

DESCRIPTION

HOUSING CASE FOR PLATE-SHAPED OBJECTS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a housing case for plate-shaped objects.

2. Description of the Related Art

In the case when precision products such as polarizing films are packaged, the packaging needs to be made so that at the time of transportation, the polarizing films are less susceptible to rattling and impacts.

Conventionally, when the polarizing films are packaged, the following packaging method shown in FIG. 27 has been used.

(1) A plurality of film laminated bodies 1 as plate-shaped objects (each of which consists of several tens of stacked polarizing films) are housed in a plurality of molded trays 20 respectively.

(2) The molded trays 20 are stacked vertically, and the molded trays 20 are fixed to each other with an adhesive tape 21 so as not to move.

(3) A corrugated board pad 23 is affixed to the bottom of a corrugated board box 22, and the molded trays 20 are placed on the corrugated board pad 23.

(4) Another corrugated board pad 23 is put on the molded trays 20.

(5) Moreover, a packing material 24 (a pad containing air) is put on the corrugated board pad 23, and the lid of the corrugated board box 22 is closed in this state.

In accordance with the above-mentioned conventional packaging method, it is possible to prevent the film laminated bodies from rattling and also to make them less susceptible to impacts.

However, the problem with this method is that upon packaging, time-consuming packaging tasks, such as bonding jobs with adhesive tapes and packing jobs of corrugated board pads, packing materials, etc., into the corrugated board box, are required.

Moreover, after the package has been opened, the adhesive tapes, the corrugated board pads, packing materials, etc., need to be discarded, and the corrugated board box also needs to be discarded after having been used several times, resulting in high packaging costs and adverse effects in terms of the environmental conservation.

SUMMARY OF THE INVENTION

The present invention has been devised to solve the above-mentioned problem, and its objective is to provide a packaging method whereby:

(1) packaging is made so that, during transportation, the plate-shaped objects are free from rattling, and also less susceptible to impacts;

(2) the packaging job of the plate-shaped objects is easily carried out, and even after the packaging has been opened, it is possible to prevent generation of wastes and consequently to preserve environments; and

(3) it becomes possible to shorten the time of the packaging process, and to reduce packaging costs by cutting costs required for the packaging materials.

In order to achieve the above-mentioned objectives, a plate-shaped object housing case in accordance with the present invention is provided with: a plurality of plate-shaped object housing spaces that are formed by allowing a plurality of partition walls made of a resin material having an impact-absorbing property to engage a pair of side walls in a manner so as to be aligned with predetermined intervals from each other and also to be allowed to shift close to or apart from each other,

a tightening means for tightening and fixing the group of partition walls housing the plate-shaped objects in the respective plate-shaped object housing spaces in an approaching direction of the adjacent partition walls, and in this arrangement, the size of the entire case that has been tightened and fixed by the tightening means is set to a

predetermined size that is fitted to a predetermined transporting box, or to such a size as to allow a plurality of these cases to be housed in one box, or to such a size as to allow these to be housed together with a packing material.

Thus, the present invention provides the following functions and effects:

[A] A plurality of plate-shaped objects are housed in a plurality of plate-shaped object housing spaces in an independent manner, and the tightening means tightens and fixes the group of partition walls in the approaching directions of the adjacent partition walls, and this is housed in a predetermined transporting box, and transported in this state.

[B] As described above, the tightening means tightens and fixes the group of partition walls in approaching directions of the adjacent partition walls, and in this arrangement, the size of the entire case that has been tightened and fixed by the tightening means is set to a predetermined size that is fitted to a predetermined transporting box, or to such a size as to allow a plurality of these cases to be housed in one box, or to such a size as to allow these to be housed together with packing materials; therefore, it is possible to prevent the plate-shaped object housing case from rattling inside the transporting box, and also to prevent the plate-shaped objects from rattling inside the plate-shaped object housing case.

The above-description that "the size of the entire case

that has been tightened and fixed by the tightening means is set to a predetermined size that is fitted to a predetermined transporting box, or to such a size as to allow a plurality of these cases to be housed in one box" refers to either of the following cases (1) and (2):

(1)-I The size of the entire case is set so as to closely fit to a predetermined transporting box.

(1)-II The size of the entire cases is set so as to allow a group of the plate-shaped object housing cases to closely fit to a transporting box.

(2) The size of the entire case is set to be slightly smaller than the case (1).

The case (1) makes it possible to eliminate the necessity of stuffing the transporting box with pads (cushioning materials, etc.). Thus, it becomes possible to eliminate the generation of wastes (pads after use).

In the case (2), approximately one to two sheets of pads are put into the transporting box together with the housing case having the above-mentioned arrangement. Even in this case, since only one to two sheets of pads are used, it is possible to reduce the amount of wastes even though they might produce wastes. Moreover, if the pads are formed as re-usable materials, it becomes possible to eliminate the generation of wastes (pads after use).

Here, in some cases, for example, the plate-shaped objects

are polarizing films and film-laminated bodies, each having a plurality of laminated polarizing films, are housed in the plate-shaped object housing spaces, and transported from the factory to a customer's site.

In such a case, the number of the ordered film laminated bodies to be transported to a customer's site might be smaller than the number of all the plate-shaped object housing spaces, and the shipment might be made with several of the plate-shaped object housing spaces being in an empty state.

In accordance with the arrangement of the present invention, the respective partition walls are engaged by a pair of side walls in a manner so as to be allowed to shift close to or apart from each other; therefore, even in such a case, the adjacent partition walls forming empty spaces are shifted closer to each other by the tightening force from the tightening means so that the tightening force is applied to the plate-shaped objects.

In this case, in comparison with the full state of the plate-shaped objects, the length of the group of partition walls (the length of the group of partition walls in the aligning direction of the partition walls) becomes shorter; therefore, if this is housed in a transporting box, as it is, there will be a space between this and the inner wall of the transporting box.

However, for example, as shown in Fig. 23, an air pack

45 (a pack the size of which is freely adjustable by supplying or discharging air therein or therefrom), which can be re-used, is housed so that it is possible to prevent the plate-shaped objects from rattling inside the transporting box. Then, this is transported in the above-mentioned state.

[C] Moreover, since the respective partition walls are made from a resin material having an impact-absorbing property, it is possible to make the plate-shaped objects less susceptible to impacts during transportation.

[D] Since the resin material having the impact-absorbing property is superior in durability, it is possible to use the plate-shaped object housing case repeatedly.

Therefore, the above-mentioned functions [B] and [C] make it possible to package in such a manner that the plate-shaped objects are free from rattling and less susceptible to impacts during transportation.

The above-mentioned function [A] makes it possible to easily carry out a packaging process of the plate-shaped objects, and also to reduce the generation of wastes after the packaging has been opened, thereby reducing adverse effects to the environment.

Moreover, the above-mentioned functions [A] and [D] make it possible to shorten the time required for the packaging process, and also to reduce costs required for the packaging materials, thereby reducing packaging costs.

In a preferred embodiment of the present invention, the tightening means may have an arrangement in which a belt-shaped member, made from a resin material having impact-absorbing and flexible properties, is inserted into an insertion hole formed in an end portion of each of the partition walls on the side opposite to the insertion opening for the plate-shaped objects, and a first coupling section for coupling the ends of the belt-shaped member in the length direction is placed so that the belt-shaped member, wound around the group of partition walls, is tightened so as to fix the group of partition walls.

This arrangement provides the following functions in addition to the same effects as those obtained by the arrangement of the first invention:

The belt-shaped member, which has impact-absorbing and flexible properties, is wound around the group of partition walls, and both of the ends of the belt-shaped member in the length direction is coupled by the first coupling member so as to tighten and fix the group of partition members.

In this manner, since the belt-shaped member wound around the group of partition walls is tightened so as to fix the group of partition walls, it is possible to positively tighten and fix the group of partition walls.

Moreover, when the group of partition walls are tightened and fixed, the belt-shaped member is simply wound around them,

and both of the ends of the belt-shaped member are only coupled to each other by the first coupling section; therefore, it is not necessary to take a time-consuming task in the tightening and fixing process.

Since the belt-shaped member has an impact-absorbing property and flexibility, the plate-shaped objects are less susceptible to impact forces during transportation.

Therefore, it becomes possible to provide a simple structure for the tightening means.

In another preferred embodiment of the present invention, a holding-use hole may be formed in each of the ends of the belt-shaped member in the length direction so that the respective ends of the belt-shaped member can be held in an uncoupled state.

This arrangement provides the following functions:

For example, after the transporting box thus transported has been opened and the coupling of the ends of the belt-shaped member has been released, the above-mentioned ends can be held, and the plate-shaped housing case having the above-mentioned arrangement can be taken out, and carried to a predetermined place.

Moreover, at the time of packaging, the ends of the belt-shaped member can be held, and put the case into a transporting box.

Therefore, it is possible to improve the operability.

In another preferred embodiment of the present invention, the above-mentioned partition walls and side walls may be formed by corrugated board material made from a resin.

This arrangement makes it possible to provide the following functions:

Since the partition walls and the side walls are formed by the corrugated board material made from a resin, it is possible to make the plate-shaped objects less susceptible to impact forces during transportation.

In another preferred embodiment of the present invention, a positional fixing means, which presses the plate-shaped objects housed in the housing spaces of the plate-shaped objects in the width direction from outside so that they are fixed in their positions in the width direction with respect to the partition walls, may be installed.

This arrangement makes it possible to provide the following functions:

The plate-shaped objects housed in the housing spaces of the plate-shaped objects are pressed by the positional fixing means in the width direction from outside so that they are fixed in their positions in the width direction of the plate-shaped objects with respect to the partition walls.

Then, the group of partition walls are tightened and fixed by the tightening means in such a direction as to allow the adjacent partition walls to approach each other, and then housed

in a predetermined transporting box, and this is transported in this state.

As described above, since the plate-shaped objects are fixed by the positional fixing means in their positions in the width direction of the plate-shaped objects with respect to the partition walls, it becomes possible to prevent the plate-shaped objects from rattling in the width direction with respect to the partition walls.

For example, it may be proposed that only the tightening force of the tightening member is used so as to prevent the plate-shaped objects from rattling in the width direction with respect to the partition walls.

However, in this method, the tightening force has to be increased sufficiently, resulting in the following problems in some cases.

In other words, in the case when the plate-shaped objects are polarizing films and when film laminated bodies, each having a plurality of laminated polarizing films, are housed in the plate-shaped object housing spaces, the excessive tightening force causes an adhesivematerial layer formed on the polarizing plate to be compressed and deformed.

When the deformation remains as a dent without having been recovered and when the polarizing plate is used in a liquid crystal display apparatus, etc., the dent causes an image deformation, resulting in a defective polarizing plate.

In contrast, the arrangement of the present embodiment uses the positional fixing means to prevent the plate-shaped objects from rattling in the width direction with respect to the partition walls; therefore, as compared with the case in which only the tightening force from the tightening means is used to prevent the plate-shaped objects from rattling in the width direction, it is possible to weaken the tightening force from the tightening means, and consequently to avoid the above-mentioned problem.

As described above, the plate-shaped objects are positionally fixed by the positional fixing means in the width direction of the plate-shaped objects with respect to the partition walls, and they are also tightened and fixed by the tightening means in such a direction as to allow the adjacent partition walls to approach each other, while the size of the entire case that has been tightened and fixed is set to a predetermined size that is fitted to a predetermined transporting box, or to such a size as to allow a plurality of these cases to be housed in one box, or to such a size as to allow these to be housed together with packing materials; therefore, it is possible to prevent the plate-shaped object housing case from rattling inside the transporting box, and also to prevent the plate-shaped objects from rattling inside the plate-shaped object housing case.

In still another preferred embodiment of the present

invention, the positional fixing means may have an arrangement in which: a cutout section is formed in each of the two ends or in one end in the width direction of each of the partition walls, and an elongated plate-shaped object pressing member bridging over the partition walls is placed in the cutout sections so as to freely change its position in the width direction, while a second coupling section for coupling the plate-shaped object pressing member to the belt-shaped member or to the outermost partition wall is installed.

This arrangement makes it possible to provide the following functions:

The elongated plate-shaped object pressing member, placed in the cutout sections each of which is formed in each of the two ends or in one end in the width direction of each of the partition walls, is altered in its position to the center portion of each of the partition walls.

Then, the second coupling section of the plate-shaped pressing members is coupled to the belt-shaped member or to the outermost partition wall.

Thus, the plate-shaped objects housed in the plate-shaped object housing spaces are pressed in the width direction of the plate-shaped objects from outside so that they are positionally fixed in the width direction of the plate-shaped objects with respect to the partition walls.

Therefore, it is possible to simplify the structure of

the positional fixing means.

In still another preferred embodiment of the present invention, the plate-shaped object pressing member may be formed into a plate shape, and may have an arrangement in which: protruding portions, which protrude outwards in the width direction of the plate-shaped objects, are formed in the respective ends in the length direction of the plate-shaped object pressing member, and with the plate-shaped object pressing member being pressed onto the plate-shaped objects, each of the protruding portions is engaged with the outermost partition wall from outside of the partition wall.

This arrangement makes it possible to provide the following function:

It is possible to prevent the plate-shaped object pressing member from offsetting from the plate-shaped objects in the direction in which the partition walls are aligned.

In still another preferred embodiment of the present invention, the second coupling section may have an arrangement in which: assisting belt-shaped members are affixed to the plate-shaped object pressing member in a manner so as to protrude from both of the ends in the length direction thereof, and female or male face fasteners, which fit to male or female face fasteners attached to the belt-shaped member or the outermost partition walls, are formed on both of the ends of the assisting belt-shaped members.

This arrangement makes it possible to provide the following function:

The plate-shaped objects are housed in the plate-shaped object housing spaces. Then, the female or male face fasteners on both of the ends of the assisting belt-shaped members affixed to the plate-shaped object pressing member are engaged with the male or female face fasteners placed on the belt-shaped member or the outermost partition walls.

Thus, the plate-shaped objects are positionally fixed in the width direction of the plate-shaped objects with respect to the partition walls.

In other words, in order to positionally fix the plate-shaped objects in the width direction of the plate-shaped objects with respect to the partition walls, the elongated plate-shaped object pressing member is altered in its position to the center portion of the partition walls, and the female or male face fasteners on both of the ends of the assisting belt-shaped members are simply engaged with the male or female face fasteners placed on the belt-shaped member or the outermost partition walls; therefore, it is not necessary to take a time-consuming task to positionally fix the plate-shaped objects.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing a film-laminated body

housing case;

Fig. 2 is a drawing that shows respective parts of the film-laminated body housing case;

Fig. 3 is a perspective view that shows a film-laminated body, the film-laminated body housing case and a transporting box;

Fig. 4A is a drawing that shows a state in which the film-laminated body housing case is housed in the transporting box;

Fig 4B is a perspective view of an air-pact in a film-laminated body housing case;

Fig. 5 is a drawing that shows a state in which the film-laminated body housing case is housed in the transporting box;

Fig. 6 is a perspective view that shows the transporting box;

Fig. 7 is a perspective view that shows another embodiment;

Fig. 8 is a perspective view that shows still another embodiment;

Fig. 9 is a perspective view that shows still another embodiment;

Fig. 10 is a perspective view that shows still another embodiment;

Fig. 11 is a perspective view that shows still another embodiment;

Fig. 12 is a drawing that shows still another embodiment;

Fig. 13 is a perspective view that shows still another

embodiment;

Fig. 14 is a perspective view that shows still another embodiment;

Fig. 15 is a perspective view that shows still another embodiment;

Fig. 16 is a perspective view that shows still another embodiment;

Fig. 17 is a perspective view that shows still another embodiment;

Fig. 18 is a perspective view that shows still another embodiment;

Fig. 19 is a perspective view that shows still another embodiment;

Fig. 20 is a perspective view that shows still another embodiment;

Fig. 21 is a perspective view that shows still another embodiment;

Fig. 22 is a perspective view that shows still another embodiment;

Fig. 23 is a perspective view that shows still another embodiment;

Fig. 24 is a perspective view that shows still another embodiment;

Fig. 25 is a perspective view that shows still another embodiment;

Fig. 26 is a perspective view that shows still another embodiment; and

Fig. 27 is a drawing that shows a conventional arrangement.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figures, the following description will discuss embodiments of the present invention.

Figs. 1, 2 and 3 show a housing case C (corresponding to the plate-shaped object housing case) for housing a plurality of film-laminated bodies 1 (each having a structure in which 50 polarizing films serving as the plate-shaped objects are laminated), and a transporting box D for housing this housing case C.

The housing case C is provided with: a plurality of film-laminated body housing spaces S (corresponding to the plate-shaped object housing spaces) that are formed by allowing a plurality of partition plates 2 (corresponding to a plurality of partition walls) to engage a pair of side plates 3 (corresponding to a pair of side walls) in a manner so as to be aligned with predetermined intervals from each other and also to be allowed to shift close to or apart from each other, and

a tightening means 4 for tightening and fixing the group of partition plates housing the film-laminated bodies 1 in an approaching direction of the adjacent partition plates 2.

Both of the partition plates 2 and the side plates 3 are formed by corrugated board material made from a resin (corresponding to the resin material having an impact-absorbing property).

Each of the partition plates 2 and each of the side plates 3 are assembled by fitting the side plate 3 into a slit 12 formed in the partition wall 2 (that is, by allowing it to engage the partition wall 2) so that, as described above, the adjacent partition plates 3 are allowed to shift close to or apart from each other.

Moreover, through holes 35 are formed in both of the end portions in the width direction of each of the partition plates 2 on the bottom side thereof (that is, the end side opposite to the insertion opening for the film-laminated body 1), and a pair of resin frame 14 are respectively inserted into the pair of through holes aligned in rows.

Stoppers 37, 36 with respect to the partition plates 2 are attached to both of the ends of each the side plates 3 and both of the ends of each of the resin frames 14 in a direction in which the partition plates 2 are aligned.

The tightening means 4 has an arrangement in which a belt-shaped member 5, formed by corrugated board material made from a resin (corresponding to the resin material having impact-absorbing and flexible properties), is inserted into an insertion hole 11 formed in an end portion of each of the

partition plates 2 on the side opposite to the insertion opening for the film-laminated bodies 1, and a face fastener 6 (corresponding to the coupling section) for superposing and coupling the ends of the belt-shaped member 5 in the length direction is placed on the belt-shaped member 5 so that the belt-shaped member 5, wound around the group of partition plates, is tightened so as to fix the group of partition plates.

Here, on each of the two ends in the length direction of the belt-shaped member 5, two folding lines L (more specifically, "narrowed portions") are formed in the width direction.

Moreover, a pair of holding-use holes 33, which are superposed when the belt-shaped member 5 is folded down along the folding line L on the idle end side, is formed in the belt-shaped member 5 so that both of the ends of the belt-shaped member 5 can be held, when it is in an uncoupled state (see Fig. 3). The portions of the belt-shaped member 5 that have been folded down along the folding lines L are coupled to each other by face fasteners 6.

A recessed section 7 is formed in each partition plate 2 on the insertion opening side so that each film-laminated body 1 is easily inserted to and removed from each film-laminated body housing space S. Moreover, a window 8 is formed in one of the partition plate 2 of the pair of the outermost partition plates 2 so that a label (on which the kind, etc. of the film-laminated bodies are written) affixed

on the film-laminated body 1 can be read.

Furthermore, the size (length, width and height) of the entire case in which the film-laminated bodies 1 have been housed in the film-laminated body housing spaces S, and tightened and fixed (that is, in a filled state) is set to an appropriate size to be fitted to the transporting box D.

As illustrated in Fig. 3, with the above-mentioned structure, the film-laminated bodies 1 are housed in the film-laminated body housing spaces S individually, and the belt-shaped member 5 is wound around the group of the partition plates.

Moreover, both of the ends in the length direction of the belt member 5 are superposed, and coupled by the face fasteners 6 so that the group of the partition plates are fastened, and fixed. Thus, the housing case C is housed in the transporting box D, and transported.

In this case, the size (length, width and height) of the entire case in which the film-laminated bodies 1 have been housed in the film-laminated body housing spaces S is set to an appropriate size so as to be fitted to the transporting box D; therefore, it is possible to prevent the film-laminated bodies 1 from rattling inside the transporting box D.

Here, for example, in the case when the film laminated bodies 1 are transported from the factory to a customer's site and when the number of the ordered film laminated bodies 1

to be transported to a customer's site might be smaller than the number of all the film-laminated body housing spaces S, the shipment might be made with several of the film-laminated body housing spaces S being in an empty state.

In this arrangement, however, the respective partition plates 2 are engaged by a pair of side plates 3 in a manner so as to be allowed to shift close to or apart from each other; therefore, even in such a case, the adjacent partition plates 3 forming empty film-laminated body housing spaces S are shifted closer to each other by the tightening force from the tightening means 4 so that the tightening force is applied to the film-laminated bodies 1.

In this case, in comparison with the full state of the film-laminated bodies 1, the length of the group of partition plates (the length of the group of partition plates in the aligning direction of the partition plates) becomes shorter; therefore, if this is housed in a transporting box D, as it is, there will be a space between this and the inner wall of the transporting box D.

However, for example, as shown in Fig. 4(B), an air pack 45 (a pack the size of which is freely adjustable by supplying or discharging air therein or therefrom), which can be re-used, is housed so that it is possible to prevent the film-laminated bodies 1 from rattling inside the transporting box D. (Here, the group of partition plates may be gathered to the center

of the transporting box D with two air bags 45 being placed on both of the sides of the group of partition plates so as to support the group of the partition plates).

Then, this is housed in the transporting box D, and transported.

As illustrated in Figs. 4(A), 5 and 6, the transporting box D consists of a box main body 12 and an upper lid 13. The upper lid 13 is provided with two folding portions 13A on the short side with face fasteners 19, one folding portion 13A on the long side with a face fastener 19, and one folding portion 13A on the long side without any face fastener.

Then, the three folding portions 13A with the face fasteners 19 are folded down on the upper end side of the box main body 12, and fixed thereon with the fasteners 19.

Moreover, the one folding portion 13A on the long side without any face fastener is fixed on the upper end side of the box main body 12 with a rivet (not shown). Furthermore, a sealing tack 15 is put over the folding portion 13A on the long side with the face fastener 19 and the upper end side of the box main body 12.

Four face fasteners 71 are placed on the four corners of the surface of the upper lid 13 and four face fasteners 71 are also placed on four corners of the bottom face of the box main body 12 so that, in the case when a plurality of transporting boxes D are stacked longitudinally, the corresponding face

fasteners 71 are coupled to each other; thus, it is possible to make the transporting boxes D less susceptible to offsetting in their positions. In Fig. 6, reference number 30 represents a handle.

This handle 30 is placed on the short side wall of the long and short side walls of the box main body 12; however, this may be placed only on the long side wall, or may be placed on either of the long and short side walls.

Both of the ends of the handle 30 are inserted into through holes formed in each of the side walls, and fastened on the rear face side of the side wall.

Then, the handle portion on the rear face side is pressed by an adhesive tape 40 so as to be fixed (see Fig. 3). In this manner, by pressing and fixing the handle portion with the adhesive tape 40, it is possible to suppress the handle portion from rising on both of the end sides inside the box main body 12. Moreover, this also makes it possible to prevent foreign matters from entering the box main body 12 through the through holes.

[Another preferred embodiment I]

As illustrated in Figs. 7, 8 and 9, the size (length, width and height) of the entire case in which the film-laminated bodies 1 have been housed in the film-laminated body housing spaces S, and tightened and fixed is set to an appropriate

size so that two of these cases are fitted to the transporting box D.

In the above-mentioned structure, the film-laminated bodies 1 are housed in the film-laminated body housing spaces S individually, and the belt-shaped member 5 is wound around the group of the partition plates. Moreover, both of the ends in the length direction of the belt member 5 are superposed, and coupled by the face fasteners 6 so that the group of the partition plates are fastened, and fixed. Thus, two of the cases are housed in the transporting box D, and transported.

The size of the entire case that has been tightened and fixed may be set to an appropriate size so that three or more of these cases are fitted to the transporting box D.

[Still another preferred embodiment II]

As illustrated in Fig. 10, upon setting the size of the case, the size of the entire case that has been tightened and fixed may be set to an appropriate size so as to be fitted to the transporting box D together with a packing material 50.

The packing material 50 is a so-called air pack which is used by supplying air into a bag so as to be inflated, and designed to be re-used.

[Still another preferred embodiment III]

Figs. 11, 12 and 15 show a housing case C for housing a plurality of film-laminated bodies 1, and a transporting box D for housing this housing case C.

The housing case C is provided with: a plurality of film-laminated body housing spaces S that are formed by allowing a plurality of partition plates 2 to engage a pair of side plates 3 in a manner so as to be aligned with predetermined intervals from each other and also to be allowed to shift close to or apart from each other,

a positional fixing means 51 which presses the film-laminated bodies 1 housed in the film-laminated body housing spaces S in the width direction of the film-laminated bodies 1 from outside so that they are fixed in their positions in the width direction with respect to the partition plates 2; and

a tightening means 4 for tightening and fixing the group of partition plates housing the film-laminated bodies 1 in an approaching direction of the adjacent partition plates 2.

Both of the partition plates 2 and the side plates 3 are formed by corrugated board material made from a resin.

The positional fixing means 51 has an arrangement in which: a cutout section 52 is formed in each of the two ends in the width direction of each of the partition plates 2, and an elongated film-pressing member 53 (corresponding to plate-shaped object pressing member) bridging over the

partition plates 2 is placed in the cutout sections 52 so as to freely change its positions in the width direction, while a second coupling section 57 for coupling the film-pressing member 53 to the belt-shaped member 5 is installed.

More specifically, the film-pressing member 53 is formed into a plate shape, and has protruding portions 53a which protrude outwards in the width direction of the film-pressing member 53, and are formed in the respective ends in the length direction of the film-pressing member 53.

Here, with the film-pressing member 53 being pressed onto the film-laminated bodies 1, each of the protruding portions 53a is engaged with the outermost partition plate 2 from outside of the partition plate 2.

Moreover, an assisting belt-shaped member 54 is affixed to the film-pressing member 53 in a manner so as to protrude from both of the ends in the length direction of the film-pressing member 53.

Here, male face fasteners 56 relating to female face fasteners 55 attached to the belt-shaped member 5 are placed on both of the ends of the assisting belt-shaped members 54 so as to form the second coupling section 57.

The assisting belt-shaped member 54 is an elongated female face fastener, and is inserted into through holes formed in both of the endsides of the film-pressing member 53. Moreover, the male face fasteners 56 are patched on the assisting

belt-shaped member 54 back to back.

The tightening means 4 has an arrangement in which: the belt-shaped member 5, formed by corrugated board material made from a resin, is inserted into an insertion hole 11 formed in an end portion of each of the partition plates 2 on the side opposite to the insertion opening for the film-laminated body 1, and a face fastener 6 (corresponding to the first coupling section) for superposing and coupling the ends of the belt-shaped member 5 in the length direction is placed on the belt-shaped member 5 so that the belt-shaped member 5, wound around the group of partition plates, is tightened so as to fix the group of partition plates.

L represents folding line, and reference number 33 represents a holding-use hole (in the same manner as the first embodiment).

The assembling structure, etc., between the partition plates 2 and the side plates 3 are the same as those of the first embodiment; therefore, the description thereof is omitted.

The size (length, width and height) of the entire case in which the film-laminated bodies 1 have been housed in the film-laminated body housing spaces S is set to an appropriate size so as to be fitted to the transporting box D.

In the above-mentioned structure, as illustrated in Figs. 13, 14 and 15, the film-laminated bodies 1 are housed in the

film-laminated body housing spaces S independently, and the film-laminated bodies 1 are pressed by the film-pressing member 53 in the width direction from outside.

Then, one of male face fasteners 56 on both of the end sides of the assisting belt-shaped members 54 affixed to the film-pressing member 53 is superposed on the female face fastener 55 formed on the belt-shaped member 5.

Moreover, the other of the male face fasteners 56 on both of the end sides of the assisting belt-shaped member 54 is superposed on the rear face of the one of the ends of the assisting belt-shaped member 54 (that is, female face fastener as described earlier).

Thus, the film-laminated body 1 is positionally fixed in the width direction of the film-laminated body 1 with respect to the partition plates 2.

Then, the belt-shaped member 5 is wound around the group of partition plates, and both of the ends of the belt-shaped member 5 in the length direction are superposed on each other to be coupled by the face fasteners 6 so that the group of the partition plates are tightened, and fixed. This is housed in the transporting box D in this state, and transported (see Figs. 15, 16, 17 and 18).

Here, for example, in the case when the film laminated bodies 1 are transported from the factory to a customer's site, one housing case C sometimes is not filled with the

film-laminated bodies 1.

In this arrangement, however, the respective partition plates 2 are engaged by a pair of side plates 3 in a manner so as to be allowed to shift close to or apart from each other; therefore, even in such a case, the adjacent partition plates 3 forming empty film-laminated body housing spaces S are shifted closer to each other by the tightening force from the tightening means 4 so that the tightening force is applied to the film-laminated bodies 1.

In this case, in comparison with the full state of the film-laminated bodies 1, the length of the group of partition plates (the length of the group of partition plates in the aligning direction of the partition plates) becomes shorter; therefore, if this is housed in a transporting box D, as it is, there will be a space between this and the inner wall of the transporting box D.

However, for example, as shown in Fig. 23, an air pack 45 (a pack the size of which is freely adjustable by supplying or discharging air therein or therefrom), which can be re-used, is housed so that it is possible to prevent the film-laminated bodies 1 from rattling inside the transporting box D. (Here, the group of partition plates may be gathered to the center of the transporting box D with two air bags 45 being placed on both of the sides of the group of partition plates so as to support the group of the partition plates).

The face fasteners on the end sides of the pair of right and left assisting belt-shaped members 54 may be coupled to each other so that the film-laminated bodies 1 housed in the film-laminated body housing spaces S are pressed in the width direction from outside so as to be positionally fixed in the width direction with respect to the partition plates 2.

The film-pressing member 53 may be coupled to the partition plate 2 on the outermost side.

As illustrated in Figs. 19 and 20, the size (length, width and height) of the entire case in which the film-laminated bodies 1 have been housed in the film-laminated body housing spaces S, and tightened and fixed is set to an appropriate size so that two of these cases are fitted to the transporting box D.

Figs. 19 and 21 show a state in which two housing cases are housed into the transporting box D.

As illustrated in Fig. 22, the size of the entire case that has been tightened and fixed may be set to an appropriate size so as to be fitted to the transporting box D together with a packing material 50.

The size of the entire case that has been tightened and fixed may be set to an appropriate size so that three or more of these cases are fitted to the transporting box D.

The male face fasteners and the female face fasteners may be set to have colors different from each other. This

arrangement makes it possible to easily recognize the male and female face fasteners.

As illustrated in Figs. 24 and 25, the assisting belt-shaped member 54 may be superposed on the face fastener 55 formed on the film-pressing member 53 so as to be engaged therewith. Cutout sections 60 are formed in both of the ends of the film-pressing material 53 so as to accept the assisting belt-shaped member 54.

As illustrated in Fig. 26, the positional fixing means 51 may have an arrangement in which an elongated film-pressing member 53 bridging over a plurality of partition plates 2 is housed in a cutout section 52 formed in only one end in the width direction of each of the partition plates 2, in a manner so as to freely change in its position in the width direction.

In the above-mentioned embodiments, the first coupling section 6 and the second coupling section 57 may be formed by materials other than the face fasteners. Moreover, the belt-shaped member 5 may be formed by cloth material. The above-mentioned plate-shaped objects are not intended to be limited to polarizing films; and, for example, glass may be housed. Furthermore, the resin material having an impact-absorbing property may be replaced by expanded polyethylene or expanded polypropylene.



We claim:

1. A plate-shaped object housing case characterized by comprising:

a plurality of plate-shaped object housing spaces (S) that are formed by allowing a plurality of partition walls (2) made of a resin material having an impact-absorbing property to engage a pair of side walls (3) in a manner so as to be aligned with predetermined intervals from each other and also to be allowed to shift close to or apart from each other,

a tightening means (4) for tightening and fixing the group of partition walls (2) housing the plate-shaped objects (1) in said respective plate-shaped object housing spaces (S) in an approaching direction of the adjacent partition walls (2),

characterized in that the size of the entire case that has been tightened and fixed by said tightening means (4) is set to a predetermined size that is fitted to a predetermined transporting box (D), or to such a size as to allow a plurality of these cases to be housed in one box, or to such a size as to allow these to be housed together with a packing material (50).

2. The plate-shaped object housing case according to claim 1, characterized in that

said tightening means (4) has an arrangement in which a belt-shaped member (5), having impact-absorbing and flexible properties, is inserted into an insertion hole (11) formed



in an end portion of each of the partition walls (2) on the side opposite to the insertion opening for the plate-shaped objects (1), and

a first coupling section (6) for coupling the ends of said belt-shaped member (5) in the length direction is placed so that said belt-shaped member (5), wound around said group of partition walls, is tightened so as to fix said group of partition walls.

3. The plate-shaped object housing case according to claim 2, characterized in that

a holding-use hole (33) is formed in each of the ends of said belt-shaped member (5) in the length direction so that the respective ends of said belt-shaped member (5) can be held in an uncoupled state.

4. The plate-shaped object housing case according to any one of claims 1, 2 and 3, characterized in that

said partition walls (2) and side walls (3) are formed by corrugated board material made from a resin.

5. The plate-shaped object housing case according to any one of claims 1, 2, 3 and 4, characterized in that

a positional fixing means (51), which presses the plate-shaped objects (1) housed in said housing spaces (S) of the plate-shaped objects in the width direction of the plate-shaped objects (1) from outside so as to be fixed in the positions thereof in said width direction with respect



to said partition walls (2), is installed.

6. The plate-shaped object housing case according to claim 5, characterized in that

said positional fixing means (51) has an arrangement in which: a cutout section is formed in each of the two ends or in one end in said width direction of each of said partition walls (2), and an elongated plate-shaped object pressing member (53) bridging over said partition walls (2) is placed in the cutout sections so as to freely change its position in the width direction, while a second coupling section (57) for coupling said plate-shaped object pressing member (53) to said belt-shaped member (5) or to the outermost partition wall (2) is installed.

7. The plate-shaped object housing case according to claim 6, characterized in that

said plate-shaped object pressing member (53) is formed into a plate shape, and has an arrangement in which: protruding portions (53a), which protrude outwards in the width direction of the plate-shaped objects (1), are formed in the respective ends in the length direction of said plate-shaped object pressing member (53), and with said plate-shaped object pressing member (53) being pressed onto said plate-shaped objects (1), each of said protruding portions (53a) is engaged with the outermost partition wall (2) from outside of the partition wall (2).



8. The plate-shaped object housing case according to claim 6 or 7, characterized in that

said second coupling section (57) has an arrangement in which: an assisting belt-shaped member (54) is affixed to said plate-shaped object pressing member (53) in a manner so as to protrude from both of the ends in the length direction of said plate-shaped object pressing member (53), and female or male face fasteners, which fit to male or female face fasteners attached to said belt-shaped member (5) or the outermost partition walls (2), are formed on both of the ends of said assisting belt-shaped member (54).