

SPECIFICATION

Container capable of maintaining its compressed state in a longitudinal direction and compression method thereof

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to a container for juice or mineral water produced by a blow molding method or the like, in particular an improvement of a container capable of being compressed in a longitudinal direction (being reduced in volume) after drinking up its content.

DESCRIPTION OF THE RELATED ART

Sales of synthetic resin containers have been increasing considerably in recent years. However, when juice or mineral water in the body of a container is drunk and the container is thrown away, the shape of the container body remains the same, and in case of throwing such a container away in a trash can, the trash can looks as if air is dumped in it. The trash can will be undesirably fulfilled soon, and in the end, such containers will be thrown away out of the trash can, which might deteriorate our life environment, and in addition, the cost of collecting drained containers and the labor cost for cleaning are problematic in public services.

Also, this kind of synthetic resin container can be manufactured by a simple means such as blow molding, but on the contrary, the strength of the container could not yet be said satisfactory for transportation by vehicle which is accompanied by violent vibration or for stacked display in stores.

Furthermore, when containers are transported from a container manufacturer to a bottler of juice or mineral water, the containers take up much space, which results in increasing the cost of transportation.

SUMMARY OF THE INVENTION

It is an object of the present invention to make it possible to reduce extremely the volume of a container body remarkably, when juice or mineral water in the container body is drained and the container body is thrown away, and to increase the number of the containers that can fit in a trash can.

At the same time, the present invention makes it possible to transport a large number of empty container bodies at a time, so it is also an object of the present invention to make it possible to reduce the collection cost and the labor cost thereof.

It is also an object of the present invention to increase a quantity of containers per transportation from a container manufacturer to a bottler of juice or mineral water.

Furthermore, the object of the present invention is to make it possible to maintain a compressed shape of a container body without providing the container body with a compressing force after the volume of the container body is reduced.

It should be appreciated that the general shape of the container body of the present invention is selected from a circular or elliptical cylinder, a rectangular column, a circular cone and a pyramid, and the horizontal cross sectional shape of the container is selected from a circle, an ellipse and a rectangle.

Another object of the present invention is to make it possible to enlarge the surface area of the container, compared to a conventional one, on which a label showing contents, a trademark or the like is fixed or on which its contents or a trademark is directly printed.

Also, it should be appreciated that the container body of the present invention has a good appearance, can be prevented from failing when being used, can prevent its contents from spilling out, and can maintain a compressed state in its longitudinal direction, and a compression method thereof is provided.

The present invention is characterized by that a force in one direction acts on the inner periphery of a fold constituting an accordion-shaped portion of a container body, while a force in the opposite direction acts on its outer periphery, when a

longitudinally-directed force is applied to the accordion-shaped portion, thereby a compressed state of the container body in a longitudinal direction is maintained.

Furthermore, the present invention may be characterized by that the accordion-shaped portion of the container body has one diameter thereof smaller than the other diameter.

Still further, the present invention may be characterized by that the accordion-shaped portion of the container body has one diameter smaller than the other diameter, and equal to a lower diameter, by increasing gradually as it approaches the other.

Still further, the present invention may be characterized by a compression method of a container capable of maintaining a compressed state in a longitudinal direction wherein a force in one direction acts on a piece of folds constituting the accordion shape and/or a part of inner periphery, while a force in the opposite direction acts on the outer periphery thereof, when a longitudinally-directed force is applied to the accordion-shaped portion of said container body, thereby a compressed state in a longitudinal direction is maintained.

Still further, the present invention may be characterized by that the general shape of the container body is selected from a circular or elliptical cylinder, a rectangular column, a circular cone, a pyramid, an hourglass shaped drum, and a barrel shaped drum.

Still further, the present invention may be characterized by that the horizontal cross sectional shape of the container body is selected from a circle, an ellipse, and a rectangle.

Still further, the present invention may be characterized by that a label showing contents, trademark or the like is fixed on the external periphery of the container body.

Still further, the present invention may be characterized by a container body provided with a tap portion projecting upward from the middle portion at the top end, and horizontal accordion shape formed on the inner and outer wall of the container body, over the whole length in the longitudinal (height) direction or a part thereof, except the tap portion, wherein the accordion-shaped portion of the body has an upper diameter thereof smaller than the lower diameter, and increasing gradually as it goes downward; a force acts downwards in the inner diameter direction of the folds of accordion shape of the upper part, and downwards in the outer diameter direction, when the force from a substantially right-angle direction is applied to the accordion-shaped portion of said container body; and the force acts upwards in the inner diameter direction of the folds of accordion shape of the lower part, and upwards and downwards in the outer diameter direction, for maintaining a accordion shape where the length (height) of said container body is compressed.

It should be appreciated that for the container body of the present invention, in case of carrying or holding it after having drained a part of, for example, juice, the container

body can be compressed by the amount of drained quantity thereof; therefore, the present invention is also characterized by that its volume to be carried or held can be reduced as much.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a container body which is one embodiment of the present invention.

Fig. 2 is a partial longitudinal cross sectional view of the container body when collapsed.

Fig. 3 is a view of a circular transverse cross section of a cylindrical embodiment.

Fig. 4 is a view of an elliptical transverse cross section of another embodiment.

Fig. 5 is a view of a rectangular transverse cross section of another embodiment.

Fig. 6 is a view of a polygonal transverse cross section of another embodiment.

Fig. 7 is a perspective view of an hourglass shaped drum embodiment.

Fig. 8 is a perspective view of the same embodiment as shown in Fig. 7 to which labels are fixed.

DESCRIPTION OF CHARACTERS

- 1 Body of container
- 2 Accordion-shaped portion
- 3 Tap portion
- 4 Curved portion
- 5 Label
- 6 Fold of the first stage
- 7 Fold of the second stage
- 8 Fold of the third stage
- 9 Fold of the fourth stage

- d Outer diameter of container body
- d1 Outer diameter of the first stage
- d2 Outer diameter of the second stage
- d3 Outer diameter of the third stage

- f Pushing down force at tap portion (3)

- f1 Pushing down force at inside periphery
 of fold (6)
- f2 Pushing up force at outside periphery
 of fold (6)
- f3 Pushing up force at inside periphery
 of fold (9)
- f4 Pushing down force at outside
 periphery of fold (9)

DETAILED DESCRIPTION OF THE PRESENT INVENTION

An embodiment of the present invention shown in the attached drawings will be described. (1) is a container body, and the outer and inner peripheries in the height (length) direction thereof have an accordion shape (2). Pairs of adjacent folds, in the form of annular plate members, are connected together alternately at inner and outer peripheries to form successive stages of a pleated bellows of the accordion shaped-portion. There, though the illustrated container has an accordion shape all over the height direction, the middle or the end portion thereof can be made flat (i.e. plain, without the accordion shape), to indicate the commercial mark of product contents thereon.

Fig. 2 shows a state where mineral water sealed in the aforementioned container body (1) is drained up and the body is collapsed in the height (length) direction from one or both ends (i.e. the top and/or the bottom) thereof. Namely, the container body (1) of the present invention has an excellent configuration and deploys an excellent function.

Also, in Fig. 2, (3) is a tap portion of the container body (1), a directly adjacent lower part thereof has a outwardly convex curved portion (4) with a curved cross-sectional shape, and the outer diameter (d1) of the first stage (namely, the uppermost stage of the aforementioned accordion-shaped portion (2)) is made smaller than the outer diameter (d) of the container body (1). Then, the outer diameter (d2) of the

second stage of the accordion-shaped portion (2) is larger than the aforementioned outer diameter (d1) of the first stage and smaller than the outer diameter (d) of the container body (1).

Further, the shape of the longitudinal cross section as seen in Fig. 2 is stepped in order to form an outer diameter (d3), of the third stage contiguous to the second stage, larger than the aforementioned outer diameter (d2) of the second stage; however, the number of stages is of course not limited to three (3) but a plurality of stages may be adopted.

It should be appreciated that the transverse cross sectional shape of the container body (1) is not limited to a circle as in Fig. 2 and Fig. 3, but it may be elliptical as in Fig. 4 or square or rectangular as in Fig. 5, or hexagonal or polygonal as in Fig. 6. Also, the height (length) direction shape may be, in addition to a circular cylinder as in Fig. 1, an hourglass shaped drum as in Fig. 7 and Fig. 8, or a barrel-shaped drum though not illustrated herein.

Moreover, in this Fig. 8, (5) is a label fixed around one or both of the upper part or lower part of the container body (1), made of a thin synthetic resin film and showing a trademark for the product or a specification of contents and, in this case, it should be collapsible together with the container body (1) without resistance when the contents of the container body (1) is drained up and the container body (1) is collapsed.

Thus, the container body (1) is manufactured by a blow molding means and is transported to a bottling factory of, for example, mineral water. In this case, a large quantity of container bodies (1) can be transported at a time by reducing the height (length) of the container body (1) by a certain means as shown in Fig. 2, and be expanded again in the bottling factory of mineral water.

However, ordinarily, in most of the bottling operations of mineral water or juice, material flows in the form of pipe through an extruder from a powder resin material, the container body (1) is molded by an automatic molder called a rotary machine, filled with mineral water automatically, capped and labeled in a series of continuous operations.

Now, suppose all juice in the container body (1) is drained up. Here, the tap portion (3) is pushed down by a relatively strong force (f). This force (f) pushes down the inside periphery at a fold (6) of the first stage of the accordion-shaped portion, through the inside of the curved portion (4). As the result, an outside periphery at the fold (6) is raised upward. Thus, several stages (three stages for the illustrated example) of the accordion-shaped portion (2) performs in such a manner. However, in case of this embodiment, the upper part of the accordion-shaped portion (2) forms the curved portion (4), the outer diameter (d_1) of the fold (6) of the first stage is smaller than the outer diameter (d_2) of a fold (7) of the second stage, the outer diameter (d_3) of a fold (8) of the third stage is larger the outer diameter (d_2) of this fold (7) of the second stage, and the outer diameter (d_3) is equal to the

outer diameter (d) of the container body (1). Therefore, the downward force (f) on the aforementioned tap portion (3) is transformed into a force (f3) pushing up at the inside periphery and pushing down at the outside periphery, at a fold (9) of the fourth stage in the drawing.

As the result, the accordion-shaped portion (2) of the container body (1) is shaped en (>) at the curved portion (4) over it and at the portion under it, the force (f1) pushing down the inside peripheries of folds (6) to (8) and the curved portion (4), and a force (f3) pushing up the fold (9) inside are balanced. At the same time, a force (f4) pushing down the outside of the lower folds (9) and a force (f2) pushing up the outside of the folds (6) to (8) and the curved portion (4) are balanced and this prevents or impedes an insufficient force (righting moment) restoring the container body (1) to its original shape, and the container body (1) maintains this collapsed state.

As the result, in repeated experiments, the height (volume) of container body (1) was compressed to 1/3 to 1/4 or lesser, and the space necessary in a trash can or the like for dumping it can be reduced by far.

A main effect of the present invention mentioned above is that the volume of the container body was made able to be reduced by far, and the number thereof to be contained in a trash can or other was increased by far.

In addition, as such a compressed container body can be transported in quantity at the same time, the collection cost thereof, and the labor cost for cleaning and collection could be reduced considerably.

The container body of the present invention has a good looking external shape, arouses a strong interest of the user, the accordion shape of the container body becomes a friction stop, preventing the container body from slipping and falling during use, and the contents spilling.

Besides, even the shape of the container body collapsed according to the present invention looks good in respect of design and can be used as outer container as it is.

WHAT IS CLAIMED IS:

1. A container capable of maintaining a compressed state in a longitudinal direction, the container having a container body formed with a tap portion and an accordion-shaped portion which includes:

an outwardly convex portion having an inside periphery connected with the tap portion and having an outside periphery;

an upper group of plate members of successively increasing length downwards as measured on a cross-sectional plane taken along a longitudinal axis of the container; each plate member of the upper group, except the lowermost, having an inside periphery connected with an inside periphery of another plate member of the upper group by a fold therebetween; and each plate member of the upper group, except the uppermost, having an outside periphery connected with an outside periphery of another plate member of the upper group by a fold therebetween; the uppermost plate member of the upper group having an outside periphery connected with the outside periphery of the convex portion; and

a lower group of plate members each having substantially the same length as measured on the cross-sectional plane, which length is longer than said length of each plate member of the upper group; each plate member of the lower group, except an uppermost plate member, having an inside periphery

connected with an inside periphery of another plate member of the lower group by a fold therebetween; and each plate member of the lower group, except a lowermost plate member of the lower group, having an outside periphery connected with an outside periphery of another plate member of the lower group by a fold therebetween; the uppermost plate member of the lower group having an inside periphery connected with an inside periphery of the lowermost plate member of the upper group; and wherein

the accordion-shaped portion is collapsible by application at the top portion of a force along the longitudinal direction of the container; and when the accordion-shaped portion is collapsed, the inside peripheries of the plate members of the upper group are collapsed downward and the inside peripheries of the plate members of the lower group are raised upward, and the outside peripheries of the plate members of the upper group are raised upward and the outside peripheries of the plate members of the lower group are collapsed downward; and a downward force on the inside peripheries of the convex portion and the plate members of the upper group reaches a balance with an upward force on inside peripheries of the plate members of the lower group; and an upward force on the outside peripheries of the plate members of the upper group reaches a balance with a downward force on the outside peripheries of the plate members of the lower group.

2. The container according to claim 1, wherein the container body has a transverse cross sectional shape that is circular, elliptical, square, rectangular or polygonal.

3. The container according to claim 1 or claim 2, wherein the general shape of the container body is a circular cylinder, an elliptical cylinder, a rectangular column, a polygonal column, a circular cone, a pyramid, an hourglass shaped drum, or a barrel shaped drum.

4. The container as claimed in any one of claims 1 to 3, wherein a label or commercial mark of contents of the container is put around the external periphery of the container body.

5. A compression method for compressing a container capable of maintaining a compressed state in a longitudinal direction, the method including:

providing a container body formed with a tap portion and an accordion-shaped portion which includes:

an outwardly convex portion having an inside periphery connected with the tap portion and having an outside periphery;

an upper group of plate members of successively increasing length downwards as measured on a cross-sectional plane taken along a longitudinal axis of the container; each plate member of the upper group, except the lowermost, having

an inside periphery connected with an inside periphery of another plate member of the upper group by a fold therebetween; and each plate member of the upper group, except the uppermost, having an outside periphery connected with an outside periphery of another plate member of the upper group by a fold therebetween; the uppermost plate member of the upper group having an outside periphery connected with the outside periphery of the convex portion; and

a lower group of plate members each having substantially the same length as measured on the cross-sectional plane, which length is longer than said length of each plate member of the upper group; each plate member of the lower group, except an uppermost plate member, having an inside periphery connected with an inside periphery of another plate member of the lower group by a fold therebetween; and each plate member of the lower group, except a lowermost plate member of the lower group, having an outside periphery connected with an outside periphery of another plate member of the lower group by a fold therebetween; the uppermost plate member of the lower group having an inside periphery connected with an inside periphery of the lowermost plate member of the upper group; and

applying a force along the longitudinal direction to the tap portion of said container body so as to reach a balance between a downward force on inside peripheries of the convex portion and the plate members of the upper group and an upward force on inside peripheries of the plate members of

the lower group such that the inside peripheries of the plate members of the upper group members are collapsed downward and the inside peripheries of the plate members of the lower group are raised upward, and a balance between an upward force on outside peripheries of the plate members of the upper group and a downward force on outside peripheries of plate members of the lower group such that the outside peripheries of the plate members of the upper group are raised upward and the outside peripheries of the lower-group plate members are collapsed downward, and a compressed state of the container body in a longitudinal direction being thereby maintained.