of the resin made container X complicated, disadvantageously.

[0076] In this case, advantageously, an arrangement can be made such that the occupancy of the protruding ribs 54 in the recessed rib 53 will range from 30 to 60%. For instance, if there are provided ten protruding ribs 54, their occupancy amounts to 36%.

[0077] In the instant arrangement too, the protruding ribs 54 can be disposed over the circumferential face of the recessed rib 53 with an appropriate ratio that allows maintaining of the flexibility of the resin made container X.

[0078] Further, the width W of the bottom of the recessed rib 53 should range equal to or smaller than 15 mm, preferably equal to or smaller than 10 mm, more preferably equal to or smaller than 5 mm. This width W of the bottom is the width in the same direction as the axis (center axis A) direction of the resin made container X. In the instant embodiment, there will be explained a case in which the bottom width W is set to 3.5 mm.

[0079] With the above arrangement, the bottom width W of the recessed rib 53 can be set as a width appropriate for allowing maintaining the flexibility of the resin made container X.

[0080] Incidentally, if the bottom width W of the recessed rib 53 exceeded 15 mm, it would become difficult to maintain the flexibility of the resin made container X.

[0081] Advantageously, the protruding rib 54 can be configured such that the amount of its recession from the surface of the resin made container X will range from 0.3 to 3 mm.

[0082] With the above-described arrangement, the amount of recession of the protruding rib 54 can be set to be appropriate for maintaining the flexibility of the resin made container X.

[0083] Incidentally, in the protruding rib 54, if the amount of its recession from the surface of the resin made container X were less than 0.3 mm, this would invite the risk of accidental contact between any protruding portion of adjacent resin made container and the protruding rib 54, thus leading to risk of eventual damage or breakage of these, disadvantageously. On the other hand, if the amount of recession from the surface of the resin made container X exceeded 3 mm, this would make it difficult to maintain the flexibility of the resin made container X.

[0084] In this way, with the resin made container X of the instant embodiment, the recessed rib 53 and the protruding

rib 54 are provided in either upper half of the resin made container X (the connecting portion 30A between the shoulder portion 20 and the body portion 30, which is upwardly of the body portion 30).

[0085] When the resin made containers X are conveyed via a conveyor or the like, contact can occur between upper portions of the resin made containers X due to e.g. pivotal displacement of the resin made containers X. In such case, if the receded rib 53 and the protruding ribs 54 are provided in either upper half of the resin made container X as provided in the above-described arrangement, even when a dent or warp has occurred at portion of stress concentration resulting from application of an excessive stress to that portion, such occurred dent or warp will be resolved easily.

[0086] In the intermediate portion 30B intermediately of the body portion 30, there are provided a plurality of approximately quadrangular shaped panel portions 31 each having an upper side 31a and a lower side 31b thereof displaced. In this embodiment, although there is explained a case where six panel portions 31 are provided, the arrangement is not limited thereto. Then, as the plurality of approximately quadrangular shaped panel portions 31 with the upper sides 31a and the lower sides 31b thereof displaced are connected in a tubular form, the intermediate portion 30B of the body portion 30 can be formed approximately tubular (having an approximately hexagonal cross section) (FIG. 6). In this, between the adjacent panel portions 31, a chevron-shaped rib 32 is formed.

[0087] The intermediate portion 30B of this approximately tubular body portion 30 presents a twisted shape with the lower side 31b of the panel portion 31 being rotated about the center axis A of the resin made container X relative to the upper side 31a of the same. Therefore, this body portion 30 has its diameter progressively decreased from the upper side 31a of the panel portion 31 to the lower side, with the diameter being smallest at the midway of the panel portion 31 and then progressively increased from the intermediate portion of the panel portion 31 toward the lower side 31b of the panel portion 31. Incidentally, it will be advantageous to set an angle (a) of the twisted shape of the intermediate portion 30B of the body portion 30 under a normal condition to about 75 degrees as seen in a side view. However, the angle is not limited thereto.

[0088] Such intermediate portion 30B of the body portion 30 can function as a "vacuum absorbing portion". Namely, after filling of contents at a high temperature, the spout portion 10 will be closed by a cap. Then, in association with subsequent gradual cooling of the content, pressure drop will be caused inside the resin made container X, which then will invite risk of significant deformation of the resin made container X. In this regard, by providing the plurality of panel portions 31 in the intermediate portion 30B of the body portion 30, such pressure drop (depressurization) inside the resin made container X will be absorbed through deformation of the plurality of panel portions 31, thus preventing occurrence of significant deformation of the resin made container X as a whole.

[0089] Specifically, in the intermediate portion 30B (vacuum absorbing portion) of the body portion 30, each one of the plurality of panel portions 31 will be deformed to the radial inner side and in addition, the chevron-shaped rib 32 will be twistedly deformed with increasing of its slope angle, whereby relative to the upper side 31a of the panel portion 31, the lower side 31b of the same can be twisted in the form

of relative rotation about the center axis A of the resin made container X. Then, with such twisting of the intermediate portion 30B (vacuum absorbing portion) of the body portion 30, there will occur corresponding reduction in the content volume of the resin made container X. Therefore, when depressurization occurs inside the resin made container X as result of high temperature filling, a twisting motion will occur at the intermediate portion 30B (vacuum absorbing portion) of the body portion 30, so that this depressurization can be effectively absorbed.

[0090] With the instant arrangement, since the body portion 30 is provided with the plurality of approximately quadrangular shaped panel portions 31 with the upper sides 31a and the lower sides 31b thereof being displaced, the panel portions 31 can be provided with square shape. Therefore, compared with the conventional resin made container with the upper side and the lower side thereof having different shapes, a portion exposed to stress concentration will be formed less likely. Thus, even if an excessive stress is applied to the resin made container X e.g. in the course of conveyance thereof via a conveyor, buckling of the resin made container X will occur less likely. Therefore, this resin made container X will be provided as a resin made container with improved buckling resistance. Further, even when the amount of thermoplastic resin used in one container is reduced (e.g. from 20 g to 18 g) in order to realize weight reduction of the resin made container X, with the above described arrangement, thanks to the improvement of the buckling resistance, the possibility of buckling will be smaller.

[0091] Moreover, since the body portion 30 can be configured to present a twisted shape twisted with the relative rotation of a lower side 31b of the panel portion 31 relative to its upper side 31a about the center axis A of the resin made container X, even if depressurization occurs inside the resin made container X, significant deformation of the resin made container X can be avoided.

[0092] In the instant arrangement, the respective panel portion 31 has a parallelogram shape and widths of the respective panel portions 31 are made equal.

[0093] With the above-described arrangement, at the panel portion 31, no wide or narrow part is formed. Thus, the part in the vacuum absorbing portion which would be formed wide in the conventional resin made container having the upper side and lower side with different shapes can now be formed narrow. So, buckling of the panel portion 31 (deformation occurring in the direction perpendicular to the load) can be suppressed.

[0094] Moreover, since the plurality of chevron-shaped ribs 32 formed between the respective adjacent panel portions 31 can be disposed equidistantly, a part where stress concentration would occur in each chevron shaped rib 32 will be less likely provided. Accordingly, buckling of the resin made container X will occur less likely even when an excessive stress is applied to the resin made container, as described above.

[0095] An arrangement is provided such that the chevron-shaped rib 32 formed between the respective panel portions 31 has an angle (b) ranging from 90 to 160 degrees on the inner side of the resin made container X. In this embodiment, there will be explained a case in which this angle (b) (see FIG. 6) is set to 130 degrees.

[0096] With the above-described arrangement, the strength of the chevron-shaped rib 32 can be set appropri-

ately. Accordingly, buckling of the resin made container X will occur less likely even when an excessive stress is applied to the resin made container, as described above.

[0097] The chevron-shaped rib 32 has a sloped face 32a which extends with a uniform width from the upper side to the lower side of the resin made container X. In this embodiment, there will be explained a case in which the widths of two sloped faces 32a included in the chevron-shaped rib 32 are set equal to each other. In this case, the section of the chevron-shaped rib 32 has a shape of isosceles triangle.

[0098] With the above-described arrangement, a part where stress concentration would occur in each chevron-shaped rib 32 will be less likely provided. Accordingly, deformation of the resin made container X will occur less likely even when an excessive stress is applied to the resin made container, as described above.

[0099] In the resin made container X, the panel portion 31 can include, in at least one of its upper and lower parts, an annular receded rib 55 which is receded to the inner side of the resin made container X and which extends in a circumferential direction of the resin made container X. In this embodiment, there will be explained a case in which such receded rib 55 is provided at the upper part of the panel portion 31.

[0100] With the above-described arrangement, the strength of the circumferential edge of the body portion having the panel portions 31 can be improved. Accordingly, buckling of the resin made container X will occur less likely even when an excessive stress is applied to the resin made container, as described above.

[0101] Incidentally, the top load is improved if the resin made container X is configured such that a plurality of approximately quadrangular shaped panel portions 31 each having an upper side 31a and the lower side 31b thereof displaced and between adjacent panel portions 31, a chevron shaped rib 32 is provided, as provide in the instant embodiment.

[0102] At a connecting portion 30C between the body portion 30 and the bottom portion 40 which is downwardly of the body portion 30, there are provided two annular bottom face side receded ribs 56, 57 that are receded to the inner side of the resin made container X and that extend in the circumferential direction of the resin made container X. The two bottom face side receded ribs 56, 57 are configured such that the rib width thereof increases progressively to the outer side of the resin made container X (FIG. 7). In the instant embodiment, there will be explained a case in which the bottom face side receded rib 56 has an opening angle of 60 degrees and the bottom face side receded rib 57 has an opening angle of 80 degrees. However, the arrangement is not limited thereto. Between the bottom face side receded ribs 56, 57, there is provided an annular protruding rib 63 which protrudes to the outer side of the resin made container X and which extends in the circumferential direction of the resin made container X.

[0103] With provision of two bottom face side receded ribs 56, 57 in the connecting portion 30C provided downwardly of the body portion 30 (lower side of the resin made container X) as provided in the above arrangement, the top load of the connecting portion 30C can be improved. Thus, in the course of conveyance via a conveyer or the like or in the case of stacking the resin made containers X being laid sideways, even if an excessive stress is applied to the lower

side of the resin made container (the portion where the bottom face side receded ribs 56, 57 are provided), buckling of the lower side of the resin made container X will occur less likely.

[0104] Incidentally, in the bottom face side receded ribs 56, 57, an appropriate depth of the ribs thereof is about 2.8 mm. In this case, the side load is improved. However, the depth of the rib is not limited to such value.

[0105] The bottom portion 40 continuous with the body portion 30 and closing the lower end of the body portion 30 is provided with a receded portion 41 which is receded to the inner side of the resin made container X and a bottom face 42 which will come into contact with a flat face or the like when the resin made container X is placed erect on such flat face. The bottom face 42 presents a ring shape as seen in a plan view and will be disposed in the outer circumference of the receded portion 41.

#### INDUSTRIAL APPLICABILITY

[0106] This invention is applicable to a resin made container including a spout portion acting as an outlet for contents, a shoulder portion continuous with the spout portion, a body portion continuous with the shoulder portion and a bottom portion continuous with the body portion and closing a lower end of the body portion.

#### DESCRIPTION OF SIGNS

[0107] X: resin made container  
 [0108] 10: spout portion  
 [0109] 20: shoulder portion  
 [0110] 30: body portion  
 [0111] 31: panel portion  
 [0112] 31a: upper side  
 [0113] 31b: lower side  
 [0114] 32: chevron shaped rib  
 [0115] 40: bottom portion  
 [0116] 53: receded rib  
 [0117] 54: protruding rib  
 [0118] 55: receded rib  
 [0119] 56, 57: bottom face side receded ribs

1. A resin made container comprising:
  - a spout portion acting as an outlet for contents;
  - a shoulder portion continuous with the spout portion;
  - a body portion continuous with the shoulder portion; and
  - a bottom portion continuous with the body portion and closing a lower end of the body portion;
 wherein the body portion includes a plurality of approximately quadrangular shaped panel portions each having an upper side and a lower side thereof displaced; and between adjacent panel portions, a chevron-shaped rib is provided.
2. The resin made container of claim 1, wherein the respective panel portion has a parallelogram shape and widths of the respective panel portions are made equal.
3. The resin made container of claim 1, wherein the chevron-shaped rib has an angle ranging from 90 to 160 degrees.
4. The resin made container of claim 1, wherein the chevron-shaped rib has a sloped face which extends with a uniform width from the upper side to the lower side of the resin made container.
5. The resin made container of claim 1, wherein the panel portion includes, in at least one of its upper and lower parts,

an annular recessed rib which is recessed to the inner side of the resin made container and which extends in a circumferential direction of the resin made container.

6. A resin made container including: a spout portion acting as an outlet for contents; a shoulder portion continuous with the spout portion; a body portion continuous with the shoulder portion; and a bottom portion continuous with the body portion and closing a lower end of the body portion;

wherein the resin made container comprises an annular recessed rib which is recessed to the inner side of the resin made container and which extends in a circumferential direction of the resin made container; and

the recessed rib includes a plurality of protruding ribs protruding in a direction intersecting the extending direction of the recessed rib, the protruding ribs being recessed from the surface of the resin made container.

7. The resin made container of claim 6, wherein the container includes from eight to twelve of the protruding ribs.

8. The resin made container of claim 6, wherein the occupancy of the protruding ribs in the recessed rib ranges from 30 to 60%.

9. The resin made container of claim 6, wherein the bottom of the recessed rib has a width of less than or equal to 15 mm.

10. The resin made container of claim 6, wherein the amount of recession of the protruding ribs from the surface of the resin made container ranges from 0.3 to 3 mm.

11. The resin made container of claim 6, wherein the recessed rib and the protruding ribs are provided in either upper half of the resin made container.

12. The resin made container of claim 6, wherein at the connecting portion between the body portion and the bottom portion, there are provided two annular bottom face side recessed ribs that are recessed to the inner side of the resin made container and that extend in the circumferential direction of the resin made container.

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