



(19) **United States**

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

(10) **Pub. No.: US 2009/0310890 A1**

(43) **Pub. Date: Dec. 17, 2009**

(54) **DUPLEX-CHAMBER PACKAGE**

(52) **U.S. Cl. .... 383/38**

(75) **Inventors: Toyoaki Suzuki, Tokyo (JP);  
Koichi Miura, Tokyo (JP)**

Correspondence Address:  
**BIRCH STEWART KOLASCH & BIRCH**  
**PO BOX 747**  
**FALLS CHURCH, VA 22040-0747 (US)**

(73) **Assignee: FUJIMORI KOGYO CO., LTD.,  
Tokyo (JP)**

(21) **Appl. No.: 11/922,124**

(22) **PCT Filed: Jun. 15, 2005**

(86) **PCT No.: PCT/JP2005/010918**

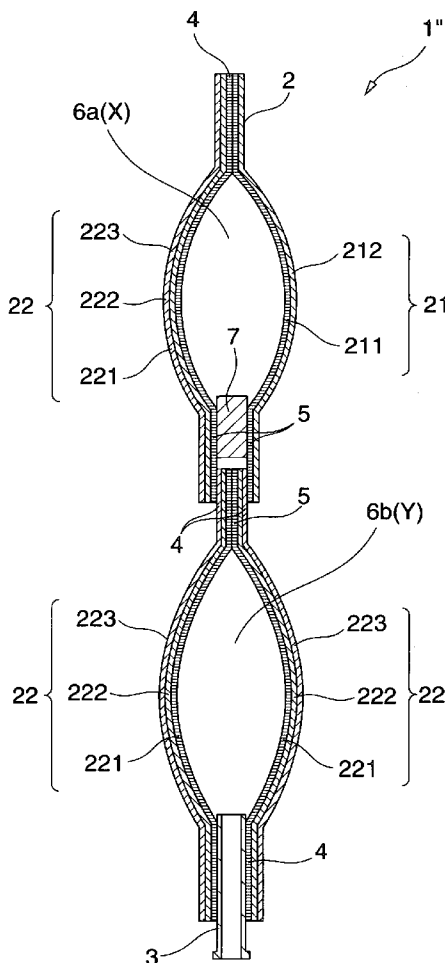
§ 371 (c)(1),  
(2), (4) **Date: Dec. 13, 2007**

**Publication Classification**

(51) **Int. Cl. B65D 30/22 (2006.01)**

(57) **ABSTRACT**

This invention provides a duplex-chamber package that has a high level of water vapor barrier properties, can realize mixing of plural contents in a hermetically sealed state, and can reduce the elution of a material contained in the sheet of a duplex-chamber package material into the contents of the package. The duplex-chamber package comprises a package comprising a first sheet superimposed onto a second sheet, the peripheral part of the assembly having been sealed, a weakly sealed part for partitioning the inside of the package into two or more chambers having been provided in a part of the package. The first sheet (I) is a laminated sheet comprising a heat seal layer, a mass transfer layer and a mass transfer blocking layer, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer. The second sheet (II) is a laminated sheet comprising a heat seal layer, a mass transfer layer, a mass transfer blocking layer and a moisture blocking layer, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer.



# FIG. 1

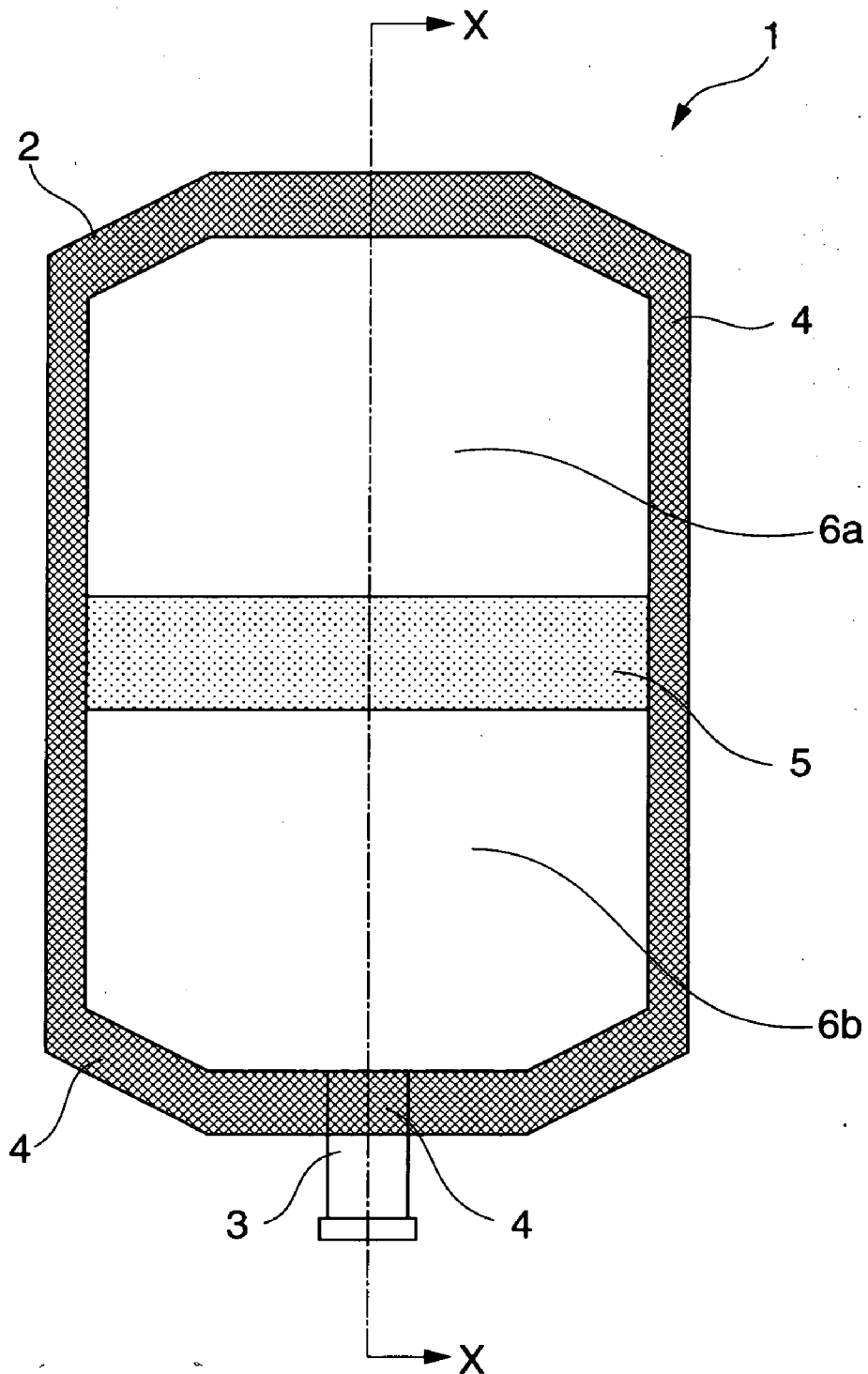


FIG.2

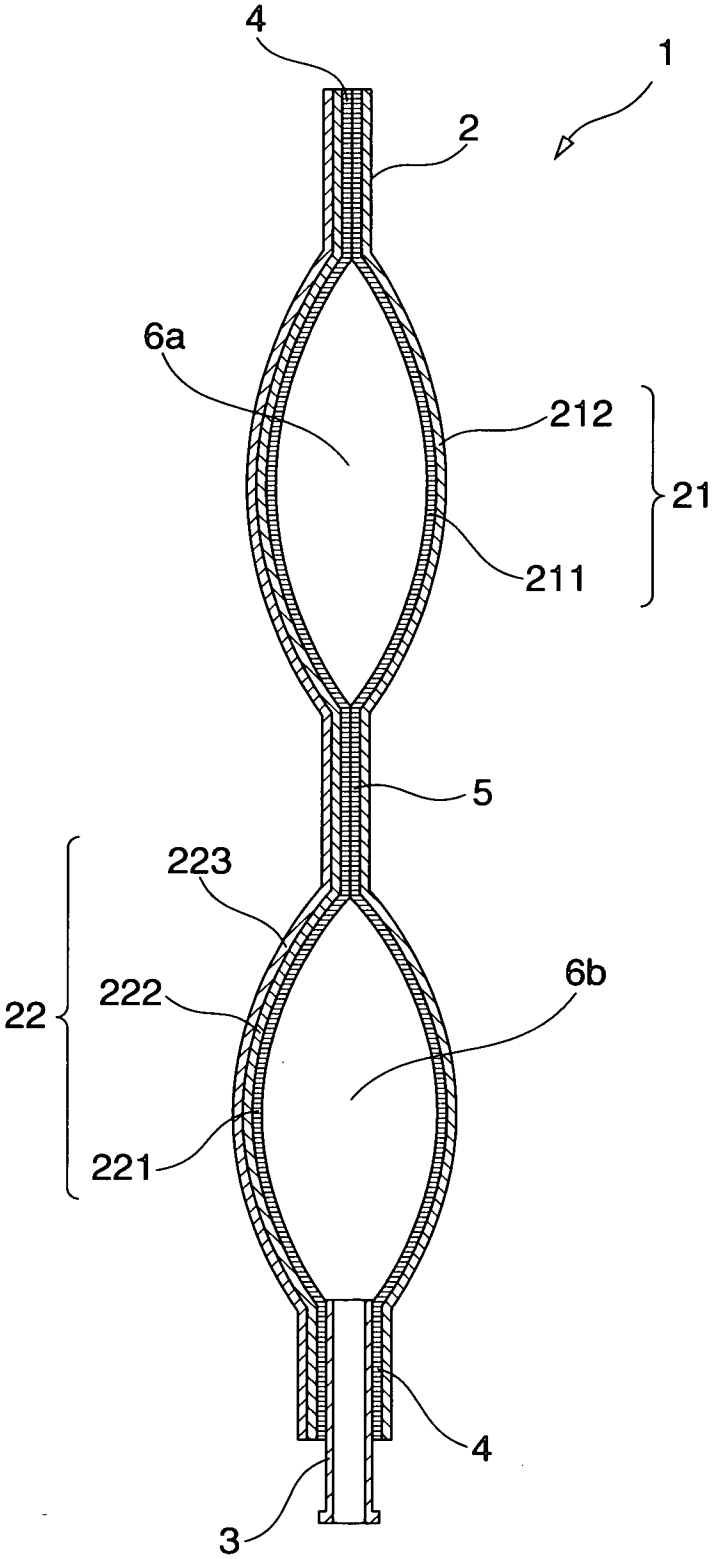


FIG.3

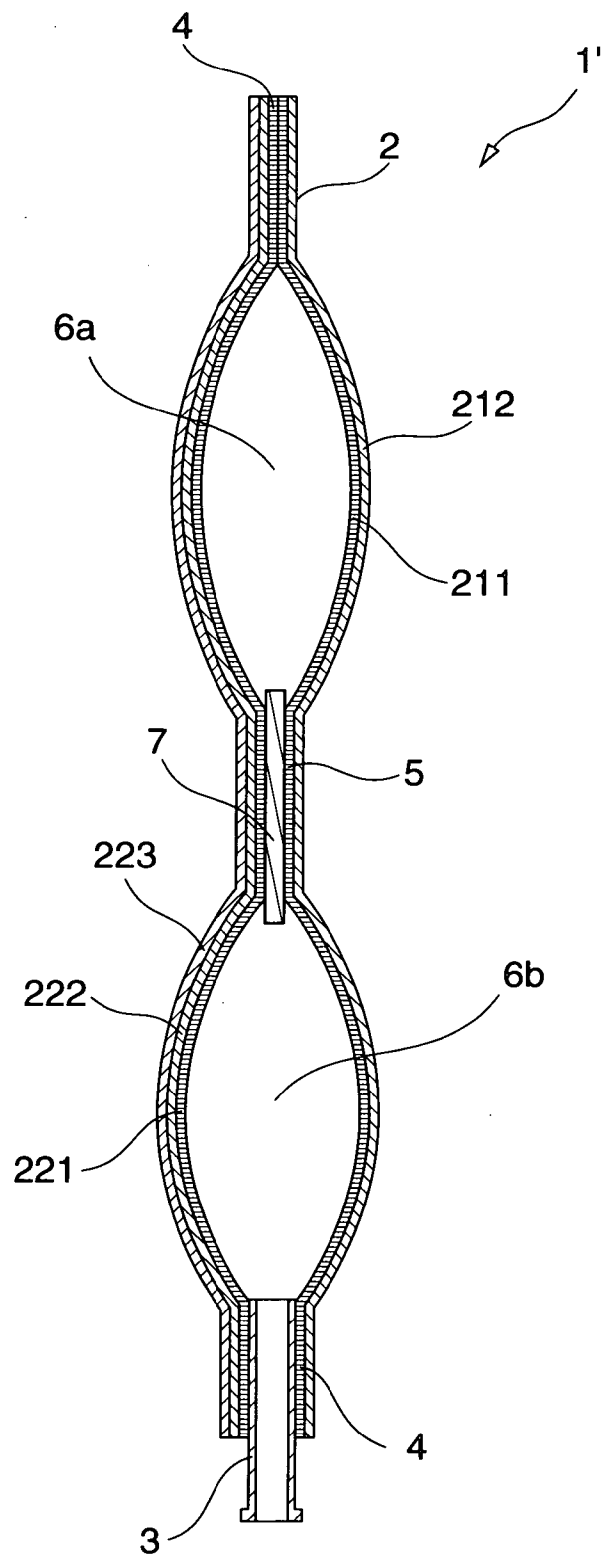
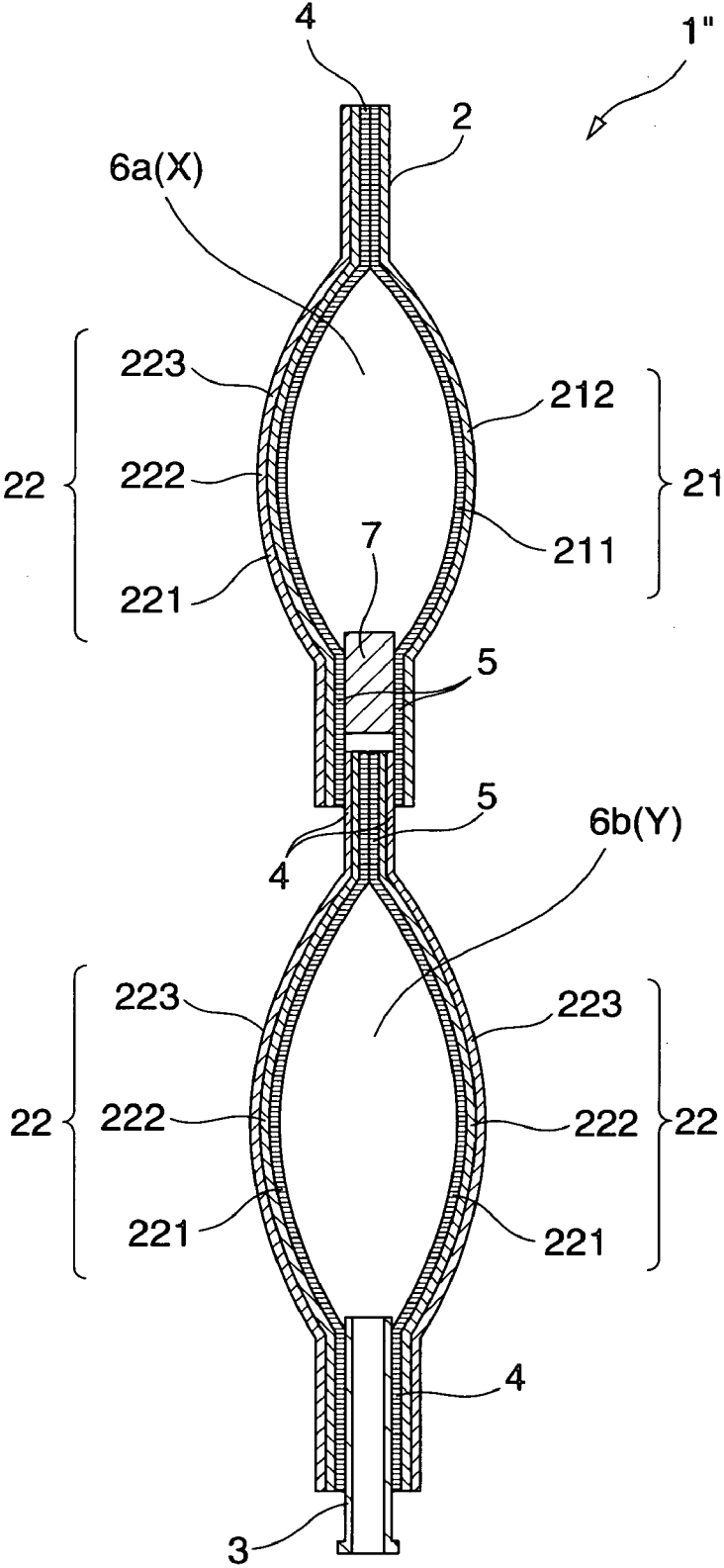


FIG.4



## DUPLEX-CHAMBER PACKAGE

### TECHNICAL FIELD

**[0001]** This invention relates to a duplex-chamber package wherein plural contents are separately accommodated from each other and the plural contents can be mixed together by removing the separation at the time of use.

### BACKGROUND ART

**[0002]** In recent years, there have been acknowledged as a problem of interactions between accommodated contents and various types of additives employed in packages such as antioxidants, lubricants, stabilizers, UV inhibitors and anti-blocking agents or monomer components left in plastic materials for packages or materials transferred from printed inks, adhesives, anchor coating agents and the like. The materials transferred from a package in itself to a content are used for the purpose of stably retaining the package over a long term or for the purpose of keeping strength during the course of storage and distribution, or are necessary for stabilizing film-forming properties in the step of manufacturing various types of films. Accordingly, it would be impossible as a matter of practice to provide packages wherein these materials have been completely removed.

**[0003]** In order to suppress an influence of the materials transferred from a package on the content, the present inventors have already proposed inventions in Japanese Patent Laid-open Nos. Hei 08-258211 and Hei 08-252298.

**[0004]** In the Japanese Patent Laid-open No. Hei 08-258211, a plastic film for medical liquid container, which is imparted with a heat resistance and ensures excellent safety and hygienic quality, has been proposed wherein small amounts of an anchor coating agent and an adhesive resin are used together in oriented nylon, oriented polyethylene terephthalate, oriented polypropylene and the like without use of a bonding agent. Excellent effects have been confirmed with respect to an elution test from a container prescribed in the Japanese Pharmacopoeia and the film has been actually satisfied for use as a plastic film for medical liquid container. In this connection, however, elution of a monomer component or a oligomer component, such as a dimer and more highly polymerized component, in an anchor coating agent used in small amounts, and additives or residual monomer components used in nylon and polypropylene cannot be completely prevented.

**[0005]** In the Japanese Patent Laid-open No. Hei 08-252298, there has been proposed a technique of manufacturing a plastic film for medical liquid container wherein a non-oriented multi-layered composite comprising an adhesive resin layer and a polyethylene or polypropylene layer on a plastic surface layer of a non-oriented nylon or non-oriented polypropylene formed by an inflation method or a T-die method is oriented at a draw ratio of 1.5 to 20 times, and extruded polyethylene or polypropylene melting bonding to the polyethylene or polypropylene layer of the oriented film. According to this method, it is possible to form a container of low elution characteristics and high excellence in safety and hygienic quality without complete use of an adhesive and an anchor coating agent. However, these packages actually have to be printed, making it substantially difficult to completely suppress elution of the printed ink to a content. In fact, there has never been obtained such a package that various types of additives and residual monomer components employed in

nylon resin, polypropylene resin and polyethylene resin used are suppressed from transferring to a content, and interactions with a content never happened. Moreover, an additional problem is involved in that the package formed in this way cannot be imparted with water vapor barrier properties at a very high level (of 0.5 g/m<sup>2</sup>.24 hours (90% R.H.) or below).

**[0006]** In PCT Patent Publication No. 99/39679, there has been proposed a layer structure of a polyolefin, cyclic olefin copolymer and polyolefin arranged in this order from an inner surface of a container, with which a content of vitamin D in a liquid content is suppressed from lowering. However, no consideration is given to the container with respect to the use of printed inks, adhesives, anchor coating agents therein, but this container is substantially a medical container co-extrusion molded in multilayer. The cyclic olefin copolymer is not used for the purpose of preventing the elution of monomer components, oligomers such as dimers and more highly polymerized components from printed inks, adhesives, anchor coating agents and the like. Moreover, no consideration is given to the influence of additives in employed polyethylene and the influence of residual monomers such as polyethylene at all. Neither oriented polyethylene terephthalate films nor oriented polyamide films are used, mechanical strength is poor and water vapor barrier properties at a very high level of not greater than 0.5 g/m<sup>2</sup>.24 hours (90% R.H.) cannot be imparted.

**[0007]** In Japanese Patent Laid-open No. 2000-70331, there has been proposed a container making use of a composition comprising a cyclic polyolefin and a linear polyolefin as an inner wall surface. This proposal is not for a container considered with respect to the use of printing inks, adhesives, anchor coating agents and the like, like the above case. This is actually a medical container co-extrusion molded in multilayer, and the cyclic polyolefin is not used for preventing elution of monomer components and oligomers such as dimers and more highly polymerized component from printed inks, adhesives, anchor coating agents and the like. In addition, a problem is involved in that because neither oriented polyethylene terephthalate films nor oriented polyamide films are used, mechanical strength is poor and water vapor barrier properties at a very high level of not greater than 0.5 g/m<sup>2</sup>.24 hours (90% R.H.) cannot be imparted. For providing a duplex-chamber container having a weakly sealed portion, the innermost layer is formed of a cyclic polyolefin incorporated with a linear polyolefin, and no consideration is given to the interaction between a residual low-molecular-weight monomer from the linear polyolefin and a content.

**[0008]** In Japanese Laid-open Patent Application 2001-157704, there is pointed out a problem in that a monomer component of an adhesive used is dissolved out in a content at the time of retort sterilization. The use of a cyclic olefin polymer blend for a container is proposed for an improvement. However, this container fails to provide a function as a duplex-chamber container with a weakly sealed portion at a part thereof at all. Although high water vapor barrier properties are imparted by using a glass-deposited film, the deposited film suffers from occurrence of cracking of the deposited layer at the time of retort sterilization or during the course of transportation and storage. This film can not suppress the barrier properties from lowering. Thus, very high water vapor barrier properties intended cannot be imparted and retained.

**[0009]** In other words, in conventional packages, there have been acknowledged as a problem of interactions between accommodated contents and various types of additives

employed in packages such as antioxidants, lubricants, stabilizers, UV inhibitors, and anti-blocking agents, or monomer components left in plastic materials for packages, or materials transferred from printed inks, adhesives, anchor coating agents and the like. In conventional packages that permit a content to be visually seen in use, these problems cannot be solved, and high water vapor barrier properties cannot be imparted thereto.

#### DISCLOSURE OF THE INVENTION

##### Problem to Be Solved by the Invention

**[0010]** The invention has been accomplished under such circumstances as stated hereinabove. An object of the invention is to provide a duplex-chamber package that has a high level of water vapor barrier properties, enable a plurality of contents to be mixed in a hermetically sealed condition and is particularly suitable for medical use.

##### Means for Solving the Problem

**[0011]** The present inventors have made intensive studies so as to achieve the above object and, as a result, found that for manufacturing a duplex-chamber package wherein the inside is partitioned into plural chambers by means of weakly sealed portions, a first sheet having a specific type of layer arrangement and a second sheet are superposed each other to provide a duplex-chamber package, which is particularly suitable as a duplex-chamber container for medical use, thereby arriving at completion of the invention.

**[0012]** Accordingly, the invention provides the following duplex-chamber packages.

**[I]** A duplex-chamber package comprising a package comprising a first sheet and a second sheet being superimposed each other with a peripheral portion of the sheets being sealed, and an inside of the package being partitioned into plural chambers by means of a weakly sealed portion provided at a part of the facing inner wall surfaces of the package, wherein the first sheet and the second sheet are respectively formed of a first laminated sheet (I) and a second laminated sheet (II):

**[0013]** (I) A laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer and a mass transfer blocking layer, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer; and

**[0014]** (II) A laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer, a mass transfer blocking layer and a moisture blocking layer comprising metallic component, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer.

**[II]** A duplex-chamber package comprising a container (X) and a container (Y) formed respectively such that a first sheet and a second sheet are superimposed each other with a sealed portion being formed along a peripheral portion of the sheets and a weakly sealed portion being formed at a part of the facing inner wall surfaces of the package, both containers being so connected as to be communicable with each other at the insides thereof when the weakly sealed portions of the respective containers are separated from each other, wherein the connection is formed by means of a seal between the inner wall surface of the container (X) and the outer wall surface of the other container (Y), and the first sheet and the second

sheet, at least for the container (X), are respectively formed of a first laminated sheet (I) and a second laminated sheet (II):

**[0015]** (I) A laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer and a mass transfer blocking layer, the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer; and

**[0016]** (II) A laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer, a mass transfer blocking layer and a moisture blocking layer comprising metallic components, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer.

**[III]** The duplex-chamber package as recited in [I] or [II], wherein the laminated sheet (I) further comprises a moisture blocking layer.

**[IV]** The duplex-chamber package as recited in [I], [II] or [III], wherein a total light transmittance in a normal direction of the surface of said laminated sheet (I) is not lower than 70%.

**[V]** The duplex-chamber package as recited in any one of [I] to [IV], wherein the mass transfer layer and the mass transfer blocking layer are bonded with an adhesive resin.

**[VI]** The duplex-chamber package as recited in any one of [I] to [V], wherein the mass transfer blocking layer and/or the heat seal layer comprise(s) a cyclic polyolefin composition as a main component.

**[VII]** The duplex-chamber package as recited in any one of [I] to [VI], wherein the mass transfer blocking layer and/or the heat seal layer comprise(s) polytetrafluoroethylene and/or ultrahigh molecular weight polyethylene as a main component.

**[VIII]** The duplex-chamber package as recited in [VI] or [VII], wherein the cyclic polyolefin composition comprises the following components (A) and (B):

**[0017]** (A) a cyclic polyolefin having a glass transition temperature of lower than 100° C.; and

**[0018]** (B) a cyclic polyolefin having a glass transition temperature of not lower than 100° C.

**[IX]** The duplex-chamber package as recited in any one of [I] to [VIII], wherein the weakly sealed portion is formed by thermocompression bonding, from outside of the package, the facing inner wall surfaces of the package.

**[X]** The duplex-chamber package as recited in any one of [I] to [IX], wherein the weakly sealed portion is formed by inserting a tape between facing inner wall surfaces of the package, and then subjecting the inserted portion to thermocompression bonding from outside of the package, said tape comprises at least a surface layer containing the following component (A) and/or (B):

**[0019]** (A) a cyclic polyolefin having a glass transition temperature of lower than 100° C.; and

**[0020]** (B) a cyclic polyolefin having a glass transition temperature of not lower than 100° C.;

**[XI]** The duplex-chamber package as recited in any one of [I] to [X], wherein the duplex-chamber container is in medical use.

##### Benefits of the Invention

**[0021]** The duplex-chamber package of the invention has a high level of water vapor barrier properties, is high in mechanical strength and is able to permit a plurality of contents to be mixed in a hermetically sealed condition. If the arrangement of [IV] set forth above is adopted, such a duplex-

chamber package exhibits excellent visibility of contents and can reduce, to an extent as low as possible, the possibility of permitting the transfer of mass (materials) such as low molecular weight components contained in constituent materials of the duplex-chamber package to be dissolved out in the content of the package, and thus is especially usable as a medical duplex-chamber container.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0022]** FIG. 1 is a plan view showing an example of a duplex-chamber package of the invention.

**[0023]** FIG. 2 is a sectional view of the duplex-chamber package taken along X-X of FIG. 1.

**[0024]** FIG. 3 is a sectional view of a duplex-chamber package 1' illustrating another example of a duplex-chamber package of the invention.

**[0025]** FIG. 4 is a sectional view of a duplex-chamber package 1" illustrating a further example of a duplex-chamber package of the invention.

#### BEST MODE FOR CARRYING OUT THE INVENTION

**[0026]** The invention is now described in more detail.

**[0027]** FIG. 1 is a plan showing an embodiment of a duplex-chamber package of the invention, FIG. 2 is a sectional view of the duplex-chamber package taken along X-X of FIG. 1, FIG. 3 is a sectional view of a duplex-chamber package 1' illustrating another example of a duplex-chamber package of the invention, and FIG. 4 is a sectional view of a duplex-chamber package 1" illustrating a further example of a duplex-chamber package of the invention.

**[0028]** A duplex-chamber package 1 shown in FIGS. 1 and 2 includes a package 2 and a port 3 provided at part of a periphery of the package 2, and the peripheral portion of the package 2 is sealed at a strongly sealed portion 4. The inside of the package 2 is partitioned into plural chambers 6a, 6b (two chambers) by means of a weakly sealed portion 5.

**[0029]** The package 2 is made up of a first laminated sheet 21 constituted of a heat seal layer 211 and a mass transfer layer 212 laminated on the heat seal layer 211, and a second laminated sheet 22 constituted of a heat seal layer 221 forming an inner wall surface of the package 2, a mass transfer layer 222 laminated on the heat seal layer 221 and a moisture blocking layer 223 containing a metallic component and laminated on the mass transfer layer 222, the laminated sheets 21 and 22 are superimposed each other so that the heat seal layers 211 and 212 face each other and a strongly sealed portion 4 is formed along a peripheral portion.

**[0030]** While forming the strongly sealed portion 4, a port 3 can be appropriately inserted, if necessary, to provide the port 3 in the package 2.

**[0031]** A given position of the package 2 is heated from outside to subject the heat seal layers 211 and 212 to thermal bonding to form the weakly sealed portion 5, thereby forming the duplex-chamber package 1. It will be noted that the conditions of forming the strongly and weakly sealed portions will be described hereinafter. As the heat seal layers 211, 221 used in the package 2, materials also preparing for function as a mass transfer blocking layer can be adopted.

**[0032]** In the duplex-chamber package 1, the communication between the inside and outside of the package 2 is possible through the port 3, so the charge of a content into the duplex-chamber package 1 and the discharge of the content

from the duplex-chamber package 1 are possible through the port 3. It will be noted that the port used is preferably one which is able to block contents after charge in the respective chambers, or can be opened or closed.

**[0033]** In the duplex-chamber package 1, because the chambers 6a and 6b are separated from each other by means of the weakly sealed portion 5 formed by weakly sealing the facing heat seal layers 211 and 221, the communication of the chambers 6a and 6b in use is realized by pressing the chamber 6a or 6b charged with a content therein from outside to break (separate) the weakly sealed portion 5.

**[0034]** Additionally, the duplex-chamber package 1 is formed of the sheets 21 and 22 having specific film arrangements, the possibility of contaminating a content with a mass transfer in the sheets can be reduced to an extent as small as possible.

**[0035]** For the formation of the weakly sealed portion 5, like the duplex-chamber package 1, a given position may be heated as it is from outside of the container, followed by thermocompression of the inner wall surfaces at the position. Alternatively, a tape for weak sealing may be inserted inbetween facing inner wall surfaces and subjected to thermocompression from outside of the container. A duplex-chamber package 1' wherein a weakly sealed portion is formed by a tape 7 for weak sealing being inserted inbetween facing inner wall surfaces and being subjected to thermocompression from outside of a container is shown in FIG. 3. It will be noted that the thermocompression conditions of forming the weakly sealed portion by use of a tape for weak sealing may be the same conditions as for the formation of the strongly sealed portion.

**[0036]** When a tape for weak sealing is used, the heat seal layer 211 made of a material functioning also as a mass transfer blocking layer is replaced by a heat seal layer 211a and a mass transfer blocking layer 211b (both not shown), and the heat seal layer 221 of such a material as set forth hereinbefore is replaced by a heat seal layer 221a and a mass transfer blocking layer 221b (both not shown). This is favorable from the standpoint of further increasing heat seal strength at the peripheral portion of the package 2.

**[0037]** For the formation of the duplex-chamber package of the invention, a plurality of sub-containers having weakly sealed portions may be connected with each other to provide the package. A sectional view of a duplex-chamber 1" wherein a sub-container X and a sub-container Y having a weakly sealed portion, respectively, are mutually connected is shown in FIG. 4.

**[0038]** The sub-container X is made up of a first laminated sheet 21 constituted of a heat seal layer 211 and a mass transfer layer 212 laminated on the heat seal layer 211, and a second laminated sheet 22 constituted of a heat seal layer 221, a mass transfer layer 222 laminated on the heat seal layer 221, and a moisture blocking layer 223 containing a metallic component and laminated on the mass transfer layer 222, the laminated sheets 21 and 22 are superimposed each other so that the heat seal layers 211 and 221 face each other to form a strongly sealed portion along a periphery thereof, and provide a weakly sealed portion 5 at part of facing inner wall surfaces. The weakly sealed portion 5 of this sub-container X is formed by use of a weakly sealing tape 7.

**[0039]** On the other hand, the sub-container Y is formed by superimposing two laminated sheets 22 set forth above each other so that the heat seal layers 221 and 221 face each other

to form a strongly sealed portion along a periphery thereof, and provide a weakly sealed portion 5 at part of facing inner wall surfaces.

**[0040]** The inner wall surface of the sub-container X and an outer wall surface of the sub-container Y are connected at a given position, thereby forming a duplex-chamber package 1" wherein both containers become communicable in the inside thereof by the film peeling at the respective sealed portions.

**[0041]** This duplex-chamber package 1" is formed by connection between the sub-container X and the sub-container Y, so that both containers may be connected after filling contents in individual sub-containers beforehand. More particularly, in case that one of the sub-containers or a content thereof undergoes degradation or change in quality by application of heat, the other sub-container can be thermally sterilized in a state of the sub-container being filled with a content. Accordingly, the variations of a sterilization procedure can be extended, in case of forming the duplex-chamber package, it is favorite to be able to choose an optimum sterilization condition so that containers or contents seldom suffer from a burden.

**[0042]** It is to be noted that the layer arrangements of the laminated sheets 21 and 22 constituting the duplex-chamber packages 1, 1' and 1" of the invention, are not limited to such a two-layered or three-layered arrangement as stated herein-above. In view of required characteristics of a duplex-chamber package and the like, four or more layered arrangements may be adopted. No limitation is placed on the shape of the port 3, and no port 3 may be provided or plural ports may be provided. Moreover, for forming the sub-container Y, although two laminated sheets of the same type have been used above, two laminated sheets of different types may be used with no limitation being placed on arrangements thereof.

**[0043]** The duplex-chamber package of the invention includes: a duplex-chamber package comprising a package comprising a first sheet and a second sheet being superimposed each other with a peripheral portion being sealed, and an inside of the package being partitioned into plural chambers by means of a weakly sealed portion provided at a part of the facing inner wall surfaces of the package, wherein the first sheet and the second sheet are respectively formed of a first laminated sheet (I) and a second laminated sheet (II); and a duplex-chamber package comprising a container (X) and a container (Y) arranged such that a first sheet and a second sheet are superimposed each other with a sealed portion being formed along a peripheral portion of the sheets and a weakly sealed portion being formed at a part of the facing inner wall surfaces of the package, both containers being so connected as to be communicable with each other at the inside thereof when the weakly sealed portions of the respective containers are separated from each other, wherein the connection is formed by means of sealing between the inner wall surface of the container (X) and an outer wall surface of the other container (Y), and the first sheet and the second sheet, at least for the container (X), are respectively formed of a first laminated sheet (I) and a second laminated sheet (II):

**[0044]** (I) a laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer and a mass transfer blocking layer, the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer; and

**[0045]** (II) a laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer

layer, a mass transfer blocking layer and a moisture blocking layer comprising metallic components, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer.

**[0046]** The mass transfer layer used herein means a layer containing a component capable of layer diffusion and movement (e.g. a low molecular weight component). More particularly, examples include a layer containing additives capable of layer diffusion and movement such as an antioxidant, a lubricant, a stabilizer, an UV inhibitor, an anti-blocking agent; a resin material layer wherein unreacted monomer components remain; a layer containing a printed ink; an adhesive layer; an anchor coating layer; and the like.

**[0047]** The heat seal layer is not critical in type and heat seal layers used in ordinary packages can be adopted. From the standpoint of adhesiveness, LLDPE layers are preferred. Particularly, in view of reducing a content of components capable of layer diffusion and movement, an LLDPE layer which is prepared by use of a metallocene catalyst and has a density of not smaller than 0.925 g/cm<sup>3</sup> is favorably employed.

**[0048]** For the moisture-blocking layer comprising a metallic component, any material may be used without limitation so far as gas barrier materials containing a metallic component as a main component are used. Examples include an aluminium foil, aluminium-deposited PET, alumina-deposited PET, silica-deposited PET and the like. The water vapor transmittance of the moisture blocking layer formed of such a metallic component is generally not larger than 1 g/m<sup>2</sup>.24 hours, preferably not larger than 0.5 g/m<sup>2</sup>.24 hours, and more preferably not larger than 0.3 g/m<sup>2</sup>.24 hours in terms of water vapor permeability per unit area (i.e. a value of a measurement which makes use of a flat sheet having the same structure as a package pursuant to JIS Z0208 (cup method) and is carried under conditions of a temperature of 40° C. and a relative humidity of 90%). If the water vapor permeability of the moisture blocking layer comprising a metallic component is larger than 1 g/m<sup>2</sup>.24 hours, a content may absorb moisture to lose activity thereof.

**[0049]** The mass transfer blocking layer used herein means a layer having the function of preventing components which are capable of layer diffusion and movement from diffusing (i.e., a function of preventing, for example, a low molecular weight component diffused from an adjacent layer from dissolving in itself).

**[0050]** For such a mass transfer blocking layer, examples include a layer containing, as a main component, a cyclic polyolefin composition, ethylene vinyl alcohol copolymer, polytetrafluoroethylene (Teflon), ultrahigh molecular weight polyethylene or the like, a layer comprising a metallic component such as an aluminium foil, a PET film, a nylon film and the like. Of these, a layer comprising a cyclic polyolefin composition as a main component is preferred from the standpoint of transparency and processability or in view of the ease in forming a weakly sealed portion for composing a duplex-chamber container.

**[0051]** It will be noted that the term "containing as a main component" used herein means that the content of such a cyclic polyolefin composition, ethylene vinyl alcohol copolymer, Teflon or ultrahigh molecular weight polyethylene based on the total of individual components of the layer is generally not smaller than 50% (wt % herein and whenever it appears hereinafter), preferably not smaller than 60%, more preferably not smaller than 70% and most preferably 100%.

**[0052]** The layer containing, as a main component, such a cyclic polyolefin composition relatively contributes to good water vapor barrier properties as a resin, thereby also contributes to reduction of a water vapor permeability of a duplex-chamber package of the invention as a whole. In some cases, this layer may be adopted as a moisture blocking layer set forth hereinabove.

**[0053]** Moreover, the layer containing, as a main component, the cyclic polyolefin composition like the above mentioned is relatively low interaction as a resin with low molecular weight components, so it is unlikely to adsorb effective components of a content. Thus, the use of the layer as an innermost layer of the duplex-chamber package of the invention is favorable because of no compositional change of the content.

**[0054]** The cyclic polyolefin composition should preferably be one which includes the following components (A) and (B):

**[0055]** (A) a cyclic polyolefin having a glass transition temperature of lower than 100° C.; and

**[0056]** (B) a cyclic polyolefin having a glass transition temperature of not lower than 100° C.

**[0057]** The cyclic polyolefin composition including the components (A) and (B) exhibits good heat sealability (which means a wide temperature range within which heat sealing is possible) and can be adopted as a main component of such a heat seal layer as set forth hereinabove.

**[0058]** Although the mixing ratio between the components (A) and (B) is not critical, the mixing ratio (ratio by weight) of component (A)/component (B) is generally at 2/98 to 70/30, preferably 5/95 to 65/35. If the mixing amount of component (A) is too large, a satisfactory heat resistance cannot be kept upon sterilization, with the possibility that the resulting container is deformed. On the other hand, when the amount is too small, the range of the temperature to make the weak sealing cannot be secured enough.

**[0059]** The glass transition temperature of the component (A) is generally lower than 100° C., preferably 95° C. or below, and more preferably 90° C. or below. The glass transition temperature of the component (B) is generally 100° C. or over, preferably 115° C. or over, and more preferably 120° C. or over.

**[0060]** The difference between the glass transition temperature of the component (A) and the glass transition temperature of the component (B) is not critical and is generally 20° C. or over, preferably 25° C. or over and more preferably 30° C. or over. If the temperature difference between the glass transition temperature of the component (A) and the glass transition temperature of the component (B) is smaller than 20° C., a satisfactory weakly sealing temperature range cannot be obtained, and a sealing temperature becomes as high as 220° C. or over, so that a stable weak sealing might not be obtained.

**[0061]** The components (A) and (B) are ones obtained by polymerizing monomer compositions including cyclic olefin monomers.

**[0062]** A cyclic olefin having a norbornene ring can be used as the cyclic olefin monomer, and a multi ring cyclic olefin (hereinafter, it might be described as a norbornene monomer) more than two rings or three rings of substitution and unsubstitution that has the norbornene ring is preferably used as the cyclic olefin.

**[0063]** More particularly, examples include two rings cyclo-olefins such as norbornene, norbornadiene, methylnor-

bornene, dimethylnorbornene, ethylnorbornene, chlorinated norbornene, chloromethylnorbornene, trimethylsilylnorbornene, phenylnorbornene, cyanonorbornene, dicyanonorbornene, methoxycarbonylnorbornene, pyridylnorbornene, nadic acid anhydride, and nadic acid imide; three rings cyclo-olefins such as dicyclopentadiene, dihydrodicyclopentadiene, and alkyl, alkenyl, alkylidene and aryl-substituted products thereof; four rings cyclo-olefins such as dimethanohexahydronaphthalene, dimethanooctahydronaphthalene, and alkyl, alkenyl, alkylidene and aryl-substituted products thereof; five rings cyclo-olefins such as tricyclopentadiene; and six rings cyclo-olefins such as hexacycloheptadecene. Additionally, there may also be used dinorbornene, compounds wherein two norbornene rings are bonded with a hydrocarbon chain or an ester group, and compounds containing a norbornene ring such as an alkyl or aryl substituted product of the above-indicated compound.

**[0064]** These norbornene monomers may be used singly or in combination of two or more. If two or more are used in combination, monomers capable of producing thermoplastic resins and monomers capable of producing thermosetting resins are appropriately used in combination, thereby producing cyclic polyolefins having different physical properties. Moreover, the use of a plurality of monomers in combination is preferable because a range of dealing with the monomers as a liquid is extended owing to the descent of freezing point. Single ring cyclo-olefins such as cyclobutene, cyclopentene, cyclooctene, cyclododecene and the like and derivatives thereof having substituents may be copolymerized with these norbornene monomers.

**[0065]** In the practice of the invention, the use of polar group-free monomers alone is preferred as the norbornene monomers producing the components (A) and (B) from the standpoint of reducing the interaction with low molecular weight components and also of reducing a water vapor permeability. However, polar monomers may be partly used in combination within a range not impeding the purposes of the invention. For such polar monomers, examples include substituted products of the norbornene monomers into which a halogen group such as chlorine, bromine or an ester group is introduced. The ratio of the polar monomer to the total of the norbornene monomers producing the components (A) and (B) is generally at 30 mol % or below. Over 30 mol %, the resulting polymer may lower in water vapor permeability or may be impeded with respect to the function of blocking the transfer of mass (materials).

**[0066]** Moreover, other types of monomers may be used together as a starting material for the components (A) and (B) within a range not impeding the purpose of the invention.

**[0067]** Other types of monomers include  $\alpha$ -olefins having two or more carbon atoms and more particularly, examples include ethylene, propylene, 1-butene, 1-pentene, 1-hexene, 3-methyl-1-butene, 3-methyl-1-pentene, 3-ethyl-1-pentene, 4-methyl-1-pentene, 4-methyl-1-hexene, 4,4-dimethyl-1-hexene, 4,4-dimethyl-1-pentene, 4-ethyl-1-hexene, 3-ethyl-1-hexene, 1-octene, 1-decene, 1-dodecene, 1-tetradecene, 1-hexadecene, 1-octadecene, 1-eicosene and the like. These may be used singly or in combination. Of these, ethylene or propylene is preferred and ethylene is more preferred.

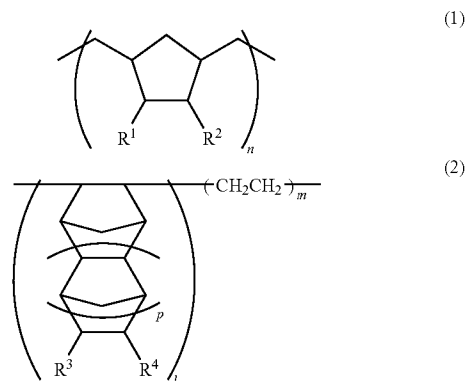
**[0068]** In the above-mentioned monomer composition, the mixing ratio (ratio by weight) which the cyclic olefin monomer is divided by the other types of monomer is not critical and is generally at 98/2 to 30/70, preferably 95/5 to 40/60. If the mixing quantity of the cyclic olefin monomer is too large,

satisfactory sealability may not be obtained in some case, on the other hand, it is too small, non-adsorptivity may be ruined in some case.

**[0069]** It will be noted that for a polymerization method or mechanism of a plurality of monomers used in combination, known methods are usable. Copolymerization may be effected after formulation of monomers, or block copolymerization may be effected by formulation subsequent to polymerization to an extent. In addition, either ring-opening polymerization or addition polymerization may be carried out.

**[0070]** Specific structures of the cyclic polyolefins include polymers having structural units represented by the following general formulae (1) and (2).

[Chemical Formula 1]



(wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are independently same or different organic group having 1 to 20 carbon atoms and may form a ring,  $m$  or  $p$  is 0 or an integer of 1 or more, and  $l$  and  $n$  are an integer of 1 or more).

**[0071]** Specific examples of the organic group having 1 to 20 carbon atoms include alkyl groups such as methyl, ethyl, n-propyl, i-propyl, n-butyl, i-butyl, sec-butyl, t-butyl, i-pentyl, t-pentyl, n-hexyl, n-heptyl, n-octyl, t-octyl (1,1-dimethyl-3,3-dimethylbutyl), 2-ethylhexyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, nanodecyl, and icosyl; cycloalkyl groups such as cyclopentyl, cyclohexyl, cycloheptyl, and cyclooctyl; alkylcycloalkyl groups such as 1-methylcyclopentyl, 1-methylcyclohexyl, and 1-methyl-4-1-cyclohexyl; alkenyl groups such as allyl, propenyl, butenyl, 2-butenyl, hexenyl, and cyclohexenyl; aryl groups such as phenyl group, naphthyl group, methylphenyl group, methoxyphenyl group, biphenyl group, phenoxyphenyl group, chlorophenyl group, and sulfophenyl group; and aralkyl groups such as benzyl group, 2-phenylethyl group, (phenethyl group),  $\alpha$ -methylbenzyl group, and  $\alpha,\alpha$ -dimethylbenzyl group; although not limited thereto. These may be used singly or in combination of two or more.

**[0072]** These cyclic polyolefins are appropriately controlled as having appropriate glass transition temperatures by controlling the values of  $l$ ,  $m$ ,  $n$  and  $p$  in the above general formulas (1) and (2), the molecular weight of the cyclic polyolefins represented by the general formulae (1) and (2), and using cyclic olefin monomers in combination.

**[0073]** For the cyclic polyolefins represented by the general formula (1), commercially available products can be used,

and, for example, ZEONEX® and ZEONOR®, made by Zeon Corporation are conveniently usable.

**[0074]** For the cyclic polyolefins represented by the general formula (2), commercially available products can be used, for example, APL® made by Mitsui Chemicals, Inc. and TOPAS® made by Ticona are conveniently usable.

**[0075]** When plural types of cyclic polyolefins are used in combination in accordance with the invention, the manner of formulation is not critical, for which there can be ordinarily used known single-screw or double-screw melt mixing extruders or static melt mixing machines.

**[0076]** The cyclic polyolefin composition may further include, if necessary, various types of additives such as, for example, pigments, dispersants, antioxidants, UV absorbers, light stabilizers, inorganic fillers and the like within ranges of amount not impeding the purpose of the invention.

**[0077]** From the standpoint of enhancing visibility of a content, the laminated sheet (I) has a total light transmittance in a normal direction of the sheet surface being not lower than 70%, preferably not lower than 80% and more preferably not lower than 85% when measured pursuant to JIS-K7105.

**[0078]** It is preferred that the laminated sheet (I) further includes a transparent moisture blocking layer therein from the standpoint of storage of a content and foreign body inspection in a post-processing.

**[0079]** For such a transparent moisture blocking layer includes a layer which is obtained by depositing silica, alumina or carbon or coating polyvinylidene chloride (saran coating) on a sheet made of a polyester resin such as PET, PEN or a polyamide resin such as nylon 6, 6, ethylene-vinyl alcohol copolymer, polyvinyl alcohol copolymer, or a polyolefin resin, and a layer made of a saran resin and polyvinyl alcohol copolymer.

**[0080]** It will be noted that the water vapor permeability of the laminated sheet (I) as a whole, which is expressed in terms of water vapor permeability per unit area (i.e. a value measured by use of a flat sheet having the same structure as a package under conditions of a temperature of 40° C. and a relative humidity of 90% pursuant to JIS Z0208 (cup method)) is generally at 1.0 g/m<sup>2</sup>.24 hours or below, preferably 0.8 g/m<sup>2</sup>.24 hours or below, and more preferably 0.5 g/m<sup>2</sup>.24 hours or below. If the water vapor permeability of the laminated sheet (I) as a whole exceeds 1.0 g/m<sup>2</sup>.24 hours, the activity or potency of a content may lower in some case.

**[0081]** The laminated sheets (I) and (II) comprise respectively a plurality of laminated layers and a mass transfer blocking layer is interposed between a heat seal layer and a mass transfer layer as stated hereinbefore. For the lamination, known procedures may be used, and dry lamination, melt lamination (sand lamination) and the like methods can be adopted.

**[0082]** For the lamination of a mass transfer layer and a mass transfer blocking layer, it is preferred from the standpoint of reducing migration of components that the mass transfer layer and the mass transfer blocking layer are laminated through an adhesive resin.

**[0083]** In the duplex-chamber package of the invention, the other layers except the heat seal layer, mass transfer layer, mass transfer blocking layer and moisture blocking layer comprising metallic components are not critical, and the layers formed by use of materials such as known thermoplastic resins, thermosetting resins, metals, ceramics and the like may be appropriately adopted. Among them, a thermoplastic resin is preferably used from the standpoint of processability.

Especially, from the standpoints of production costs, visibility of a content and protection of a content from deterioration, there may be appropriately used, in combination, layers formed of polyolefins such as polyethylene, polypropylene and the like, polyesters such as polyethylene terephthalate, polybutylene terephthalate and the like, polyamides such as nylons and the like, polyurethanes, ethylene-vinyl alcohol copolymers, polyvinylidene chloride, polyacrylonitrile, polyvinyl alcohol, elastomers obtained by one-stage or multistage polymerization thereof.

**[0084]** For the manufacture of the duplex-chamber package of the invention, known methods can be adopted. For instance, extrusion is carried out through a single-layer or multilayer T die or circular die, and the resulting flat sheet, tubular sheet, parison or the like is appropriately subjected to a thermofforming, blowing, stretching, cutting or fusing technique for processing to a specific shape or form.

**[0085]** The duplex-chamber package of the invention is partitioned in the inside thereof by means of a weakly sealed portion. For the formation of such a sealed portion, seal strength should preferably be at a level at which breakage is unlikely to occur at the time of manufacture or transportation and at which permits easy breakage by hand or a tool at the time of use (or at the time of mixing) (i.e. seal strength of a sample along a direction of MD pursuant to JIS Z 0238 (180° peeling strength) is generally at 0.5 N/15 mm or more, preferably 0.8 N/15 mm or more with its upper limit being generally at 8 N/15 mm or lower, preferably 5 N/15 mm or lower). The weakly sealed portion of the duplex-chamber package of the invention is formed by thermocompression between the facing inner wall surfaces at a part thereof from outside of the container. In order to achieve such seal strength as set forth above, the temperature, pressure and time conditions for the thermocompression should be appropriately controlled.

**[0086]** For the formation of the weakly sealed portion, although sealing conditions are not limited to specific ones, a thermocompression temperature generally ranges 120 to 220° C., preferably 140 to 200° C., a thermocompression pressure generally ranges 1 to 4 kg/cm<sup>2</sup>, preferably 2 to 3 kg/cm<sup>2</sup>, and a thermocompression time generally ranges 1 to 6 seconds, preferably 2 to 4 seconds. When the seal conditions are out of the above ranges, the weakly sealed portion may not be adequately formed or an appearance of the sealed portion may become poor or the productivity may become poor. The seal width of the weakly sealed portion is generally 2 to 10 mm.

**[0087]** It will be noted that the number of accommodation chambers of the duplex-chamber package of the invention is determined by the number of the weakly sealed portions and is not critical, and is generally at 2 to 5.

**[0088]** In the practice of the invention, it is also preferred for the formation of the weakly sealed portion that a tape including a heat-sealable layer at least as a surface layer is inserted inbetween the facing inner wall surfaces, then the inserted portion is subjected to thermocompression from outside of the package. Such a layer arrangement may have a single layer or plural layers.

**[0089]** For a constituent component of the heat-sealable layer, such cyclic polyolefins as set forth hereinbefore can be preferably used, and other types of thermoplastic resins such as, for example, polyethylene, polypropylene or the like may be used in combination. It will be noted that the tape should preferably contain, at least at one side thereof, a resin com-

monly employed in the heat seal layer of (I) and/or (II) as a constituent component of the heat-sealable layer.

**[0090]** The formation of such a weakly sealed portion enables easy peel strength to be more reliably and stably imparted thereto, enables a seal temperature range of the weakly sealed portion to be well extended, and thereby ensures advantageous manufacture of a duplex-chamber package. It is to be noted that the conditions of forming the weakly sealed portion using the tape may be those conditions similar to the following strongly sealed portion-forming conditions.

**[0091]** In the duplex-chamber package of the invention, the conditions of forming a strongly sealed portion (peripheral sealed portion) are not critical. When the sealing is carried out by thermocompression like the above case, an appropriate sealing conditions are set so as to impart a seal strength at a level of not permitting easy breakage (i.e. the seal strength of a sample along an MD direction pursuant to JIS Z 0238 (180° peel strength) is generally at 15 N/15 mm or more, preferably at 20 N/15 mm or more). More particularly, the thermocompression conditions include, for example, a thermocompression temperature of 150 to 260° C., preferably 180 to 230° C., a thermocompression pressure of 1 to 6 kg/cm<sup>2</sup>, preferably 2 to 5 kg/cm<sup>2</sup>, and a thermocompression time of 1 to 6 seconds, preferably 2 to 4 seconds. When the seal conditions are out of the above ranges, the peripheral seal may not be adequately formed or an appearance of a seal portion may become poor or the productivity may become poor. The seal width of the peripheral sealed portion is generally at 2 to 30 mm.

**[0092]** Herein the strongly sealed portion-forming conditions can be appropriately adopted in such a way that the strongly sealed portion-forming temperature is higher than the weakly sealed portion-forming temperature, the strongly sealed portion-forming pressure is higher than the weakly sealed portion-forming pressure, and the strongly sealed portion-forming time is longer than the weakly sealed portion forming time.

**[0093]** The sealing method for manufacturing a duplex-chamber package is not critical and a more preferred one is possible using, aside from the thermocompression sealing, high frequency sealing and ultrasonic sealing singly or in combination. Especially, high frequency seal enables sealing and cooling to be carried out simultaneously at one sealing cycle and is advantageous in case of sealing at high temperatures of 200° C. or more, or in case of sealing with a port or in case of a stable formation of a weakly sealed portion.

**[0094]** When contents which have to be sterilized are accommodated in the duplex-chamber package of the invention, the duplex-chamber package should have a resistance to heat, or a container heat resistance tested pursuant to the 14th revision of the Japanese Pharmacopoeia is 110° C. or more so as to stably sterilize the content in the accommodated condition by application of heat and especially, to subject to high pressure steam sterilization treatment. In order to permit such characteristics of the duplex-chamber of the invention as stated above to be developed, the thermocompression conditions and the types of materials for an outer wall surface and an intermediate layer should be appropriately selected.

**[0095]** When an inner wall surface of the duplex-chamber package of the invention is formed of such a cyclic polyolefin as set forth hereinbefore, trace elements or ions thereof, such as manganese, iron, zinc, copper and iodine which would be adsorbed on a conventional inner wall surface formed of a conventional linear polyolefin such as polyethylene,

polypropylene or the like, or various types of vitamins such as vitamin A, vitamin B's, vitamin C, vitamin E, isosorbit nitrate, nitroglycerine and the like used as a content are not adsorbed on the inner wall surfaces. Accordingly, such a package is especially suited for storage and use of various types of nutrient preparations containing these ingredients as an effective component, e.g. amino acid preparations, sugar preparations, protein and amino acid preparations, vitamin preparations, inorganic preparations and appropriate mixed preparations of these nutritive components (nutrients) and is preferred as a medical duplex-chamber container.

**[0096]** It will be noted that the content charged in the duplex-chamber package of the invention is not limited to those mentioned above, and the duplex-chamber package is suitably used for charging water, aqueous solutions, powders or the like. The duplex-chamber package of the invention has a low water vapor permeability and has a preferably excellent visibility of a content, so when a dry condition has to be kept or when a plurality of components need to be completely mixed, the work can be performed while confirming the degree of mixing. Thus, the duplex-chamber package of the invention is advantageous in comparison with conventional duplex-chamber containers.

**[0097]** Examples and comparative Examples are shown below to illustrate the invention and the invention should not be construed as limited thereto.

## EXAMPLES

### Example 1

**[0098]** After dry lamination of a 12  $\mu\text{m}$  thick alumina-deposited polyethylene terephthalate (GL film, made by Toppan Printing Co., Ltd.) film to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), dry lamination was carried out by inserting a preliminarily formed three-layered sheet of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), a 20  $\mu\text{m}$  thick cyclic polyolefin (ZENOR<sup>®</sup>, made by Zeon Corporation) and a 30  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) on the other surface of the polyethylene terephthalate film (an ester, made by Toyobo Co., Ltd.) as an adhesive resin, thereby providing a multi-layered sheet (I-1).

**[0099]** This multi-layered sheet (I-1) was one including the innermost layer of the 30  $\mu\text{m}$  linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), the adjacent second layer of the 20  $\mu\text{m}$  cyclic polyolefin (ZENOR<sup>®</sup>, made by Zeon Corporation), the third layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), the fourth layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) serving as an adhesive resin, the fifth layer of the 12  $\mu\text{m}$  polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.), and the sixth layer of the 12  $\mu\text{m}$  thick alumina-deposited polyethylene terephthalate film (GL film, made by Toppan Printing Co., Ltd.).

**[0100]** Further, after dry lamination of a 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.) to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo

Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), sand lamination was carried out by inserting a preliminarily formed three-layered sheet of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), a 20  $\mu\text{m}$  thick cyclic polyolefin (ZENOR<sup>®</sup>, made by Zeon Corporation) and a 30  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, Nippon Polyethylene Co., Ltd.) on the other surface of the aluminium foil as an adhesive resin, thereby providing a multi-layered sheet (II-1).

**[0101]** This multi-layered sheet (II-1) was one including the innermost layer of the 30  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), the adjacent second layer of the 20  $\mu\text{m}$  thick cyclic polyolefin (ZENOR<sup>®</sup>, made by Zeon Corporation), the third layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), the fourth layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) serving as an adhesive resin, the fifth layer of the 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.), and the sixth layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate film.

**[0102]** The multi-layered sheet (I-1) and multi-layered sheet (II-1) made in this manner were so superposed that the innermost layers were turned inside and were facing each other and heat sealed to provide a three sides sealed pouch, followed by placing 100 ml of distilled water and subjecting to a storage test at 70° C. after 24 hours, revealing that little transfer of adhesive-derived components (monomers or multimers including dimers or higher oligomers such as acids and alcohols derived from the polyester) was recognized. The analysis of the adhesive-derived substances was carried out by concentrating and evaporating to dryness 100 ml of extracted water, dissolving in dichloromethane and analyzing with a gas chromatography equipment attached with a hydrogen flame ionization detector. (column: capillary column).

**[0103]** A 70  $\mu\text{m}$  thick melt blend film of linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) and polypropylene (made by Japan Polychem Corporation) at a blending ratio of 70:30 respectively were inserted inbetween the facing innermost layers of the multi-layered sheets (I-1) and (II-1) and sealed, with which a weakly sealed portion (peel strength 2 N/15 mm in width) could be formed at part of the container.

### Example 2

**[0104]** A multi-layered sheet (I-2) was made in the same manner as in (I-1) of Example 1, and another multi-layered sheet (II-2) was made in such a way that after dry lamination of a 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.) to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), dry lamination was carried out by inserting a preliminarily formed, 40  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) film, simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) on the other surface of the aluminium foil as an adhesive resin.

**[0105]** This multi-layered sheet (II-2) was one including the innermost layer of the 40  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation), the adjacent second layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) serving as an adhesive resin, the third layer of the 9  $\mu\text{m}$  thick aluminium (made by Nippon Foil Mfg. Co., Ltd.) and the fourth layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate.

**[0106]** The multi-layered sheet (I-2) and the multi-layered sheet (II-2), both formed in this way, were heat sealed in such a way that the innermost layers were turned inside in face-to-face relation to provide a pouch as in Example 1, followed by a similar test, with the result that it was confirmed that little transfer of adhesive-derived components (monomers and multimers including dimers and higher oligomers, derived from the polyester) to the liquid content was recognized.

#### Example 3

**[0107]** After dry lamination of a 60  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, Japan Polyethylene Co., Ltd.) film to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), sand lamination was carried out by inserting a preliminarily formed two-layered sheet of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) and a 30  $\mu\text{m}$  thick cyclic polyolefin (ZENOR®, made by Zeon Corporation), simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) on the other surface of the polyethylene terephthalate as an adhesive resin, thereby providing a multi-layered sheet (I-3).

**[0108]** This multi-layered sheet (I-3) was one including the innermost layer of the 30  $\mu\text{m}$  thick cyclic polyolefin (ZENOR®, made by Zeon Corporation), the adjacent second layer of the  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation), the third layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) serving as an adhesive resin, the fourth layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.), and the fifth layer of the 60  $\mu\text{m}$  thick linear low density polyethylene film (Harmorex®, made by Japan Polyethylene Corporation).

**[0109]** Further, after dry lamination of a 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.) to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), sand lamination was carried out by inserting a preliminarily formed two-layered sheet of a 30  $\mu\text{m}$  thick cyclic polyolefin (ZENOR®, made by Zeon Corporation) and a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation), simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, Nippon Polyethylene Co., Ltd.) on the other surface of the aluminium foil as an adhesive resin, thereby providing a multi-layered sheet (II-3).

**[0110]** This multi-layered sheet (II-3) was one including the innermost layer of the 30  $\mu\text{m}$  thick cyclic polyolefin (ZENOR®, made by Zeon Corporation), the adjacent second layer of the  $\mu\text{m}$  thick linear low density polyethylene (Har-

morex®, made by Japan Polyethylene Corporation), the third layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) serving as an adhesive layer, the fourth layer of the 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.), and the fifth layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate film.

**[0111]** The multi-layered sheet (I-3) and the multi-layered sheet (II-3) made in this manner were so superposed that the innermost layers were turned inside and were facing each other and heat sealed to provide a pouch in the same manner as in Example 1 and to carry out the test in the same manner as in Example 1, revealing that little transfer of adhesive-derived components (polyester-derived monomers and multimers including dimers and higher oligomers) to a liquid content was recognized.

**[0112]** A 70  $\mu\text{m}$  thick melt blend film of a cyclic polyolefin (ZENOR®, made by Zeon Corporation) and linear low density polyethylene (Moretech®, made by Idemitsu Petrochemical Co., Ltd.) at a blending ratio of 70:30 were inserted inbetween the facing innermost layers of the multi-layered sheets (I-3) and (II-3) and sealed, with which a weakly sealed portion (peel strength 2.2 N/15 mm in width) could be formed at part of the container.

#### Example 4

**[0113]** After printing (using a two-part curing ink, made by Dainichiseika Color & Chemicals Mfg. Co., Ltd.) on a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.), sand lamination was carried out by inserting a preliminarily formed two-layered sheet of a 30  $\mu\text{m}$  thick cyclic polyolefin (ZENOR®, made by Zeon Corporation) and a 40  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation), simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) on the printed face, thereby providing a multi-layered sheet (I-4).

**[0114]** This multi-layered sheet (I-4) was one including the innermost layer of the 40  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan polyethylene Corporation), the adjacent second layer of the 30  $\mu\text{m}$  thick cyclic polyolefin (ZENOR®, made by Zeon Corporation), the third layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) serving as an adhesive resin, and the fourth layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate.

**[0115]** After dry lamination of a 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.) to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), a 60  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation) was melt extruded on the other surface of the aluminium foil to provide a multi-layered sheet (II-4).

**[0116]** This multi-layered sheet (II-4) was one including the innermost layer of the 60  $\mu\text{m}$  thick linear low density polyethylene (Harmorex®, made by Japan Polyethylene Corporation), the adjacent second layer of the 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.) and the third layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate.

**[0117]** After formation of a pouch in the same manner as in Example 1 by heat sealing the thus obtained multi-layered sheet (I-4) and the multi-layered (II-4) so that the innermost

layers were turned inside in face-to-face relation with each other, a test was carried out in the same manner as in Example 1, with the result that little transfer of the adhesive-derived components (polyester-derived monomers and multimers including dimers and higher oligomers) to a liquid content was recognized.

#### Example 5

**[0118]** One multi-layered sheet (I-5) was made in the same manner as in (I-4) of Example 4, and another multi-layered sheet (II-5) was made such that after dry lamination of a 12  $\mu\text{m}$  thick aluminium-deposited polyethylene terephthalate film to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), sand lamination was carried out by inserting a preliminarily formed 50  $\mu\text{m}$  thick sheet of a melt blend of a cyclic polyolefin (ZENOR<sup>®</sup>, made by Zeon Corporation) and a linear low density polyethylene (Moretech<sup>®</sup>, made by Idemitsu Petrochemical Co., Ltd.) at a ratio of 70:30, simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, Nippon Polyethylene Co., Ltd.) on the other surface of the polyethylene terephthalate film (an ester, made by Toyobo Co., Ltd.) as an adhesive resin.

**[0119]** This multi-layered sheet (II-5) was one including the innermost layer of the 50  $\mu\text{m}$  thick sheet including the cyclic polyolefin (ZENOR<sup>®</sup>, made by Zeon Corporation) and the linear low density polyethylene (Moretech<sup>®</sup>, made by Idemitsu Petrochemical Co., Ltd.) at a ratio of 70:30, the adjacent second layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), the third layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) and the fourth layer of the 12  $\mu\text{m}$  thick alumina-deposited polyethylene terephthalate film (GL film, made by Toppan Printing Co., Ltd.).

**[0120]** The multi-layered sheet (I-5) and the multi-layered sheet (II-5) were so superposed that the innermost layers were turned inside and were facing each other and heat sealed to provide a pouch in the same manner as in Example 1. Thereafter, a test was carried out in the same manner as in Example 1, with the result that little transfer of adhesive-derived components (polyester-derived monomers and multimers including dimers and higher oligomers) to a liquid content was recognized. In addition, a weakly sealed portion (peel strength: 3.5 N/15 mm in width) could be formed at part of the container.

#### Example 6

**[0121]** After dry lamination of a 60  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, Japan Polyethylene Co., Ltd.) film to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), sand lamination was carried out by inserting a preliminarily formed two-layered sheet of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) and a 30  $\mu\text{m}$  thick cyclic polyolefin (melt blend of ZENOR<sup>®</sup> having Tg of 136° C. and ZENOR<sup>®</sup> having Tg of 75° C. at a ratio of 9:1, made by Zeon Corporation), simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>,

made by Japan Polyethylene Corporation) on the other surface of the polyethylene terephthalate as an adhesive resin, thereby providing a multi-layered sheet (I-6).

**[0122]** This multi-layered sheet (I-6) was one including the innermost layer of the 30  $\mu\text{m}$  thick cyclic polyolefin (melt blend of ZENOR<sup>®</sup> having Tg of 136° C. and ZENOR<sup>®</sup> having Tg of 75° C. at a ratio of 9:1, made by Zeon Corporation), the adjacent second layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), the third layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) serving as an adhesive resin, the fourth layer of the 20  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.), and the fifth layer of the 60  $\mu\text{m}$  thick linear low density polyethylene film (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation).

**[0123]** Another multi-layered sheet (II-6) was made in such a way that after dry lamination of a 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.) to a 12  $\mu\text{m}$  thick polyethylene terephthalate (an ester, made by Toyobo Co., Ltd.) by use of a two-part curing adhesive (polyester-urethane/isocyanate adhesive, made by Mitsui Takeda Chemicals Inc.), sand lamination was carried out by inserting a preliminarily formed two-layered sheet of a 30  $\mu\text{m}$  thick cyclic polyolefin (a melt blend of ZENOR<sup>®</sup> having Tg of 136° C. and ZENOR<sup>®</sup> having Tg of 75° C. at a ratio of 9:1, made by Zeon Corporation) and a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), simultaneously with melt extrusion of a 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, Nippon Polyethylene Co., Ltd.) on the other surface of the aluminium foil as an adhesive resin.

**[0124]** This multi-layered sheet (II-6) was one including the innermost layer of the 30  $\mu\text{m}$  thick cyclic polyolefin (a melt blend of ZENOR<sup>®</sup> having Tg of 136° C. and ZENOR<sup>®</sup> having Tg of 75° C. at a ratio of 9:1, made by Zeon Corporation), the adjacent second layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation), the third layer of the 20  $\mu\text{m}$  thick linear low density polyethylene (Harmorex<sup>®</sup>, made by Japan Polyethylene Corporation) serving as an adhesive layer, the fourth layer of the 9  $\mu\text{m}$  thick aluminium foil (made by Nippon Foil Mfg. Co., Ltd.), and the fifth layer of the 12  $\mu\text{m}$  thick polyethylene terephthalate film.

**[0125]** The multi-layered sheet (I-6) and the multi-layered sheet (II-6) made in this manner were so heat sealed that the innermost layers were turned inside and were facing each other to provide a pouch in the same manner as in Example 1, followed by testing in the same manner as in Example 1. As a result, little transfer of adhesive-derived components (polyester-derived monomers and multimers including dimers and higher oligomers) to a liquid content was recognized. In addition, a weakly sealed portion (peel strength: 3.0 N/15 mm in width) could be formed at part of the container.

1. A duplex-chamber package comprising a package comprising a first sheet and a second sheet being superimposed each other with a peripheral portion of the sheets being sealed, and an inside of the package being partitioned into plural chambers by means of a weakly sealed portion provided at a part of the facing inner wall surfaces of the package, wherein the first sheet and the second sheet are respectively formed of a first laminated sheet (I) and a second laminated sheet (II):

- (I) a laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer and a mass transfer blocking layer, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer; and
  - (II) a laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer, a mass transfer blocking layer and a moisture blocking layer comprising metallic components, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer.
2. A duplex-chamber package comprising a container (X) and a container (Y) formed respectively such that a first sheet and a second sheet are superimposed each other with a sealed portion being formed along a peripheral portion of the sheets and a weakly sealed portion being formed at a part of the facing inner wall surfaces of the package, both containers being so connected as to be communicable with each other at the insides thereof when the weakly sealed portions of the respective containers are separated from each other, wherein the connection is formed by means of sealing between the inner wall surface of the container (X) and the outer wall surface of the other container (Y), and the first sheet and the second sheet, at least for the container (X), are respectively formed of a first laminated sheet (I) and a second laminated sheet (II):
- (I) a laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer and a mass transfer blocking layer, the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer; and
  - (II) a laminated sheet comprising a heat seal layer forming the inner wall surface of the package, a mass transfer layer, a mass transfer blocking layer and a moisture blocking layer comprising metallic components, and the mass transfer blocking layer being interposed between the heat seal layer and the mass transfer layer.
3. The duplex-chamber package according to claim 1, wherein the laminated sheet (I) further comprising a moisture blocking layer.
4. The duplex-chamber package according to claim 2, wherein the laminated sheet (I) further comprising a moisture blocking layer.
5. The duplex-chamber package according to claim 1, wherein a total light transmittance in a normal direction of the surface of said laminated sheet (I) is not lower than 70%.
6. The duplex-chamber package according to claim 2, wherein a total light transmittance in a normal direction of the surface of said laminated sheet (I) is not lower than 70%.
7. The duplex-chamber package according to claim 1, wherein said mass transfer layer and said mass transfer blocking layer are bonded with an adhesive resin.
8. The duplex-chamber package according to claim 2, wherein said mass transfer layer and said mass transfer blocking layer are bonded with an adhesive resin.
9. The duplex-chamber package according to claim 1, wherein said mass transfer blocking layer and/or said heat seal layer comprise(s) a cyclic polyolefin composition as a main component.

10. The duplex-chamber package according to claim 2, wherein said mass transfer blocking layer and/or said heat seal layer comprise(s) a cyclic polyolefin composition as a main component.
11. The duplex-chamber package according to claim 1, wherein said mass transfer blocking layer and/or said heat seal layer comprise(s) polytetrafluoroethylene and/or ultra-high molecular weight polyethylene as a main component.
12. The duplex-chamber package according to claim 2, wherein said mass transfer blocking layer and/or said heat seal layer comprise(s) polytetrafluoroethylene and/or ultra-high molecular weight polyethylene as a main component.
13. The duplex-chamber package according to claim 6, wherein said cyclic polyolefin composition comprises the following components (A) and (B):
- (A) a cyclic polyolefin having a glass transition temperature of lower than 100° C.; and
  - (B) a cyclic polyolefin having a glass transition temperature of not lower than 100° C.
14. The duplex-chamber package according to claim 7, wherein said cyclic polyolefin composition comprises the following components (A) and (B):
- (A) a cyclic polyolefin having a glass transition temperature of lower than 100° C.; and
  - (B) a cyclic polyolefin having a glass transition temperature of not lower than 100° C.
15. The duplex-chamber package according to claim 1, wherein said weakly sealed portion is formed by thermocompression bonding, from outside of the package, the facing inner wall surfaces of the package.
16. The duplex-chamber package according to claim 2, wherein said weakly sealed portion is formed by thermocompression bonding, from outside of the package, the facing inner wall surfaces of the package.
17. The duplex-chamber package according to claim 1, wherein said weakly sealed portion is formed by inserting a tape between the facing inner wall surfaces of the package, and then subjecting the inserted portion to thermocompression bonding from outside of the package, said tape comprises at least a surface layer containing the following component (A) and/or (B):
- (A) a cyclic polyolefin having a glass transition temperature of lower than 100° C.; and
  - (B) a cyclic polyolefin having a glass transition temperature of not lower than 100° C.
18. The duplex-chamber package according to claim 2, wherein said weakly sealed portion is formed by inserting a tape between the facing inner wall surfaces of the package, and then subjecting the inserted portion to thermocompression bonding from outside of the package, said tape comprises at least a surface layer containing the following component (A) and/or (B):
- (A) a cyclic polyolefin having a glass transition temperature of lower than 100° C.; and
  - (B) a cyclic polyolefin having a glass transition temperature of not lower than 100° C.
19. The duplex-chamber package according to claim 1, wherein said duplex-chamber container is in medical use.
20. The duplex-chamber package according to claim 2, wherein said duplex-chamber container is in medical use.

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