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(54) Honeycomb structure package

(57) There is disclosed a package which does not have a very large package height even when containing products, whereby the deterioration of a transport efficiency can be prevented, and which can realize stacking in a large number of stages while avoiding the damage of honeycomb structures. The honeycomb structure package includes a plate base, a receiving member which is disposed on the base to support the side surface portions of honeycomb structures, and a rectangular parallelepiped box member constituted of five rigid panels which surround the lower surfaces and side surfaces of the base and the receiving member.

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a package. More particularly, it relates to a honeycomb structure package capable of satisfactorily storing and transporting honeycomb structures without breaking down the structures.

Description of the Related Art

[0002] At present, a package (a package box) for storing and transporting honeycomb structures is made of a plastic material, a cardboard material or the like, and a cardboard box is mainly used because it is lightweight and can easily be prepared at a low cost.

[0003] As shown in, for example, Figs. 9 and 10, a large number of stages of packages (package boxes) are stacked during the storage and transport of the honeycomb structures. At this time, a package box 18 has a configuration in which honeycomb structures 11 are vertically disposed (the direction of through holes of the honeycomb structure is a vertical direction) in through holes (each having a size equal to that of the laterally sectional shape of each honeycomb structure 11 to be stored) in a positioning tray 16 disposed in the intermediate part of the package box 18 in a height direction thereof, and the load of the upper package box 18 is supported by the honeycomb structures 11 (which are to be packaged) stored in the lower package box 18 (JP-A-2003-112771).

[0004] However, in recent years, the size of each honeycomb structure has been increased, and the product height (length) of the structure is increased to 30 cm or more on occasion. In such a case, when the honeycomb structures are vertically disposed and stored as in a conventional technology, the height of the package box increases. On the other hand, there is usually a restriction on the height of a ship's hold, a warehouse or the like used for the storage and transport. When the package boxes each having a large height are stacked up to the above limited height, due to the limitation of the height, the less number of stages of package boxes have to be stacked as compared with the conventional technology. In such a case, there are problems that a dead space increases, and the number of the honeycomb structures which can be stored in the ship's hold, the warehouse or the like is limited, thereby lowering a transport efficiency.

[0005] To solve the problems, when the honeycomb structures are laterally disposed and stored (the direction of the through holes of the honeycomb structures is a horizontal direction), the height of the package can be prevented from being increased. However, the honeycomb structure is characterized by having a high strength in a vertical direction (a direction along the through holes of the honeycomb structure) and a low strength in a lateral direction (a direction vertical to the through holes of the honeycomb structure). Therefore, in a case where a large number of stages of packages containing the laterally disposed honeycomb structures are stacked as in the conventional technology, when the load of the upper package is supported by the lower honeycomb structures to be packaged, the lower honeycomb structures might be damaged. In such a case, there is a problem that eventually the stacking of the packages in a large number of stages has to be avoided in order to avoid the damage of the lower honeycomb structures.

SUMMARY OF THE INVENTION

[0006] The present invention has been developed in view of such a problem of the conventional technology, and an object thereof is to provide a honeycomb structure package which does not have a very large package height even when containing products as compared with the conventional technology, whereby the deterioration of a transport efficiency can be prevented, and which can realize stacking in a large number of stages while avoiding the damage of honeycomb structures.

[0007] As a result of intensive investigations for achieving the above object, the present inventors have found that the following honeycomb structure package can achieve the object, and have completed the present invention. That is, according to the present invention, there is provided a honeycomb structure package as follows.

[0008]

[1] A honeycomb structure package including: a plate base; a receiving member which is disposed on the base to support the side surface portions of honeycomb structures; and a rectangular parallelepiped box member constituted of five rigid panels which surround the lower surfaces and side surfaces of the base and the receiving member.

[0009]

[2] The honeycomb structure package according to [1], wherein the box member has, on the lower surface thereof, a connecting member having a shape complementary to that of a space formed by the upper ends of the side surfaces of the box member, whereby a plurality of box members are stacked.

[0010]

[3] The honeycomb structure package according to [2], wherein at least one of the side surfaces of the box member is openable while an opening in the upper part of the box member is closed.

[0011]

[4] The honeycomb structure package according to

any one of [1] to [3], wherein the receiving member has a receiving portion having a shape complementary to that of the side surface portion of each honeycomb structure, and equally supports the side surface portions of the honeycomb structures from the downside thereof.

[0012]

[5] The honeycomb structure package according to any one of [1] to [4], wherein the receiving members are disposed on both the surfaces of the plate base.

[0013] According to the honeycomb structure package of the present invention, as compared with a conventional vertical storage technology, the height of the honeycomb structure package even when containing the honeycomb structures does not remarkably increase, and the deterioration of a transport efficiency can be prevented. Moreover, when the packages are stacked in a large number of stages, the load of the upper stage is not carried by the lower honeycomb structures to be packaged, but is carried by the side walls of the lower box member constituted of the rigid panels, which produces an effect that stacking in a large number of stages can be realized while avoiding the damage of the honeycomb structures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is an exploded perspective view showing one embodiment of a package according to the present invention;
Fig. 2 is a schematic sectional view of the section of the center of a honeycomb structure in a longitudinal direction thereof, cut vertically to the longitudinal direction, showing that the honeycomb structure is laterally disposed on a receiving member;
Fig. 3 is a partially enlarged view from the side surface of one embodiment of the present invention showing that each honeycomb structure is laterally disposed on the receiving member and that two sets of honeycomb structures, receiving members and bases are stacked;
Fig. 4 is a partially enlarged view from the side surface of another embodiment of the present invention showing that each honeycomb structure is laterally disposed on each receiving member and that two sets of honeycomb structures, receiving members and bases are stacked;
Fig. 5 is a partially enlarged view from the side surface of still another embodiment of the present invention showing that each honeycomb structure is laterally disposed on each receiving member and that two sets of honeycomb structures, receiving members and bases are stacked;
Fig. 6 is a perspective view showing that three honeycomb structure packages of the present invention are stacked;
Fig. 7 is a perspective view showing that three honeycomb structure packages of the present invention are stacked and that a part of the side walls of the middle box member is opened;
Fig. 8 is a schematic vertical sectional view showing a modification of the honeycomb structure package of the present invention;
Fig. 9 is an explanatory view showing a conventional package and is a perspective view showing the package state of a plurality of stacked packages; and
Fig. 10 is an explanatory view showing the conventional package and is a partially sectional view cut along the A-A line of Fig. 9.

[0015] 1: package, 3: receiving member, 5: base, 7: box member, 9: connecting member, 11: honeycomb structure, 13: elastic sheet, 15: engaging member, 16: positioning tray, and 18: package box.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0016] Hereinafter, an embodiment for carrying out the present invention will specifically be described, but it should be understood that the present invention is not limited to the following embodiment and can appropriately be design-changed or improved otherwise based on the usual knowledge of a person with ordinary skill without departing from the scope of the present invention.

[0017] Fig. 1 is an exploded perspective view for explaining one embodiment of a honeycomb structure package according to the present invention. The honeycomb structure package of the present invention includes a plate base 5; a receiving member 3 which is disposed on the base 5 to support the side surface portions (on a lower side) of honeycomb structures: and a rectangular parallelepiped box member 7 having five rigid panels which surround the lower surfaces and side surfaces of the base 5 and the receiving member 3. Here, the outer shape of each honeycomb structure 11 is formed by the inlet-side end surfaces and outlet-side end surfaces of through holes of the structure and side surface portions connecting the inlet-side end surfaces to the outlet-side end surfaces of the through holes.

[1. Receiving Member]

[0018] In a honeycomb structure package 1 according to the present invention, the honeycomb structures 11 are disposed on the receiving member 3 while the longitudinal direction of each honeycomb structure 11 is set to a lateral direction (the honeycomb structures are laterally disposed so that the direction of the through holes of the honeycomb structures is a horizontal direction). There is not any special restriction on the configuration of the receiving member 3 itself as long as the rotation or movement of the honeycomb structures can be sup-

pressed. The receiving member may be, for example, a square frame made of the side surface (and the bottom surface if necessary) of a rectangular parallelepiped member. For the sake of simplicity, an only longitudinal support or guide (and the bottom surface of the member if necessary) may be used as the receiving member to suppress the rotation of the honeycomb structures, and colliding between the end surfaces of the adjacent honeycomb structures and/or between the end surfaces of the honeycomb structures and the inner side surface of the box member may be avoided by holding them with a buffer material or the like. Furthermore, as shown in Fig. 2, the receiving member more preferably has a receiving portion having a shape complementary to that of the side surface portion of the honeycomb structure 11, whereby the side surface portions of the honeycomb structures are equally supported from the downside. The receiving member 3 is preferably secured to the base 5.

[0019] The receiving member 3 used in the present invention is preferably a sheet or foam sheet made of a polyolefin-based resin, cardboard paper or the like having buffer properties. Here, the polyolefin-based resin foam sheet is a foam sheet made of polyethylene, polypropylene and a copolymer mainly made of olefin or the like. In particular, the cardboard paper or the polyethylene resin foam sheet has an excellent elasticity, and hence can suitably be used as the receiving member 3 used in the present invention.

[2. Base]

[0020] In the present embodiment, as shown in Fig. 1, eight honeycomb structures 11 are disposed on the receiving member 3 provided on the base 5, and then two bases 5 are stacked and stored in the box member 7. Fig. 3 is a partially enlarged view showing the state of the stacked bases 5. As described above, the honeycomb structure has less strength in the vertical direction as compared with the longitudinal direction, but the weight of about one to ten honeycomb structures is sufficiently bearable.

[0021] As the base 5 used in the present invention, an inexpensive and lightweight material having an appropriate rigidity is preferable. Examples of the preferable material of the base 5 include cardboard, wood, iron, aluminum, copper and a polyolefin-based resin. There is not any special restriction on the configuration of the base as long as the honeycomb structures and the receiving member can be supported and a necessary rigidity can be kept. The configuration of the base can appropriately be selected from the group consisting of flat plate, corrugated plate, perforated plate and lattice configurations.

[0022] Fig. 4 is a diagram showing another embodiment of the present invention, and is a partially enlarged view from the side surface side, showing that two sets of honeycomb structures, receiving members and bases are stacked in a case where the honeycomb structures are laterally disposed on the receiving members. As shown in Fig. 4, an elastic sheet 13 is sandwiched between the lower honeycomb structures 11 and the upper base 5 in one example of the preferable embodiment of the present invention. Examples of a material of the elastic sheet 13 include cardboard paper and a polyolefin-based resin.

[0023] Fig. 5 is a diagram showing still another embodiment of the present invention, and is a partially enlarged view from the side surface side, showing that two sets of honeycomb structures, receiving members and bases are stacked in a case where the honeycomb structures are laterally disposed on the receiving members. As shown in Fig. 5, the receiving members 3 are provided on both surfaces of the upper base 5 to protect the lower honeycomb structures in one example of the preferable embodiment of the present invention. It is to be noted that as a modification of this embodiment, instead of providing the receiving members 3 on both the surfaces of the base 5, two bases 5 each having the receiving member 3 on the only one surface thereof are used, and the surfaces of the bases which are not provided with the receiving member 3 are stacked with each other, whereby a similar effect can be realized.

[0024] Separately prepared receiving member and base may be combined and bonded if necessary, but when the receiving member and the base are made of the same material of a resin or the like, they may integrally be formed.

[3. Box Member]

[0025] The box member 7 in the present invention surrounds the lower surfaces and side surfaces of the bases 5 and the receiving members 3. The box member 7 is constituted of five rigid panels, and has a rectangular parallelepiped shape provided with an open upper surface. As shown in Fig. 6, the box members 7 of the present embodiment may vertically be stacked via connecting members 9. It is to be noted that the connecting members 9 will separately be described in detail. Moreover, as shown in Fig. 7, the box members 7 are preferably stacked so that at least one side surface of the box member can be opened while an opening in the upper part of the box member is closed. Fig. 7 is a diagram showing that the side surface of the second box member 7 among three stacked box members 7 is opened.

[0026] Such a constitution can specifically be realized as follows. Hinges are attached to the lower end of the rigid panel forming at least one side surface of the box member and the corresponding portion of the rigid panel forming the bottom surface of the box member, and the rigid panel forming the side surface of the box member is rotatable around the hinges. In this case, when engaging means and engaged means are provided around the upper end of the rigid panel forming the side surface and in the corresponding position of the adjacent rigid panel, respectively, the side surface can be opened only when necessary.

[0027] In another preferable example of the embodiment of the box member 7, the box member can be folded so as to superimpose the side surface on the bottom surface and can be made compact when the honeycomb structures are not stored. Such a constitution can be realized, for example, by disposing engaging means and engaged means between the adjacent side surfaces and disposing a hinge between each side surface and the bottom surface.

[0028] There is not any special restriction on the size of the box member 7. However, the bottom surface of the box member 7 preferably has such a size that two to four honeycomb structures are arranged in the longitudinal direction of the honeycomb structures and that about two to eight honeycomb structures are arranged in the direction vertical to the longitudinal direction of the honeycomb structures. Moreover, the box member 7 preferably has such a height that about two to four honeycomb structures disposed so as to have through holes in the horizontal direction thereof are stacked.

[0029] There is not any special restriction on the material of the rigid panels of the box member 7. A net-like material made of a metal such as iron, aluminum or copper is a preferable material because the material has a sufficient rigidity and is lightweight. There is not any special restriction on the configuration of the rigid panels constituting the box member 7 as long as contents do not jump out of the box member but are stored therein and a necessary rigidity can be kept. The configuration of each rigid panel can appropriately be selected from the group consisting of flat plate, corrugated plate, perforated plate and lattice configurations.

[4. Others]

[0030] The connecting member 9 is disposed under the box member 7. This connecting member 9 has a shape complementary to that of a space formed by the upper ends of the side surfaces of the box member 7, and has such a function that any deviation is not generated among stacked box members in a case where the plurality of box members 7 are vertically stacked. Moreover, when one box member is used alone, this connecting member 9 has a function of legs of the box member 7. There is not any special restriction on a material of the connecting member 9, but the same material as that of the box member 7 may be used.

[0031] Moreover, when a plurality of vertically stacked honeycomb structures are stored in the box member 7, an intermediate tray for stacking may be disposed between the lower honeycomb structures and the upper base 5.

[0032] Fig. 8 is a diagram showing a modification of the present invention. In Fig. 8, engaging members 15 are disposed on the corresponding portions of at least a pair of panels facing each other among rigid panels constituting side walls of a box member 7. The engaging members 15 are members which can engage the bases 5 with the rigid panels. The bases 5 are supported by the rigid panels via the engaging members 15. It is to be noted that the engaging members 15 may not be disposed on the side of the rigid panels, but may be disposed on the side of the bases 5. According to such a constitution, when the plurality of honeycomb structures are vertically stored in the box member 7, it is possible to obtain an effect that any load of the upper honeycomb structures or the like is not applied to the lower honeycomb structures. Moreover, an effect of eliminating the instability of the stacking can be produced. Furthermore, the intermediate tray for stacking or the like may not be used.

[0033] A buffer member or the like may be disposed between the box member 7 and the honeycomb structures 11 or the like. According to such a constitution, even when the rigid panels constituting the box member 7 directly come in contact with the honeycomb structures during transport or the like, the honeycomb structures can be prevented from being damaged. Moreover, dust or the like can be prevented from adhering to the honeycomb structures during storage. There is not any special restriction on a material of the buffer member, and a generally broadly used buffer material such as a polyolefin-based resin may be used.

[0034] To prevent the dust or the like from adhering to the honeycomb structures during storage, the outside of the box member 7 may be stretch wrapped in one of preferable embodiments.

[0035] As described above, the package of the present invention can satisfactorily store and efficiently transport the honeycomb structures as products which easily break down, and has a large industrial utility value.

Claims

1. A honeycomb structure package including:

   a plate base;
   a receiving member which is disposed on the base to support the side surface portions of honeycomb structures; and
   a rectangular parallelepiped box member constituted of five rigid panels which surround the lower surfaces and side surfaces of the base and the receiving member.

2. The honeycomb structure package according to claim 1, wherein the box member has, on the lower surface thereof, a connecting member having a shape complementary to that of a space formed by the upper ends of the side surfaces of the box member, whereby a plurality of box members are stacked.

3. The honeycomb structure package according to claim 2, wherein at least one of the side surfaces of the box member is openable while an opening in the upper part of the box member is closed.

4. The honeycomb structure package according to any one of claims 1 to 3, wherein the receiving member has a receiving portion having a shape complementary to that of the side surface portion of each honeycomb structure, and equally supports the side surface portions of the honeycomb structures from the downside thereof.

5. The honeycomb structure package according to any one of claims 1 to 4, wherein the receiving members are disposed on both the surfaces of the plate base.

FIG.1

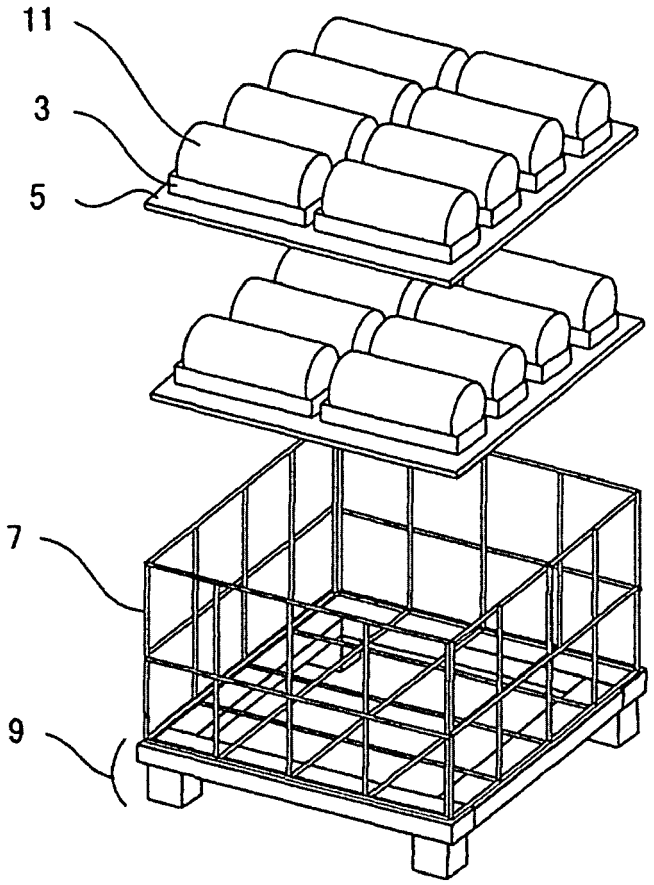


FIG.2

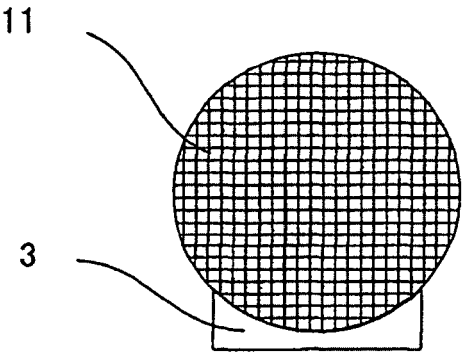


FIG.3

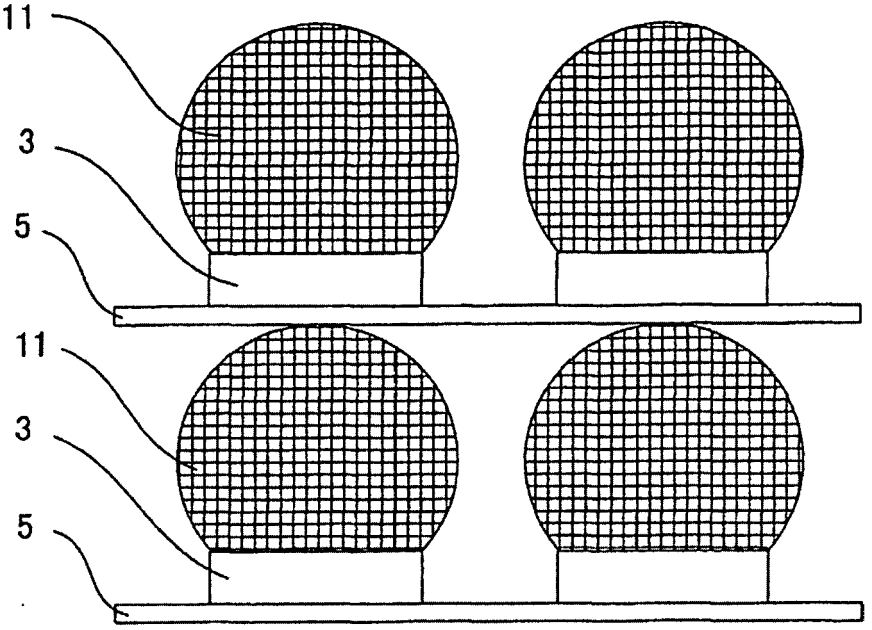


FIG.4

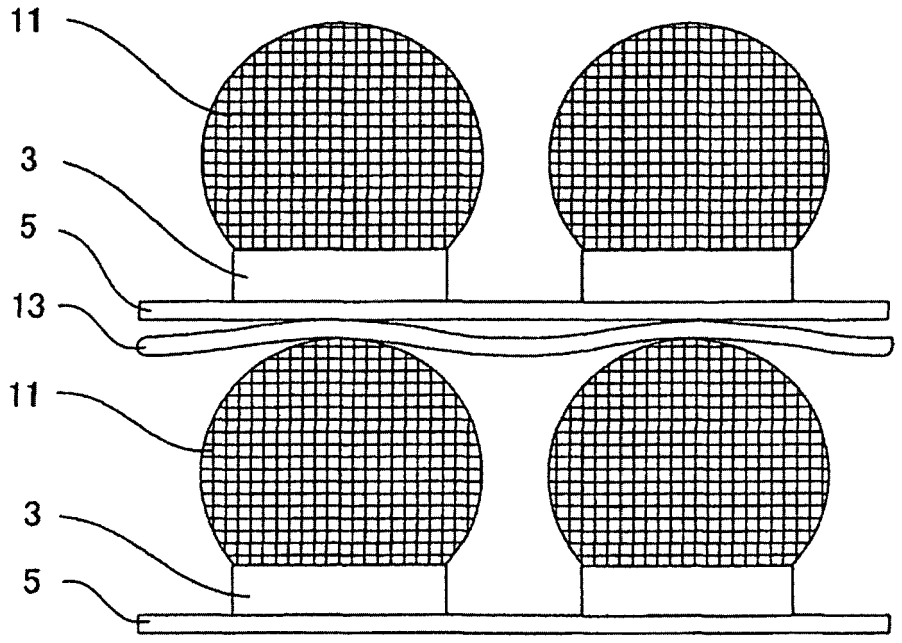


FIG.5

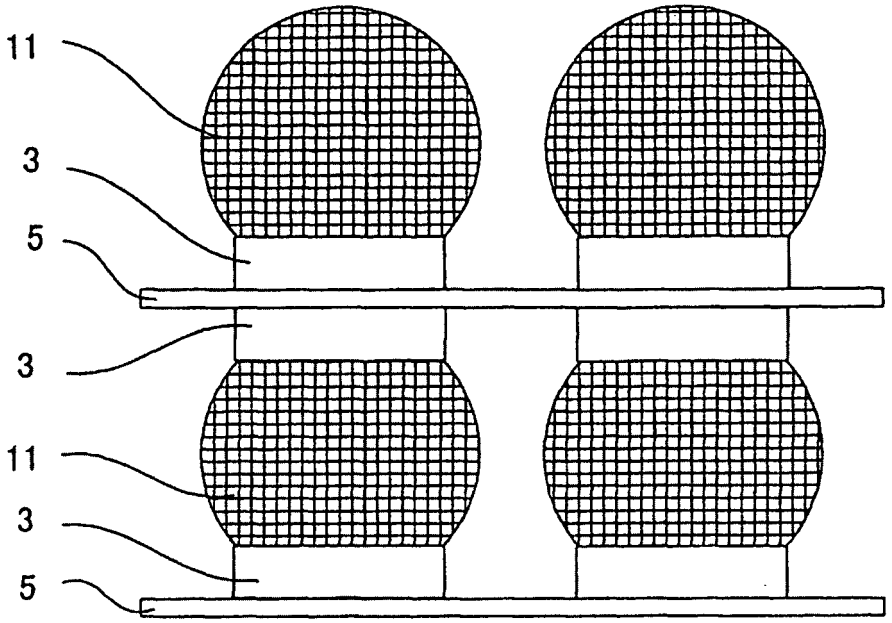


FIG.6

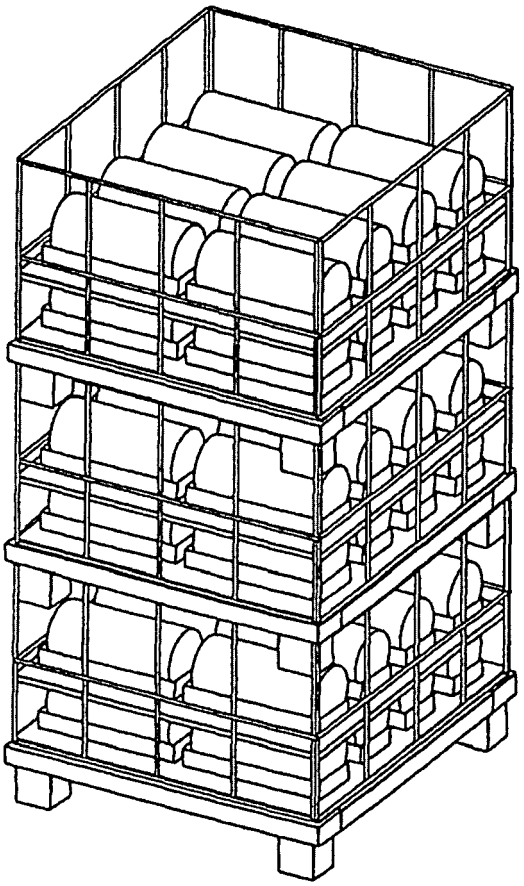


FIG.7

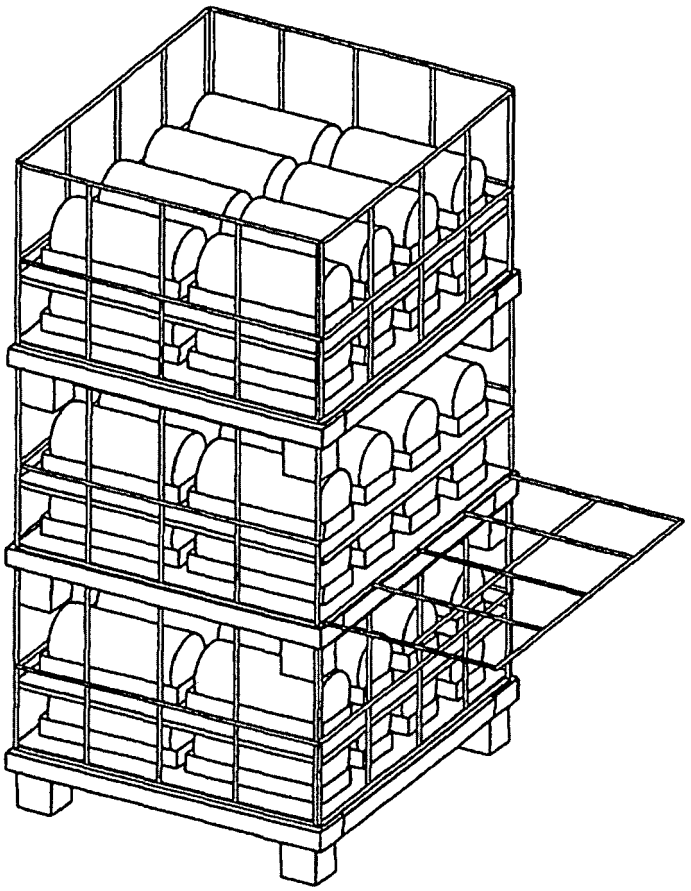


FIG.8

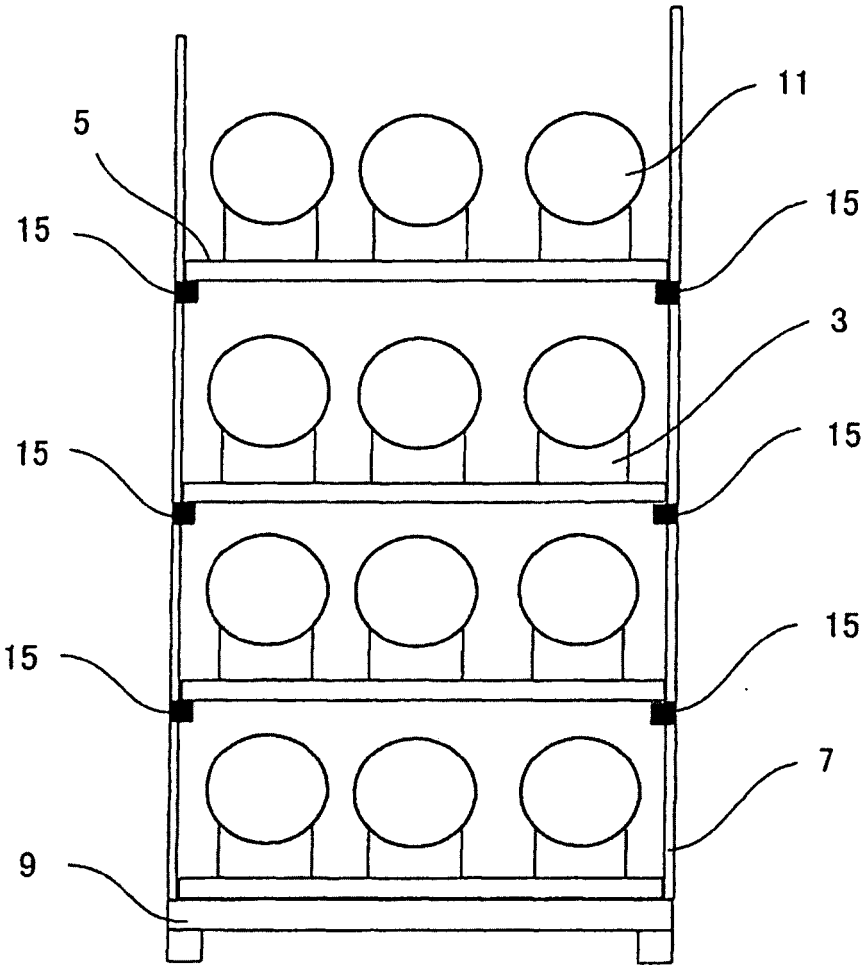


FIG.9

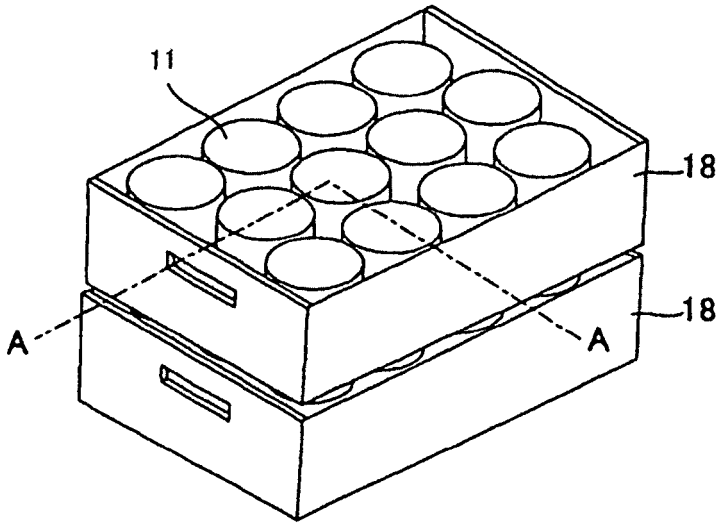
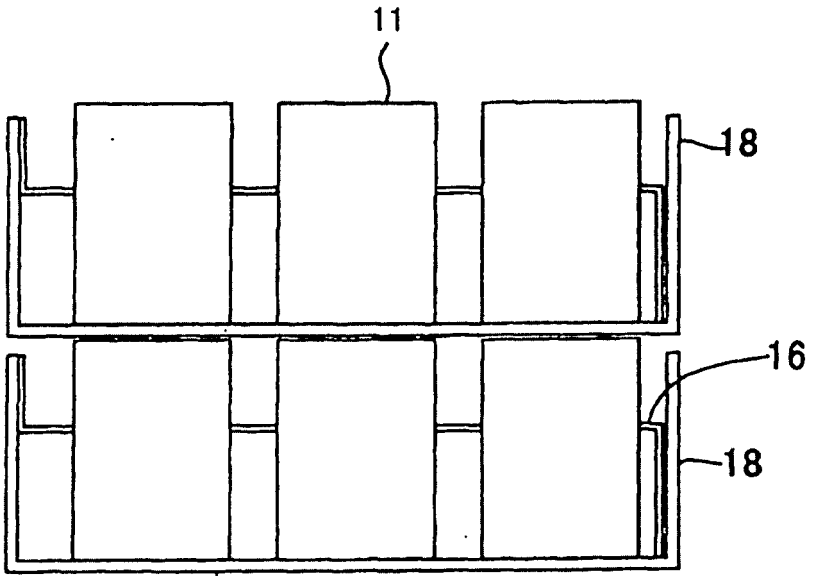


FIG.10



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EUROPEAN SEARCH REPORT

Application Number
EP 09 25 2134

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 792 815 A2 (NGK INSULATORS LTD [JP]) 3 September 1997 (1997-09-03) * page 4, lines 15-51; figures 1-5 *	1-5	INV. B65D21/02 B65D71/00 B65D5/50
X	EP 1 820 741 A1 (NGK INSULATORS LTD [JP]) 22 August 2007 (2007-08-22) * paragraph [0017] - paragraph [0021]; figure 1 *	1-5	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 December 2009	Cazacu, Corneliu

CATEGORY OF CITED DOCUMENTS

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02-12-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0792815 A2	03-09-1997	DE 69709470 D1	14-02-2002
		DE 69709470 T2	14-08-2002
		JP 3005187 B2	31-01-2000
		JP 9226837 A	02-09-1997
		US 5765687 A	16-06-1998
EP 1820741 A1	22-08-2007	US 2007193912 A1	23-08-2007

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Patent documents cited in the description

- JP 2003112771 A **[0003]**