



US 20020070267A1

(19) **United States**

(12) **Patent Application Publication**
Okamura et al.

(10) **Pub. No.: US 2002/0070267 A1**

(43) **Pub. Date: Jun. 13, 2002**

(54) **FOLDABLE DISTRIBUTION CONTAINER
FOR CONVEYING PERISHABLE FOODS**

Publication Classification

(51) **Int. Cl.⁷** **B65D 5/36**

(52) **U.S. Cl.** **229/117.04; 229/117.08**

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(21) **Appl. No.:** **10/010,479**

(22) **Filed:** **Nov. 5, 2001**

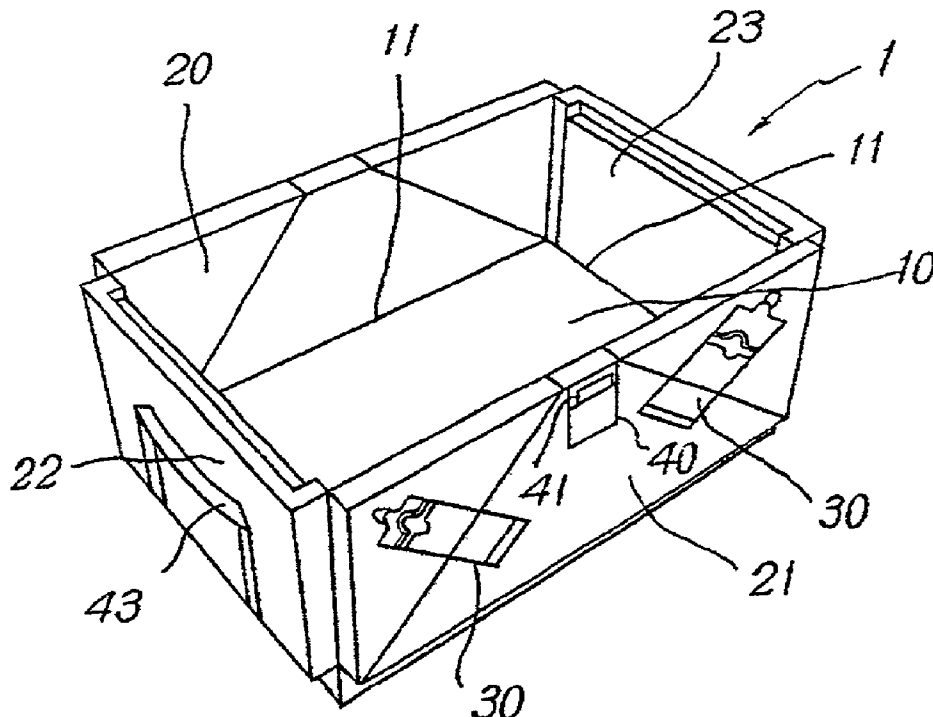
(30) **Foreign Application Priority Data**

Dec. 7, 2000 (JP) 2000-373285

Jun. 11, 2001 (JP) 2001-175672

(57) **ABSTRACT**

Conventionally, distribution containers, particularly, corrugated cardboard containers and EPS containers, have been used as containers for conveying perishable foods. These containers are disposed as waste after the containers have been used repeatedly by a few times. The amount of these containers disposed as waste is huge, and it has been necessary to reduce the waste, from the viewpoint of resource protection and environmental protection. Particularly, in the EPS containers, bacteria are easily propagated on the inner walls. Further, in the case of the corrugated cardboard containers, they have not been satisfactory from the viewpoint of heat insulation and cooling of the contents. The present invention provides a foldable distribution container for conveying perishable foods of which a foldable container main body and a lid unit covered on the upper opening of the container main body are manufactured as three-wall structures made of a transparent synthetic resin material and having two air layers.



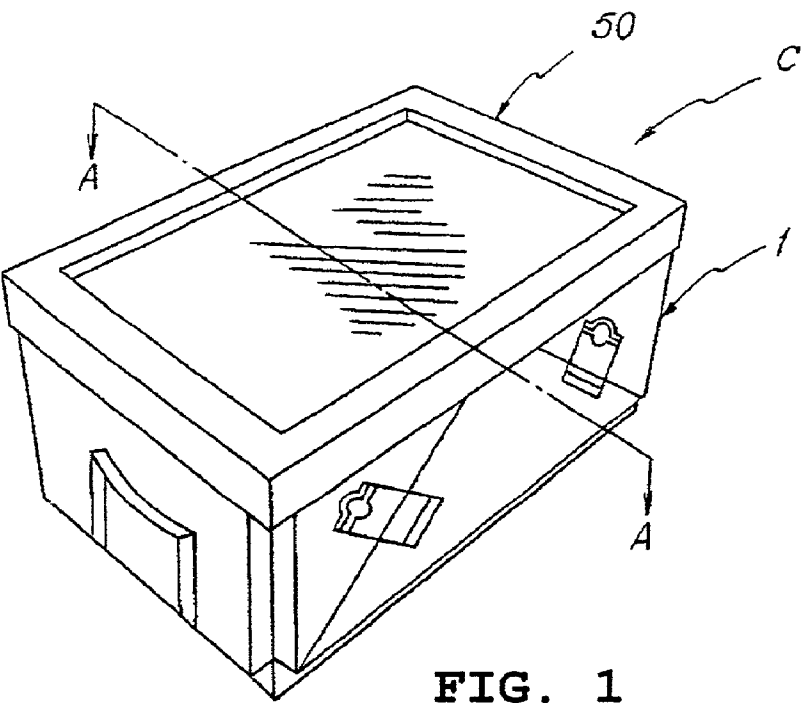


FIG. 1

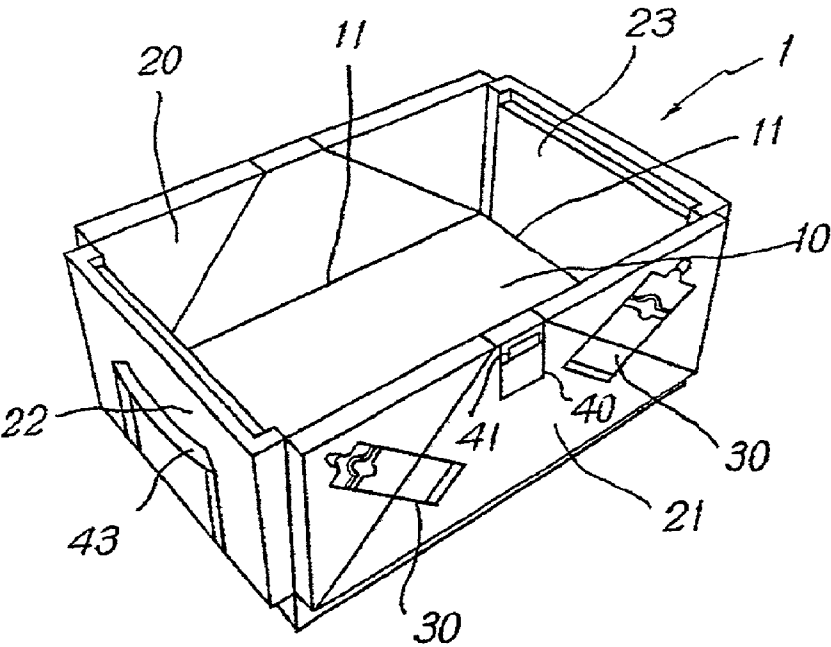


FIG. 2

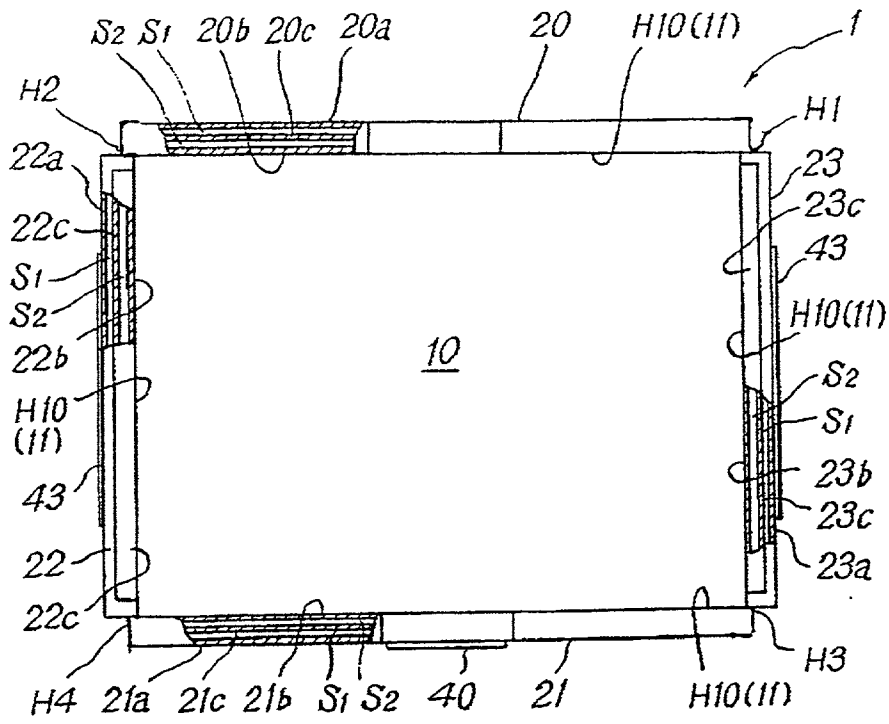


FIG. 3

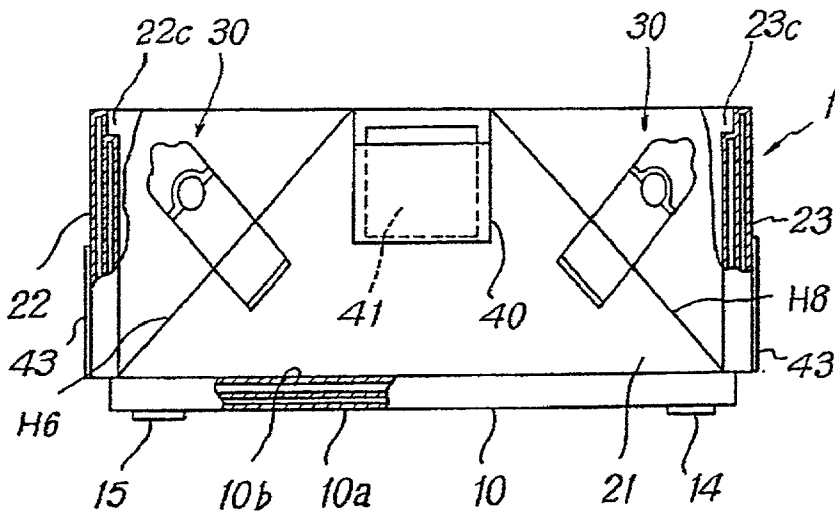


FIG. 4

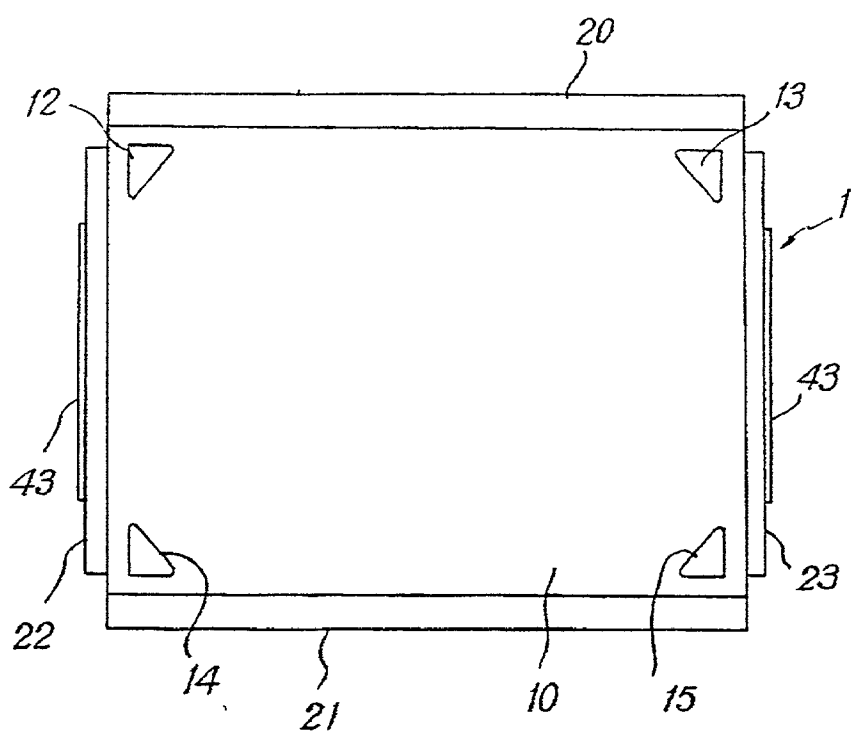


FIG. 5

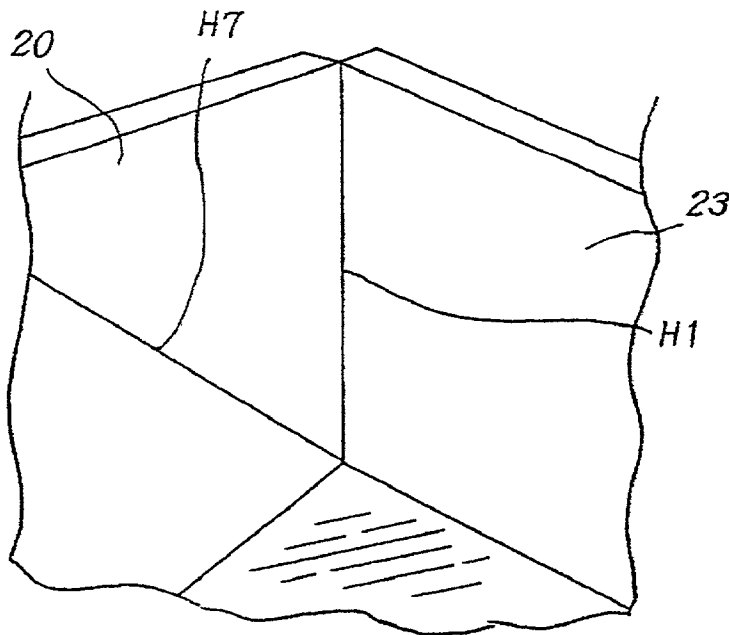


FIG. 6

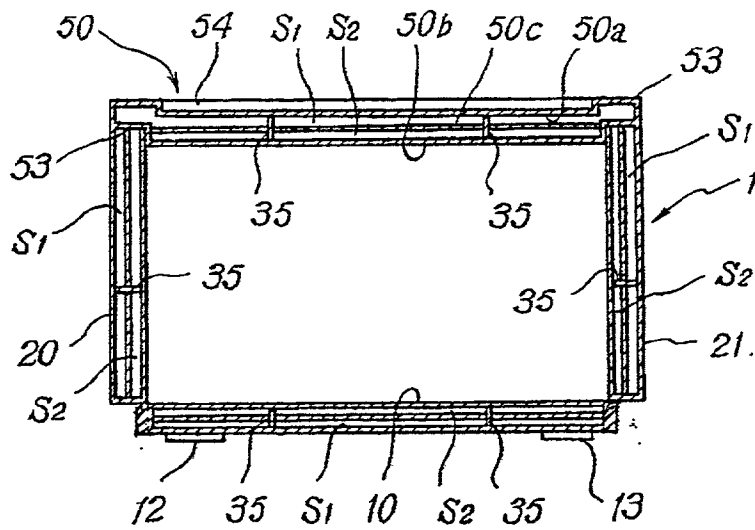
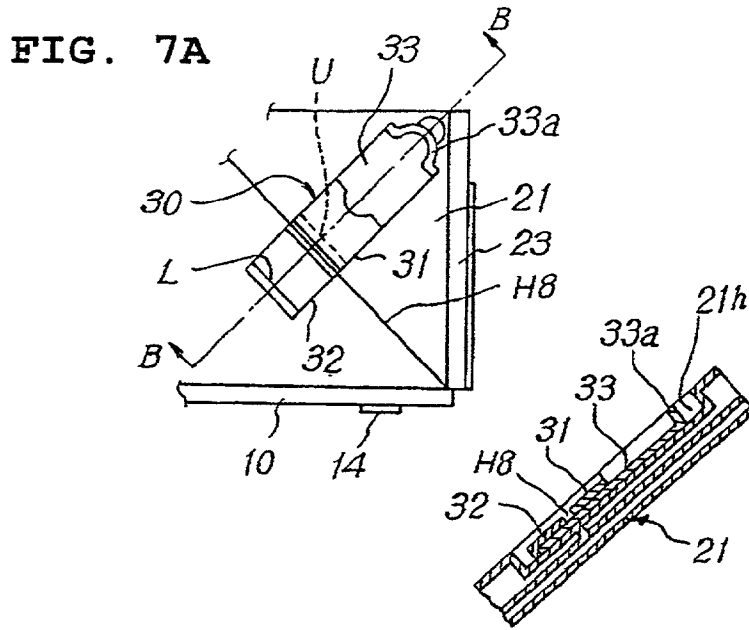


FIG. 8

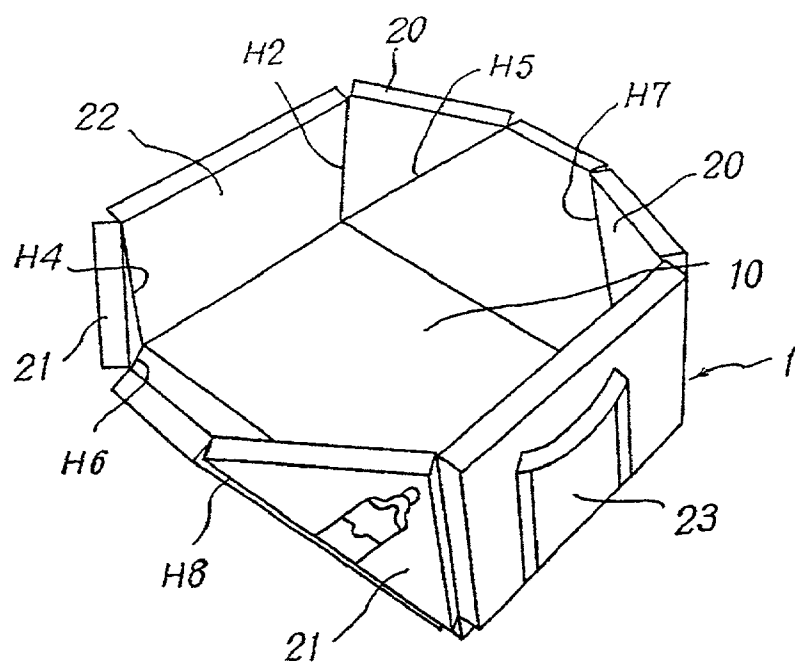


FIG. 9

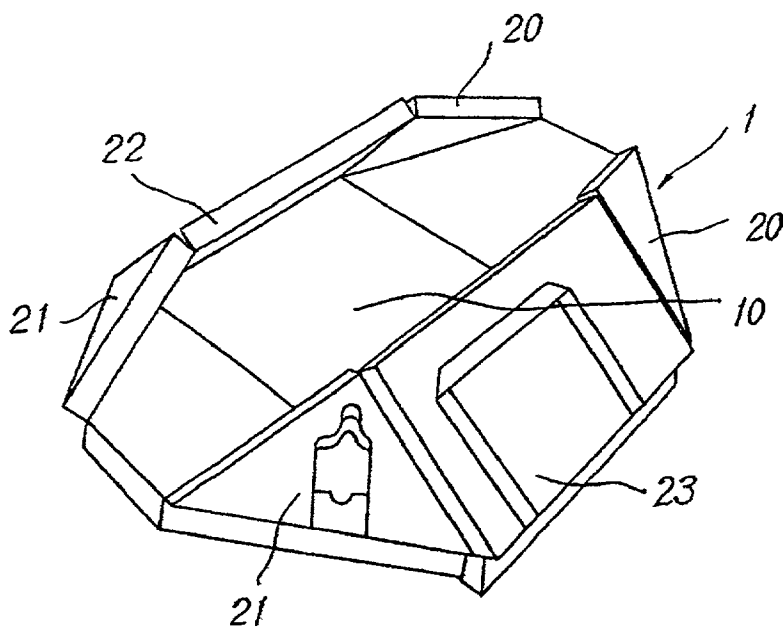


FIG. 10

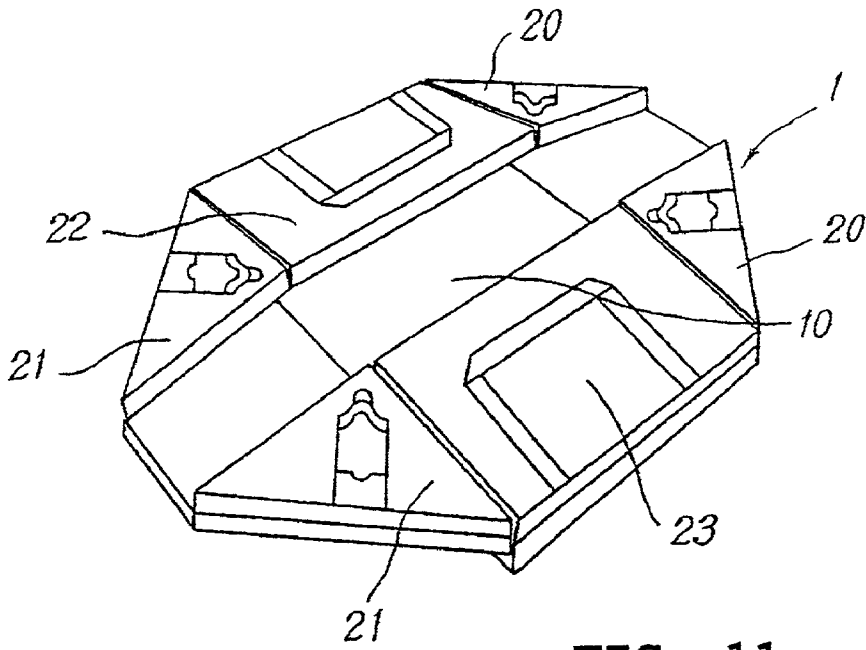


FIG. 11

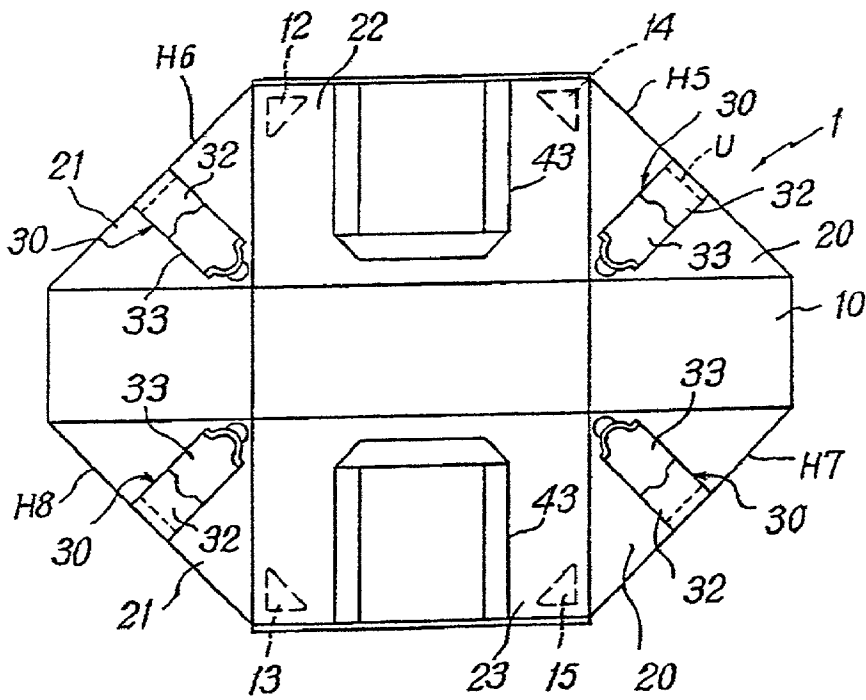
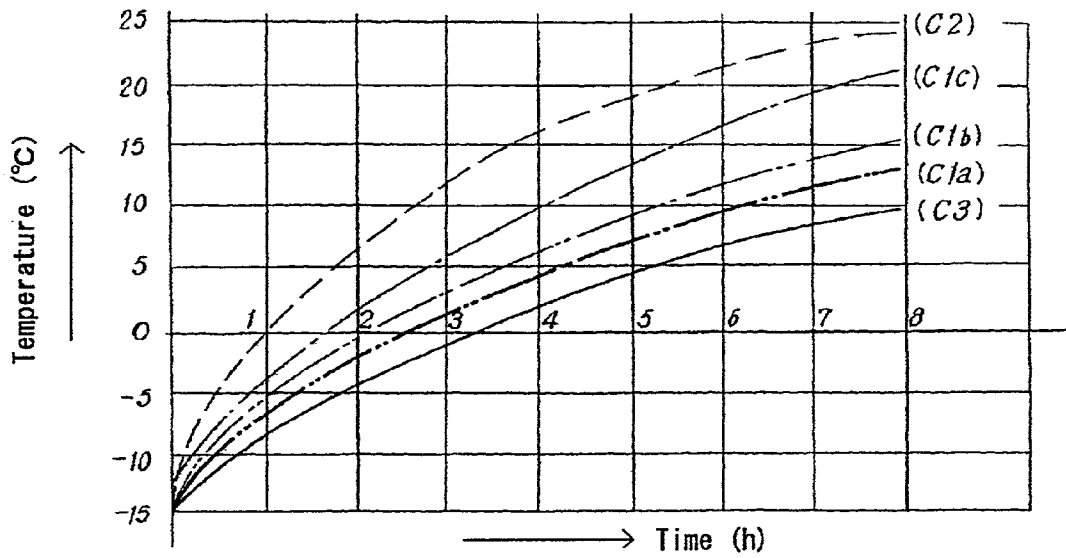


FIG. 12



C1a: a polypropylene container, having two air layers, with a layer thickness 8 mm
 C1b: a polypropylene container, having two air layers, with a layer thickness 5 mm
 C1c: a polypropylene container, having one air layer, with a layer thickness 14 mm
 C2: a corrugated cardboard container with no dirt (having no air layers)
 C3: an EPS container with no dirt (having no air layers)

FIG. 13

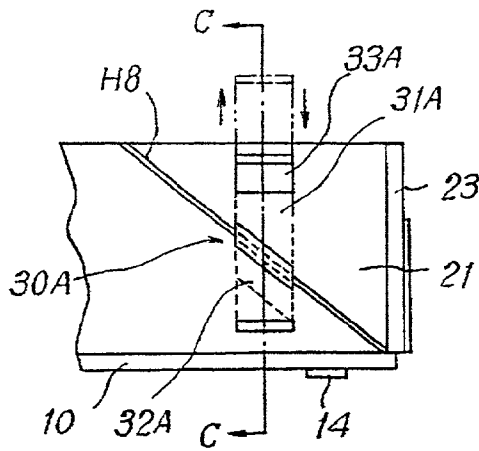


FIG. 14A

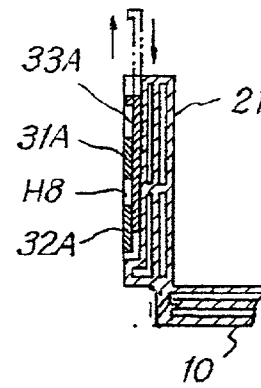


FIG. 14B

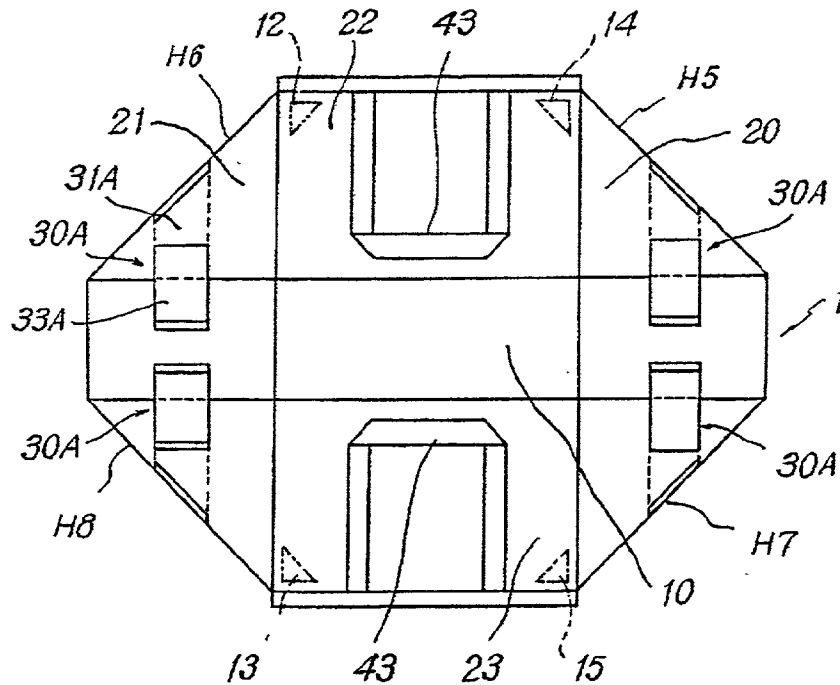


FIG. 15

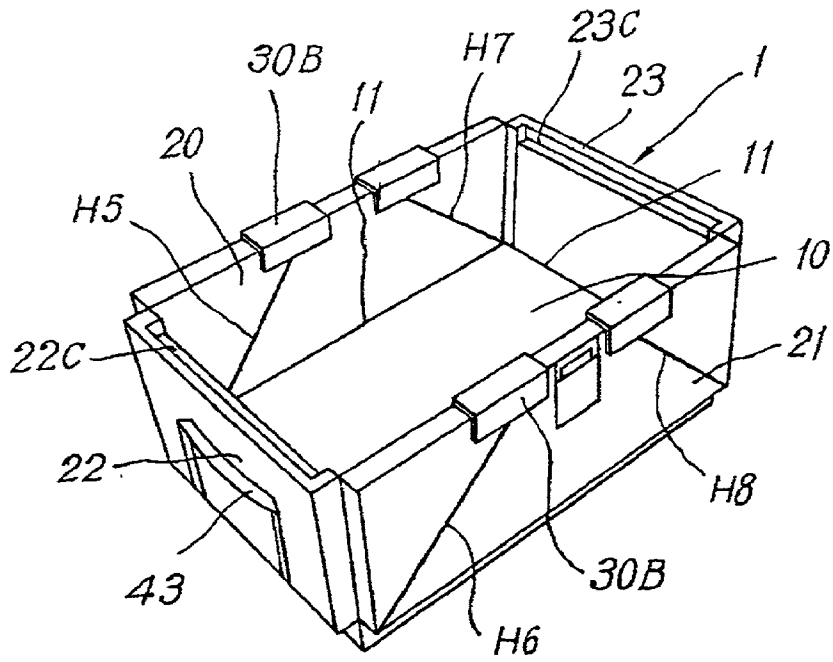


FIG. 16

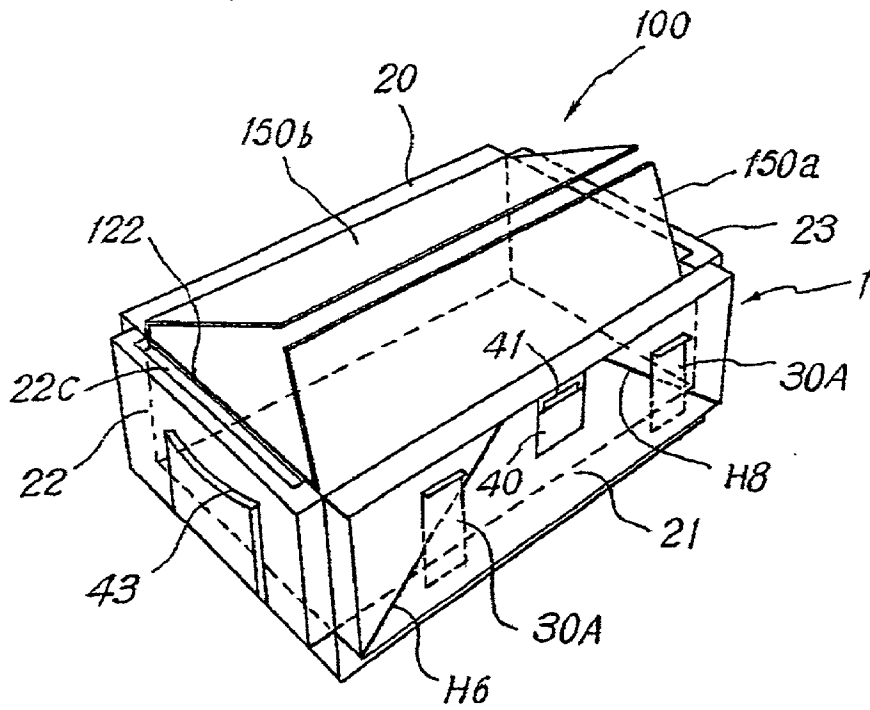


FIG. 17

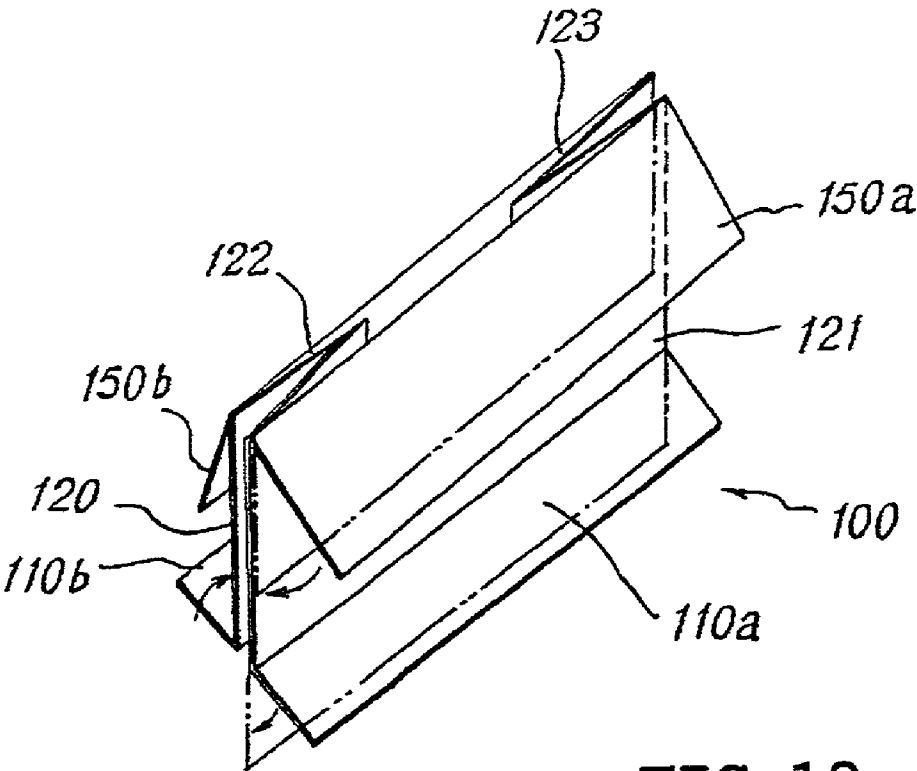


FIG. 18

FOLDABLE DISTRIBUTION CONTAINER FOR CONVEYING PERISHABLE FOODS

FIELD OF THE INVENTION

[0001] The present invention relates to a distribution container for conveying perishable foods, and relates, more particularly, to a foldable distribution container for conveying perishable foods that can be easily folded, that is excellent in cold-temperature retention (insulation and cooling effect), and that can be re-utilized.

DESCRIPTION OF THE RELATED ART

[0002] In the distribution of perishable foods such as livestock products like frozen meat and marine products like fresh fish, packaging containers having various shapes, functions, performance, and materials are used for perishable foods at present, from the needs of cold-temperature retention and protection from shock.

[0003] Among them, corrugated cardboard containers have generally been used as packaging containers for distributing livestock products. This is for the purpose of protecting the frozen contents from external shocks and for distributing the contents in lots. The cool keeping of the contents is achieved through keeping of the contents in cold storage and distribution of the contents by refrigerator car. Usually, the corrugated cardboard containers once used are not utilized again, as these containers are easily broken and stained, or as the cost of manufacturing these containers is low. The once-used containers are disposed as waste at the retailer side or the consumer side.

[0004] Further, EPS(expandable polystyrene) containers are generally used as containers for distributing marine products. The purpose of this is similar to the above. The cool keeping is achieved by similar means to the above. In addition, excellent heat insulation performance of EPS is utilized. In many cases, after ice or a cold insulator is inserted into the container, the contents of fresh fish are accommodated. However, bacteria are easily propagated in micro pores of a porous material composition that is a unique characteristic of EPS. Therefore, usually, the EPS container is utilized repeatedly by two or three times in many cases. Thereafter, the used EPS container is disposed as waste at the retail side or the consumer side, like the corrugated cardboard container.

[0005] Containers having various shapes have already been provided as distribution containers that can be re-utilized, such as, distribution containers like return boxes, for example. Usually, in order to improve the accommodation efficiency of these containers in a truck at the time of recovering the containers, it is required to reduce the volume of each container itself by folding the container. Therefore, because of the characteristics of the shapes, used materials, or the folding mechanism of the containers, these containers cannot satisfy the cold insulation performance that is required for the perishable foods, unless an optional insulation part is added to each container. Consequently, the corrugated cardboard containers and EPS containers have been employed as distribution containers for the perishable foods up to the present.

[0006] The corrugated cardboard containers and EPS containers use various kinds of materials and have various kinds

of structures and durability, by reflecting the variety of the contents accommodated in these containers. Further, usually most of them are distributed in one way from producers to consumers, or used repeatedly by a few times, and are then disposed as industrial waste or combustible waste. The amount of the used packaging containers that are disposed as waste is huge, judging from the amount of perishable foods that are daily consumed. Therefore, it is necessary to reduce the waste from the viewpoint of global resource protection and environmental protection, and this requirement has been enhanced recently. However, because of the variety in functions and performance required for the packaging containers as described above, standardization and common use of the containers have not yet been realized. As a result, only the problems have been made clear.

SUMMARY OF THE INVENTION

[0007] In the light of the above situation, the present applicant has proposed "a foldable distribution container for conveying perishable foods, comprising: a container main body formed with an approximately rectangular bottom plate for mounting perishable foods thereon, four side walls having hinge portions hinged to four side edges of said bottom plate and foldable to said bottom plate, and a holding member for holding the erection of said side wall by reinforcing said hinge portions; and a lid unit for covering an upper opening of said container main body" under Japanese Patent Application No. 2000-373285 A. Further, the present applicant has proposed particularly "a foldable distribution container for conveying perishable foods, wherein said container main body and said lid unit are formed as double-wall structures each having one-layer air layer inside". According to these containers, it is possible to assemble and fold the container main body quickly and securely in extremely simple operation. Further, it is possible to securely shut out the external air and insulate and keep cool the inside of the container. Furthermore, waste is not produced. Thus, there are excellent effects in the using aspect, the cooling aspect, and the environmental aspect.

[0008] It is an object of the present invention to provide a foldable distribution container for conveying perishable foods capable of exhibiting further advanced insulation and cooling effect, by adding further improvement to a foldable distribution container for conveying perishable foods.

[0009] The present invention relates to a foldable distribution container for conveying perishable foods, and it is possible to achieve the above object of the invention by a foldable distribution container for conveying perishable foods. Namely, the foldable distribution container comprises: a container main body formed with an approximately rectangular bottom plate for mounting perishable foods thereon, four side walls having hinge portions hinged to four side edges of the bottom plate and foldable to the bottom plate, and a holding member for holding the erection of the side wall by reinforcing the hinge portions; and a lid unit for covering an upper opening of the container main body, wherein the bottom plate and the four side walls that constitute the container main body, and the lid unit are formed as multi-layer wall structures having a plurality of air layers inside these structures respectively.

[0010] Further, it is possible to achieve the above object of the present invention more effectively by a foldable distri-

bution container for conveying perishable foods, wherein the structures are three-wall structures having two air layers respectively.

[0011] It is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein the bottom plate and the four side walls that constitute the container main body, and the lid unit are made of a synthetic resin material.

[0012] It is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein the synthetic resin material is polypropylene.

[0013] Further, it is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein a foldable inner case having a set of folding lids is mounted inside the container main body.

[0014] Further, it is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein the inner case is made of a material prepared by having an aluminum-deposited polyester film adhered to foamed polyethylene.

[0015] It is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein the four side walls foldable to the bottom plate are hinged to the adjacent side walls respectively, with two opposite side walls formed with angular hinge portions rising from both lower ends of the side walls, and the holding members for reinforcing the hinge portions are sliders.

[0016] Further, it is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein the upper surface of the lid unit is formed with recess portions, and the lower surface of the bottom plate of the container main body is provided with projected bases that are engaged with the recess portions.

[0017] Further, it is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein the lower surface of the bottom plate is formed in a shape to be engaged with the upper opening of the container main body.

[0018] Still further, it is possible to achieve the above object of the present invention more effectively by a foldable distribution container for conveying perishable foods, wherein the side wall of the container main body is provided with an IC card accommodation pocket capable of accommodating an IC card.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In the accompanying drawings:

[0020] FIG. 1 is a perspective view of the whole container relating to one embodiment of the present invention;

[0021] FIG. 2 is a perspective view of the container main body according to the present invention;

[0022] FIG. 3 is a top plan view of the container main body according to the present invention;

[0023] FIG. 4 is a side view of the container main body according to the present invention;

[0024] FIG. 5 is a bottom plan view of the container main body according to the present invention;

[0025] FIG. 6 is a perspective view showing a structure of a hinge portion of the container main body according to the present invention;

[0026] FIGS. 7A and 7B are a side view showing a structure of a slider portion provided on the container main body and a cross-sectional view cut along the B-B line;

[0027] FIG. 8 is a cross-sectional view of the container main body cut along the A-A line of FIG. 1;

[0028] FIG. 9 is a perspective view for explaining the sequence of folding the container main body according to the present invention;

[0029] FIG. 10 is a perspective view for explaining the sequence of folding the container main body according to the present invention;

[0030] FIG. 11 is a perspective view for explaining the sequence of folding the container main body according to the present invention;

[0031] FIG. 12 is a top plan view for explaining the sequence of folding the container main body;

[0032] FIG. 13 is a time-temperature change characteristic line-diagram showing the heat insulation and cooling effect of a container relating to the present invention;

[0033] FIGS. 14A and 14B are a side view showing another structure of a slider portion provided on the container main body relating to the present invention and a cross-sectional view cut along the C-C line;

[0034] FIG. 15 is a top plan view showing a status that a container main body having the slider portions are folded flat;

[0035] FIG. 16 is a perspective view showing still another structure of a slider portion provided on the container main body relating to the present invention;

[0036] FIG. 17 is a perspective view of a container having an inner case relating to another embodiment of the present invention; and

[0037] FIG. 18 is a perspective view showing a method of folding the inner case.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0038] Embodiments of a foldable distribution container for conveying perishable foods relating to the present invention will be explained in detail based on attached drawings.

[0039] FIG. 1 is a perspective view showing the appearance of a foldable distribution container for conveying perishable foods (hereinafter to be referred to as a "container C") relating to a first embodiment of the present invention. In the drawing, 1 denotes a container main body for accommodating perishable foods, and 50 denotes a lid unit covered on an upper opening of the container main body 1.

[0040] FIG. 2 is a perspective view showing an internal structure of the container main body 1, with the lid unit 50 removed. This container main body 1 consists of a bottom plate 10 and four side walls 20, 21, 22 and 23. In other words, the bottom plate 10 is in approximately a rectangular shape. The four side walls 20, 21, 22, and 23 are erected from four side edges. These four side walls 20, 21, 22 and 23 and the bottom plate 10 form the container main body 1 capable of accommodating perishable foods. In FIG. 2, 30 denotes slider portions to be described later, and 43 denotes a grip.

[0041] As shown in a top plan view in FIG. 3, four side edges 11 of the bottom plate 10 are connected with four hinges H10. The four side walls 20, 21, 22 and 23 are erected, and can be folded on the upper surface of the bottom plate 10 with the respective hinges H10 as creases. The four side walls 20, 21, 22 and 23 are formed as three-wall structures consisting of external walls 20a, 21a, 22a and 23a, inner walls 20b, 21b, 22b and 23b, and intermediate walls 20c, 21c, 22c and 23c, respectively, as shown in partially sectional views in FIG. 3. Two air layers S1 and S2 are formed between the walls. External air is shut out by these air layers S1 and S2, and the inside of the container main body 1 is insulated and held at low temperature. Ribs 35 for reinforcing the three walls are provided at some portions of the air layers S1 and S2, and the bottom plate 10 and the lid unit 50 also have similar structures to those of the side walls 20. These will be explained in detail later with reference to FIG. 8. As a result of experiments relating to insulation and cooling effect to be described later, it has been confirmed that it is preferable to set 4 to 12 mm, most preferably a value around 8 mm, as the layer thickness of the air layers S1 and S2 respectively, that is, the distance between the inner wall and the intermediate wall and the distance between the intermediate wall and the external wall respectively.

[0042] The four side walls 20, 21, 22 and 23 and the bottom plate 10 that constitute the container main body 1 are formed with a transparent or translucent synthetic resin, preferably polypropylene. With this arrangement, it is possible to look through the inside of the container main body 1 from the outside. Further, the inner wall surface of the container main body 1 is a smooth surface having no micro pores at all. Therefore, it is possible to prevent propagation of bacteria inside the container main body.

[0043] The container main bodies 1 are structured such that they can be stacked together in a vertical direction. In other words, as shown in a side view in FIG. 4, the end portion of the bottom plate 10 supports approximately a half of the inside of the lower end portions of the side plates 22 and 23 of the container main body 1. On the other hand, recess portions 22c and 23c are provided inside the upper end portions of the side walls 22 and 23. A short-sided portion of the bottom plate 10 provided on the bottom portion of a separate container main body 1 that is stacked above is engaged with these recess portions 22c and 23c. At the same time, a long-sided portion of the bottom plate 10 is engaged with the inner wall surface of the side walls 20 and 21. Thus, a plurality of the container main bodies 1 can be stacked together in a vertical direction in a status that the inside of each container main body 1 is sealed. When the container main bodies 1 are stacked together in this way, the lid unit 50 is covered on only the upper opening of the

container main body 1 that is positioned at the top of the stacking. In this case, the bottom plate 10 of the container main body 1 placed at the lowest position supports the whole vertical load.

[0044] Further, the lower surface of the bottom plate 10 of the container main body 1 is provided with triangular bases 12, 13, 14 and 15 in projection as shown in the side view in FIG. 4 and in a bottom plan view in FIG. 5. These bases 12, 13, 14 and 15 have a function of preventing a collapse or a positional deviation of the containers C when they are conveyed in a stacked status, as described later. In addition, the bases 12, 13, 14 and 15 have a function of preventing a collapse of the container main bodies 1 when they are stacked together in a folded status, as shown in a top plan view in FIG. 12 (or FIG. 15).

[0045] The four side walls 20, 21, 22, and 23 that can be folded on the bottom plate 10 are connected together with hinges H12, H2, H3 and H4 at adjacent end portions respectively, as shown in the top plan view in FIG. 3 and in a partially enlarged perspective view in FIG. 6. FIG. 6 shows this status for the side wall 20 and the side wall 23. As shown in the drawing, one end of the side wall 20 is hinged to the adjacent one end of the side wall 23 with the hinge H1. Similarly, the other end of the side wall 20 is hinged to one end of the side wall 22 with the hinge H2. The other end of the side wall 23 is hinged to one end of the side wall 21 with the hinge H3. The other end of the side wall 22 is hinged to the other end of the side wall 21 with the hinge H4. These hinge portions are formed thin having strength sufficient enough to easily fold the side walls 20, 21, 22 and 23. As explained above, the four side walls 20, 21, 22 and 23 can be folded based on the hinge connection of mutually adjacent side walls.

[0046] Of the four side walls 20, 21, 22 and 23, two opposite long-sided side walls are formed with angular hinge portions H5 and H7, and H6 and H8 that rise from both lower ends of the side walls respectively, as shown in the side view in FIG. 4 and a top plan view in a folded status in FIG. 12. Along these hinges H5, H6, H7 and H8, the corner portions of the container main body 1 are folded on the upper surface of the bottom plate 10, as shown in FIG. 12.

[0047] The slider portions 30 are disposed along the hinges H5, H6, H7 and H8 respectively, as shown in side views in FIG. 4 and FIG. 7A, and in the top plan view in FIG. 12. FIG. 7A is the side view of a structure of the slider portion 30 disposed on the hinge H8 of the side wall 21 as a part of the slider portions. FIG. 7B is a view of the surface cut along the B-B line of FIG. 7A. As shown in the drawings, an upper sheath portion 31 is disposed at a right upper slanted position orthogonal with the hinge H8, and a lower sheath portion 32 is disposed at a lower slanted position. A slider 33 is slidably inserted in the upper sheath portion 31 and the lower sheath portion 32 respectively. A recess portion 21h is formed on the surface portion of the side wall 21 where the slider 33 is inserted and slides. The lower end of this slider 33 can move between a position L indicated by a solid line of the lower sheath portion 32 and a position U indicated by a dotted line of the upper sheath portion 31. When an operator moves the lower end of the slider 33 to the position L with a knob 33a, the slider 33 works as a bar to the hinge H8. Consequently, the erected

status of the side wall **21** is held firm. On the other hand, when the lower end is moved to the position U, the holding of the hinge **H8** by the slider **33** is canceled, and the corner portion of the side wall **21** becomes foldable along the hinge **H8**. **FIG. 7** and **FIG. 12** show the foldable status.

[0048] Further, on the external surface of the side wall **21**, there is provided an IC card accommodation pocket **40** capable of accommodating an IC card **41** on which various kinds of information is written such as the name of a product like perishable foods accommodated in the container main body **1** and a product convey destination, as shown in the side view in **FIG. 4**. With this arrangement, a relationship between the accommodated product and the convey destination becomes clear, and it becomes possible to prevent troubles like an error in the contents and a transportation error, etc. Further, at the outside of the side wall **22** and the side wall **23** respectively, there is provided a grip **43** for carrying the container C, as shown in the perspective view in **FIG. 2** and in the side view in **FIG. 4**.

[0049] The lid unit **50** is covered on the upper opening of the container main body **1** having the above structure. This lid unit **50** is prepared using the same material and in the same structure as those of the container main body **1**, as shown in the perspective view in **FIG. 1** and in a sectional view cut along the A-A line of **FIG. 1** in **FIG. 8**. In other words, the lid unit **50** is formed as a three-wall structure consisting of an external wall **50a**, an inner wall **50b**, and an intermediate wall **50c**, each made of a transparent or translucent synthetic resin material of polypropylene. Two air layers **S1** and **S2** are formed between the walls. The reinforcing ribs **35** are provided at some portions of the air layers **S1** and **S2**. External air is shut out by this lid unit **50**, and the inside of the container main body **1** is insulated and held at low temperature. Further, as the lid unit **50** is made of the same material as that of the container main body **1**, the lid unit **50** is crashed together with the container main body **1**, and is utilized again as a raw material, after the service life of the distribution container.

[0050] As shown in the cross-sectional view in **FIG. 8**, the lower surface of the external peripheral edge portion of the lid unit **50** is cut in a hook shape, and is formed with a stage portion **53**. This stage portion **53** is engaged with each upper end of the side walls **20**, **21**, **22** and **23** respectively, and has a function of completely cutting the external air. Further, a recess portion **54** is formed inside the upper surface peripheral portion of the lid unit **50**. This recess portion **54** is designed to be engaged with the external side end portions of the stretched bases **12**, **13**, **14** and **15** respectively provided on the bottom surface of the container main body **1**. Based on this engagement, it is possible to prevent a collapse or a positional deviation of the distribution containers when they are conveyed in a stacked status.

[0051] Next, a method of using the container C having the above-described structure will be explained. Products like perishable foods are accommodated inside the container main body **1**, and the container C is conveyed in a status that the container main body **1** is completely sealed with the lid unit **50**, as shown in the perspective view in **FIG. 1** and in the cross-sectional view in **FIG. 8**. Then, the container main body **1** after it has been used is folded in a flat shape according to the order shown in **FIG. 9** to **FIG. 12**.

[0052] First, as explained with reference to **FIG. 7**, the lower end portion of each slider **33** provided on the side

walls **20** and **21** is slid from the lower position L to the upper position U. Based on this, the holding of the hinges **H5** and **H7**, and **H6** and **H8** formed on the side walls **20** and **21** by the sliders **33** is canceled, as shown in **FIG. 9**. Therefore, the side walls **20** and **21** are gradually folded to the inside, with the respective hinges **H5** and **H7**, and **H6** and **H8** as creases. Along the work of the side walls **20** and **21**, the short-sided side walls **22** and **23** that are linked to these side walls and the hinges **H1**, **H2**, **H3** and **H4** are also gradually folded to the inside, as shown in **FIG. 10** and **FIG. 11** in sequence. Finally, all the side walls are folded flat on the upper surface of the bottom plate **10**, as shown in **FIG. 12**. As explained above, the container main body **1** is folded flat in simple operation by only slightly sliding the sliders **33**.

[0053] On the other hand, in the case of assembling an erected container main body **1** as shown in **FIG. 2** from the folded status as shown in **FIG. 12**, this can be achieved by carrying out the operation in the opposite order to that of the folding operation. In other words, the side walls **22** and **23** of the container main body **1** in the folded status as shown in **FIG. 12** are stretched to the left and right respectively by holding the upper end of the side wall. Then, the side walls **20**, **21**, **22** and **23** are erected immediately. In this status, the lower end portion of each slider **33** is slid from the upper position U to the lower position L, thereby to firmly hold the erected status of the side walls **20**, **21**, **22** and **23**. As explained above, the container main body **1** according to the embodiment of the present invention can be assembled or folded flat in extremely simple operation.

EXAMPLE

[0054] In order to confirm the heat insulation and the cooling effect (low-temperature retention) of the container C explained above, the following experiments have been carried out by making trials of various kinds of containers with changed materials that constitute the container C and changed sizes of structures.

[0055] First, three kinds of materials are selected for manufacturing the container main body **1** and the lid unit **50** respectively. Namely, a container C1 is manufactured using a synthetic resin (polypropylene), a container C2 is manufactured using corrugated cardboard, and a container C3 is manufactured using EPS. Next, structures that constitute the container main body **1** and the lid unit **50** are selected as follows. The container C1 has the following three types. A container C1a has two air layers (**S1**, **S2**), each having a layer thickness of 8 mm, and the walls that form these air layers have a thickness of 2 mm respectively. Similarly, a container C1b has two air layers (**S1**, **S2**), each having a layer thickness of 5 mm, and the walls that form these air layers have a thickness of 2 mm respectively. Then, a container C1c relating to the above-described prior application has one air layer having a layer thickness of 14 mm, and the walls that form this air layer have a thickness of 2 mm respectively. Further, the container C2 and the container C3 have no dirt (no air layers) respectively, and walls of these containers have a wall thickness of 15 mm and 5 mm respectively. The capacity of 2000 cc is set to each of the above five kinds of containers (that is, C1a, C1b, C1c, C2 and C3).

[0056] Next, 2000 cc of an antifreezing fluid at -15°C . is sealed into these five kinds of containers that have been manufactured in the above-described manner. Temperatures

of the inside of each container along the lapse of time(0 to 8 hours)are measured with a self-recording thermometer in the room at a normal temperature(22° C.). As a result, data showing temperature changes(a vertical axis) along the lapse of time(a horizontal axis) as shown in **FIG. 13** has been obtained.

[0057] As can be understood from **FIG. 13**, the temperature within each container gradually rises along the lapse of time. Containers with excellent heat insulation and cooling effect, that is, the containers in which the rise in temperature is small along the lapse of time, are in the order of the containers **C3**, **C1a**, **C1b**, **C1c** and **C2**. Following the container **C3**(the EPS container), the container **C1a**(the polypropylene container, with an air layer thickness 8 mm) is excellent, and the container **C2**(the corrugated cardboard container) shows the worst value. However, while the EPS container **C3** is excellent from the viewpoint of the heat insulation and cooling effect, this container has drawbacks in that bacteria are easily propagated in micro pores of the inner wall, and that the used container is disposed as waste, as described above. On the other hand, the synthetic resin container provided with air layers, particularly, the container **C1a**, has heat insulation and cooling effect, and has no propagation of bacteria, as the inner wall surface is smooth. Further, this container has a high practical value, as this container can be re-utilized. It is also possible to provide three or more air layers in the structures. However, this leads to an increase in manufacturing cost along the complexity of the structures. Furthermore, from the viewpoint of heat insulation and cooling effect, it is preferable to form the above-described two-layer structures.

[0058] In investigating the synthetic resin(polypropylene) container **C1** from the viewpoint of heat insulation and cooling effect, it is more preferable to provide two air layers than to provide one air layer on each structure. Further, the layer thickness of 8 mm is preferable to 5 mm. Further, according the experiments carried out by the present inventors, it has been found that the practical range of the layer thickness is 4 to 12 mm, and most preferably, 8 mm. This is because the heat insulation and cooling effect becomes lower when the layer thickness is equal to or less than 3 mm. Also, the heat insulation and cooling effect similarly becomes lower when the layer thickness is equal to or larger than 13 mm, because of the generation of convection inside the air layers.

[0059] While the content of the present invention has been explained above with reference to one example, the present invention is not limited to this example, and it is also possible to make various modifications to the construction as follows.

[0060] First, as the holding member for holding the erection of the side walls, it is possible to use slider portions **30A** as shown in **FIGS. 14A** and **14B** in stead of the slider portions **30**. As shown in a front view in **FIG. 14A** and in a cross-sectional view cut along the C-C line of **FIG. 14A** in **FIG. 14B**, slider portion **30A** is provided in a vertical direction across a hinge **H8** formed on a side wall **21**. It is so structured that a slider **33** is slid along a vertical distance between an upper sheath portion **31A** and a lower sheath portion **32A** as shown by arrow marks, thereby to erect the side wall **21** and cancel the erection. With the slider portion **30A** provided in this way, the floating of the upper end

portion of the slider **30A** is restricted by the lower surface of the container main body **1** positioned above, that is, by the bottom surface of the bottom plate **10**, at the time of conveying the container main bodies **1** in a stacked status. Therefore, it is possible to hold the erection of the side wall **21** securely and firm, during the conveyance. When the container main body **1** provided with this slider portion **30A** is folded flat as shown in **FIG. 15**, the upper portion of the knob of the slider portion **30A** is stretched above from the top of the side wall **20** and the side wall **21** respectively. Consequently, the side wall **20** and the side wall **21** are pressed against the upper surface of the bottom plate **10**. As a result, it is possible to fold the whole unit more flat.

[0061] As a further modification of the holding member, it is also possible to use sliders **30B** as shown in **FIG. 16**. These sliders **30B** are provided with a U-shaped channel member facing downward respectively, and are slidable on the upper end portions of the side wall **20** that is formed with angular hinges **H5** and **H7** and the side wall **21** that is formed with angular hinges **H6** and **H8** respectively, out of the four side walls **20**, **21**, **22**, and **23** of the container main body **1**. For erecting the side walls **20** and **21**, the sliders **30B** are disposed on the top of the hinges **H5**, **H6**, **H7** and **H8** respectively, as shown in **FIG. 16**. For folding the sliders **30B**, the sliders **30B** are removed. According to these sliders **30B**, it is possible to manufacture the container at low cost because of a simple mechanism. However, some device is necessary in the aspect of sealing between the lid unit **50** and the container main body **1**.

[0062] Further, as a method of folding the container main body **1**, it is possible to employ various known methods, such as a method used for a plastic container disclosed in Japanese Patent Application Laid-open No. 9-175541 A, for example. According to this method, at the time of vacuum molding a plastic sheet, ribs that can be folded toward the inside, when the container after the molding is pressed to the up and down directions, are integrally formed on side walls. Therefore, this plastic container is suitable for conveyance and storage in a status that the side walls are folded flat.

[0063] The above explains the container **C** structured in a single unit consisting of the container main body **1** and the lid unit **50**, for accommodating perishable foods therein. It is possible to further increase the heat insulation and cooling effect of the container according to the present invention, by providing a container **C'** that is mounted with an inner case(an inner box) **100** that is foldable inside the container main body **1**, as shown in a perspective view in **FIG. 17**. This inner case **100** is a foldable box unit having a set of folding lids that are prepared by using a material consisting of an EPS sheet of a few mm thickness adhered with a thin aluminum-evaporated polyester film, with the aluminum-deposited surface facing inside. As shown in the drawing, this container **C'** has a set of foldable lid units **150a** and **150b** on the top. **FIG. 18** shows a folded status in a perspective view. The container **C'** has four side walls **120**, **121**, **122**, and **123** around, and has bottom plates **110a** and **110b** at the bottom. This inner case **100** is designed as follows. When the inner case **100** is developed, this becomes large enough to be brought into contact with the inner surface of the container main body **1** including the lid unit **50** and the bottom plate **10** of the container **C**, and when the inner case **100** is folded as shown by arrow marks in **FIG. 18**, this becomes in a flat plate shape. For the material of the inner

case **100**, it is also possible to use various kinds of plastic films or flexible sheets having heat insulation property, in addition to the above-described deposited film. However, it is preferable to use the above-described material from the viewpoint of heat insulation and cooling effect. Further, it is needless to mention that it is possible to employ various kinds of known methods for folding the inner case **100**.

[0064] For using the container **C'** having the inner case **100** accommodated therein, perishable foods are accommodated inside the inner case **100**, and the lid units **150a** and **150b** are closed. Further, the lid unit **50** is covered on the upper opening of the container main body **1**, thereby to insulate the inside in double. In the case of the container **C'** that uses this inner case **100**, it is needless to mention that it is not necessary to manufacture the container main body **1** and the lid unit **50** with a transparent or translucent material.

[0065] As explained above, according to the present container **C'**, the inside of the container main body **1** is heat-insulated in double. Therefore, it is possible to further improve the heat insulation and cooling effect. Further, according to the experiments carried out by the present inventors, it has been made clear that changes in temperature of the container **C'** along the lapse of time show approximately intermediate values between the values of the container **C3** (the EPS container) and the container **C1a** (the polypropylene container having two air layers, with the layer thickness of 8 mm) shown in **FIG. 13**.

[0066] As explained above, according to the foldable distribution container for conveying perishable foods relating to the present invention, it is possible to obtain the following effects.

[0067] (1) The container main body is formed with an approximately rectangular bottom plate for mounting perishable foods thereon, four side walls having hinge portions hinged to four side edges of the bottom plate and foldable to the bottom plate, and a holding member for holding the erection of the side wall by reinforcing the hinge portions. Therefore, it is possible to assemble and fold the container main body quickly and securely in extremely simple operation.

[0068] (2) Particularly, the four side walls foldable to the bottom plate are hinged to the adjacent side walls respectively, with two opposite side walls formed with angular hinge portions rising from both lower ends of the side walls, and sliders for reinforcing the hinge portions are provided. According to this container, it is possible to further improve the above effect.

[0069] (3) Further, the bottom plate and the four side walls that form the container main body, and the lid unit are formed as three-wall structures having two air layers inside respectively. Therefore, it is possible to securely shut out the external air and insulate and keep cool the inside of the container.

[0070] (4) It is possible to further improve the above effect, particularly by providing a container having a foldable inner case, with a set of folding lids mounted inside the lid unit and the container main body, more preferably, a container having the inner case made of a material prepared by having an aluminum-deposited polyester film adhered to foamed polyethylene

[0071] (5) Further, as the bottom plate and the four side walls that form the container main body, and the lid unit are made of the same material consisting of a transparent synthetic resin, it is possible to confirm the products accommodated in the container main body from the outside. Further, as the inner wall of the container main body is a smooth surface having no micro pores at all, it is possible to prevent propagation of bacteria. After using the container main body, it is possible to use this container main body again by simply cleaning it. Further, as the container main body and the lid unit are made of the same material, it is possible to use them for recycling of the raw material, by crashing the container after the lapse of the service period.

[0072] (6) Further, as a recess portion is formed on the upper surface of the lid unit, and also stretched bases for engagement with this recess portion are provided on the lower surface of the bottom plate of the container main body, a collapse or a positional deviation does not occur even when a plurality of distribution containers are conveyed in a stacked status. When the container main bodies are stacked in a flat folded status, the bases are engaged with the recess portion formed on the container main body positioned above. Therefore, it is possible to prevent a positional deviation.

[0073] (7) Further, as the lower surface of the bottom plate is formed in a shape to be engaged with the upper opening of the container main body, it is possible to seal the inside without the lid unit, by stacking the distribution containers.

[0074] (8) Further, as an IC card accommodation pocket capable of accommodating an IC card is provided on the side wall of the container main body, a relationship between the accommodated product and the convey destination becomes clear. It also becomes possible to prevent troubles like an error in the contents and a transportation error, etc.

What is claimed is:

1. A foldable distribution container for conveying perishable foods, comprising: a container main body formed with an approximately rectangular bottom plate for mounting perishable foods thereon, four side walls having hinge portions hinged to four side edges of said bottom plate and foldable to said bottom plate, and a holding member for holding the erection of said side wall by reinforcing said hinge portions; and a lid unit for covering an upper opening of said container main body, wherein the bottom plate and the four side walls that constitute said container main body, and said lid unit are formed as multi-layer wall structures having a plurality of air layers inside these structures respectively.

2. A foldable distribution container for conveying perishable foods according to claim 1, wherein said structures are three-wall structures having two air layers respectively.

3. A foldable distribution container for conveying perishable foods according to claim 1 or 2, wherein the bottom plate and the four side walls that constitute said container main body, and said lid unit are made of a synthetic resin material.

4. A foldable distribution container for conveying perishable foods according to claim 3, wherein said synthetic resin material is polypropylene.

5. A foldable distribution container for conveying perishable foods according to any one of claims 1 to 4, wherein a

foldable inner case having a set of folding lids is mounted inside said container main body.

6. A foldable distribution container for conveying perishable foods according to claim 5, wherein said inner case is made of a material prepared by having an aluminum-deposited polyester film adhered to foamed polyethylene.

7. A foldable distribution container for conveying perishable foods according to any one of claims 1 to 6, wherein the four side walls foldable to said bottom plate are hinged to the adjacent side walls respectively, with two opposite side walls formed with angular hinge portions rising from both lower ends of said side walls, and said holding members for reinforcing said hinge portions are sliders.

8. A foldable distribution container for conveying perishable foods according to any one of claims 1 to 7, wherein the

upper surface of said lid unit is formed with recess portions, and the lower surface of the bottom plate of said container main body is provided with projected bases that are engaged with said recess portions.

9. A foldable distribution container for conveying perishable foods according to any one of claims 1 to 8, wherein the lower surface of said bottom plate is formed in a shape to be engaged with the upper opening of said container main body.

10. A foldable distribution container for conveying perishable foods according to any one of claims 1 to 9, wherein the side wall of said container main body is provided with an IC card accommodation pocket capable of accommodating an IC card.

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