Title: FOLDING STRUCTURE OF COLLAPSIBLE BLOW MOLDED CONTAINER

Abstract: A container having a neck with a mouth, a shoulder, a body with side panels, and a bottom. The shoulder and the side panels of the body are provided with fold lines to facilitate folding of the body. The bottom is substantially partitioned by fold lines into gable-like planes. The container further includes fastening members that retain a collapsed state when the shoulder, the body, and the bottom are collapsed. The fastening members enable artificial deformation of the container shape when discarding.
Folding Structure of Collapsible Blow Molded Container

Technical Field

The present application relates to the structure of a collapsible blow molded container.

Background of The Invention

The present invention relates to easily collapsible blow molded containers as provided by previous inventions including U.S. Pat. No. 5,511,686; U.S. Pat. No. 5,080,260; Japan Utility Model Publication No. 6-6214; PCT WO 98/31592; Japan Patent Publication No. 2002-80021; Japan Patent Publication No. 2002-160719; Japan Utility Model Publication No. 5-46717; Japan Patent Publication No. 8-324533; Japan Patent Publication No. 8-324534; U.S. Pat. No. 5,174,458; U.S. Pat. No. 6,170,712; and U.S. Pat. No. 3,559,847. In addition, the Japan Patent Application No. 2002-539215 which was invented by the inventors of the present invention and U.S. Pat. No. 5,174,458, which is related with the purpose of the present invention.

Of the prior arts, the structure of the bottom of the container implemented by U.S. Pat. No. 5,511,686 is difficult to fold, and U.S. Pat. No. 5,080,260 employs a technology that collapses the container while unfolding it, thereby being liable to the force of restitution while in a collapsed state.

Regarding the Japan Utility Model Publication No. 6-6214, its bottom has a Z-shape that is folded flat when the container is filled with liquid. However, because the Z-shaped part is of a thicker mold than a single layer bottom, it is unsuitable for collapsing, and even when collapsed, the force of restitution exerts itself on the folded form.
Regarding the PCT WO 98/31592, due to the concertinaed fold lines, it takes up relatively more space than the collapsible containers in accordance with other inventions when collapsed for disposal, and the liquid in the container could overflow should the folding structure be flattened when liquid is in the container. Regarding Japan Patent Publication No. 2002-80021, characterized by a scheme similar to that of the U.S. Pat. No. 5,080,260 apart from a slight difference in the folding structure, it takes up more space when collapsed, and could possibly unfold during use.

Regarding the Japan Patent Publication No. 2002-160719, its bottom foldability is poor. Regarding the Japan Utility Model Publication No. 5-46717, wherein the container is collapsed by unfolding its walls, of which its collapsed body does not form a smooth plane which would cause the force of restitution, as well as the possibility of overflow during use because the container is easily collapsed without significant urging force.

Regarding the Japan Patent Publication No. 8-324533, its bottom foldability is poor and it exerts the force of restitution when collapsed. Japan Patent Publication No. 8-324534 has similar problems to those of Japan Patent Publication No. 8-324533. Regarding the U.S. Pat. No. 3,559,847, it is suitable as a general refill container but not suitable as a container for use in logistic networks.

Regarding the Japan Patent Application No. 2002-539215, which was invented by the present inventor, it substitutes a spout pouch by spouting the liquid in the container in accordance with the contraction of the container as the liquid is emptied. Therefore, its criteria of intellectual rights are different from the collapsible containers relating to the collapsible container in accordance with the present invention.

For referential purposes, U.S. Pat. No. 5,310,068 has a problem in that water remains in the container when washed in preparation for filling a liquid. Additionally, its design lacks marketability.

U.S. Pat. No. 5,174,458 is related with the purpose of the present invention. However, it concerns the formation of bridges that restrain the unfolding of the two opposite panels, which are folded together within a certain range. The disadvantage
of the invention is that, in the case of large bridges, it is difficult to fold over the bridge, while in the case of smaller bridges, they might not fulfill the intended purpose; and the bottom folding structure for inward folding is too simple to achieve its intended purpose.

As described hereinabove, a number of inventors have developed and implemented collapsible containers following consideration of such factors as marketability, design, easy usability, stability, and production cost. However, the effectiveness of all the inventions has still not been satisfactorily achieved.

Summary of the Invention

A container having a neck with a mouth, a shoulder, a body with side panels, and a bottom. The shoulder and the side panels of the body are provided with fold lines to facilitate folding of the body. The bottom is substantially partitioned by fold lines into gable-like planes. The container further includes fastening members that retain a collapsed state when the shoulder, the body, and the bottom are collapsed.

The fastening members enable artificial deformation of the container shape when discarding.

As described above, a container of the present invention is formed with the one or more fastening pairs to prevent unwanted folding during use. The container can be easily collapsed and folded by using the fastening pairs for proper disposal.

Deliberating the abovementioned points, the present invention has the following aims: firstly, to facilitate the folding in of the side walls in order to achieve side wall collapsing; secondly, to provide resistance against a certain degree of urging force in order to prevent unwanted collapsing; thirdly, to shape the bottom with edged perimeters on the same elevation, suitable for a display stand preventing fall, while its structure facilitates folding by an intentional force. Finally, the container provided by the present invention accommodates the diversity of design while maintaining the basic shape of existing containers, without affecting productivity in the common production processes and facilities. The bottom fold line in accordance with the present invention is grooved to facilitate folding for convenient disposal.
The desirable shape requires that the transverse section of the container body in accordance with the present invention is rectangular or an exact square rather than circular. A container in accordance with the present invention whose collapse is facilitated by fold lines incorporating a diversity of patterns of inscriptions, whether in engraved relief or depressed, desirable for improving the rigidity of the container, and if also desired and so formed, reducing the overall weight.

The containers, including the container in accordance with the present invention, are folded in such a manner that the front wall and the rear wall are in contact together, are formed with fold lines in a diversity of lengths at appropriate positions, wherein the center fold lines are given a certain degree of angle to facilitate the inward of the walls when required to collapse. Its bottom wall includes gables that fold inwardly, incorporating fold lines appropriately arranged in order to facilitate the collapse, with appropriate stiffening grooves as necessary to resist ordinary external or bulging force, maintaining the original shape of the container until collapsed. In addition, the fold line formed at the bottom of the gable roof-like structure is formed with a depressed groove that facilitates folding.

**Brief Description of the Drawings**

Fig. 1 to Fig. 4 show a collapsible container that is an exemplary embodiment in accordance with the present invention, wherein Fig. 1 is a perspective view.

Fig. 2 is a perspective view of a portion of the bottom of the container shown in Fig. 1.

Fig. 3 shows the bottom of the container shown in Fig. 1 in collapsed state.

**Detailed Description of the Invention**

The detailed description of the present invention referring to the attached drawings is set forth below. A direct blow or injection blow molded plastic container (1) in accordance with the present invention, which is manufactured by a blow molding process, has a shoulder (200) and a neck with mouth (300) on top of the container.
body (100), and a bottom wall (400) below the body (100).

On each side wall of the container body (100) a center fold line is formed (101) as well as edge fold lines (102), wherein the center fold line is formed slightly further inwards to the inside of the container than the edge fold lines so that the side wall fractions on both sides of the center fold line (101) are folded inwards when the edge fold lines (102) are urged toward each other.

On each side of the shoulder (200) of the container, a shoulder fold line (201) is formed from the side wall up to the edge of the neck (300), and at the center of the shoulder side; and on both sides of the shoulder fold line are formed additional shoulder folder lines (202) which are the edges for folding, and preferably formed with supplementary fold lines (203) which converge at the edge of the neck (300).

The bottom wall (400) includes triangular gables that are partitioned at the bottom center fold line (401) and bottom side fold lines (402). The side fold lines (402) are connected at each corner of the bottom wall.

On both ends of the center bottom fold line 401), inclined bottom fold lines (403) are formed. Supplementary fold lines (404) are formed connecting the joint point of the center fold lines 401 and 403 with the corner of the bottom side fold lines (402). The inclined bottom fold lines (403) are connected with the inclined body fold lines (103) that are extensions of the body center fold lines (101).

Optional bottom side fold lines (104) are formed extending from the beginning point of the inclined body fold lines (103) to the corners of the bottom edges.

In order to provide the body center fold lines (101) with a certain degree of rigidity to prevent collapse without any intentional force, stiffening grooves (105) are formed to retain the rigidity of the container form during normal use, including, but not restricted to, grasping or holding the container in hand, and which are subject to collapse when an urging force is exerted to flatten the container. The stiffening grooves (105) may also be collapsed by pushing, for example with the fingers, inwardly into the container prior to collapsing the whole container (1). The stiffening grooves (105) in accordance with the present invention can be formed on the container body.
(100) sides, shoulder (200), and bottom, in a diversity of shapes and dimensions suitable to the shape, size, material, or purpose of the use of the container.

The stiffening grooves (105) are so structured that when pressed to collapse the container body (1), the grooves shall draw back inwardly facilitating the folding of the side walls of the container body (1), by virtue of the fold guide lines (106) which are formed to facilitate the folding of the stiffening grooves.

Fastening members (410) are formed on the bottom (400) of the container, as well as on the side walls and the shoulder of the container body (100) as proper, to prevent the container body (1) from restitution when in the state of collapse, and in a diversity of shapes including but not restricted to a concave and convex pairing, which can serve to couple the two opposite walls and hold them together.

On the bottom portion of the front, rear, or side wall the panels of the container body (100) are formed with a body folder line (420) that enables the bottom wall to be folded inwardly.

The functions and their effects of the members set forth and described hereinabove are described below:

A container in accordance with the present invention will be manufactured, delivered, reserved, and served in such a state that, as illustrated in the Fig. 1, the container (1) is filled with liquid and the mouth on the neck (300) is capped. When pouring the liquid out from the container (1), uncap the mouth on the neck (300), and hold the container (1) inclined so that the liquid in the container flows out through the mouth on the neck (300). The container (1) will not collapse from the force exerted in order to pick up or hold the container body (100) for pouring, due to the rigidity provided by the stiffening grooves (105).

In order to discard the container (1) when empty, depress the stiffening grooves (105) inwardly until they are collapsed, then urge the front and rear walls of the container body (100) to be collapse and flatten into the state illustrated in Fig. 3.

The bottom (400) of the container is folded inwardly according to the hinge line (420).
As was shown and described hereinabove, the container provided in accordance with the present invention can be collapsed reducing volume considerably. Therefore, the cost and space of disposal facilities can be saved, with less environmental impact. In addition, the stiffening grooves provide rigidity so that the container will not collapsed simply by a force exerted when holding it, enabling the safe and stable pouring of the liquid in the container.
Claims

What is claimed is:

5

1. A folding structure of a collapsible blow molded plastic container, comprising: a body with a shoulder, a neck with an opening, and a bottom; wherein the body, the shoulder, and the bottom comprise a plurality of fold lines that facilitate the folding of the body, the shoulder, and the bottom; wherein the plurality of fold lines comprise a plurality of stiffening grooves that prevent the container from collapsing when grasped by the shoulder or the body; and wherein the bottom comprises folding inwardly according to the plurality of fold lines when collapsed.
Fig. 1
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
   IPC: B65D 1/32 (2006.01)

   USPC: 215/381,900; 220/666
   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)
   U.S.: 215/381, 900; 220/666, 907

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 3,559,847 A (GOODRICH) 02 February 1971 (02.02.1971), see members 17-24.</td>
<td>1</td>
</tr>
<tr>
<td>Y</td>
<td>WO 94/05555 A1 (NISHIMURA) 17 March 1994 (17.03.1994), see members 17 and 18.</td>
<td>1</td>
</tr>
<tr>
<td>Y</td>
<td>US 5,174,458 A (SEGATI) 29 December 1992 (29.12.1992), see members 18 and 66.</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>US 5,255,808 A (TOBLER) 26 October 1993 (26.10.1993), see members 6-12.</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>US 3,595,441 A (GROSJEAN) 27 July 1971 (27.07.1971), see members 34, 36, 38, 40, 42, 44, 46 and 54.</td>
<td>1</td>
</tr>
</tbody>
</table>

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

* Special categories of cited documents:
   "A" document defining the general state of the art which is not considered to be of particular relevance
   "E" earlier application or patent published on or after the international filing date
   "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
   "O" document referring to an oral disclosure, use, exhibition or other means
   "P" document published prior to the international filing date but later than the priority date claimed
   "I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
   "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
   "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
16 February 2006 (16.02.2006)

Date of mailing of the international search report
21 MAR 2006

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (571) 273-3201

Authorized officer
Sue A. Weaver
Telephone No. (703) 308-1148

Form PCT/ISA/210 (second sheet) (April 2005)