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(71) Applicant: **Ricoh Company, Ltd.**  
**Tokyo 143-8555 (JP)**

(72) Inventors:  
• **Ishikawa, Sakae**  
**Ohta-ku,**  
**143-8555 Tokyo (JP)**

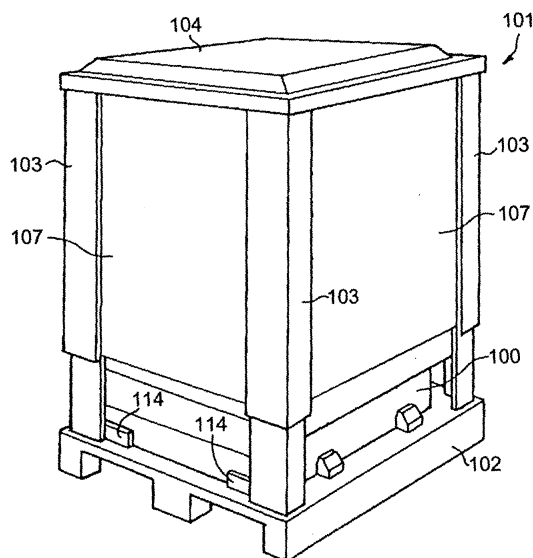
- **Naruishi, Moku**  
Ohta-ku,  
143-8555 Tokyo (JP)
- **Goda, Hideyuki**  
Ohta-ku,  
143-8555 Tokyo (JP)
- **Abe, Tsuyoshi**  
Ohta-ku,  
143-8555 Tokyo (JP)
- **Ishihara, Satoshi**  
Ohta-ku,  
143-8555 Tokyo (JP)
- **Andoh, Toshikazu**  
Ohta-ku,  
143-8555 Tokyo (JP)
- **Kasahara, Rikio**  
Ohta-ku,  
143-8555 Tokyo (JP)

(74) Representative: **Muschke, Markus Artur Heinz**  
**Patentanwälte Schwabe, Sandmair, Marx**  
**Stuntzstrasse 16**  
**81677 München (DE)**

(54) **Packaging device and method of positioning an article**

(57) A packaging device includes a mounting base (102, 502, 602) on which an article is mounted, a top plate member (104, 204) configured to be disposed above the article mounted on the mounting base (102), and a support member (103) that supports the top plate member (104). The support member (103) includes a first member (103a) and a second member (103b). The first member (103a) and the second member (103b) are slidably fitted to each other, so that a length of the support member (103) can be adjusted.

FIG. 1



## Description

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** The present document incorporates by reference the entire contents of Japanese priority documents, 2005-346171 filed in Japan on November 30, 2005, 2005-334119 filed in Japan on November 18, 2005, 2005-256596 filed in Japan on September 5, 2005, 2005-251342 filed in Japan on August 31, 2005, 2005-245920 filed in Japan on August 26, 2005, and 2005-190158 filed in Japan on June 29, 2005.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

**[0002]** The present invention relates to a packaging device and a positioning method for packaging, transporting, delivering, and storing an article such as a copying machine, a printer, and a facsimile machine.

#### 2. Description of the Related Art

**[0003]** Conventionally, packaging materials such as cardboard boxes are used for packaging, transporting, and delivering various articles and products. These conventional packaging materials are stored by users after being unpacked by them, or disposed of as a waste, when they are not necessary.

**[0004]** Recently, to achieve resource savings, recycling is required also for packaging materials for various articles and products. However, conventional packaging materials such as cardboard boxes have low durability, and are not suitable for repeated transportation or storage of the products.

**[0005]** There are also recyclable packaging materials made of resin or metal. However, these conventional packaging materials or other materials such as cardboard boxes have to be prepared to fit with different shapes and sizes for respective models of a product. This makes designing and management of the packaging materials troublesome, and also causes a cost increase.

**[0006]** Therefore, it is considered to use a dolly with casters, as described in Japanese Patent Application Laid-Open No. 2002-264815, to load various products thereon and transport and deliver these products. The dollies with casters are reusable, and can load an apparatus or a product of different shapes and sizes. However, if the product is simply loaded on the dolly, its stability is low, and there is a problem that the product can be damaged during transportation.

**[0007]** For preventing damages of the transported product or the like and loading and packaging the product or the like more firmly, there is a rack disclosed in Japanese Patent Application Laid-Open No. 2001-315777. The rack is mainly for packaging, transporting, and delivering image forming apparatuses such as copying ma-

chines, printers, or facsimile machines and can be recycled. After a product is delivered, the rack can be broken down and carried and stored efficiently.

**[0008]** However, a conventional rack described in Japanese Patent Application Laid-Open No. 2001-315777 has a problem that the type of products that can be loaded and packaged is limited, and hence the rack cannot deal with various products.

**[0009]** It is therefore an object of the present invention to solve the problems in conventional packaging devices, and to provide a packaging device that can be recycled and can deal with various products, and a positioning method.

**[0010]** Furthermore, packaging materials such as cardboard boxes are used for packaging, transporting, and delivering various articles and products. These conventional packaging materials are stored by users after being unpacked by them, or disposed of as a waste, when they are not necessary.

**[0011]** Recently, to achieve resource savings, recycling is required also for packaging materials for various articles and products. However, conventional packaging materials such as cardboard boxes have low durability, and are not suitable for repeated transportation or storage of the products. Therefore, recyclable packaging materials have been proposed in Japanese Patent Application Laid-Open No. 2001-122378 and Japanese Patent Publication No. 3289083.

**[0012]** Furthermore, as the recyclable packaging material in an image forming apparatus such as a copying machine, a printer, a facsimile machine, it has been proposed to package, transport, and deliver the image forming apparatus by the rack described in Japanese Patent Application Laid-Open No. 2001-315777.

**[0013]** In Japanese Patent Application Laid-Open No. 2001-315777, Japanese Patent Application Laid-Open No. 2001-122378, and Japanese Patent No. 328908, it has been proposed to configure the packaging device such that packaging members or a part of the members can be stacked or connected to each other, so that the packaging materials can be made compact at the time of collection or storage.

**[0014]** However, in conventional recyclable packaging materials, for example, in a product such as an image forming apparatus, not only a single product but also optional members and consumables for the product are often delivered together with the product. With respect to such a delivery mode, the conventional packaging materials and racks cannot transport and deliver the optional members and consumables together with the product.

**[0015]** When the rack described in Japanese Patent Application Laid-Open No. 2001-315777 is used, it can be also considered to load the optional members and consumables on a lid (a top plate) of the rack. Conventionally, however, it is not assumed to load the optional members and consumables on the lid, and hence the lid can bend to interfere with the upper surface of the product, thereby damaging the product.

**[0016]** Furthermore, if a distance between the upper surface of the product and the lid is increased to prevent interference between the lid and the product due to bending of the lid, a useless space increases, thereby increasing the volume at the time of transportation. This can cause deterioration of the operation efficiency.

**[0017]** It is therefore an object of the present invention to solve the above problems in conventional packaging devices, and to provide a packaging device that can deliver the optional members and consumables together with the product, and a positioning method, in which even in this case, damages of the product can be prevented and the volume is not increased unnecessarily.

**[0018]** Conventionally, packaging materials such as cardboard boxes are used for packaging, transporting, and delivering various articles and products. These conventional packaging materials are stored by users after being unpacked by them, or disposed of as a waste, when they are not necessary.

**[0019]** Recently, to achieve resource savings, reuse is required also for packaging materials for various articles and products. However, conventional packaging materials such as cardboard boxes have low durability, and are not suitable for repeated transportation or storage of the products.

**[0020]** There are also reusable packaging materials made of resin or metal. However, these conventional packaging materials or other materials such as cardboard boxes have to be prepared to fit with different shapes and sizes for respective models of a product. This makes designing and management of the packaging materials troublesome, and also causes a cost increase.

**[0021]** Therefore, it is considered to use a dolly with casters as described in Japanese Patent Application Laid-Open No. 2002-264815, to load various products thereon and transport and deliver these products. The dollies with casters are reusable, and can load an apparatus or a product of different shapes and sizes. However, if the product is simply loaded on the dolly, its stability is low, and there is a problem that the product can be damaged during transportation.

**[0022]** For preventing damages of the transported product or the like and loading and packaging the product or the like more firmly, there is a rack disclosed in Japanese Patent Application Laid-Open No. 2001-315777. The rack is mainly for packaging, transporting, and delivering the image forming apparatuses such as copying machines, printers, or facsimile machines, and can be recycled. After the product is delivered, the rack can be broken down and carried and stored efficiently.

**[0023]** However, in a process where various products and articles are shipped from a production plant or a warehouse, and delivered to customers, it is common that the products are transported in various traffic types such as by a truck or by a railway container, and handled by various different freight-handling methods. While the products and articles are transported in these traffic types and handled, the products and articles can be vibrated

or impacted. Particularly, in a precision machine like an image forming apparatus, when an excessive impact is applied to the apparatus during transportation and delivery, the apparatus can be damaged.

**[0024]** However, in conventional dollies and racks, a pallet of the dolly or the rack does not have a structure that the impact is absorbed to protect the loaded product or article, and there is a problem that the packaged product or the like can be broken or damaged due to the vibrations or impacts during transportation and delivery.

**[0025]** It is another object of the present invention to solve the problems in conventional packaging devices, and to provide a packaging device and a positioning method that can load various types of products or articles, and can absorb vibrations and impacts during transportation to protect the loaded product or article.

**[0026]** Conventionally, packaging materials such as cardboard boxes are used for packaging, transporting, and delivering various articles and products. These conventional packaging materials are stored by users after being unpacked by them, or disposed of as a waste, when they are not necessary.

**[0027]** Recently, to achieve resource savings, reuse is required also for packaging materials for various articles and products. However, conventional packaging materials such as cardboard boxes have low durability, and are not suitable for repeated transportation or storage of the products.

**[0028]** There are also reusable packaging materials made of resin or metal. However, these conventional packaging materials or other materials such as cardboard boxes have to be prepared to fit with different shapes and sizes for respective models of a product. This makes designing and management of the packaging materials troublesome, and also causes a cost increase.

**[0029]** Therefore, it is considered to use a dolly with casters as described in Japanese Patent Application Laid-Open No. 2002-264815, to load various products thereon and transport and deliver these products. The dollies with casters are reusable, and can load an apparatus or a product of different shapes and sizes. However, if the product is simply loaded on the dolly, its stability is low, and there is a problem that the product can be damaged during transportation.

**[0030]** For preventing damages of the transported product or the like and loading and packaging the product or the like more firmly, there is a rack disclosed in Japanese Patent Application Laid-Open No. 2001-315777. The rack is mainly for packaging, transporting, and delivering image forming apparatuses such as copying machines, printers, or facsimile machines, and can be recycled. After the product is delivered, the rack can be broken down and carried and stored efficiently.

**[0031]** In the rack disclosed in Japanese Patent Application Laid-Open No. 2001-315777, it is described that an article is positioned on the pallet (an article mounting base 3) via article holding members 9 (paragraphs 0036, 0098 to 0100, and Figs. 1 and 24).

**[0032]** However, to maintain the strength of the article holding members 9, it is necessary to increase a fitting hole on the pallet. Furthermore, to fit an installation position of the article holding members 9 to the dimensions of each product, it is necessary to provide more fitting holes on the pallet. Accordingly, when various articles are to be directly loaded on the pallet, rubber legs or casters can interfere with the fitting holes on the pallet and fall therein.

**[0033]** Many fitting holes 48 for fitting the article holding members 9 are formed on the pallet (the article mounting base 3) (paragraph 0100), and once the article holding members are detached, it is hard to find to which fitting holes 48 the article holding members 9 need to be fitted.

## SUMMARY OF THE INVENTION

**[0034]** It is an object of the present invention to at least partially solve the problems in the conventional technology.

**[0035]** A packaging device according to one aspect of the present invention includes a mounting base on which an article is mounted; a top plate member configured to be disposed above the article mounted on the mounting base; and a support member that supports the top plate member. The support member includes a first member and a second member. The first member and the second member are slidably fitted to each other, so that a length of the support member can be adjusted.

**[0036]** A method of positioning an article, according to another aspect of the present invention, includes mounting the article on a mounting base; setting a position of a lower part of one side of the article by pressing the lower part of the one side of the article against a positioning member fixed on the mounting base; setting a position of a lower part of other side of the article by mounting a base and a cap member on the mounting base; pressing a front surface of the article by an article pressing member mounted on a support member by mounting the support member on the mounting base; and engaging a top plate member with a top portion of the support member.

**[0037]** A method of positioning an article, according to still another aspect of the present invention, includes mounting a support member with an article pressing member on a side adjacent to a side of a positioning member fixed on a mounting base; mounting the article on the mounting base; setting positions of two sides of the article by pressing the article against the support member; setting positions of other two sides of the article by mounting a base and a cap member to the mounting base; pressing the sides of the article by an article pressing member mounted on the support member by mounting another support member to the mounting base; and engaging a top plate member with a top portion of the support member.

**[0038]** The above and other objects, features, advantages and technical and industrial significance of this in-

vention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

### [0039]

Fig. 1 is a perspective view of a state where a product is packaged according to one example of a packaging device in an embodiment of the present invention;

Fig. 2 is an exploded view of a schematic configuration of the packaging device;

Fig. 3 is a sectional view of a pallet and a top plate; Figs. 4A and 4B are block diagrams of a support;

Fig. 5 is a sectional view of the support;

Fig. 6 is a plan view of a stopper;

Fig. 7 is a perspective view of a state where the stopper is attached to the support;

Figs. 8A and 8B are schematic explanatory diagrams of an attaching/detaching operation of the stopper;

Fig. 9 is a partial enlarged view of a support fitting unit provided in the pallet;

Fig. 10 is a partial enlarged view of a lock mechanism between the support and the pallet;

Fig. 11 is a partial enlarged view of a mounting portion and a lock mechanism between the support and the top plate;

Fig. 12 is a front view of a state where a surface plate is inserted in between two supports and held therein;

Fig. 13 is a partial enlarged view of a spacer attached to the support;

Fig. 14 is a partial enlarged view of a spacer attaching portion as viewed from above;

Fig. 15 is a partial enlarged view of a state where the spacers are accommodated along the top plate;

Fig. 16 is a back view of a base of the spacer;

Figs. 17A, 17B, and 17C are three-side views of a pad of the spacer;

Fig. 18 is a partial enlarged view of an initial state when the pad is set to the base of the spacer;

Fig. 19 is a partial enlarged view of a state where the pad is locked to the base of the spacer;

Fig. 20 is a perspective view of another example of the spacer;

Figs. 21A, 21B, and 21C are perspective views of still another example of the spacer;

Figs. 22A and 22B are respectively a plan view and a front view of a stay attached between the supports;

Figs. 23A and 23B are partial enlarged views of an engaging portion to be engaged with the support, which is provided on the stay;

Fig. 24 is a partial enlarged view of a lock mechanism to be locked to the support, which is provided on the stay;

Fig. 25 is a partial enlarged view of a state where

the stay is attached to the support;

Fig. 26 is a front view of the packaging device in which the stay is attached between the supports;

Fig. 27 is a side view of the packaging device in which the stay is attached between the supports;

Fig. 28 is a perspective view of a configuration example in which the surface plate is not mounted between the supports;

Fig. 29 is a front view of the stopper including a reinforcing rib in an arm;

Fig. 30 is a perspective view of a state where a product is packaged according to one example of a packaging device in another embodiment of the present invention;

Fig. 31 is an exploded view of a schematic configuration of the packaging device;

Fig. 32 is a sectional view of the pallet and the top plate of the packaging device;

Fig. 33 is a top view of the top plate;

Fig. 34 is a bottom view of the top plate;

Fig. 35 is a sectional view of the mounting portion and the lock mechanism between the support and the top plate;

Fig. 36 is an enlarged view of an upper surface of the lock mechanism;

Fig. 37 is an enlarged view of an engaging portion provided on the top plate;

Fig. 38 is a sectional side view of the top plate, depicting an engaging convex portion provided at the back of the top plate;

Fig. 39 is an explanatory diagram of a deviation when the top plates are stacked;

Figs. 40A and 40B are respectively a partial perspective view and an enlarged view of the back of the top plate, depicting the engaging convex portion shown in Fig. 38;

Fig. 41 is a perspective view of the top plate, depicting a deviation preventing unit provided in a peripheral part of the upper surface of the top plate;

Fig. 42 is an enlarged view of a pallet positioning unit provided in the top plate;

Fig. 43 is an enlarged view of a state where the pallet is stacked on the top plate;

Fig. 44 is a front view of a state where the packaging device is stacked;

Fig. 45 is a partial enlarged view of an IC tag as an information holding unit attached to the top plate;

Fig. 46 is a front view of an IC tag holder;

Fig. 47 is a partial enlarged view of a holder supporting unit of the top plate;

Fig. 48 is an exterior view of a packaging device according to still another embodiment of the present invention, using four sidewall members as the top plate support member;

Fig. 49 is an exterior view of a packaging device according to the still another embodiment, using two sidewall members as the top plate support member;

Fig. 50 is a perspective view of a state where a prod-

uct is packaged according to one example of the packaging device according to still another embodiment of the present invention;

Fig. 51 is an exploded view of a schematic configuration of the packaging device;

Fig. 52 is a sectional view of the pallet and the top plate in the packaging device;

Fig. 53 is a partial enlarged view of the support fitting unit provided in the pallet;

Fig. 54 is a partial enlarged view of the lock mechanism between the support and the pallet;

Fig. 55 is top view of the pallet;

Fig. 56 is a front elevation perspective view of a pallet mounted with a detachable positioning member;

Figs. 57A and 57B are respectively a sectional side view and a back view of a backing plate of the pallet;

Fig. 58 is a top view of the pallet without the backing plate, depicting a buffer member arranged below the backing plate;

Fig. 59 is a plan view of a basic shape of a first buffer member (low-foamed buffer member);

Fig. 60A and 60B are plan views of a developed state and a folded state of a second buffer member;

Fig. 61 is a schematic diagram of an arrangement of the first buffer member on the pallet as viewed from the front and above;

Fig. 62 is a back view of a state where the first buffer member is fitted to the back of the backing plate;

Figs. 63A to 63D are partial perspective views of an example of the engaging convex portion provided in the rib at the back of the backing plate;

Fig. 64 is a perspective view of another example of the pallet;

Fig. 65 is a perspective view of still another example of the pallet;

Fig. 66 is a perspective view of another example of the backing plate, which is the article mounting base of the pallet;

Fig. 67 is a perspective view of still another example of the backing plate, which is the article mounting base of the pallet;

Fig. 68 is a perspective view of still another example of the backing plate, which is the article mounting base of the pallet;

Fig. 69 is a perspective view of a state where a product is packaged by a packaging rack, using one example of the packaging device according to still another embodiment of the present invention;

Fig. 70 is an exploded view of a schematic configuration of the packaging rack;

Fig. 71 is a sectional view of the pallet and the top plate;

Fig. 72 is a partial perspective view of a support fitting unit provided in the pallet;

Fig. 73 is a partial perspective view of the lock mechanism between the support and the pallet;

Fig. 74 is a top view of the pallet;

Fig. 75 is a perspective view of the pallet;

Fig. 76 is a side view of the detachable positioning member;

Fig. 77 is a bottom view of a cap of the detachable positioning member;

Figs. 78A and 78B are respectively a plan view and a sectional side view of a base of the detachable positioning member;

Fig. 79 is a schematic diagram of a diamond shape formed by small holes in four types of mounting holes provided in the pallet;

Fig. 80 depicts a state where the detachable positioning member is mounted on the pallet in a perspective view;

Fig. 81 is an explanatory diagram of a positioning and fixing method when a product is loaded on the pallet;

Fig. 82 is a front view of a state where the pallets are stacked;

Fig. 83 is a perspective view of the pallet, depicting a holder holding portion provided on the side of the pallet;

Fig. 84 is a front view of the holder that accommodates and holds an IC tag;

Fig. 85 is a back view of the holder;

Fig. 86 is a longitudinal cross section of the holder; and

Fig. 87 is a schematic diagram of a work for shifting the arranged pallets.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0040]** Exemplary embodiments of the present invention will be explained in detail below with reference to the accompanying drawings.

**[0041]** Fig. 1 is a perspective view of a state where a product is packaged according to one example of a packaging device according to an embodiment of the present invention, and Fig. 2 is an exploded view of a schematic configuration of the packaging device.

**[0042]** As shown in Figs. 1 and 2, a packaging device 101 according to the present embodiment includes a pallet 102, which is a mounting base that mounts a product 100 thereon, four supports 103 fitted to four corners of the pallet 102 and arranged in an upright mode, a top plate (lid) 104 mounted on above the respective supports 103, and a surface plate 107 put between the respective supports 103.

**[0043]** The pallet 102 is made of resin according to the present embodiment, and fork insertion holes 102a for inserting forks of a forklift are provided therein. Furthermore, a concave portion 102b is formed on the upper surface of the pallet, by depressing the upper surface downward, leaving the outer periphery thereof, and buffer members 108 are arranged in the concave portion 102b. A backing plate 106 is fitted from above of the buffer members 108, so that when the backing plate 106 is fitted, there is no difference in level between the upper

surface of the backing plate 106 and the upper surface of the pallet (upper surface of the outer periphery). Therefore, since the height of the upper surface of the outer periphery of the pallet and the height of the upper surface of the backing plate 106 match each other to form a flat surface, the product can be easily shifted and workability can be improved when the product having casters is loaded. A fitting portion 102c for attaching the support 103 is provided at four corners of the outer periphery of the pallet.

**[0044]** The backing plate 106 has a shape that covers the concave portion 102b on the upper surface of the pallet, and the upper surface of the backing plate (a product mounting surface) is formed in a planar shape without unevenness. On the other hand, a rib (not shown) is provided in a protruding state at the back of the backing plate opposite to the product mounting surface, so that the backing plate is not broken, while maintaining predetermined flexibility with respect to the weight of the article mounted on the backing plate 106. The shape of the rib at the back of the backing plate has diagonally crossing for giving a higher strength in portions where legs of the product (casters or the like) are mounted, as in a case that an image forming apparatus is packaged as a product as shown in Fig. 1, however, parallel to the four sides on the outer periphery of the backing plate for giving flexibility in other portions. Since stress concentrates on the central part due to flexure of the backing plate, a drawn part (not shown) is provided in the central part of the backing plate 106 for enduring the stress. The drawn part is provided such that a plate thickness thereof is thicker than that of other parts (the peripheral part). In this example, the pallet 102 and the backing plate 106 are formed of the same material (resin according to the present embodiment). When the service life of the pallet 102 and the backing plate 106 comes to an end, the pallet 102 and the backing plate 106 are melted together and can be reused as a recycled material.

**[0045]** The buffer members 108 arranged in the concave portion 102b of the pallet 102 are formed of a foam material according to the present embodiment, and two types of materials, that is, a material having a low foaming ratio (a low-foamed buffer member) and a material having a high foaming ratio (a high foamed buffer member) are used. The low-foamed buffer member is arranged in a portion weighted by legs (casters or the like) of the product to be mounted, and the high foamed buffer member is arranged in other portions. As a result, the weight applied to the backing plate 106 corresponding to the legs of the product is absorbed by the low-foamed buffer member, and the weight applied to the backing plate 106 corresponding to portions between the legs of the product is absorbed by the high foamed buffer member due to flexure of the backing plate 106, with respect to vertical vibrations at the time of transportation. Accordingly, the impact transmitted to the mounted product can be alleviated.

**[0046]** The top plate 104 is mounted on the supports

103, so as to cover the upper part of the product mounted on the backing plate 106. The top plate 104 and the respective supports 103 are detachably engaged with each other by an engaging portion. As shown in Fig. 3, a central part 104a of the top plate is provided in a protruding state upward from a peripheral part 104b, and the central part 104a and the peripheral part 104b are connected by oblique sides 104c. Since the central part 104a of the top plate protrudes upward from the peripheral part 104b, the strength can be improved more than a case that the top plate has a simple planar shape.

**[0047]** The packaging device 101 according to the present embodiment is constructed such that the pallet 102 can be stacked on the top plate 104 so that the packaging devices 101 can be stacked on each other, and legs 102d of the pallet 102 can be stacked and mounted on the peripheral part 104b of the top plate 104 (Figs. 3 and 12). A positioning unit (not shown) is provided on the front, back, left and right on the surface of the top plate so as to position the pallet 102 when the pallet 102 is mounted on the top plate 104. The top plate 104 can be also stacked on each other. At this time, since the top plate has the shape protruding at the central part, the top plate on the lower side is fitted into the top plate on the upper side, and even if the top plates 104 are stacked in multi stages, the top plates 104 do not collapse.

**[0048]** The support 103 includes a first member (upper support) 103a and a second member (lower support) 103b in a substantial L-shape in cross section, and is formed so that the length can be adjusted by superposing an upper support 103a and a lower support 103b on each other. As shown in Fig. 4A, a plurality of engaging holes 131 is provided for each of the upper support 103a and the lower support 103b, and the support 103 is formed (as shown in Fig. 4B) by putting the engaging holes 131 of the both supports together so that the support 103 has a predetermined height (length) and attaching a stopper 133, which is a fixing unit, on the engaging holes 131. According to the present embodiment, four engaging holes 131 are provided in the upper support 103a, and three engaging holes 131 are provided in the lower support 103b.

**[0049]** Fig. 5 depicts cross section of the support 103, and a state where the stopper 133 is attached to the support 103. Fig. 6 is a plan view of the stopper 133. Fig. 7 is a perspective view of a state where the stopper 133 is attached to the support 103.

**[0050]** As shown in Figs. 5, 6, and 7, the stopper 133 includes two arms (support insertion units) 133a and 133b. An engaging portion 133c that engages with the support to prevent the stopper 133 from coming off is provided at the end of the arm 133a on one side. The engaging portion 133c is formed by a slit 133e at the end of the arm 133a on one side, and can bend by resilience of the member. The outer end of the oblique side of the engaging portion 133c protrudes (protrudes in a direction of the arm 133b on other side) as a jaw 133d. When the stopper 133 is inserted into the engaging holes 131 of

the support 103, the oblique side of the engaging portion 133c is pressed by the support and the engaging portion 133c bends inward (toward the arm 133a side). When the engaging portion 133c protrudes inward of the lower support 103b, the pressing by the support is released, and the jaw 133d engages with the inner surface of the lower support 103b, to prevent the stopper 133 from coming off. That is, the engaging portion 133c is energized in a locking direction by the resilience of the stopper 133, and the stopper 133 can be reliably prevented from coming off at the time of attaching the stopper 133 on the support 103.

**[0051]** Figs. 8A and 8B are schematic explanatory diagrams of an attaching/detaching operation of the stopper 133.

**[0052]** The arms 133a and 133b of the stopper 133 have a hollow cylindrical shape, and a cylindrical space thereof is opened to an outer end surface of the stopper 133 (as shown in Fig. 8B), to form a holding part 133f. When the stopper 133 is detached from the support 103, put fingers on the holding part 133f to hold the stopper 133 between the fingers, and pull out the stopper 133 from the support, while pressing the engaging portion 133c inward (to a direction of releasing the lock) by the fingers. Alternatively, the upper and lower sides (in Fig. 8B, the left and right) of a junction 133g for connecting the arms 133a and 133b can be held by fingers to pull it out. The inside of the junction 133g has a rib structure where a cruciform rib is provided, so that the weight of the member is decreased, and a sufficient strength is ensured.

**[0053]** On the other hand, the respective engaging holes 131 of the upper support 103a and the lower support 103b are formed of a pair of holes 131a and 131b provided for each side of the support having the substantial L-shape in cross section, corresponding to The arms 133a and 133b of the stopper 133. The superposed upper support 103a and lower support 103b are fixed and latched by the stopper 133 by inserting the stopper 133 into the engaging holes 131 formed of the holes 131a and 131b, to form one support 103.

**[0054]** According to the present embodiment, the holes 131a and 131b forming the respective engaging holes 131 are respectively provided at 45 degrees on the respective sides, putting the corners of the upper support 103a and the lower support 103b having the substantial L-shape in cross section therebetween, The arms 133a and 133b of the stopper 133 are respectively fitted to the holes 131a and 131b on the respective sides, and the upper support 103a and the lower support 103 are latched to each other.

**[0055]** As shown in Fig. 5, convex portions 134a and 134b (hereinafter, 134a and 134b are collectively referred to as 134) are formed on the outer surface of the upper support 103a and the lower support 103b and concave portions 135a and 135b (hereinafter, 135a and 135b are collectively referred to as 135) are formed on the inner surface thereof. The convex portions 134 and the

concave portions 135 are extended along the longitudinal direction of the support 103 and provided in a plurality of numbers with an appropriate space therebetween in a cross sectional direction of the support. According to the present embodiment, three convex portions 134 are provided on the long side of the support having a substantial L-shape in cross section, and one convex portion 134 is provided on the short side. Three concave portions 135 are also provided on the long side of the substantial L-shape in cross section, and one concave portion 135 is provided on the short side. Since the respective convex portions 134 of the lower support 103b are fitted to the respective concave portions 135 of the upper support 103a, the upper support 103a and the lower support 103b are integrally formed slidably in a longitudinal direction, and the length (the height of support) becomes adjustable. That is, the convex portions 134 and the concave portions 135 function as a slide rail.

**[0056]** The convex portion 134a and the concave portion 135a at the center of the three convex portions 134 and the concave portions 135 on the long side of the L shape, and the convex portion 134a and the concave portion 135a on the short side of the L shape, of the convex portions 134 and the concave portions 135 provided on the upper support 103a and the lower support 103b, have a dovetail tenon shape. Therefore, when the both convex portion and concave portion are fitted to each other, these do not come off. Accordingly, the superposed upper support 103a and lower support 103b are fitted to each other, so as to be slidable in the longitudinal direction, and not to come off from each other.

**[0057]** As shown in Fig. 4, a base 132 to be inserted into and fitted to the fitting portion 102c provided at four corners of the pallet is provided at the lower end of the lower support 103b. A support lock member 124 is equipped in the fitting portion 102c of the pallet, and a fitting hole (not shown) is provided at a corner of the base 132 on the lower support 103b, into which the support lock member is inserted.

**[0058]** Figs. 9 and 10 are partial enlarged views of the fitting portion 102c provided at four corners of the pallet 102 in detail. As shown in Figs. 9 and 10, the fitting portion 102c has a substantial L-shape corresponding to the support 103 having the substantial L-shape in cross section. Two pairs of ribs 121 are provided in a protruding state on the long side of the L-shape of the fitting portion 102c, and a pair of ribs 121 on the short side of the fitting portion 102c, on the wall of the fitting portion 102c. When the support 103 (lower support 103b) is fitted to the fitting portion 102c and arranged in an upright mode, the ribs 121 abut against the wall of the base 132 of the lower support 103b from outside, so that the lower support 103b is tightly fitted to and supported by the fitting portion 102c. A fitting shaft 122 is arranged in an upright mode from the bottom at the corner of the fitting portion 102c. The fitting shaft 122 fits into a fitting space 136 (Fig. 5) formed at the corner of the lower support 103b, so that the lower support 103b is tightly fitted to and supported by the fitting

portion 102c. The lower support 103b is reliably fitted to the fitting portion 102c by the ribs 121 and the fitting shaft 122, and the support 103 is securely arranged in an upright mode on the pallet 102.

**[0059]** The support lock member 124 is fitted into a holding portion 123 and held at a position outside of the corner of the fitting portion 102c. The support lock member 124 includes a lock pin 124a, and is slidable in the holding portion 123. A hole (not shown) is formed on the inner wall of the holding portion 123, and the lock pin 124a can protrude from the hole. As shown in Fig. 9, when the support lock member 124 is moved to the outside, the lock pin 124a is withdrawn in the holding portion 123, and the lock between the lower support 103b and the fitting portion 102c is released. As shown in Fig. 10, when the support lock member 124 is moved to the inside, the lock pin 124a protrudes into the fitting portion 102c, and fitted to the fitting hole (not shown) provided on the base 132 of the lower support 103b, so that the lower support 103b is locked by the fitting portion 102c (on the pallet 102).

**[0060]** Fig. 11 is a sectional view of a mounting portion and a lock mechanism between the support 103 and the top plate 104. As shown in Fig. 11, a slide member 111, which is the support lock member, is held by the top plate 104 slidably in the left and right direction. Lock pins 111a (L) and 111a (R) are provided in a protruding state on the opposite sides of the slide member 111, so that the lock pin 111a (L) can protrude into a support fitting portion provided in the top plate 104.

**[0061]** On the other hand, an insertion hole 137, into which the lock pin 111a (L) of the slide member 111 is inserted, is provided on the upper inner wall of the upper support 103a. As shown in Fig. 11, the lock pin 111a (L) is fitted in the fitting hole 137 on the upper support 103a and the top plate 104 is locked to the upper part of the support, by mounting the top plate 104 on the support 103 (upper support 103a) and sliding the slide member 111 to the position shown in Fig. 11.

**[0062]** As shown in Fig. 5, surface plate holding portions 138 for holding by insertion a surface plate for protecting the side of the product to be mounted are respectively formed on the opposite ends in a cross sectional direction of the upper support 103a and the lower support 103b. When the supports 103 are arranged in an upright mode on the pallet 102, the sides, the front, or the back of the product mounted on the pallet 102 can be protected by the surface plate 107 by inserting the surface plate in between the respective supports and holding the surface plate. Fig. 12 depicts a state where the surface plate is inserted in between the supports 103 and held by a stopper 107a. In Fig. 12, a state where two packaging devices 101 are stacked is shown. In this case, the pallet 102 of an upper packaging device 101 is mounted on and fitted to the top plate 104 of a lower packaging device 101 and positioned, so that the upper packaging device is not shifted.

**[0063]** Swing in the left and right direction in Fig. 12 is

alleviated by the support 103 and the surface plate 107. When the top plate 104 is mounted on the support 103 fitted to the pallet 102, if the surface plate is not used, a barycentric position is shifted to the outside due to the weight of the support 103a. Therefore, the positions of the top of the supports are not fixed, and it can be difficult to engage the supports with the engagement portions of the top plate. Therefore, by inserting the surface plate 107 in between the supports, the top of the support is positioned, thereby enabling easy engagement between the support and the engagement portions of the top plate 104.

**[0064]** In the packaging device 101 in the embodiment, since the two supports 103, that is, the upper support 103a and the lower support 103b, are used so that the length (height) of the support 103 can be adjusted, the length of the support 103 can be set corresponding to the size and the height of the product to be packaged and mounted. Accordingly, the packaging device can be used for various products.

**[0065]** Since the length (height) of the support 103 can be adjusted in a plurality of steps, and the stopper 133 can lock the state, when the length (height) of the support is variable, the adjusted length (height) of the support can be reliably maintained.

**[0066]** Since the stopper 133 has two latches (arms 133a and 133b), a latching force in one latch increases, and the upper support 103a and the lower support 103b can be reliably latched.

**[0067]** In the engaging hole 131 on the support side to which the stopper 133 is fitted, the holes 131a and 131b corresponding to The arms 133a and 133b of the latch member are respectively arranged on the respective sides of the support, putting the corner of the support having the substantial L-shape in cross section therebetween. Therefore, The arms 133a and 133b of the latch member are respectively latched with respect to the respective sides, putting the corner of the supports 103 (103a and 103b) having the substantial L-shape in cross section therebetween. As a result, since the support and the latch member are hardly shifted even when an external force (specifically, a force in a lateral direction) is applied, and a connecting force (latching force) between the support 103 and the stopper 133 can be strongly maintained. Consequently, engagement between (superposition of) the upper support 103a and the lower support 103b can be strongly maintained.

**[0068]** Since the engaging portion 133c for preventing the stopper 133 from coming off from the support 103 is provided in the stopper 133, the connecting force (engaging force) between the support 103 and the stopper 133 can be easily and reliably obtained. Furthermore, since the engaging portion 133c is energized in a locking direction by using the resilience of the stopper 133, the stopper 133 is reliably prevented from coming off from the support 103. On the other hand, since the engaging portion 133c can be shifted (displaced) to an engagement releasing position by using the resilience of the stopper

133, when the length of the support 103 is adjusted, the engagement can be released easily by an operator by pressing the engaging portion 133c to an engagement releasing direction, and holding the holding part 133f or the junction 133g to pull it out.

**[0069]** In a recyclable and circulative packaging device, it is necessary to collect the device after the delivery of products to a user. At the time of collection, in the packaging device 101 according to the present embodiment, the length (height) of the support 103 can be reduced. In other words, at the time of delivery of the product, the support of the two-support structure is adjusted to a length corresponding to the height of the product. The support 103 formed of the upper support 103a and the lower support 103b is slidable to each other by removing the stopper 133, and the length thereof can be reduced substantially to the length of one of the upper support 103a and the lower support 103b. Furthermore, according to the present embodiment, since the upper support 103a and the lower support 103b slide to each other by fitting the respective convex portions 134 of the lower support 103b to the respective concave portions 135 of the upper support 103, the length thereof can be reduced, with the upper support 103a and the lower support 103b being integrated, these can be handled easily, and a transportation space and a storage space can be reduced. In addition, the upper support 103a and the lower support 103b are not disjointed, and one support 103 can be stored reliably. If the stopper 133 is attached, in a state where the length of the upper support 103a and the lower support 103b is shortened, not only the support can be held in the shortened state, but also loss of the stopper 133 can be prevented.

**[0070]** As shown in Fig. 1, in the packaging device 101 according to the present embodiment, a spacer 114 is appropriately attached to the support 103, and the space between the support 103 and the mounted product is closed to prevent shaking or shift of the product. The spacer 114 can be attached either on the upper support 103a or on the lower support 103b.

**[0071]** Fig. 13 depicts the spacer 114 attached to the support 103 (the lower support 103b) as viewed from the back of the support 103. Fig. 14 is a schematic diagram of a spacer attaching portion as viewed from above. As shown in Figs. 13 and 14, the spacer 114 includes a base 115 and a pad 116. A mounting cylinder 115a (Fig. 16) is provided in a protruding state at the back of the base 115, and the mounting cylinder 115a is fitted to the concave portion 135a of the support 103 (the upper support 103a and the lower support 103b), thereby attaching the spacer 114 at an appropriate position of the support. The point of the mounting cylinder 115a is a large diameter portion, and the large diameter portion is fitted to the concave portion 135a (Fig. 5) in the dovetail tenon shape, of the concave portions 135 of the support 103 (the upper support 103a and the lower support 103b), to prevent the spacer 114 from coming off. As shown in Fig. 15, the spacer 114 can be attached, with the direction being

changed. Fig. 15 depicts a state where the spacer 114 is accommodated along the support 103.

**[0072]** Fig. 16 is a back view of the base 115. As shown in Fig. 16, the mounting cylinder 115a is provided in a protruding state at the back of the base 115. Two set holes 115b and 115c for setting the pad 116 are formed on the base 115. The set hole 115b has a keyhole shape. As shown in an enlarged view, the other set hole 115c has an apex 115d where two semicircles intersect, and a square notch 115e.

**[0073]** Figs. 17A, 17B, and 17C are three-side views of the pad 116. As shown in Figs. 17A to 17C, a body 116a of the pad 116 is formed in a bellows shape so as to be stretchable. Two latches 116b are provided in a protruding state on the back (on the mounting surface side to the base 115) of the body 116a. The latches 116b include a substantially cylindrical portion 116c and a flat portion 116d. The end of the flat portion 116d protrudes to the side, and becomes a coming-off preventing portion 116e. An insertion port 116f for injecting (inserting) the buffer member such as beads into the body 116a is provided in the substantially cylindrical portion 116c. The insertion port 116f is a ventilation port for alleviating the impact on the product.

**[0074]** As explained with reference to Fig. 16, the set holes 115b and 115c are formed on the base 115 of the spacer 114. When the pad 116 is mounted on the base 115, as shown in Fig. 18, the pad 116 is slightly inclined with respect to the base 115, and the coming-off preventing portion 116e of one latch 116b (the right side in Fig. 18) on the pad 116 is inserted into the set hole 115b of the base 115. Since the coming-off preventing portion 116e is projected from the end of the flat portion 116d to the side, the coming-off preventing portion 116e can fit into the back side of the base from the right end of the set hole 115b. Therefore, the latch 116b on the other side (left side in Fig. 18) of the pad 116 can be inserted into the notch 115e (see the enlarged view in Fig. 16) of the other set hole 115c on the base 115. In this state, the pad 116 is pressed against the base 115, thereby fitting the catches 116b on the pad 116 to the set holes 115b and 115c on the base 115. As shown in Fig. 19, when the base 115 and the pad 116 are rotated so as to become parallel to each other, the coming-off preventing portion 116e formed on the other latch 116b (the left side in Fig. 19) on the pad 116 is latched by an engaging portion 115f (Fig. 18) of the base 115. At this time, the coming-off preventing portion 116e formed on the latch 116b on the right side in Fig. 19 is also latched by the back of the base. Accordingly, the pad 116 is mounted on the base 115, to form the spacer 114.

**[0075]** As shown in the enlarged view in Fig. 16, since the apex 115d where the two semicircles intersect is provided in the other set hole 115c on the base, when the pad 116 is mounted on the base 115 and the substantially cylindrical portion 116c of the latch 116b on the pad 116 is fitted to the lower semicircle in Fig. 19, the substantially cylindrical portion 116c is not shifted (does not come off)

upward due to the presence of the apex 115d, thereby preventing the pad 116 from carelessly coming off from the base 115. According to the present embodiment, further, since the respective ends of the catches 116b on the pad 116 constitute the coming-off preventing portion 116e and are engaged with the back of the base, the pad 116 can be reliably prevented from coming off.

**[0076]** While the inside of the pad 116 can be hollow, by filling the buffer member such as beads, the product can be efficiently pressed. Particularly, when the product load is applied on the pad 116, deformation of the pad can be advantageously suppressed. In the pad 116, the left side in Fig. 17C forms an abutting surface on the product (a product pressing surface).

**[0077]** Fig. 20 is a perspective view of another example of the spacer. A spacer 114B shown in Fig. 20 includes a base 117 and a pad 118. The pad 118 is foldable, and the pad 118 can be unfolded as shown in the left drawing, or can be folded as shown in the right drawing. A spacer adjusted to the product size can be realized by folding or unfolding the pad 118, matched with the product to be mounted. The configuration of a portion on which the pad 118 is mounted on the base 117 is the same as that of the spacer 114. The buffer member such as beads can be filled in the pad 118.

**[0078]** Figs. 21A, 21B, and 21C are three-side views of still another example of the spacer, and are respectively a side view, a plan view, and a back view in order from above. A spacer 114C shown in Figs. 21A to 21C includes a base 115C and a pad 116C. The pad 116C is made of polypropylene according to the present embodiment, and as shown in the back view, engaging portions 116g and 116h to be inserted into the fitting hole on the base 115C are provided in a protruding state on the back of the pad. The pad 116C is snapped to the base 115C by fitting the engaging portions 116g and 116h to the fitting holes on the base 115C. The spacer 114C in the example and the spacer 114B in Fig. 20 can be formed so as to be rotatably supported with respect to the support 103 as the spacer 114 explained above.

**[0079]** The pad 116 of the spacer 114 explained with reference to Figs. 13 to 19 includes a bellows portion, and hence having a large buffer property and excellent vibration absorptivity. However, on the other hand, the thickness of the pad easily changes at the time of buffering. When the packaging device is shaken due to vibrations at the time of transportation, a force from the mounted product (a horizontal force due to shaking) is applied to the pad 116. Therefore, the thickness of the pad 116 having the excellent vibration absorptivity changes, and there is a possibility that the mounted product is substantially shifted horizontally. Particularly, when the packaging devices are stacked as explained with reference to Fig. 12, if the product is shifted horizontally, the stability deteriorates. Therefore, it is preferable to use the spacer 114C shown in Figs. 21A, 21B, and 21C for the spacer for pressing the lower part of the product.

**[0080]** In the spacer 114C in this example, the pad is

a relatively hard member, and since it does not have the bellows portion, the deformation is small at the time of absorbing vibrations. Therefore, to suppress the shift of the product, the spacer 114C shown in Figs. 21A, 21B, and 21C is arranged at the lower position of the product, and the spacer 114 shown in Fig. 14 having excellent buffer property is arranged at the upper part of the product, thereby enabling reliable positioning of the product and suppression of the shift of the product due to vibrations at the time of transportation. Specifically, for example, in Fig. 2, two spacers 114 are attached respectively at the upper and the lower positions of the supports 103 (although the spacers 114 at the lower position at the back cannot be seen due to the surface plate 107). The lower spacer 114 needs to be replaced by the spacer 114C in this example.

**[0081]** Since the spacer 114C in this example is a slightly hard member, it is preferred to make the spacer 114C abut against a portion of the mounted product having high strength, to minimize the influence of the impact at the time of transportation. For example, when an image forming apparatus is to be mounted as the product, it is preferred to make the spacer 114C abut against a surface of a structural frame or a sheet metal frame in an exterior cover.

**[0082]** Fig. 22A is a plan view of the stay for pressing the product including the pad 116. Fig. 22B is a front view of the stay for pressing the product including the pad 116. As shown in Figs. 22A and 22B, the pad 116 can be mounted on a stay 105. The pad 116 is the same as the one explained with reference to Figs. 17A to 17C. Pad mounting portions 151 for fitting the pads 116 are provided on the stay 105 at four places according to the present embodiment. In Figs. 17A to 17C, the pads 116 are respectively mounted on two pad mounting portions 151 at the left and right ends. The pad mounting portion 151 is formed as a concave portion depressed from the side of the stay, and has a pillar 152 provided in a protruding state in a pillar shape at the center thereof, and projections 154 formed on the opposite sides of the pad mounting portion 151. A fixed guide 153 having a gourd or potbelly shape is formed at the center of the pillar 152. The projections 154 are formed by being projected (overhung) on the concave portion of the pad mounting portion 151 from the side of the stay.

**[0083]** When the pad 116 is fitted to the pad mounting portion 151, the pad 116 is slightly inclined and pressed to the stay 105 so that the atches 116b on the pad 116 shown in Figs. 17A and 17B are inserted into the concave portions on the opposite sides of the pillar 152 of the mounting portion. Next, the coming-off preventing portion 116e at the end of the latch 116b on one side is hooked to the inside of the projection on one side. The pad 116 is then rotated so that the coming-off preventing portion 116e at the end of the latch 116b on the other side is hooked to the projection 154 on the other side, to make the pad 116 be parallel to the stay 105. Accordingly, the substantially cylindrical portions 116c of the atches 116b

on the pad 116 engage with circular arc concave portions at the center of the fixed guide 153 on the opposite sides provided in the pillar 152, and the coming-off preventing portions 116e of the atches 116b are pressed by the projections 154 on the opposite sides of the mounting portion, thereby mounting the pad 116 on the pad mounting portion 151.

**[0084]** At this time, the fixed guide 153 of the mounting portion is put between the opposite faces of the substantially cylindrical portions 116c of the atches 116b on the pad 116, so that the pad 116 is fixed and held by the stay 105. At the same time, the coming-off preventing portions 116e of the pad 116 is pressed by the projections 154 of the stay from outside, to prevent the pad 116 from coming off.

**[0085]** When the pad 116 is detached from the pad mounting portion 151, the pad 116 can be detached from the mounting portion 151 by rotating the pad 116. In Figs. 22A and 22B, the pad 116 is fitted at two positions at the opposite ends, of the four pad mounting portions 151. However, the pad 116 can be fitted to an optional pad mounting portion 151.

**[0086]** As shown in Fig. 23A, an engaging pillar 155 for fitting the stay 105 to the support 103 is provided in a protruding state on a surface of the stay 105 at the opposite ends. Click lock portions 155a are provided in a protruding state from both sides of the upper and lower parts of the engaging pillar 155. The engaging pillars 155 are respectively fitted to the concave portions 135a (Fig. 5) of the support 103 (the upper support 103a and the lower support 103b) having the dovetail tenon shape. At this time, since the click lock portions 155a are provided, the stay 105 is held to the support 103 reliably, and hence the stay 105 hardly comes off from the support.

**[0087]** A pin hole 156 in which a frame lock pin 157 shown in Fig. 24 is inserted is formed at the center between the engaging pillars 155 on the upper and the lower sides. The frame lock pin 157 includes a head 157a and a shaft 157b, and held by the pin hole 156 movably between a lock release position shown by solid line in Fig. 24 and a lock position shown by broken line. Two large diameter portions 158 and 159 are formed in the middle of the shaft 157b. The large diameter portion 159 on the head side serves as a stopper for preventing the lock pin from coming off from the stay 105. The large diameter portion 158 on the point side is fitted to the dovetail tenon of the concave portion 135a of the support 103 to lock the stay 105 to the support 103. Although not shown, a fitting hole, into which the point of the shaft 157b of the frame lock pin 157 is inserted, is provided at an appropriate position in the concave portion 135a of the support 103. The point of the shaft 157b of the lock pin is inserted into the fitting hole, and the large diameter portion 158 is fitted to the dovetail tenon of the concave portion 135a, so that the stay 105 is held on the support 103 and locked to the support 103.

**[0088]** Fig. 25 is a partial top view of a state where the stay 105 is attached to the support 103, and the pad 116

fitted to the stay 105 presses the side of the product 100 to hold the product. From Fig. 25, it is recognized that the point of the frame lock pin 157 is fitted into the fitting hole provided in the concave portion 135a of the support 103 to protrude to the internal space of the support, and the large diameter portion 158 on the point side is fitted to the dovetail tenon of the concave portion 135a, so that the stay 105 is held on the support 103 and locked to the support 103. It is also recognized that the side of the pad 116 abuts against the side of the product 100 to press the product.

**[0089]** Thus, when the product is pressed by the stay fitted with the pad 116, vibrations at the time of transportation with respect to the product is efficiently absorbed by the pad 116. However, it is desired that the deformation of the stay 105 (deformation when the weight is applied) be small, from a standpoint of preventing shifting or excessive shaking of the product. Likewise, also in the respective spacers 114, 114B, and 114C explained above, it is desired that the base to which the pad is fitted has a small deformation at the time of buffering.

**[0090]** Packaging and unpacking operations of the product/article by the packaging device 101 according to the present embodiment are explained with reference to Figs. 26 and 27. Fig. 26 is a plan view and Fig. 27 is a side view of the packaging device 101.

**[0091]** When the product/article is packaged, the support 103 and the top plate 104 of the packaging device are removed from the pallet 102. The product/article is then mounted on the pallet 102. The length of the support 103 is adjusted corresponding to the height of the product to be mounted (it can be adjusted beforehand), four supports 103 are fitted to the fitting portions 102c at four corners of the pallet to set up the supports on the pallet, the surface plate 107 is inserted between the supports, and the upper ends of the respective supports are engaged with the engaging portions of the top plate 104 to fit the top plate 104 on the supports. The supports 103 and the pallet 102, and the supports 103 and the top plate 104 are locked by the respective lock mechanisms. The spacer 114 is appropriately attached between the supports 103 and the mounted product to prevent shaking or shift of the product. The stay 105 is put between the supports 103. The pad 116 is fitted to the stay 105 to prevent shaking or shift of the product. The product can be covered with a plastic bag for protection or the like. The basic packaging operation is thus completed. When a heavy product or article is mounted, since the fork insertion holes are provided in the pallet 102, the forklift can be used. Since the support 103 is formed of the upper support 103a and the lower support 103b so as to be able to adjust the length, various products/article can be mounted and packaged.

**[0092]** As for the unpacking operation, the lock between the top plate 104 and the respective supports 103 is released to remove the top plate 104 from the supports, and the surface plate 107 is then removed from between the supports. Furthermore, the lock between the supports

103 and the pallet 102 is released to pull out the supports 103 from the fitting portions 102c and remove the supports 103, to finish the basic unpacking operation. Removal and the like of the stay 105 can be performed at an appropriate stage. After unpacking, the spacer 114 is accommodated in the supports 103, and the length of the supports 103 is shortened, thereby reducing handling at the time of collecting the packaging device and the space at the time of storage in a warehouse. Further, since the supports 103 having the two-piece structure are integrally retained, it can be prevented that the upper supports 103a and the lower supports 103b are disjointed.

**[0093]** While the present invention has been explained by way of illustrated examples, the invention is not limited thereto.

**[0094]** The shape, the structure, and the like of the support (support member) and the latch member (stopper) can be appropriately changed. For example, the convex portions 134 and the concave portions 135 are formed on both of the upper support 103a and the lower support 103b. However, only the convex portions 134 can be provided on one side, and only the concave portions 135 can be provided on the other side. In the illustrated examples, the convex portions 134 are formed on the outer surface of the upper support 103a and the lower support 103b and the concave portions 135 are formed on the inner surface, and it can also be the other way around. The convex portions 134 and the concave portions 135 can be provided on the same surface.

**[0095]** Furthermore, the number of stages for length (height) adjustment and the adjustment width of the supports (support members) are optional. The shape and the number of the configuration for slidably fitting the two-piece supports (in the example, the convex portions 134 and the concave portions 135) are also optional. Appropriate materials can be used for respective members. The top plate member can have a gap or a space, and for example, a mesh member made of resin can be used. The lock mechanism between the supports and the top plate member and between the supports and the pallet is not limited to the illustrated example. The article to be packaged by the packaging device is not limited to image forming apparatuses, and can be any article that can be mounted on the mounting base (pallet).

**[0096]** The surface plate 107 is mounted on between the supports 103 in the example shown in Figs. 1 and 2. However, the surface plate 107 may not be mounted as shown in Fig. 28.

**[0097]** Two arms 133a and 133b of the stopper 133 (Figs. 4 to 8) used for adjusting the length of the support 103 has a hollow cylindrical shape. However, a reinforcing rib 133h can be appropriately provided inside of the arms 133a and 133b as shown in Fig. 29, for ensuring the strength at the time of inserting or pulling out the arms and accommodating the impacts by vibrating at the time of transportation.

**[0098]** Thus, the problem mentioned above is solved

by the packaging device including the mounting base on which an article is mounted, the top plate member arranged above the article mounted on the mounting base, and the support members that support the top plate member, in which the support members include a first member and a second member, and the first member and the second member are slidably fitted to each other, so that the length of the support members can be adjusted.

**[0099]** In the packaging device according to the present embodiment, the support members that support the top plate member include the first member and the second member, and the first member and the second member are slidably fitted to each other, so that the length of the support members can be adjusted. Accordingly, the length (height) of the support members can be adjusted corresponding to the size (height) of the product to be mounted, and hence various products can be mounted and packaged.

**[0100]** Since the support members have the substantial L-shape in cross section, the strength of the support members can be increased.

**[0101]** The first member and the second member can be slidably integrated with a simple configuration, thereby suppressing the parts cost.

**[0102]** Since a plurality of convex portions and concave portions are respectively provided on the first member and the second member, the first member and the second member can be precisely fitted to each other, so as to be slidable.

**[0103]** Since at least a part of the convex portions and the concave portions of a plurality of convex portions and concave portions is formed in the dovetail tenon shape, the first member and the second member can be prevented from coming off, while the first member and the second member are held slidably.

**[0104]** Furthermore, since the fixing unit that fixes the first member and the second member at a predetermined position is provided, the length (height) of the support member can be set to a desired length.

**[0105]** The length (height) of the support member can be adjusted stepwise, and the operator can easily adjust the length.

**[0106]** Since the fixing unit includes two insertion arms, and the fitting holes into which the insertion arms are respectively inserted are respectively provided on the first member and the second member, the first member and the second member can be reliably fixed by the two insertion arms.

**[0107]** Furthermore, since the two insertion arms of the fixing unit are respectively inserted into and fitted to respective sides of the L shape, putting an intersection of the two sides of the L shape of the first and the second members therebetween, the first member and the second member can be reliably fixed. Particularly, even when a force is applied to the support members from the side or from an oblique direction, the fixing unit is hardly shifted, and hardly comes off. Furthermore, the first and the second members having the L shape in cross section are

hardly deformed (a deformation such that the L shape is opened).

**[0108]** The fixing unit is prevented from coming off from the support members, since the engaging portion of the fixing unit engages with the first or the second member. Sufficient strength can be secured, while reducing the weight of the fixing unit. The strength of the insertion arms of the fixing unit can be ensured.

**[0109]** Since the holding part for holding the fixing unit at the time of pulling it out is provided, the fixing unit can be easily pulled out.

**[0110]** Furthermore, since the lock mechanism that locks the support members to the mounting base, the support member can be prevented from coming out/off from the mounting base.

**[0111]** The support members can be tightly arranged in an upright mode on the mounting base.

**[0112]** Since the surface plate is attachably provided on between a plurality of support members arranged in an upright mode on the mounting base, the side of the mounted product can be protected by the surface plate.

**[0113]** Since an article pressing member (spacer) for pressing the product mounted on the mounting base is attachably provided on the support member, shaking or a shift of the product can be prevented, thereby preventing damages of the product.

**[0114]** Furthermore, a shift of the product due to vibrations at the time of transportation can be reliably suppressed, and positioning with high generality can be realized, regardless of the size of the product. The product can be prevented from being damaged. The article pressing member is rotated and positioned at an appropriate position corresponding to the product.

**[0115]** Furthermore, at the time of collecting or storing the packaging device, the article pressing member can be stored inside of an outer wall of the support members, so as the article pressing member does not to be an obstacle.

**[0116]** Since the article pressing member is formed of the base and the pad mounted on the base, the pad can press the product without damaging the product.

**[0117]** The stay is attached between the support members to press the mounted product, and prevent shaking or shift of the product, thereby preventing the product from being damaged. The pad mounted on the stay can press the product without damaging the product.

**[0118]** Since a plurality of pad mounting portions are provided on the stay, the pad can be mounted on an appropriate position.

**[0119]** Since the pad can be mounted on an optional position of the pad mounting portions, the pad can be mounted on an appropriate position corresponding to the mounted product.

**[0120]** Since the pad can be retractable, the product can be pressed corresponding to products of different sizes.

**[0121]** Since the pad can be folded or developed, the size (thickness) of the pad can be easily changed to ac-

commodate various products.

**[0122]** Since the pad can be detachable to the base or the stay, the pad can be easily changed when it is damaged or broken.

**[0123]** Since the coming-off preventing portion for preventing the pad from coming off from the base or the stay is provided, the pad does not come off carelessly.

**[0124]** Since the buffer member is filled in the pad, the pad can efficiently press the product, even if the product is heavy.

**[0125]** A shift of the product due to vibrations at the time of transportation can be suppressed, thereby enabling reliable positioning.

**[0126]** Since the engaging portion for engaging the stay with the support members is provided, the stay can be easily fitted to the support members.

**[0127]** Since the click lock portion for engagement with the dovetail tenon provided on the support member is formed in the engaging portion of the stay, the stay can be easily attached to the support members to enable positioning, and the stay hardly comes off.

**[0128]** Since a stay fixing portion for fixing the stay to the support member is provided, the stay fixing portion can be prevented from coming off from the support member.

**[0129]** Furthermore, the stay fixing portion can be easily attached to the support member, and the stay fixing portion can be prevented from coming off.

**[0130]** Another embodiment of the present invention is explained with reference to the accompanying drawings.

**[0131]** Fig. 30 is a perspective view of a state where a product is packaged according to one example of a packaging device according to the present embodiment, and Fig. 31 is an exploded view of the configuration of the packaging device.

**[0132]** As shown in Figs. 30 and 31, a packaging device 201 according to the present embodiment includes a pallet 202, which is a mounting base for mounting the product 100 thereon, four supports 203 fitted to four corners of the pallet 202, and a top plate (lid) 204 mounted on above the respective supports 203. The supports 203 are support members that support the top plate 204.

**[0133]** The pallet 202 is made of resin according to the present embodiment, and fork insertion holes 202a for inserting forks of a forklift are provided therein. Furthermore, a concave portion 202b is formed on the upper surface of the pallet, by depressing the upper surface downward, leaving the outer periphery thereof, and buffer members 205 are arranged in the concave portion 202b. A backing plate 206 is fitted from above of the buffer members 205, so that when the backing plate 206 is fitted, there is no difference in level between the upper surface of the backing plate 206 and the upper surface of the pallet (upper surface of the outer periphery). Therefore, since the height of the upper surface of the outer periphery of the pallet and the height of the upper surface of the backing plate 206 match each other to form a flat

surface, the product can be easily shifted and workability can be improved when the product having casters is loaded. A fitting portion 202c for attaching the support 203 is provided at four corners of the outer periphery of the pallet.

**[0134]** The backing plate 206 has a shape that covers the concave portion 202b on the upper surface of the pallet, and the upper surface of the backing plate (a product mounting surface) is formed in a planar shape without unevenness. On the other hand, a rib (not shown) is provided in a protruding state at the back of the backing plate opposite to the product mounting surface, so that the backing plate is not broken, while maintaining predetermined flexibility with respect to the weight of the article mounted on the backing plate 206. The rib at the back of the backing plate has a shape diagonally crossing for giving a higher strength in portions where legs of the product (casters or the like) are mounted, as in a case that an image forming apparatus is packaged as a product as shown in Fig. 30, and it can be parallel to the four sides on the outer periphery of the backing plate for giving flexibility in other portions. Since stress concentrates on the central part due to flexure of the backing plate, a drawn part (not shown) is provided in the central part of the backing plate 206 for enduring the stress. The drawn part is provided such that a plate thickness thereof is thicker than that of other parts (the peripheral part). According to the present embodiment, the pallet 202 and the backing plate 206 are formed of the same material (resin according to the present embodiment). When the usable life of the pallet 202 and the backing plate 206 comes to an end, the pallet 202 and the backing plate 206 are melted together and can be reused as a recycled material.

**[0135]** The buffer members 205 arranged in the concave portion 202b of the pallet 202 are formed of a foam material according to the present embodiment, and two types of materials, that is, a material having a low foaming ratio (a low-foamed buffer member) and a material having a high foaming ratio (a high foamed buffer member) are used. The low-foamed buffer member is arranged in a portion weighted by legs (casters or the like) of the product to be mounted, and the high foamed buffer member is arranged in other portions. As a result, the weight applied to the backing plate 206 corresponding to the legs of the product is absorbed by the low-foamed buffer member, and the weight applied to the backing plate 106 corresponding to portions between the legs of the product is absorbed by the high foamed buffer member due to flexure of the backing plate 206, with respect to vertical vibrations at the time of transportation. Accordingly, the impact transmitted to the mounted product can be alleviated.

**[0136]** In the conventional pallet, since the article individually packaged in a cardboard box are simply mounted, only a thick mounting surface is provided so as to endure the weight of the article, and the configuration thereof does not take the impact on the product into con-

sideration, when a product such that the weight thereof is applied, centering on the legs of the product, for example, an image forming apparatus is mounted. Accordingly, when the product such as the image forming apparatus is transported and delivered by using a conventional pallet, it is necessary to strengthen the product structure or provide a buffer function to the product itself, only for enduring the vertical vibrations at the time of transportation. However, the product structure or the buffer function does not have a merit in using the product after the delivery, and hence a useless cost is required. On the other hand, in the packaging device 201 according to the present embodiment, the product can be transported and delivered, while preventing damages of the product, without unnecessarily strengthening its structure.

**[0137]** The support 203 includes a first member (upper support) 203a and a second member (lower support) 203b in a substantial L-shape in cross section, and is formed so that the length can be adjusted by superposing the upper support 203a and the lower support 203b on each other. That is, a plurality of engaging holes (not shown) is provided for each of the upper support 203a and the lower support 203b, and the height of the support 203 is adjusted by putting the engaging holes of the both supports together so that the support 203 has a predetermined height (length) and fitting a latch member (not shown) to the engaging holes. The respective supports 203 are fitted into the fitting portions 202c provided at the corner on the upper surface of the pallet 202, and arranged in an upright mode on the pallet.

**[0138]** The top plate 204 is mounted on the supports 203, so as to cover the upper part of the product mounted on the backing plate 206. The top plate 204 and the respective supports 203 are detachably engaged with each other by the engaging portion. As shown in Fig. 32, a central part 204a of the top plate is provided in a protruding state upward from a peripheral part 204b, and the central part 204a and the peripheral part 204b are connected by oblique portions 204c. Since the central part 204a of the top plate protrudes upward from the peripheral part 204b (drawn shape), the strength can be improved than in a case that the top plate has a simple planar shape.

**[0139]** The packaging device 201 according to the present embodiment is constructed such that the pallet 202 can be stacked on the top plate 204 so that the packaging devices 201 can be stacked on each other, and legs 202d of the pallet 202 can be stacked and mounted on the peripheral part 204b of the top plate 204. A positioning portion (204b, explained later) is provided on the surface of the top plate so as to position the pallet 202 when the pallet 202 is mounted on the top plate 204. The top plate 204 can be also stacked on each other. At this time, since the top plate has the drawn shape, the top plate on the lower side is fitted into the top plate on the upper side, and even if the top plates 204 are stacked in multi tiers, the top plates 204 do not collapse.

**[0140]** Fig. 33 is a top view of the top plate 204. Fig.

34 is a bottom view of the top plate 204. As shown in Figs. 33 and 34, a plurality of reinforcing grooves 205a, 205b, and 205c is formed on the upper surface of the top plate 204. The top plate 204 according to the present embodiment is made of resin and has a thickness of 4 millimeters, and the respective reinforcing grooves 205a, 205b, and 205c have a depth of 20 millimeters. The reinforcing grooves 205a are extended parallel to the four sides of the top plate (hereinafter, "parallel grooves"), and the reinforcing grooves 205b are diagonally provided, connecting four corners of the top plate (hereinafter, "oblique grooves"). The reinforcing grooves 205c are provided in the peripheral part 204b of the top plate (hereinafter, "peripheral grooves"). As for the parallel grooves 205a according to the present embodiment, 5 parallel grooves extending right and left, and 5 parallel grooves extending in the vertical direction, in total 10 parallel grooves are provided. As for the oblique grooves 205b, in total two grooves connecting four corners of the top plate are provided. The peripheral groove 205c is provided one each in the peripheral part 204b of the top plate, in total, four grooves are provided. The top plate 204 according to the present embodiment is made of resin, and as shown in Fig. 34, the respective reinforcing grooves 205a, 205b, and 205c is formed by resin molding so that the grooves (concave portions) on the upper surface of the top plate protrude to the rear surface of the top plate (to form convex portions).

**[0141]** Ten parallel grooves 205a are provided as explained above. As for the arrangement thereof, when it is assumed that the width of the central part 204a of the top plate 204 is 100%, the respective parallel grooves 205a are provided at positions of 12.5%, 27%, and 50% from the end of the central part 204a. Therefore, a horizontal parallel groove 205a and a vertical parallel groove 205a are respectively provided at a central position (at a position of 50% in the width of the central part 204a) one each in the cross direction and in the vertical direction, and cross each other at a right angle at the center of the top plate 204. Other eight parallel grooves are arranged outside of the central parallel grooves with a good balance. When the top plate 204 is square or rectangular, the two oblique grooves 205b connecting the four corners of the top plate 204 inevitably cross each other at the center of the top plate, and also cross the two parallel grooves 205a at the center of the top plate. The parallel grooves 205a and the peripheral grooves 205c act effectively upon warpage in the outskirts of the top plate and flexure in the central part, and the two oblique grooves 205b act effectively upon distortion of the entire top plate, thereby preventing deformation and flexure of the top plate.

**[0142]** A reinforcing portion 206 is provided at the portion where the respective reinforcing grooves 205a, 205b, and 205c cross each other. The reinforcing portion 206 is provided as a convex portion in the reinforcing groove 205. However, as shown in Fig. 34, the reinforcing portion 206 is formed as a concave portion sinking in the

reinforcing groove 205 formed as the convex portion, when viewed from the back. The upper surface (upper surface of the surface) of the reinforcing portion 206 is formed so as to be coplanar with the surface of the central part 204a of the top plate 204. If the portion where the reinforcing grooves 205a, 205b, and 205c cross each other remains as a groove, the strength of the crossing decreases. However, according to the present embodiment, since the reinforcing portion 206 is provided at the portion where the reinforcing grooves 205a, 205b, and 205c cross each other, strength degradation at the crossing can be prevented. A reinforcing portion larger than the other reinforcing portions is provided in the central part of the top plate where four reinforcing grooves (two parallel grooves 205a and two oblique grooves 205b) cross each other. A reinforcing wall 207 is provided, positioned in the middle between the reinforcing portions 206 in the respective reinforcing grooves 205a, 205b, and 205c. However, since there is no crossing in the peripheral part 205c, the reinforcing portion 206 is not provided, and the reinforcing wall 207 is provided in the groove with an appropriate distance therebetween. The strength in the groove is increased by the reinforcing wall 207.

**[0143]** A plurality of reinforcing ribs 208 is arranged with an appropriate space therebetween on the back of the top plate. The reinforcing ribs 208 are provided from the parallel groove 205a on the outermost side toward the oblique portion 204c of the top plate. A plurality of reinforcing ribs 209 is also arranged with an appropriate space therebetween in the peripheral part 204b of the top plate.

**[0144]** In the packaging device 201 according to the present embodiment, since the reinforcing grooves 205a, 205b, and 205c are provided as the reinforcing portion for the top plate 204, the strength of the top plate 204 is largely increased as compared to conventional packaging devices. Since the reinforcing grooves 205a, 205b, and 205c as the reinforcing portion are formed as grooves depressed from the outside of the top plate 204 (protruding at the back), the cross-section area of the top plate increases, and the top plate has a higher strength than that of a conventional flat lid. Furthermore, since multiple reinforcing portions such as the ten parallel grooves 205a, two oblique grooves 205b, and four peripheral grooves 205c as the reinforcing grooves, the reinforcing portion 206 provided in the reinforcing groove crossing, the reinforcing wall 207 provided in the reinforcing groove, and the reinforcing ribs 208 and 209 provided on the back of the top plate are provided, the packaging device 201 has high strength.

**[0145]** In conventional rack type packaging devices, it is not assumed to mount an article on the lid (the top plate), and hence the strength of the lid is small. Therefore, when the article is mounted on the lid in the conventional packaging device, the lid bends to interfere with the upper surface of the product, and hence there is a possibility that the product is damaged or broken. In the

packaging device 201 according to the present embodiment, however, since the strength of the top plate 204 is sufficiently high, for example, when an image forming apparatus is packaged by the packaging device 201 and transported and delivered, optional members and consumables accompanying the product can be mounted on the top plate 204, and hence the optional members and consumables can be transported and delivered together with the product.

**[0146]** Furthermore, since the strength of the top plate 204 is sufficiently high, it is not necessary to have a large gap between the upper surface of the product to be mounted on the pallet 202 and the top plate 204 (a gap corresponding to a hop amount of the product corresponding to a vibration amount in the vertical direction at the time of transportation needs only to be formed), thereby reducing the volume at the time of transportation and storage, and increasing the efficiency at the time of transportation, delivery, and storage.

**[0147]** Furthermore, since the strength of the top plate 204 is sufficiently high, the packaging device 201 according to the present embodiment can be stacked stably in a state with the product being mounted. Therefore, the packaging device 201 is useful for reducing the storage area in a warehouse or the like, and improving the transportation efficiency.

**[0148]** As shown in Fig. 34, a support engaging portion 210 for fitting the support 203 is formed on the back of the top plate 204 at four corners. The top plate 204 is mounted on the supports 203 by fitting the upper ends of the supports 203 to the support engaging portions 210 formed as concave portions as viewed from the back of the top plate. According to the present embodiment, fixing mechanisms for fixing the supports 203 and the top plate 204 are provided. Of the fixing mechanisms, a slide member 211 arranged on the top plate 204 side is arranged one each at the opposite ends of two peripheral grooves 205c, of the four peripheral grooves 205c provided in the peripheral parts 204b of the top plate 204 (in total four side members are provided). The slide members 211 are arranged slidably in the longitudinal direction of the groove inside of the peripheral grooves 205c at the opposite ends thereof, and a coming-off preventing portion (not shown) for preventing the slide member from coming off from the groove is formed on the peripheral groove 205c side. According to the present embodiment, the opposite ends of the peripheral groove 205c provided as the reinforcing portion also function as a casing for slidably holding the slide members 211 of the lock mechanism.

**[0149]** The entire peripheral grooves 205c or the peripheral grooves 205c at portions where the slide members 211 are arranged are formed in a shape having a tapered section or a semicircular section (a shape in which an upper part (an open surface) is wider than a bottom), and the cross section of the slide member 211 is preferably formed in the tapered section or the semicircular section. As a result, insertion of the slide member

211 is facilitated at the time of setting the slide member 211 in the peripheral groove 205c, thereby improving the workability.

**[0150]** Fig. 35 is a sectional view of the mounting portion and the lock mechanism between the supports and the top plate. Fig. 36 is an enlarged partial view of the upper surface of the top plate 204 indicating a member on the top plate side of the lock mechanism. As shown in Figs. 35 and 36, in the slide member 211, cylindrical portions 211a (L) and 211a (R) are provided in a protruding state from the opposite ends of a box portion 211b substantially in a shape of rectangular solid with the upper surface opened. An engaging portion 211c is provided in the central part of the box portion 211b in the longitudinal direction so as to protrude outward from the opposite sides of the box portion 211b.

**[0151]** On the other hand, in the peripheral groove 205c in which the slide member 211 is arranged, an opening is provided on the wall at the outer end thereof in the longitudinal direction and the surface of the reinforcing wall 207, so that the cylindrical portions 211a (L and R) can protrude. A latch 212 is provided so as to protrude semicircularly from the longitudinal wall of the peripheral groove 205c corresponding to the engaging portion 211c of the slide member 211. The slide member is made of resin according to the present embodiment. Accordingly, when the slide member 211 is pressed strongly in the longitudinal direction of the peripheral groove 205c, the engaging portion 211c engages with the latch 212 and pressed, the box portion 211b having the opened upper surface is elastically deformed, and the engaging portion 211c can go past (pass) the latch 212 and move to the opposite side.

**[0152]** When the slide member 211 moves left and right in Fig. 35 within the peripheral groove 205c, as shown in Figs. 35 and 36, when the slide member 211 has moved to the left end in the peripheral groove 205c, the engaging portion 211c engages with the left side than the central part of the latch 212, and the slide member 211 is held at a lock position at which the left cylindrical portion 211a (L) in Fig. 35 is protruded from the wall of the peripheral groove 205c. When the slide member 211 is shifted to the right side in the peripheral groove 205c, the engaging portion 211c is engaged with the right side than the central part of the latch 212, and the slide member 211 is held at a lock release position at which the right cylindrical portion 211a (R) in Fig. 35 is protruded from the reinforcing wall 207. At the lock release position, the left cylindrical portion 211a (L) in Fig. 35 is in a state of being pulled into the peripheral groove 205c.

**[0153]** Since the slide member 211 is arranged one each at the opposite ends of the peripheral groove 205c, the configuration and the operation are the same at the opposite side (right side) in Figs. 35 and 36, although the left and right relation becomes opposite. Therefore, the slide member 211 is held at the lock position or the lock release position by shifting the slide member 211 in the peripheral groove 205c (in the peripheral groove 205c

on the outermost side in which the slide member 211 is arranged).

**[0154]** As shown in Fig. 35, an insertion hole (no reference numeral is designated), into which the cylindrical portion 211a of the slide member 211 is inserted, is provided on the inner wall at the upper part of the support 203, and when the slide member 211 is shifted to the lock position, the cylindrical portion 211a is inserted into the insertion hole of the support 203, thereby preventing the top plate 204 from coming off at the upper part of the support 203. On the contrary, by shifting the slide member 211 to the lock release position, the cylindrical portion 211a is pulled out from the insertion hole of the support 203, thereby enabling removal of the top plate 204 from the support 203. A display unit 213 for indicating the direction for releasing the lock of the top plate by the slide member 211 is provided in the peripheral part 204b of the top plate 204 located outside of the peripheral groove 205c in which the slide member 211 is arranged.

**[0155]** Fig. 37 is an enlarged view of the reinforcing rib provided inside of the outer circumference of the top plate 204. As shown in Fig. 37, a horizontal portion 209a and a wall 209b are formed in the reinforcing rib 209. When the top plates 204 are stacked on each other, or when the top plate 204 is stacked on the pallet 202 at the time of storage and the like, the horizontal portions 209a and the walls 209b provided in the reinforcing ribs 209 become the engaging portions that engage with the corner on the upper surface of the top plate 204 or the corner on the upper surface of the pallet 202. Since the horizontal portions 209a and the walls 209b as the engaging portions are provided, when the top plates 204 are stacked on each other, or when the top plate 204 is stacked on the mounting base, the both members are stacked tightly.

**[0156]** As shown in Fig. 38, an engaging convex portion 217 can be provided on the rear surface of the top plate 204, so as to engage with the reinforcing groove 205a of the top plate 204. When the top plates are stacked on each other, if the stacked number is small, there is no problem in transportation at the time of collecting the packaging device, only by positioning by the oblique portion 204c on the surface of the top plate (Fig. 32) and an oblique portion of the reinforcing rib 208 (Fig. 34) at the back of the top plate. However, when the stacked number increases as shown in Fig. 39, there is a possibility that the opposite end positions deviate largely (na) between the lowermost stage and the uppermost stage due to addition of small deviations (a) between the top plate members. If horizontal vibrations at the time of transportation are large, the uppermost top plate swings largely left and right (na+na), centering on the normal position, and as a result, the stacked top plates can collapse.

**[0157]** However, by fitting the engaging convex portion 217 provided on the rear surface of the top plate 204 to the reinforcing groove 205a, even when large horizontal vibrations occur, collapse of the top plates 204 stacked on each other in multiple stages can be reliably prevented.

ed. Even if a large deviation (displacement) occurs in the stacked top plates as shown by the largest amplitude 2na in Fig. 39, the top plates are fixed by the engaging portions formed of the engaging convex portions 217 and the reinforcing grooves 205a, and as a result, fall of the uppermost top plate can be prevented.

**[0158]** The engaging convex portions 217 are provided so as to protrude from the bottom of the reinforcing groove at the opposite ends of the reinforcing groove 205a. The reinforcing groove 205a, where the engaging convex portions 217 are provided at the opposite ends, are positioned in the middle of the cross direction in Fig. 40A, and the engaging convex portions 217 provided at the opposite ends of the central reinforcing groove 205a are provided at the front end and rear end of the top plate in Fig. 33. Therefore, the reinforcing groove 205a, to which the engaging convex portion 217 is fitted, is positioned in the middle of the cross direction in Fig. 33 and extends front and back (vertical direction in Fig. 33). The engaging convex portion 217 is fitted to an engaging portion 218 of the central reinforcing groove 205a, which is a short portion divided by the two lateral reinforcing grooves 205a on the near side and the far side, of the other reinforcing grooves 205a extending in the cross direction in Fig. 33.

**[0159]** The position where the engaging convex portion 217 is provided is an outermost edge of the central part 204a (Fig. 32) of the top plate 204 (opposite ends at the front and back in Fig. 33, and left and right opposite ends in Fig. 38). The position at which the engaging convex portion 217 is provided is a position where the convex portion does not interfere with the product based on a hop amount of the mounted product due to the vibrations at the time of transportation. Therefore, for example, when the product to be mounted on the packaging device is a copying machine as the image forming apparatus, an automatic document feeder (ADF) is positioned at the uppermost part of the apparatus, and interference with the mounted product is prevented by arranging the engaging convex portions 217 at a position lower than the ADF, that is, at a position above an operation panel at the front of the apparatus, a rear part of the apparatus (normally, a portion where a drive system or the like is arranged), or a two-sided printing unit and a manual tray portion on the sides of the apparatus.

**[0160]** The engaging convex portion 217 includes, as shown in Fig. 40B, a first latch 217a corresponding to a deviation in the left and right direction in the drawing (for restricting a shift of the top plate 204 in the left and right direction), and a second latch 217b arranged on the both sides of the first latch 217a corresponding to a deviation in the vertical direction (back and forth direction in Fig. 33) in the drawing (for restricting a shift of the top plate 204 in the back and forth direction), which is provided at the opposite sides of the first latch 217a.

**[0161]** Since a force is applied to the first latch 217a due to right and left vibrations, as shown in Fig. 40B, reinforcing portion 217c is provided for preventing the

first latch from being damaged by connecting the first latches 217a on the both sides. Accordingly, the engaging convex portion 217 is formed in a substantially "H" shape as viewed from rear surface of the top plate.

**[0162]** When the top plates 204 are stacked on each other, the lower surface of the outer peripheral part of the upper top plate comes in contact with the upper surface of the outer peripheral part 204b of the top plate (Fig. 32) and mounted thereon. Fine irregularities are provided from the end of the central part 204a of the top plate over the upper surface of the oblique portions 204c and the peripheral parts 204b as a deviation preventing portion 219 (shown by thick line in Fig. 38). As shown in Fig. 41, the deviation preventing portion 219 (shown by cross hatching) is provided so as to surround the circumference of the top plate 204. The deviation preventing portion 219 can be formed by affixing a member having a high coefficient of friction (for example, rubber), instead of the fine irregularities. By providing this deviation preventing portion 219, a deviation at the time of stacking the top plates 204 on each other can be prevented, thereby preventing the top plates from largely deviating from each other in the horizontal direction.

**[0163]** The reinforcing ribs 209 (Fig. 37), the engaging convex portions 217 and the fitting portions 218, and the deviation preventing portion 219, which constitute the configuration for preventing misregistration of the top plates at the time of stacking the top plates 204 on each other can be provided singly, or a plurality of configurations can be combined. For example, the reinforcing ribs 209, and the engaging convex portions 217 and the fitting portions 218 can be combined, the engaging convex portions 217 and the fitting portions 218, and the deviation preventing portion 219 can be combined, the reinforcing ribs 209 and the deviation preventing portion 219 can be combined, or all the members for preventing the deviation can be provided.

**[0164]** In Fig. 33, a positioning portion 204d at the time of stacking the pallet 202 on the top plate 204 is provided in the central part on the upper surface of the top plate 204. Fig. 42 is an enlarged view of the positioning portion 204d. The positioning portion 204d positions the pallet when the pallet 202 is put on the top plate 204, by making the positioning portion 204d abut against the wall (inside wall) of the pallet legs. The pallet is securely positioned by providing the positioning portion 204d at four sides (four faces) of the top plate. Accordingly, the pallet does not move out of its position when the pallet 202 on the top plate 204 is stacked, so that storage and transportation of the pallet can be made in a stacking manner. Fig. 43 depicts a state where the pallet 202 is stacked on the top plate 204. Fig. 44 depicts a state where the packaging devices 201 are stacked, although the upper parts of the supports 203 in the upper stage are omitted. As shown in Fig. 44, a side plate 215 can be mounted between the supports 203. The side plate 215 can be mounted on other three faces (not shown), to protect the packaged product. The side plate 215 shown in Fig. 44 has a short

length with the lower part thereof being opened. However, the size thereof can be a size of covering the whole surfaces between the pallet 202 and the top plate 204.

**[0165]** In a recyclable and circulative packaging device, it is necessary to collect the packaging device after the delivery of the product to a user. At this time, to use the packaging device efficiently, it is necessary to obtain and store the information of the packaging device being used, and take measures for reusing the packaging device based on the information. Therefore, in the packaging device 201 according to the present embodiment, as shown in Fig. 34, an IC tag 220 as an information holding unit is provided, located at a central part of two sides of the rear surface of the top plate 204. The IC tag 220 is attached to a holder support 216, as shown in Fig. 45, on the reinforcing rib provided on the rear surface of the top plate 204, via a holder 221. While two IC tags 220 are attached to the top plate 204 according to the present embodiment, only one IC tag will do. On the IC tag 220 as the information holding unit, the production date of the packaging device 201, use frequency, product information at the time of use (information of the packaged product), information of the product to be packaged (the type and the like of the product that can be packaged), delivery destination, carrier, use environment, position information and the like are recorded, as one example.

**[0166]** Fig. 46 depicts the IC tag 220 stored in the holder 221. The holder 221 includes a pocket for storing the IC tag 220 between two long sides 221a and 221d facing each other. A predetermined area on the right end in Fig. 46 of one of the long sides, 221a, is a free end, and a latch 221b is formed at the end thereof. A pressing portion 221c is formed on the upper end of the central part on the long side 221a so as to extend over the upper surface of the storage pocket. To store the IC tag 220 in the storage pocket of the holder 221, the free end of the long side 221a of the holder made of resin is bent outward, and the IC tag 220 is inserted from the right in Fig. 46 toward the left, and stored in the storage pocket. When the free end of the long side 221a is released, the latch 221b returns to the original position due to the elasticity of the resin material, and the end of the IC tag 220 is pressed to prevent the IC tag from coming off. At this time, the upper surface of the IC tag 220 is pressed by the pressing portion 221c to prevent the IC tag from coming off. The bottom of the IC tag 220 is held by the invisible bottom of the holder 221 (bottom of the storage pocket). The holder 221 storing the IC tag 220 is fitted to the top plate 204 by mounting a holding portion 221e formed at the opposite ends of the other long side 221d on the holder support 216 formed on the reinforcing rib 208 on the rear surface of the top plate 204 shown in Fig. 47. The stored information can be read from the IC tag 220 in a non-contact manner, and in a factory, a warehouse, or a wholesale distributing agent, the information can be easily read at the time of shipping or collecting the packaging device, and used for management of the packaging device 201.

**[0167]** Packaging and unpacking operations of the product/article by the packaging device 201 according to the present embodiment are explained. When packaging a product or article, the support 203 and the top plate 204 of the packaging device are removed from the pallet 202. The product/article is then mounted on the backing plate 206 of the pallet 202. The supports are fitted to the fitting portions 202c of the pallet 202 to set up the supports on the pallet, and the upper ends of the respective supports are engaged with the support engaging portions 210 (Fig. 34) of the top plate 204 to fit the top plate 204 on the supports. The slide member 211 of the lock mechanism is shifted to the lock position, to lock the top plate 204 and the respective supports 203. A spacer 214 (Fig. 30) is appropriately attached between the supports 103 and the mounted product to prevent shaking or shift of the product. If necessary, the side plate 215 (Fig. 44) is mounted on between the supports. The product can be covered with a plastic bag or the like for protection. The basic packaging operation is thus completed. When a heavy product or article is mounted, since the fork insertion holes are provided in the pallet 202, the forklift can be used.

**[0168]** As for the unpacking operation, the slide member 211 of the lock mechanism is shifted to the lock release position to release the lock between the top plate 204 and the respective supports 203. The top plate 204 is then removed from the supports, and the supports 203 are pulled out from the fitting portions 202c of the pallet 202 and removed, thereby finishing the basic unpacking operation. Removal of the spacer and the like can be performed at an appropriate stage.

**[0169]** In the packaging device 201 according to the present embodiment, since the strength of the top plate 204 is sufficiently high, the product can be transported or stored, with attachments or consumables being put on the top plate. For example, when an image forming apparatus is packaged by the packaging device 201 as the product, optional members and consumables accompanying the product can be mounted on the top plate 204 and transported or stored, thereby increasing the transportation efficiency. Furthermore, optional members and consumables corresponding to the product can be transported or stored together with the product, thereby realizing transportation and storage associating the product with accessories.

**[0170]** Furthermore, since the strength of the top plate 204 is sufficiently high, a useless space between the upper surface of the product to be packaged and the top plate 204 can be reduced as much as possible, thereby reducing the volume at the time of transportation and storage, and increasing the efficiency at the time of transportation, delivery, and storage.

**[0171]** Fig. 48 is an exterior view of the packaging device according to still another embodiment of the present invention, using four wall members as the support members that support the top plate 204.

**[0172]** In a packaging device 301 shown in Fig. 48,

four sidewall panels 303 are mounted and arranged in an upright mode on the pallet 202, and the top plate 204 is mounted and supported on the sidewall panels 303. The configuration of the top plate 204 and the pallet 202 is the same as that of the packaging device 201 according to the present embodiment. A lock mechanism is provided between the top plate 204 and the sidewall panels 303 as in the packaging device 201 according to the present embodiment. In the packaging device 301 according to the present embodiment, since the sidewall panels 303 are used as the top plate support members, all the sides of the packaged product are protected by the sidewall panels 303.

**[0173]** The height of the sidewall panels 303 in Fig. 48 cannot be adjusted. However, the sidewall panel can be formed of a plurality of members, so that the height thereof can be adjusted as in the supports 203 in the packaging device 201 according to the present embodiment. For example, the sidewall panel 303 is formed of two pieces of an upper panel and a lower panel as in the support 203 according to the present embodiment, and the upper and lower panels are put together at a predetermined position and a latch member is fitted thereto, to adjust the height of the panels at a desired height.

**[0174]** Fig. 49 is an exterior view of the packaging device according to still another embodiment of the present invention, using two wall members as the support members that support the top plate 204.

**[0175]** In a packaging device 401 shown in Fig. 49, two sidewall panels 303 are mounted and arranged in an upright mode on the pallet 202, and the top plate 204 is mounted and supported on sidewall panels 403. The configuration of the top plate 204 and the pallet 202 is the same as that of the packaging device 201 according to the present embodiment. A lock mechanism is provided between the top plate 204 and the sidewall panels 403 as in the packaging device 201 according to the present embodiment. In the packaging device 401 according to the present embodiment, since the two sidewall panels 403 are used as the top plate support members, two sides of the packaged product are protected by the sidewall panels 403.

**[0176]** The height of the sidewall panels 403 in Fig. 49 cannot be adjusted. However, the sidewall panel can be formed of a plurality of members, so that the height thereof can be adjusted as in the supports 203 in the packaging device 201 according to the present embodiment. For example, the sidewall panel 403 is formed of two pieces of an upper panel and a lower panel as in the support 203 according to the present embodiment, and the upper and lower panels are put together at a predetermined position and a latch member is fitted thereto, to adjust the height of the panels at a desired height.

**[0177]** While the present invention has been explained with reference to the drawings, the invention is not limited thereto.

**[0178]** For example, the number, the shape, or the like of the reinforcing grooves as the reinforcing structure can

be appropriately changed. Any appropriate materials can be used for the top plate and other members. The shape and the structure of the top plate, the supports, the sidewall panels, or the mounting base can be appropriately set within the scope of the present invention. The lock mechanism between the top plate and the support members is not limited to the one shown in the embodiments described above. A recording medium having an optional shape and configuration can be mounted on the top plate.

The holding member of the recording medium can be matched with the shape and the configuration of the recording medium. The article to be packaged by the packaging device is not limited to image forming apparatuses, and can be any article that can be mounted on the mounting base.

**[0179]** Thus, the object of the present invention can be achieved by a packaging device having a mounting base on which an article is mounted, a top plate member arranged above the article mounted on the mounting base, and support members that support the top plate member, in which the top plate has a reinforcing structure for preventing the top plate from being bent.

**[0180]** In the packaging device according to the present embodiment, since the top plate has the reinforcing structure for preventing the top plate from bending, the strength of the top plate can be largely increased as compared to the conventional packaging devices. Furthermore, since the strength of the top plate is high, a large gap is not necessary between the upper surface of the product to be mounted on the mounting base and the top plate, thereby reducing the required space at the time of transportation and storage, and increasing the efficiency of transportation, delivery, and storage.

**[0181]** Since the reinforcing structure is a plurality of reinforcing grooves provided on the surface of the top plate, the cross-sectional area of the top plate is increased, and a higher strength can be demonstrated as compared to the conventional flat upper lid.

**[0182]** Since the parallel grooves provided parallel to the outskirts of the top plate are provided as the reinforcing grooves, warpage in the outskirts of the top plate and flexure in the central part can be efficiently suppressed.

**[0183]** Since the oblique grooves provided diagonally with respect to the outskirts of the top plate are provided as the reinforcing grooves, distortion of the entire top plate can be efficiently suppressed.

**[0184]** Since the oblique grooves are provided diagonally connecting the corners of the top plate, the strength of the entire top plate can be improved.

**[0185]** Since the reinforcing portion is provided respectively at the crossing between of the reinforcing grooves, a decrease in strength can be prevented at the crossing.

**[0186]** Since the reinforcing wall is provided at a predetermined position in the reinforcing groove, the strength of the reinforcing groove can be increased.

**[0187]** Since the top plate is formed in the drawn shape such that the central part of the top plate protrudes upward from the peripheral part, the strength of the top plate

can be increased.

**[0188]** The lock mechanism that locks the top plate to the support members is provided, so that the top plate can be prevented from coming off from the support members.

**[0189]** Since the lock mechanism includes a slide member movable to the lock position where the top plate is locked and to the lock release position where the top plate is unlocked, and the slide member is supported by the top plate, so that the top plate and the support members can be locked or unlocked easily from upward of the packaging device.

**[0190]** Since the slide member is arranged in the reinforcing groove, and the reinforcing groove also serves as a casing of the slide member, parts cost and manufacturing cost can be reduced.

**[0191]** Since the slide member has a tapered shape or a substantially semicircular cross section, the slide member can be easily fitted.

**[0192]** Since the slide member holding portion that holds the slide member at the lock position or the lock release position is provided, the slide member is reliably held at the lock position or the lock release position, thereby preventing the supports and the top plate from coming out unexpectedly.

**[0193]** Since a plurality of top plates can be stacked on each other, the collection capacity and the storage space are saved, and the transfer cost and the storage cost can be reduced.

**[0194]** Since the engaging portion to be engaged with the reinforcing structure is provided on the rear surface of the top plate, a deviation of the top plates from each other can be prevented, at the time of transporting the top plates, stacked on each other.

**[0195]** Since the reinforcing structure is a plurality of reinforcing grooves provided on the surface of the top plate, the engaging portion is engaged with the reinforcing groove, and hence the position of the stacked top plate is reliably fixed with respect to the top plate on the lower side.

**[0196]** Since the engaging portion includes the first latch for restricting a shift of the top plate in the left and right direction, and a second latch for restricting a shift of the top plate in the back and forth direction, the position of the top plate is reliably fixed with respect to horizontal vibrations.

**[0197]** Processing is applied at least to a part of the surface of the lower top plate, with which the bottom of the upper top plate comes in contact when the top plates are stacked on each other, so that the coefficient of friction thereof becomes higher than that of the non-contact portion. Accordingly, at the time of transportation, the top plate can be prevented from shifting largely due to vibrations.

**[0198]** Furthermore, since the mounting base can be mounted on the top plate, the packaging device can be stacked, and hence the storage efficiency in a warehouse or the like and the transportation efficiency can be in-

creased. The top plate and the mounting base can be also stacked on each other for storage.

**[0199]** Since the positioning portion for positioning the mounting base mounted on the top plate is provided on the surface of the top plate, a deviation of the mounting base when mounted on the top plate can be prevented, and hence the mounting base can be reliably mounted on the top plate.

**[0200]** The positioning portion performs positioning of the mounting base mounted on the top plate in the front and back, and right and left directions, a deviation of the mounting base in the front and back, and right and left directions can be prevented, and hence the mounting base can be reliably mounted on the top plate.

**[0201]** Since the reinforcing rib is provided on the inner surface of the outer periphery of the top plate, and the engaging portion that engages with the corner on the upper surface of the top plate or the mounting base is formed on the reinforcing rib, the top plates or the top plate and the mounting base can be reliably mounted.

**[0202]** Since the height of the support member can be adjusted, various types of articles can be packaged by the packaging device, by adjusting the height of the support member corresponding to the height of the articles to be mounted on the mounting base.

**[0203]** The sides of the article can be protected by supporting the top plate by the wall-like members as the support members.

**[0204]** Since the support member is a support, the configuration of the packaging device can be simplified.

**[0205]** Since the side plate is provided so as to be mounted on between the supports, the side of the article mounted on the mounting base can be protected.

**[0206]** Since the recording medium that can record information is fitted to the top plate, various pieces of information can be carried by the packaging device and used for management and operation of the packaging device.

**[0207]** Since the recording medium is fitted to the top plate via the holding member that holds the recording medium and is detachable to the top plate, the recording medium can be easily attached to or detached from the top plate. The recording medium is also protected by the holding member.

**[0208]** Since the holding member is supported by the reinforcing member provided on the rear surface of the top plate, the holding member can be supported by using the reinforcing member, thereby simplifying the configuration of the top plate.

**[0209]** Since a part of the holding member is provided movably to the holding position for holding the recording medium and to the releasing position for releasing holding, attachment and detachment of the recording medium with respect to the holding member can be facilitated.

**[0210]** Since the holding member is formed of the resin material, and a part of the holding member can be moved to the holding position and to the releasing position due to the elasticity of the resin material, the recording me-

dium can be easily attached or detached at a low cost with a simple configuration.

**[0211]** Since the management information of the packaging device is stored in the recording medium, the packaging device can be managed and operated efficiently.

**[0212]** Since the information of the article to be packaged by the packaging device is stored in the recording medium, the packaged and transported article can be efficiently managed.

**[0213]** Since accessories accompanying the article to be packaged by the packaging device can be mounted on the top plate, the transportation efficiency can be increased. Since the article and the accessories can be transported together, working efficiency of installation and setup after the article has been delivered can be increased, and value-added services can be offered. The image forming apparatus can be packaged, transported, and delivered.

**[0214]** Fig. 50 is a perspective view of a state where a product is packaged by a packaging rack using one example of the packaging device according to the present embodiment. Fig. 51 is an exploded view of the configuration of the packaging rack.

**[0215]** As shown in Figs. 50 and 51, a packaging rack 501 according to the present embodiment includes a pallet 502 (packaging device), which is a mounting base for mounting the product 100 thereon, four supports 503 fitted to four corners of the pallet 502, a top plate (lid) 504 mounted on above the respective supports 503, and a surface plate 507 fitted in between respective supports 503. A spacer 514, which is a product pressing member, can be fitted to the supports 503 as required. In Fig. 51, the surface plate 507 is omitted.

**[0216]** The pallet 502 is made of resin according to the present embodiment, and fork insertion holes 502a for inserting forks of a forklift are provided therein. Furthermore, a concave portion 502b is formed on the upper surface of the pallet, by depressing the upper surface downward, leaving the outer periphery thereof, and buffer members 505 are arranged in the concave portion 502b. A backing plate 506 is fitted from above of the buffer members 505, so that when the backing plate 506 is fitted, there is no difference in level between the upper surface of the backing plate 506 and the upper surface of the pallet (upper surface of the outer periphery). A support fitting portion 502c for mounting the support 503 is provided at four corners of the outer periphery of the pallet.

**[0217]** The support 503 includes a first member (upper support) 503a and a second member (lower support) 503b in a substantial L-shape in cross section, and is formed so that the length can be adjusted by superposing the upper support 503a and the lower support 503b on each other. That is, a plurality of engaging holes (not shown) is provided for each of the upper support 503a and the lower support 503b, and the height of the support 503 is adjusted by putting the engaging holes of the both supports together so that the support 503 has a prede-

termined height (length) and fitting a latch member (not shown) to the engaging holes. The respective supports 503 are fitted into the support fitting portions 502c provided at the corner on the upper surface of the pallet 502, and arranged in an upright mode on the pallet.

**[0218]** The top plate 504 is mounted on the supports 503, so as to cover the upper part of the product mounted on the backing plate 506. The top plate 504 and the respective supports 503 are detachably engaged with each other. As shown in Fig. 52, a central part 504a of the top plate is provided in a protruding state upward from a peripheral part 504b, and the central part 504a and the peripheral part 504b are connected by oblique sides 504c. Since the central part 504a of the top plate protrudes upward from the peripheral part 504b, the strength can be improved more than a case that the top plate has a simple planar shape.

**[0219]** Figs. 53 and 54 are partial enlarged views of the support fitting portion 502c provided at four corners of the pallet 502 in detail. As shown in Figs. 53 and 54, the support fitting portion 502c has a substantial L-shape corresponding to the support 503 having the substantial L-shape in cross section. Two pairs of ribs 521 are provided in a protruding state on the long side of the L-shape of the support fitting portion 502c, and a pair of ribs 521 on the short side of the support fitting portion 502c, on the wall of the support fitting portion 502c. When the support 503 (lower support 503b) is fitted to the support fitting portion 502c and arranged in an upright mode, the ribs 521 abut against the wall of the base of the lower support 503b from outside, so that the lower support 503b is tightly fitted to and supported by the support fitting portion 502c. A fitting shaft 642 is arranged in an upright mode from the bottom at the corner of the support fitting portion 502c. The fitting shaft 642 fits into a fitting portion formed at the corner of the lower support 503b, so that the lower support 503b is tightly fitted to and supported by the support fitting portion 502c. The lower support 503b is reliably fitted to the support fitting portion 502c by the ribs 521 and the fitting shaft 642, and the support 503 is securely arranged in an upright mode on the pallet 502.

**[0220]** A support lock member 524 is fitted into a holding portion 523 and held at a position outside of the corner of the support fitting portion 502c. The support lock member 524 includes a lock pin 524a, and is slidable in the holding portion 523. A hole (not shown) is formed on the inner wall of the holding portion 523, and the lock pin 524a can protrude from the hole. As shown in Fig. 53, when the support lock member 524 is moved to the outside, the lock pin 524a is withdrawn in the holding portion 523, and the lock between the lower support 503b and the support fitting portion 502c is released. As shown in Fig. 54, when the support lock member 524 is moved to the inside, the lock pin 524a protrudes into the support fitting portion 502c, and fitted to the fitting hole (not shown) provided on the base of the lower support 503b, so that the lower support 503b is locked by the support fitting portion 502c (on the pallet 502).

**[0221]** As shown in the top view of the pallet shown in Fig. 55, the backing plate 506 fitted in the concave portion 502b (Fig. 51) is placed on the upper surface of the pallet 502, and the support fitting portion 502c is respectively provided at four corners of the outer periphery of the pallet. Fitting holes 527A, 527B, 527C, and 527D for fitting detachable positioning members 526 that presses the product or the like mounted on the backing plate 506 to position and fix the product or the like are arranged at appropriate positions on the upper surface of the backing plate 506. Fig. 56 depicts a state where the detachable positioning members 526 are fitted to the fitting holes 527. Respective fitting holes 527B to 527D of the fitting holes 527 are respectively formed of many small holes so that the fitting position of the detachable positioning members 526 can be adjusted. In Fig. 55, the left side indicates the front surface of the pallet, that is, the front surface in Fig. 51 and Fig. 55. Fitting convex portions 525 for preventing a deviation at the time of stacking the pallets 502 are provided in a protruding state at four places on the upper surface of the outer periphery on the left and right sides (in Fig. 55, the upper and lower sides) of the pallet 502. Fitting holes (not shown) to be fitted to the fitting convex portions 525 are provided on the bottom surface of the pallet legs. As a result, the pallets 502 can be stacked in multiple numbers.

**[0222]** Fig. 57A is a sectional, side view of the backing plate 506. Fig. 57B is a back view of the backing plate 506. As shown in Figs. 57A and 57B, the upper surface (product mounting surface) of the backing plate 506 is formed in a planar shape without unevenness. On the other hand, a plurality of ribs 528 is provided in a protruding state on the rear surface of the backing plate, opposite to the product mounting surface. The ribs 528 are formed so that the backing plate is not damaged, while maintaining predetermined flexure with respect to the weight of the product mounted on the backing plate 506. The ribs 528 on the rear surface of the backing plate include lateral ribs 528a extended in the cross direction of the pallet (vertical direction in Fig. 57B), vertical ribs 528b orthogonal to the lateral ribs 528a and extended in the back and forth direction of the pallet (left and right direction in Fig. 57B), oblique ribs 528c slantwise with respect to the lateral ribs 528a and the vertical ribs 528b, and peripheral ribs 528d provided so as to go round the backing plate. The lateral ribs 528a and the vertical ribs 528b are provided so as to be parallel to the four sides on the outer periphery of the pallet (the lateral ribs 528a are parallel to the front and back sides of the pallet, and the vertical ribs 528b are parallel to the left and right sides of the pallet), and the oblique ribs 528c are provided slantwise with respect to the outer periphery of the pallet. As shown in Fig. 57A, the height of the oblique ribs 528c is higher than the lateral ribs 528a and the vertical ribs 528b.

**[0223]** It is assumed that the vicinity of the four corners of the backing plate 506 is first reinforcing portions 531 combining the lateral ribs 528a and the oblique ribs 528c (areas enclosed by one-dot chain line), and spaces be-

tween the respective first reinforcing portions 531 are second reinforcing portions 532 combining the lateral ribs 528a and the vertical ribs 528b (areas enclosed by two-dot chain line). The first reinforcing portions 531 have a higher density of the ribs than that of the second reinforcing portions 532, and are therefore strength-increased portions.

**[0224]** The first reinforcing portions 531 at four positions correspond to portions where legs or casters of the article are mounted, as in the case that an image forming apparatus is packaged as the product. The strength in the portions is increased by the first reinforcing portions 531 having the oblique ribs, and other portions correspond to the second reinforcing portions 532 formed of parallel ribs with respect to the four sides on the periphery of the backing plate, so as to give slight flexure.

**[0225]** Since the weight of the product is not applied to the central part of the backing plate, the ribs can be omitted. Therefore, a concave portion is provided in the central part of the backing plate 506 as a drawn part 529. As shown in Fig. 57A, it is recognized that the plate thickness of the drawn part 529 becomes thick. According to the present embodiment, the pallet 502 and the backing plate 506 are formed of the same material (resin according to the present embodiment). When the usable life of the pallet 502 and the backing plate 506 ends, the pallet 502 and the backing plate 506 are melted together and can be reused as a recycled material.

**[0226]** Fig. 58 is a top view of the pallet with the backing plate 506 being removed, indicating a buffer member arranged below the backing plate 506 of the pallet. In Fig. 51, the buffer member arranged in the concave portion 502b is schematically shown as the buffer member 505. However, as shown in Fig. 58 in detail, two types of buffer members such as a first buffer member 551 and a second buffer member 552 are arranged in the concave portion 502b of the pallet 502 according to the present embodiment. The first buffer member 551 and the second buffer member 552 are formed of a foam material according to the present embodiment, and the first buffer member 551 is formed of a material having a low foaming ratio (a low-foamed buffer member) and the second buffer member 552 is formed of a material having a high foaming ratio (a high foamed buffer member). The low-foamed buffer member (the first buffer member 551) is arranged in a portion weighted by legs and the like of the article to be mounted, and the high foamed buffer member (the second buffer member 552) is arranged in other portions. As a result, the weight applied to the backing plate 506 corresponding to the legs of the article is absorbed by the low-foamed buffer member (the first buffer member 551), and the weight applied to the backing plate 506 corresponding to the portions between the legs of the product is absorbed by the high foamed buffer member (the second buffer member 552) due to flexure of the backing plate 506, with respect to vertical vibrations at the time of transportation. Accordingly, the impact transmitted to the mounted product can be alleviated.

**[0227]** The ribs on the rear surface of the backing plate 506 have been explained with reference to Figs. 57A and 57B. However, since a force due to vibrations at the time of transportation concentrate on the portions corresponding to the first reinforcing portions 531 where the legs or the like of the image forming apparatus are mounted, if the foaming ratio is high, the deformation of the buffer member increases, and only the first reinforcing portions 531 are depressed in the concave portion 502b of the pallet. Accordingly, there is a possibility that the bottom surface other than the legs or the casters of the mounted article is bumped into the backing plate due to the second reinforcing portions 532. Therefore, for the first buffer member 551 arranged in the first reinforcing portions 531 of the backing plate, a low-foamed buffer member having a buffer property such that the mounted product or article is not broken or damaged is used.

**[0228]** Fig. 59 is a plan view of a basic shape of the first buffer member 551 (low-foamed buffer member). As shown in Fig. 59, the first buffer member 551 formed of the foam material includes convex portions 553a, 553b, 553c, and 553d on a base 559. The respective convex portions 553a and 553b fit into between the oblique ribs 528c and the lateral ribs 528a in the first reinforcing portions 531 on the rear surface of the backing plate 506 and engage therewith, to demonstrate the buffering action. The convex portions 553c and 553d are for engaging the second buffer member 552 with the first buffer member 551, with the height thereof being lower than that of the convex portions 553a and 553b, and are arranged below the lateral ribs 528a and the vertical ribs 528b on the rear surface of the backing plate 506. A concave portion (not shown) for arranging the first buffer material 551 is formed in the concave portion 502b of the pallet. Since the first buffer member 551 is positioned in the concave portion and the convex portions 553a and 553b fit into between the oblique ribs 528c and the lateral ribs 528a, the first buffer member 551 can be prevented from being shifted even when the pallet 502 is vibrated or shaken at the time of transportation. In the first buffer member 551, the number and arrangement of the respective convex portions 553 can be changed according to the arranged location, thereby changing the size and shape of the buffer member.

**[0229]** Figs. 60A and 60B depict the second buffer member 552 (high foamed buffer member), and the second buffer member 552 having a bellows shape can be developed as shown in Fig. 60A and can be folded as shown in Fig. 60B. At the time of use, the second buffer member 552 is developed as shown in Fig. 60A, and the ends thereof are engaged with the convex portions 553c or 553d of the first buffer member 551, thereby being positioned between the first buffer members 551 in the concave portion 502b of the pallet, and arranged below the second reinforcing portion 532 of the backing plate 506. Since the second buffer member 552 is in a bellows shape and is retractable, the second buffer member 552 can follow the first buffer member 551 even when the

first buffer member 551 is shifted.

**[0230]** The difference between the first buffer member 551 (low-foamed buffer member) and the second buffer member 552 (high foamed buffer member) can be realized not only by changing the foaming ratio, but also by changing the material, changing the structure with the same material, or changing both the material and the structure. When the foam material (for example, polyethylene foam) is used as according to the present embodiment, the foaming ratio of the first buffer member 551 is lower than that of the second buffer member 552, and the first buffer member 551 is harder than the second buffer member 552.

**[0231]** According to the present embodiment, two types of buffer members such as the first buffer member 551 (low-foamed buffer member) and the second buffer member 552 (high foamed buffer member) are used as the buffer member arranged below the backing plate 506. However, as shown in Fig. 61, only the first buffer member 551 can be used without using the second buffer member 552 (high foamed buffer member). In Fig. 61, third buffer members 553 (low-foamed buffer member) are arranged on the rear side of the pallet. The third buffer members 553 includes convex portions fitted into the lateral ribs 528a and the vertical ribs 528b provided on the rear side on the rear surface of the backing plate 506. As shown in Fig. 61, the central part of the concave portion 502b of the pallet is formed in a cross shape and higher than the buffer member fitting portion, and the convex portion 554 corresponds to the drawn part 529 of the backing plate 506.

**[0232]** According to the configuration of the pallet 502, the load from the product and the like due to vibrations at the time of transportation is buffered by the backing plate 506 (the first reinforcing portion 531), the first buffer member 551 (the low-foamed buffer member), and the pallet base (the pallet main body) in the portion corresponding to the vicinity of the legs of the product. Furthermore, in the periphery thereof, the load is buffered by the backing plate (the second reinforcing portion 532), the second buffer member 552 (the high foamed buffer member), and the pallet base. As a result, vibrations and the like at the time of transportation can be effectively absorbed, thereby effectively preventing failure or damages of the mounted product and the like.

**[0233]** The first buffer members 551 engage with the backing plate 506, with the convex portions 553a and 553b thereof fitting into between the oblique ribs 528c and the lateral ribs 528a on the rear surface of the backing plate 506. As shown in Fig. 62, therefore, when the backing plate 506 is detached from the pallet main body, the first buffer members 551 are held by the backing plate 506, and lifted together with the backing plate 506. The third buffer members 553 shown in Fig. 61 are also lifted together with the backing plate 506. Although not shown in Fig. 62, when the second buffer members 552 are arranged between the respective first buffer members 551, the second buffer members 552 engaged with the first

buffer members 551 are also held by the backing plate 506. Accordingly, the respective buffer members are not disjointed from each other at the time of cleaning or maintenance of the pallet, thereby facilitating the operation and preventing misregistration and loss of respective buffer members. Furthermore, when the respective buffer members are set, the respective buffer members are fitted to the rear surface of the backing plate 506, and the backing plate 506 is reversed and set to the concave portion 502b of the pallet. As a result, fitting of the respective buffer members is also facilitated.

**[0234]** Figs. 63A to 63D are examples of the engaging convex portion provided on the respective ribs on the rear surface of the backing plate 506 for fitting the first buffer member 551 or the third buffer members 553 to the rear surface of the backing plate 506. Fig. 63A is an example where flat convex portions 555 are provided on the opposite sides of the rib 528. Fig. 63B is an example where semicircular convex portions 556 are provided on the opposite sides of the rib 528. Fig. 63C is an example where the flat convex portion 555 is provided on one side of two adjacent ribs at a position respectively facing each other. Fig. 63D is an example where the semicircular convex portion 556 is provided on one side of two adjacent ribs 528 at a position respectively facing each other. According to these configurations, the first buffer members 551 or the third buffer members 553 can be fitted to the rear surface of the backing plate 506.

**[0235]** Figs. 64 and 65 are perspective views of another example of the pallet. In a pallet 502B shown in Fig. 64, lower deck boards 557 are provided so as to cover the lower part of the fork insertion holes 502a.

**[0236]** In a pallet 502C shown in Fig. 65, the fork insertion holes 502a are also provided on the sides of the pallet so that the forks of the forklift can be inserted also from the sides of the pallet, and the lower deck boards 557 are provided as well, so as to cover the lower part of the respective fork insertion holes 502a.

**[0237]** In the pallets 502B and 502C in Figs. 64 and 65, a mark 558 is provided at the center on the front of the pallet. A holder 522 holding an IC tag is fitted to the side of the pallet. The holder 522 can be fitted on the opposite side of the pallet as well. In this case, the IC tag can be held on the side of the pallet 502.

**[0238]** The mark 558 can be used at the time of stacking the pallet for directing respective pallets to the same direction by matching the marks with each other. As a result, even when the collected pallets are stacked in the warehouse or the like, the information of the IC tags can be read from one side of the stacked pallets, thereby improving efficiency of the pallet management operation. The mark 558 and the holder 522 can be also provided on the pallet 502 explained with reference to Figs. 50 to 63A, 63B, 63C, and 63D.

**[0239]** Figs. 66 to 68 are perspective views of another example of the backing plate 506, which is the article mounting base of the pallet. Backing plates 506B, 506C, 506D shown in the respective drawings can be used not

only for the pallet 502 explained in Figs. 50 to 63A, 63B, 63C, and 63D, but also for the pallets 502B and 502C explained with reference to Figs. 64 and 65.

**[0240]** In the backing plate 506B in Fig. 66, four reinforcing members 561 are arranged on the front surface (article mounting surface) of the backing plate (on four sides). According to the present embodiment, since the reinforcing members 561 are arranged only at positions on which the product load is applied, corresponding to the vicinity of the product legs, the parts cost and the weight of members can be suppressed, and the backing plate can be efficiently reinforced at a low cost.

**[0241]** In the backing plate 506C in Fig. 67, two reinforcing members 562 are arranged on the front surface (article mounting surface) of the backing plate. The reinforcing members 562 according to the present embodiment are arranged on the opposite sides in the left and right cross direction when the pallet 502 is viewed from the front, extending from the near side of the pallet to the far side. Since the reinforcing members 562 are arranged in a range where the product legs or casters move at the time of loading or unloading the product, it prevents scratches and damages of the backing plate precisely. Furthermore, since the reinforcing members 562 extend from the near side of the pallet to the far side, there is no difference in level, thereby enabling smooth loading and unloading of the product.

**[0242]** In the backing plate 506D in Fig. 68, one reinforcing member 563 is provided so as to cover substantially the whole surface of the backing plate (in this example, the entire inner side of respective mounting holes 527 explained with reference to Fig. 55). In this example, since only one reinforcing member 563 is set on the backing plate, the operation at the time of fitting the reinforcing member can be simplified. Furthermore, since the reinforcing member 563 is arranged in the range where the product legs or casters move at the time of loading or unloading the product, it prevents scratches and damages of the backing plate precisely. Furthermore, since the reinforcing member 563 extends from the near side of the pallet to the far side, there is no difference in level, thereby enabling smooth loading and unloading of the product.

**[0243]** As the method for mounting respective reinforcing members 561 to 563 on the backing plate, the respective reinforcing members can be fixed to the backing plate by a double-sided tape, can be screwed to the backing plate, or can be fitted to the backing plate by providing a groove on the backing plate. The method of fixing the reinforcing member by the double-sided tape does not require machining on the surface of the backing plate, and hence the reinforcing member can be arranged at an optional position, and at a low cost. The screwing method enables fixation strong against vibrations and impacts. The fitting method does not require a separate member such as a tape or a screw for fixation, thereby reducing the cost. As the material of the respective reinforcing members 561 to 563, metal materials such as

stainless steel and aluminum, resin materials such as ABS, and the same material as that (for example, PP) of the pallet base (pallet main body) can be used. The metal materials such as stainless steel and aluminum can be used for a case that a heavy product is mounted. The resin materials such as ABS can reduce the weight. When the same material as that of the pallet base is used, the weight can be reduced since it is made of resin, and at the time of recycle, the reinforcing member can be processed together with the pallet main body. Accordingly, cost reduction and improvement of recyclability can be realized.

**[0244]** While the present invention has been explained with reference to the accompanying drawings, the invention is not limited thereto.

**[0245]** For example, the shape, size, configuration, material, and the like of the buffer member arranged below the backing plate are not limited to those described above, and appropriate shape, size, configuration, material, and the like can be used. The rib shape on the rear surface of the backing plate is optional, and the range in which the respective ribs are arranged is also optional. For example, the first reinforcing portion 531 (Fig. 57B) corresponding to the portion on which the legs or casters of the mounted article can be in a honeycomb rib shape.

**[0246]** In the packaging device, the shape and the configuration of the supports and the top plate can be appropriately changed. The configuration of the mounting portion of the pallet and the supports are optional, and the lock mechanism and the like can be appropriately changed. The product/article to be packaged by the packaging device is not limited to image forming apparatuses, and can be any article that can be mounted on the pallet.

**[0247]** Thus, the object of the present invention can be achieved by a packaging device having a base as a packaging device main body, a backing plate arranged above the base with a space therebetween, and a buffer member provided so as to intervene between the backing plate and the base.

**[0248]** In the packaging device according to the present embodiment, since the buffer member provided so as to intervene between the backing plate and the base is included, vibrations, impacts, and the like applied to the article at the time of transportation can be absorbed and alleviated, and the article can be prevented from being broken or damaged.

**[0249]** Since the reinforcing ribs are provided on the rear surface of the backing plate, strength of the backing plate can be increased.

**[0250]** Since the peripheral ribs are provided in the periphery of the backing plate, the strength in the circumference of the backing plate can be increased, the rigidity can be improved, and damages of the product can be prevented.

**[0251]** Since the vertical ribs, the lateral ribs, and the oblique ribs are provided, the strength of the backing plate can be increased, the rigidity can be improved, and the product can be prevented from being damaged. Fur-

thermore, strength against the load from all directions can be achieved by ribs of different shapes.

**[0252]** Since the oblique ribs are provided in a higher density than that of the vertical ribs and the lateral ribs, the strength of the backing plate can be effectively increased by arranging the oblique ribs at portions requiring a higher strength.

**[0253]** Since the oblique ribs are higher than the vertical ribs and the lateral ribs, the strength of the oblique ribs can be increased.

**[0254]** Since the oblique ribs are arranged in four sides of the backing plate, the strength of the backing plate is efficiently increased with a good balance, and effective strength with respect to the mounted article can be obtained.

**[0255]** Since the oblique ribs are arranged at portions corresponding to the legs or the like of the article to be mounted on the backing plate, the strength at portions to which the weight of the article is applied can be increased.

**[0256]** Since the first buffer members are arranged on the base on four sides, the load applied from the mounted article can be efficiently absorbed and distributed with a good balance.

**[0257]** Since the first buffer members are arranged at portions corresponding to the legs or the like of the article to be mounted on the backing plate, an effective buffer performance can be obtained with respect to the load applied from the article.

**[0258]** Since the second buffer members are arranged between the first buffer members, the load in a portion where there is no first buffer member can be absorbed and distributed. The second buffer members can supplement the first buffer members, and can absorb and distribute the load, which cannot be absorbed by the first buffer members.

**[0259]** Since the buffer property of the first buffer members and the second buffer members are different from each other, necessary buffer performance can be obtained at an appropriate position.

**[0260]** Since the density of the first buffer members is higher than that of the second buffer members, the large load applied during transportation and the like is absorbed and alleviated, and the load applied to the backing plate can be uniformly distributed.

**[0261]** Since the second buffer members are provided retractably, the size of the second buffer members can be easily changed corresponding to the size or position of the first buffer members.

**[0262]** The first buffer member and the second buffer member can be engaged with each other easily, and they do not come off.

**[0263]** Since the engaging portion for engaging the first buffer member with the rear surface of the backing plate is provided, misregistration of the first buffer member with respect to the backing plate can be prevented.

**[0264]** The first buffer member can be easily engaged with the rear surface of the backing plate easily with a

simple configuration.

**[0265]** Since a thick portion is provided partial in the reinforcing rib, the engagement strength of the first buffer material with the rear surface of the backing plate can be increased.

**[0266]** Since the backing plate has the drawn shape in which the upper surface of the central part of the backing plate is depressed, the number of ribs can be decreased, and the member can be made light.

**[0267]** In the base, the height of a portion corresponding to the central part of the backing plate is formed to be higher than the peripheral part. Therefore, when a worker tramples the central part of the backing plate underfoot carelessly, the central part of the base higher than the peripheral part abuts on the central part of the backing plate, thereby preventing the backing plate from being bent further, and preventing deformation and damages of the backing plate.

**[0268]** Since the positioning member for positioning the article to be mounted on the upper surface of the backing plate can be mounted, the mounted article can be precisely positioned and mounted.

**[0269]** Since the recording medium that can record information is held, various pieces of information can be carried by the packaging device, and can be used for management and operation of the packaging device.

**[0270]** Since the reinforcing members are arranged on the upper surface of the backing plate, the surface of the backing plate can be protected and reinforced, and the surface of the backing plate can be prevented from being damaged.

**[0271]** Since the reinforcing members are arranged on four sides on the backing plate, the portions corresponding to the legs or the like of the mounted article can be effectively protected and reinforced.

**[0272]** Since the reinforcing members are extended on the opposite sides in the cross direction of the packaging device backward from the front of the packaging device in two lines, the surface of the backing plate is not damaged by the legs or the like of the article at the time of loading and unloading the article. Furthermore, since there is no difference in level, the article can be easily loaded and unloaded.

**[0273]** Since the reinforcing member is provided so as to cover substantially the whole surface of the backing plate, the surface of the backing plate is not damaged by the legs or the like of the article at the time of loading or unloading the article. Furthermore, since there is no difference in level, the article can be easily loaded and unloaded. Further, time and labor for mounting the reinforcing member on the backing plate can be saved.

**[0274]** In addition to the effect of the packaging device explained above, the upper surface of the article can be protected by the top plate, and the sides of the article can be protected by the support members.

**[0275]** Since the height of the support members can be adjusted, the product/article having different heights can be loaded on the packaging device.

**[0276]** Still another embodiment of the present invention is explained below with reference to the accompanying drawings.

**[0277]** Fig. 69 is a perspective view of a state where a product is packaged by a packaging rack using one example of the packaging device according to the present embodiment. Fig. 70 is an exploded view of the configuration of the packaging rack.

**[0278]** As shown in Figs. 69 and 70, a packaging device 601 according to the present embodiment includes a pallet 602 (packaging device), which is a mounting base for mounting the product 100 thereon, four supports 603 fitted to four corners of the pallet 602, and a top plate (lid) 604 mounted on above the respective supports 603. Although not shown in the drawings, a surface plate for protecting the sides of the product can be mounted.

**[0279]** The pallet 602 is made of resin according to the present embodiment, and fork insertion holes 602a for inserting forks of a forklift are provided therein. Furthermore, a concave portion 602b is formed on the upper surface of the pallet, by depressing the upper surface downward, leaving the outer periphery thereof, and buffer members 605 are arranged in the concave portion 602b. A backing plate 606 is fitted from above of the buffer members 605, so that when the backing plate 606 is fitted, there is no difference in level between the upper surface of the backing plate 606 and the upper surface of the pallet (upper surface of the outer periphery). Therefore, since the height of the upper surface in the outer periphery of the pallet matches the height of the upper surface of the backing plate 606 and the whole surface becomes flat, movement of the product is facilitated at the time of loading the product having casters, thereby improving the workability. A fitting portion 602c for attaching the supports 603 is provided at four corners of the outer periphery of the pallet.

**[0280]** The buffer members 605 arranged in the concave portion 602b of the pallet 602 are formed of a foam material according to the present embodiment, and two types of materials, that is, a material having a low foaming ratio (a low-foamed buffer member) and a material having a high foaming ratio (a high foamed buffer member) are used. The low-foamed buffer member is arranged in a portion weighted by legs (casters or the like) of the product to be mounted, and the high foamed buffer member is arranged in other portions. As a result, the weight applied to the backing plate 106 corresponding to the legs of the product is absorbed by the low-foamed buffer member, and the weight applied to the backing plate 106 corresponding to portions between the legs of the product is absorbed by the high foamed buffer member due to flexure of the backing plate 606, with respect to vertical vibrations at the time of transportation. Accordingly, the impact transmitted to the mounted product can be alleviated.

**[0281]** The support 603 includes a first member (upper support) 603a and a second member (lower support) 603b in a substantial L-shape in cross section, and is

formed so that the length can be adjusted by superposing the upper support 603a and the lower support 603b on each other. That is, a plurality of engaging holes (not shown) is provided for each of the upper support 603a and the lower support 603b, and the height of the support 603 is adjusted by putting the engaging holes of the both supports together so that the support 603 has a predetermined height (length) and fitting a latch member (not shown) to the engaging holes. The respective supports 603 are fitted into the fitting portions 602c provided at the corner on the upper surface of the pallet 602, and arranged in an upright mode on the pallet.

**[0282]** The top plate 604 is mounted on the supports 603, so as to cover the upper part of the product mounted on the backing plate 606. The top plate 604 and the respective supports 603 are detachably engaged with each other. As shown in Fig. 71, a central part 604a of the top plate is provided in a protruding state upward from a peripheral part 604b, and the central part 604a and the peripheral part 604b are connected by oblique sides 604c. Since the central part 604a of the top plate protrudes upward from the peripheral part 604b, the strength can be improved than in a case that the top plate has a simple planar shape.

**[0283]** Figs. 72 and 73 are partial enlarged views of the fitting portion 602c provided at four corners of the pallet 602 in detail. As shown in Figs. 72 and 73, the fitting portion 602c has a substantial L-shape corresponding to the support 603 having the substantial L-shape in cross section. Two pairs of ribs 641 are provided in a protruding state on the long side of the L-shape of the fitting portion 602c, and a pair of ribs 641 on the short side of the fitting portion 602c, on the wall of the fitting portion 602c. When the support 603 (lower support 603b) is fitted to the fitting portion 602c and arranged in an upright mode, the ribs 641 abut against the wall of the base of the lower support 603b from outside, so that the lower support 603b is tightly fitted to and supported by the fitting portion 602c. A fitting shaft 642 is arranged in an upright mode from the bottom at the corner of the fitting portion 602c. The fitting shaft 642 fits into a fitting portion formed at the corner of the lower support 603b, so that the lower support 603b is tightly fitted to and supported by the fitting portion 602c. The lower support 603b is reliably fitted to the fitting portion 602c by the ribs 641 and the fitting shaft 642, and the support 603 is securely arranged in an upright mode on the pallet 602.

**[0284]** A support lock member 644 is fitted into a holding portion 643 and held at a position outside of the corner of the fitting portion 602c. The support lock member 644 includes a lock pin 644a, and is slidable in the holding portion 643. A hole (not shown) is formed on the inner wall of the holding portion 643, and the lock pin 644a can protrude from the hole. As shown in Fig. 72, when the support lock member 644 is moved to the outside, the lock pin 644a is withdrawn in the holding portion 643, and the lock between the lower support 603b and the fitting portion 602c is released. As shown in Fig. 73, when the

support lock member 644 is moved to the inside, the lock pin 644a protrudes into the fitting portion 602c, and fitted to the fitting hole (not shown) provided on the base of the lower support 603b, so that the lower support 603b is locked by the fitting portion 602c (on the pallet 602).

**[0285]** Fig. 74 is a plan view of the upper surface of the pallet 602. In Fig. 74, the left side denotes the front of the pallet 602 (front surface in Fig. 70), the right side denotes the rear surface, the upper side denotes the left side, and the lower side denotes the right side. Fig. 75 is a perspective view of the pallet 602.

**[0286]** As shown in the drawings, the backing plate 606 fitted in the concave portion 602b (Fig. 70) is placed on the upper surface of the pallet 602, and the fitting portion 602c is respectively provided at four corners of the outer periphery of the pallet. Furthermore, on a periphery part (an outer part of the backing plate 606) of the left side of the pallet 602 (upper side in Fig. 74), positioning members 625 for abutting on the product mounted on the backing plate 606 to position the product are provided in a protruding state. The positioning members 625 can be provided by forming integrally with the pallet 602, or can be provided separately from the pallet 602 and fixed to the pallet 602. The positioning members 625 are arranged on one side of the pallet 602 with an appropriate interval therebetween. While two positioning members 625 are arranged in this example, three or more positioning members 625 can be provided. Alternatively, the positioning member can be one positioning member long sideways.

**[0287]** The upper surface (product mounting surface) of the backing plate 606 is formed in a planar shape without unevenness. On the other hand, a plurality of ribs (not shown) is provided in a protruding state on the rear surface of the backing plate, opposite to the product mounting surface. The ribs are formed such that the backing plate is not damaged, while maintaining predetermined flexure with respect to the weight of the product mounted on the backing plate 606. The ribs on the rear surface of the backing plate are such that diagonally crossed ribs are used in portions where the legs (casters or the like) of the article are mounted to increase the strength, and in other portions, ribs parallel to the four sides of the periphery of the backing plate are used to give flexure. Since stress concentrates on the central part due to the flexure of the backing plate, a drawn part (not shown) is provided in the central part of the backing plate 606 to endure the stress. The drawn part is provided by increasing the thickness thereof thicker than that of other portions (peripheral part). According to the present embodiment, the pallet 602 and the backing plate 606 are made of the same material (resin according to the present embodiment). Accordingly, when the service life of the pallet 602 and the backing plate 606 comes to an end, the pallet 602 and the backing plate 606 are melted together and can be reused as a recycled material.

**[0288]** Mounting holes 627 for mounting a detachable positioning member 626 that presses the product or the

like mounted on the backing plate 606 to position and fix the product are arranged in place on the backing plate 606. In the pallet 602 according to the present embodiment, four types of mounting holes 627A, 627B, 627C, and 627D having different number and different arrangement of small holes forming the mounting holes 627 are provided.

**[0289]** The mounting hole 627A include four small holes arranged in a diamond shape, and two mounting holes 627A are arranged one each near the inner side of the positioning member 625, with an appropriate interval therebetween.

**[0290]** The mounting hole 627B includes eleven small holes, and two mounting holes 627B are provided along the back side (right side in the drawing) of the pallet 602, with an appropriate interval therebetween.

**[0291]** The mounting hole 627C includes fourteen small holes, and located slightly on the far side (right side in the drawing) than the center of the side opposite to the positioning member 625.

**[0292]** The mounting hole 627D includes ten small holes, and located at a corner on the near side (left side in Fig. 74) on the opposite side to the positioning member 625.

**[0293]** Fig. 76 is a side view of the detachable positioning member 626 fitted to the mounting hole 627. As shown in Fig. 76, the detachable positioning member 626 includes a cap 628 and a base 627.

**[0294]** Fig. 77 is a bottom view of the cap 628, and Figs. 78A and 78B are respectively a plan view and a sectional side view of a base 629. As shown in Figs. 77, 78A, and 78B, two fitting shafts 629a are arranged in an upright mode on the base 629. Fitting portions 628a, to which the fitting shafts 629a are fitted, are provided opened to the bottom of the cap 628. Pin receiving portions 629b, to which fitting pins 631 are respectively fitted, are provided on the rear surface of the base near the opposite ends of the base 629. The fitting pins 631 fitted to the pin receiving portions 629b are fitted to the mounting hole 627 in the pallet 602. Screw holes 630 are provided between the fitting shafts 629a on the base 629. A predetermined screw (not shown) is respectively fitted into the screw hole 630, and the base 629 is fitted and fixed to the mounting hole 627 in the pallet by the fitting pins 631 and the two screws.

**[0295]** As can be understood from Fig. 78A, when the pin receiving portion 629b and the screw hole 630 are sequentially connected, a diamond shape is formed. By matching the diamond shape with the diamond shape of the small holes forming the mounting hole 627 in the pallet 602, the base 629 and the mounting hole 627 in the pallet can be easily aligned, the fitting pin 631 can be inserted into the mounting hole 627, and a predetermined screw can be screwed in the mounting hole 627 from the screw hole 630. After the base 629 is mounted and fixed on the pallet 602, the cap 628 is put on the base 629, thereby mounting and fixing the detachable positioning member 626 on the pallet 602.

**[0296]** When the detachable positioning member 626 is detached from the pallet 602, the cap 628 is removed from the base 629, the screw in the screw hole 630 is removed, and the base 629 is detached from the mounting hole 627, thereby enabling detachment of the detachable positioning member 626.

**[0297]** Fig. 79 is a schematic diagram of a diamond shape formed by small holes constituting the respective mounting holes in four types of mounting holes 627A, 627B, 627C, and 627D provided on the backing plate 606 of the pallet 602. In the mounting hole 627A, one diamond shape is formed by four small holes. Therefore, there is only one mounting method of the base 629.

**[0298]** In the mounting hole 627B, three diamond shapes can be formed by eleven small holes. Therefore, there are three mounting methods of the base 629. That is, the mounting base 627B has three mounting positions as the mounting position of the base 629.

**[0299]** In the mounting hole 627C, four diamond shapes can be formed by fourteen small holes. Therefore, there are four mounting methods of the base 629. That is, the mounting hole 627C has four mounting positions as the mounting position of the base 629.

**[0300]** In the mounting hole 627D, four diamond shapes can be formed by ten small holes. Therefore, there are four mounting methods of the base 629. That is, the mounting hole 627D has four mounting positions as the mounting position of the base 629.

**[0301]** Thus, the mounting holes 627B, 627C, and 627D, of the four types of mounting holes 627A, 627B, 627C, and 627D provided on the backing plate 606 of the pallet 602, have a plurality of base mounting positions. Therefore, the detachable positioning member 626 can be mounted and fixed by using the diamond shape at an appropriate position corresponding to the size of the product to be mounted on the backing plate 606, and the lower side faces of the mounted product are pressed by the side of the cap 628, thereby enabling prevention of shifting or shaking of the product. Normally, the mounting hole 627A is not used, and as shown in Fig. 80, the product mounted on the pallet 602 is positioned by four detachable positioning members 626 mounted on the mounting holes 627B, 627C, and 627D, and the positioning members 625 explained above.

**[0302]** The positioning and fixing method when the product is mounted on the pallet 602 according to the present embodiment is explained below. As shown in Figs. 74 and 75, the pallet 602, on which the detachable positioning members 626 are not mounted, is prepared, and the product is mounted on the backing plate 606 of the pallet. The lower part of one side of the product (not shown) is pressed against the positioning members 625 set in the peripheral part of the pallet 602, and positioning is performed by the one side of the product. As shown in Fig. 81, the bases 629 are then screwed and fixed to the appropriate small holes of the mounting holes 627B, 627C and 627D to press the far side of the product 100 and the respective sides thereof opposite to the position-

ing members 625. The caps 628 are put on the bases 629, to press the lower sides of the product 100 with the sides of the caps 628, to position and fix the three sides of the product 100 with the positioning members 625 and the detachable positioning members 626. The front surface of the product 100 is, as shown in Fig. 69, pressed by spacers 614 fitted to the supports 603 arranged in an upright mode on the pallet 602, thereby positioning and fixing the product 100. The top plate 604 is then engaged with the top of the supports 603.

**[0303]** As shown in Fig. 74 or 75, the pallet 602, on which the detachable positioning members 626 are not mounted, is prepared. One support 603 with the spacer 614 fitted to the fitting portion 602c near the mounting hole 627A (upper left in Fig. 74) is fitted, and the product is mounted on the backing plate 606 of the pallet. The lower two sides of the product (not shown) are pressed against the positioning members 625 and the support 603, to position the two sides of the product. To press other two sides of the product 100, the bases 629 are screwed and fixed to appropriate small holes of the two mounting holes 627B and the mounting holes 627C and 627D. The caps 628 are then put on the bases 629, to press the lower sides of the product 100 with the sides of the caps 628, to position and fix the four sides of the product 100 with the positioning members 625, the detachable positioning members 626, and the supports 603. Thereafter, the supports 603 other than the upper left support 603 in Fig. 74 are fitted, to press the front surface of the product 100 with the spacers 614 fitted to the supports 603, as shown in Fig. 69, thereby positioning and fixing the product 100. The top plate 604 is then engaged with the top of the supports 603.

**[0304]** When the product is small (when the product is smaller than a space between the positioning member 625 and the detachable positioning member 626 fitted on the innermost side of the positioning member 627D), the detachable positioning member 626 can be fitted to the mounting holes 627A, which are in front of the positioning members 625.

**[0305]** As can be understood from Figs. 77 and 78A and 78B, since the base 629 has a linear symmetrical shape, and the fitting portions 628a of the cap 628 are provided in linear symmetry, the base 629 and the cap 628 can be fitted by rotating these by 180 degrees. That is, the cap 628 can be put on the base 629 fitted to the mounting hole 627 in the direction shown in Fig. 76, or in an opposite direction. Consequently, positioning can be performed by the side of the cap (the right side in Fig. 76) and the slope of the cap 628, thereby enabling the use of the cap 628 differently at the time of mounting and positioning various products. Accordingly, positioning and fixation at more appropriate positions can be realized.

**[0306]** In the pallet 602 of the present embodiment, when the product to be mounted is positioned and fixed on the pallet, the member that firstly positions and fixes one side of the product (the positioning member 625) is

initially fixed on the pallet. Therefore, one side of the product only needs to be pressed simply against the positioning members 625, and hence the initial positioning (of the first one side) is quite easy. The detachable positioning members 626 are then fitted so as to be aligned with other sides of the product, whose one side has been positioned and fixed. Therefore, position adjustment of the detachable positioning members 626 becomes easy (as compared to difficulties of a conventional pallet, in which the detachable positioning members have to be fitted to positions aligned with the product, before mounting the product). Accordingly, when various products/articles are mounted on the pallet 602 and positioned and fixed thereon, the operation becomes simple and easy.

**[0307]** When a product for which mounting positions of the detachable positioning members 626 are known beforehand is mounted, the detachable positioning members 626 can be mounted on the pallet first, and the product can be mounted later. At this time, when the cap 628 is used in the opposite direction, the product is guided to an appropriate mounting position by the slope of the cap, and reliably positioned and fixed.

**[0308]** In the pallet 602 of the present embodiment, since the fitting pins 631 and the screw holes 630 for mounting the detachable positioning member 626 on the pallet 602 are arranged in a diamond shape, and small holes of the mounting hole 627 to which these are fitted and mounted are arranged in a diamond shape, the mounting position of the detachable positioning member 626 can be easily determined by reading the diamond shape by connecting the small holes of the mounting hole 627, at the time of fitting the detachable positioning member 626 to the mounting hole 627. When the mounting position of the detachable positioning member 626 is shifted and adjusted, the mounting position can be easily adjusted by shifting the detachable positioning member 626 so as to match with the diamond shape of the small holes. As a result, the detachable positioning member 626 can be fitted easily and efficiently.

**[0309]** In the pallet 602 of the present embodiment, the mounting holes 627C and 627D, to which the detachable positioning members 626 are fitted for pressing the side of the product on the opposite side to the positioning members 625 initially fixed on the pallet, are provided so that the mounting position can be adjusted in a direction that the detachable positioning member 626 is approached and alienated from the positioning members 625, the product can be appropriately pressed against the positioning members 625, and positioned and fixed.

**[0310]** Furthermore, the mounting holes 627B provided on the far side, orthogonal to the side on which the positioning members 625 are provided, are provided so that the mounting positions of the detachable positioning members 626 can be adjusted in a direction parallel to the side where the positioning members 625 are provided. Accordingly, the position of the product can be appropriately adjusted, positioned, and fixed on the far side orthogonal to the initially positioned and fixed side of the

product.

**[0311]** As shown in Fig. 80, after the product 100 is mounted, positioned, and fixed on the pallet 602, four supports 603 are arranged in an upright mode on the support fitting portions 602c provided at four corners of the pallet 602, and the top plate 604 is mounted and fixed on the supports (Fig. 70). Thereafter, as shown in Fig. 69, the product 100 is packaged by the packaging device 601. According to need, the spacer 614 is fitted to the support 603 to prevent shaking or shift of the product.

**[0312]** Fig. 82 is a front view of a state where the pallets 602 are stacked. As explained above, the positioning members 625 are provided in a protruding state on one side on the upper surface of the pallet 602. In the pallet 602 according to the present embodiment, spaces 632 for avoiding the positioning members 625 when the pallets are stacked on each other (for accommodating the positioning members 625) are formed in the leg on one side (on the positioning member 625 side) of the pallet 602. As a result, the pallets 602 can be stacked at the time of storage in a warehouse or the like, thereby increasing the storage efficiency. More than three pallets 602 can be stacked.

**[0313]** In the recyclable and circulative packaging device, the packaging device needs to be collected after having delivered the product/article to a user. At this time, to operate the packaging device efficiently, it is necessary to obtain and store the information of the packaging device being used, and take measures for reusing the packaging device based on the information. Therefore, in the packaging device 601 according to the present embodiment, as shown in Figs. 75 and 83, a holder holding portion 621 for holding an IC tag 620 as an information holding unit is provided, located on the sides (two sides of the positioning member 625 side and the opposite side) of the legs of the pallet 602. The holder holding portion 621 is formed in a concave shape on the side of the leg of the pallet, and includes two insertion holes, into which a latch of a holder 622 is inserted, on the bottom thereof. An engaging portion, with which an engaging ear of the holder 622 is engaged, is provided on the side of the holding unit.

**[0314]** Fig. 84 is a front view of the holder that accommodates and holds the IC tag 620. The holder 622 shown in Fig. 84 includes two latches 622a provided in a downward protruding state from the bottom, and two engaging ears provided in a protruding state outward from the left and right sides. Since the latches 622a of the holder 622 are inserted into the insertion holes provided in the holder holding portion 621 in the pallet 602, and engaging ears 622b are engaged with the engaging portions provided in the holder holding portion 621, the holder 622 is held by the holder holding portion 621 in the pallet 602, so that the holder 622 does not come off.

**[0315]** Fig. 85 is a back view of the holder 622. Fig. 86 is a longitudinal cross section of the holder 622. As shown in Figs. 85 and 86, the holder 622 has a plate-like cross section, and has two holder holding arms 622c standing

from the bottom on the back side. Two first positioning portions 622d are provided in a protruding state inward of the holder, located respectively near the outside of the holder holding arms 622c. Two second positioning portions 622e are also provided in a protruding state inward of the holder inside of the holder holding arm 622c. The second positioning portions 622e are provided, as can be understood from Fig. 86, in a predetermined length from above, and are not provided in a range from the bottom to the height of the holder. Consequently, as shown in Fig. 86, in the cross sectional direction of the holder, a concave holder holding portion 623 surrounded by the surface of the holder, the bottom of the holder, and the holder holding arms 622c is formed, the upper part of the holder holding portion 623 is regulated by the second positioning portions 622e. As shown in Fig. 85, the left and right sides of the holder holding portion 623 are regulated by the first positioning portions 622d. Thus, the IC tag 620 is positioned and held in the holder 622.

**[0316]** On the IC tag 620 as the information holding unit, as one example, production date of the packaging device 601, use frequency, product information at the time of respective use (information of the packaged product), information of the product to be packaged (the type and the like of the product that can be packaged), transport destination, carrier, use environment, position information, and the like are recorded. The stored information can be read from the IC tag 620 in a non-contact manner, and in a factory, a warehouse, or a wholesale distributing agent, the information can be easily read at the time of shipping or collecting the packaging device, and used for management of the packaging device.

**[0317]** In the pallet 602 according to the present embodiment, the IC tag 620 can be held on the opposite sides of the pallet 602 (the opposite sides when the pallet is carried by the forklift). Thus, by holding the IC tag 620 on the opposite sides of the pallet 602, the workability in the warehouse or the like can be improved.

**[0318]** In other words, when the pallets 602 are stored in the warehouse, or transported from the warehouse to carrying facilities such as trucks, as shown in Fig. 87, the pallets 602 are arranged in the longitudinal direction (a surface of the pallet on which there are the fork insertion holes 602a is a direction of the longitudinal direction, so that the IC tag holding faces are on the left and right sides), and are carried sequentially by the forklift from the near side toward the far side. At this time, since the information of the product 100 on the pallet 602 is held on the IC tag 620, the information can be easily read from the side of the pallet 602. Furthermore, when the holder 622 holding the IC tag 620 is fitted to the holder holding portion 621, this operation can be efficiently performed from the side of the pallet 602. If the holder holding portion 621 is provided on a surface of the pallet where the fork insertion holes 602a are provided (and the opposite surface thereof), the holder holding portion 621 is covered by the pallet arranged adjacent thereto, thereby hindering the read operation of the tag information and fitting op-

eration of the holder 622 to the holder holding portion 621, to deteriorate the workability.

**[0319]** When a plurality of pallet rows (rows of pallets arranged as shown in Fig. 87) is arranged and stored in the warehouse, the IC tags 620 face a passage, thereby facilitating the read operation of the tag information and fitting operation of the holder 622 to the holder holding portion 621.

**[0320]** Furthermore, although the pallet 602 according to the present embodiment is not a complete square, it has an oblong shape (when it is assumed that a side on which the holder holding portion 621 is provided is lengthwise, and a surface on which the fork insertion holes 602a are provided and the opposite surface are sidewise, the lengthwise side is larger than the sidewise side). Accordingly, installation efficiency in the storage places and transportation means, such as warehouses, container, or trucks (efficiency in arranging the pallets 602, that is, the packaging devices 601) is improved.

**[0321]** While the present invention has been explained by way of illustrated examples, the invention is not limited thereto.

**[0322]** For example, the shape and the aspect ratio of the pallet as the packaging device can be appropriately changed. Furthermore, the shape and the size of the positioning members set on the pallet and the detachable positioning members can be appropriately changed. The configuration for mounting the detachable positioning members on the upper surface of the pallet is also optional, and the position and the number thereof can be appropriately set.

**[0323]** Furthermore, in the case of a large product (when the position of the product to be positioned is outside of the position of the detachable positioning member to be fitted to the outermost mounting holes 627B and 627D, and still inside of the supports 603), the product can be positioned and fixed by pressing the product with the supports or with the supports and the spacers 614 fitted to the supports, without using the detachable positioning member. In this case, the product is first made to abut against the positioning members 625 and the support fitted to the side adjacent to the positioning members 625, and then, the supports are fitted to other sides to position the product. At this time, fine adjustment of the space between the product and the supports can be made by adjusting the thickness of the spacer 614.

**[0324]** The configuration and the shape of the information recording medium are optional, and the configuration of the holder for holding the information recording medium and the holder holding portion is also optional. The information to be stored on the information recording medium is also optional.

**[0325]** In the packaging rack and the like using the pallet as the packaging device, the shape and the configuration of the supports and the top plate can be appropriately changed. The configuration of the pallet and the support mounting portion is also optional, and the lock mechanism and the like can be appropriately changed.

The product or article to be packaged by the packaging device is not limited to image forming apparatuses, and can be anything that can be mounted on the pallet. The packaging device (pallet) according to the present invention can be used as the article mounting base such as an article-delivery box.

**[0326]** Thus, the object of the present invention can be achieved by a packaging device having a positioning member set on the upper surface of the packaging device so as to abut against the article for positioning the article, and a detachable positioning member detachably provided on the packaging device so as to abut against the article positioned by the positioning member for positioning the article, in which the mounting portion for mounting the detachable positioning member is provided so as to be able to adjust the mounting position of the detachable positioning member.

**[0327]** In the packaging device according to the present embodiment, since the article can be positioned on the packaging device by the positioning member and the detachable positioning member, and the mounting position of the detachable positioning member can be adjusted, various types of product/article can be reliably positioned and fixed.

**[0328]** Since the packaging device can be used for products of various sizes by only shifting the detachable positioning members (only the positioning members on the two sides of the product), the adjustment of the positioning members corresponding to the difference of the product is easy.

**[0329]** Since the detachable positioning member includes the base, mounting means for mounting the base on the mounting portion, and a cap member that covers the base and has an article positioning surface, the detachable positioning member can be realized at a low cost with a simple configuration. Since the base stays on the pallet even when the cap is detached, the fitting position of the cap is clear when the cap is fitted again to the pallet. Accordingly, the packaging device can be used for various types of articles by only changing the cap.

**[0330]** The mounting holes provided on the pallet can be smaller than the rubber legs or casters of the article, thereby preventing the rubber legs or casters from going therein. Since the base is locked in the mounting hole by the pin and then screwed, the base can be easily and reliably fitted to the mounting hole in the mounting portion.

**[0331]** When the detachable positioning member is fitted to the mounting portion, the mounting position can be easily determined by reading the diamond shape of the mounting hole.

**[0332]** Since a plurality of mounting holes are provided so as to be able to form a plurality of diamond shapes, the mounting position of the detachable positioning members can be easily adjusted in a simple configuration. The mounting position of the detachable positioning member can be easily adjusted.

**[0333]** Furthermore, various types of articles can be appropriately positioned. The articles can be also guided

to an appropriate mounting position by the slope at the time of loading the product.

**[0334]** The packaging device can be stacked. In this case, the positioning member is not obstructive.

**[0335]** Since the recording medium that can record information is held on the packaging device, various pieces of information can be carried by the packaging device and used for management and operation of the packaging device.

**[0336]** Since the recording medium is detachably held on the packaging device, when one of the recording medium and the packaging device is damaged, only the one can be changed.

**[0337]** Since the recording medium is held on the packaging device via the holder, the recording medium can be easily attached to or detached from the packaging device.

**[0338]** Since the holder mounting portion for mounting the holder on the packaging device is provided on the side of the packaging device where the fork insertion holes are not provided, the holder can be easily attached or detached and the information can be easily read at the time of shipping or storing the packaging device. A possibility of damaging the recording medium due to a contact with the forklift or the like can be reduced.

**[0339]** Since the positioning member is provided along the side of the packaging device where the fork insertion holes are not provided, the article can be easily positioned with respect to the side of the packaging device.

**[0340]** Since the position of the recording medium is fixed, reliability in reading can be improved.

**[0341]** In addition to the effect of the packaging device explained above, the upper surface of the article can be protected by the top plate, and the sides of the article can be protected by the support members.

**[0342]** Since the height of the support members can be adjusted, the product/article having different heights can be loaded on the packaging device.

**[0343]** Since the article pressing member can be mounted on the support member, the article can be pressed by the article pressing member in addition to the positioning member and the detachable positioning member, and hence the article can be reliably positioned and fixed.

**[0344]** The lock mechanism for locking the support member to the packaging device is provided, so that the support member can be prevented from coming off from the packaging device.

**[0345]** The product is easily unloaded from the packaging device by pressing at least one side of the product by the support member, which is detached at the time of unpacking the product, and workability at the time of unpacking can be increased.

**[0346]** Since two sides of the article are positioned first, and the other two sides are positioned by the detachable positioning members, the two sides of the article only need to be pressed against the positioning members, and hence initial positioning (of the first two sides) is re-

markably easy.

**[0347]** Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications can be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

**[0348]** Although the invention has been described with respect to a specific embodiment for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

## Claims

### 1. A packaging device comprising:

- a mounting base (102, 502, 602) on which an article is mounted;
- a top plate member (104, 204) configured to be disposed above the article mounted on the mounting base (102); and
- a support member (103) that supports the top plate member (104), wherein

the support member (103) includes a first member (103a) and a second member (103b), and the first member (103a) and the second member (103b) are slidably fitted to each other, so that a length of the support member (103) can be adjusted.

### 2. The packaging device according to claim 1, wherein a convex portion (134a, 134b) is formed on one of the first member (103a) and the second member (103b), the convex portion (134a, 134b) being extended in a longitudinal direction of the at least one of the first member (103a) and the second member (103b),

a concave portion (135a, 135b) is formed on other of the first member (103a) and the second member (103b), the concave portion (135a, 135b) being extended in the longitudinal direction of the other of the first member (103a) and the second member (103b), and

the convex portion (134a, 134b) and the concave portion (135a, 135b) are fitted to each other slidably.

### 3. The packaging device according to claim 1, further comprising:

- a fixing unit (133) that fixes the first member (103a) and the second member (103b) at a predetermined position.

4. The packaging device according to claim 3, further comprising:

a plurality of fixing unit-fitting portions (131) for fitting the fixing unit (133), the fixing unit-fitting portions (131) being provided along the longitudinal directions of the first member (103a) and the second member (103b), wherein

the fixing unit (133) is fitted by matching one of the fixing unit-fitting portions (131) of the first member (103a) with one of the fixing unit-fitting portions (131) of the second member (103b).

5. The packaging device according to claim 1, further comprising:

a first article pressing member (114) that presses an upper part of the article mounted on the mounting base (102); and  
a second article pressing member (114) that presses a lower part of the article mounted on the mounting base (102), wherein

the first article pressing member (114) and the second article pressing member (114) are attachably provided to the support member (103), and a volume of deformation of the second article pressing member (114) due to an impact is smaller than that of the first article pressing member (114).

6. The packaging device according to claim 5, wherein the first article pressing member (114) and the second article pressing member (114) are turnable between a pressing position for pressing the article and an accommodating position along the support member (103).

7. The packaging device according to claim 1, wherein the top plate member (204) has a reinforcing structure for preventing a bending.

8. The packaging device according to claim 7, wherein the reinforcing structure is formed with a plurality of reinforcing grooves (205) provided on a surface of the top plate member (204).

9. The packaging device according to claim 8, wherein the reinforcing grooves (205) include parallel grooves (205a) provided parallel to outer circumference of the top plate member (204).

10. The packaging device according to claim 1, wherein the top plate member (204) includes a recording medium (220) on which information is recorded.

11. The packaging device according to claim 1, wherein the mounting base (502) includes

a base (502) as a main body of the packaging device; a backing plate (506) arranged above the base (502) with a space therebetween; and  
a buffer member (505) provided to intervene between the backing plate (506) and the base (502).

12. The packaging device according to claim 11, further comprising:

a reinforcing rib (528) provided on a rear surface of the backing plate (506).

13. The packaging device according to claim 11, wherein the buffer member (505) includes  
a first buffer member (551) arranged on the base (502) on four sides; and  
a second buffer member (552) arranged between the first buffer members (551), and  
buffering characteristic of the first buffer member (551) is different from that of the second buffer member (552).

14. The packaging device according to claim 13, further comprising:

an engaging portion (553) for engaging the first buffer member (551) with a rear surface of the backing plate (506).

15. The packaging device according to claim 11, wherein the backing plate (506) has a drawn shape with an upper surface being depressed at a center part.

16. The packaging device according to claim 1, further comprising:

a positioning member (625) fixed on an upper surface of the mounting base (602), the positioning member (625) making a contact with the article for setting a position of the article;  
a detachable positioning member (626) detachably provided on the upper surface of the mounting base (602), the detachable positioning member (626) making a contact with the article positioned by the positioning member (625) for setting the position of the article; and  
a mounting portion (627) for mounting the detachable positioning member (626), the mounting portion (627) being provided to be able to adjust a mounting position of the detachable positioning member (626).

17. The packaging device according to claim 16, wherein the detachable positioning member (626) includes  
a base (629);  
a mounting unit (630, 631) for mounting the base (629) on the mounting portion (627); and  
a cap member (628) that covers the base (629), the

cap member (628) having an article positioning surface.

18. The packaging device according to claim 1, wherein the packaging device is configured to be stacked, and the packaging device further comprises an accommodating portion (632) for accommodating the positioning member (625) at a time of stacking the packaging device in a leg portion of the packaging device.

19. A method of positioning an article, the method comprising:

mounting the article on a mounting base;  
 setting a position of a lower part of one side of the article by pressing the lower part of the one side of the article against a positioning member fixed on the mounting base;  
 setting a position of a lower part of other side of the article by mounting a base and a cap member on the mounting base;  
 pressing a front surface of the article by an article pressing member mounted on a support member by mounting the support member on the mounting base; and  
 engaging a top plate member with a top portion of the support member.

20. A method of positioning an article, the method comprising:

mounting a support member with an article pressing member on a side adjacent to a side of a positioning member fixed on a mounting base;  
 mounting the article on the mounting base;  
 setting positions of two sides of the article by pressing the article against the support member;  
 setting positions of other two sides of the article by mounting a base and a cap member to the mounting base;  
 pressing the sides of the article by an article pressing member mounted on the support member by mounting another support member to the mounting base; and  
 engaging a top plate member with a top portion of the support member.

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FIG.1

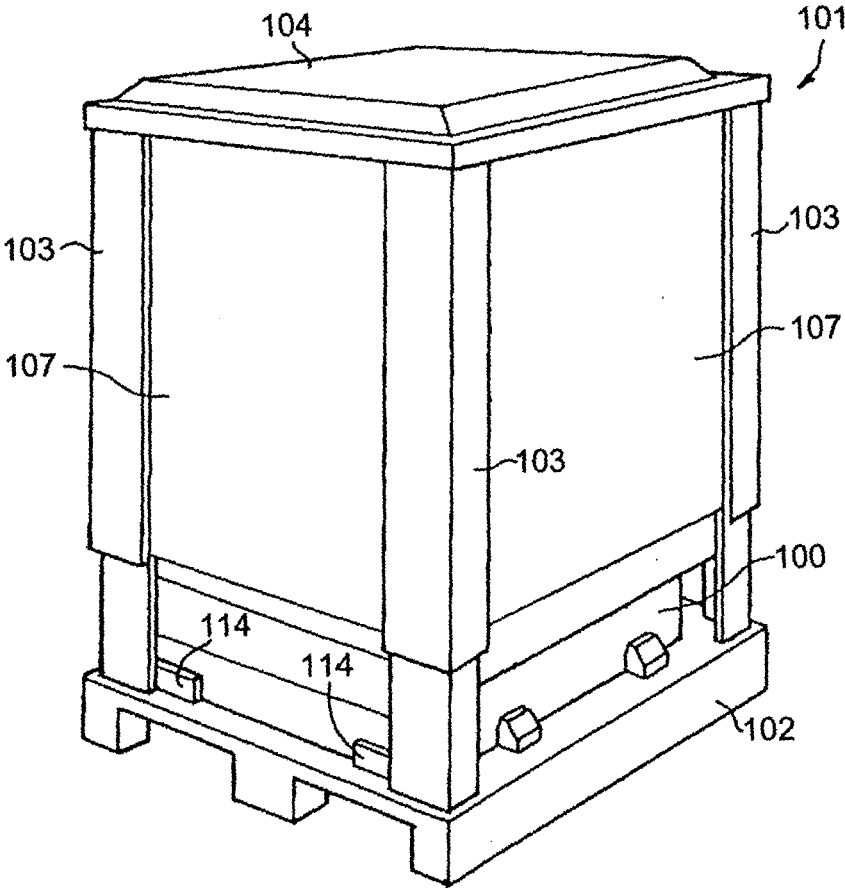


FIG.2

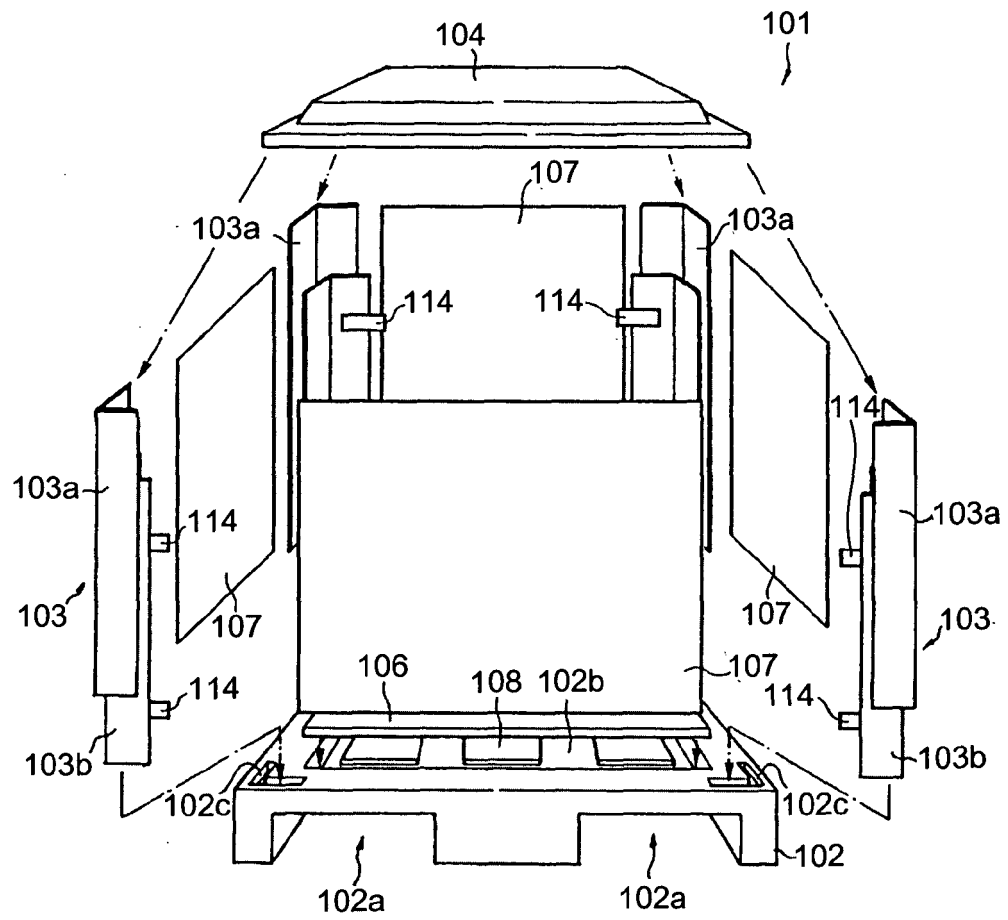


FIG.3

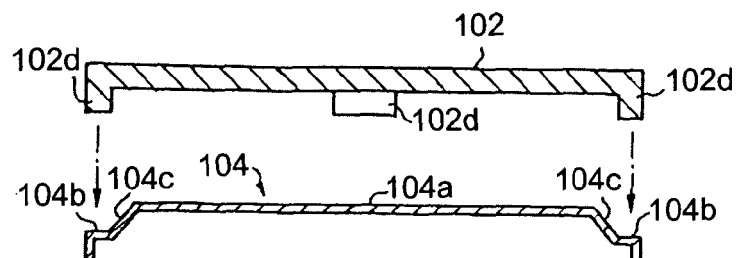


FIG.4A

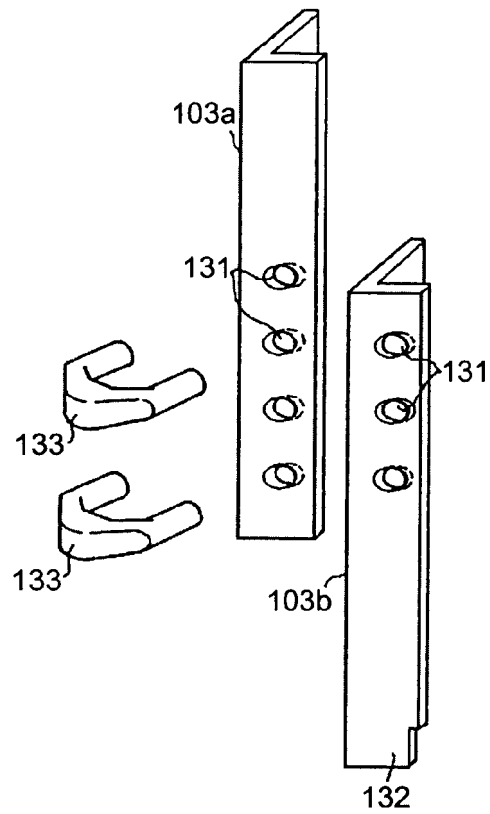


FIG.4B

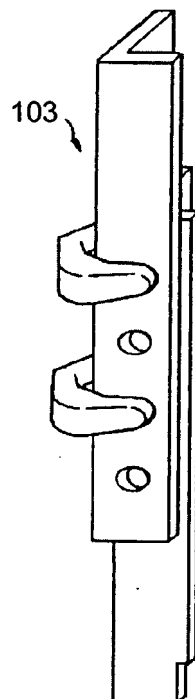


FIG.5

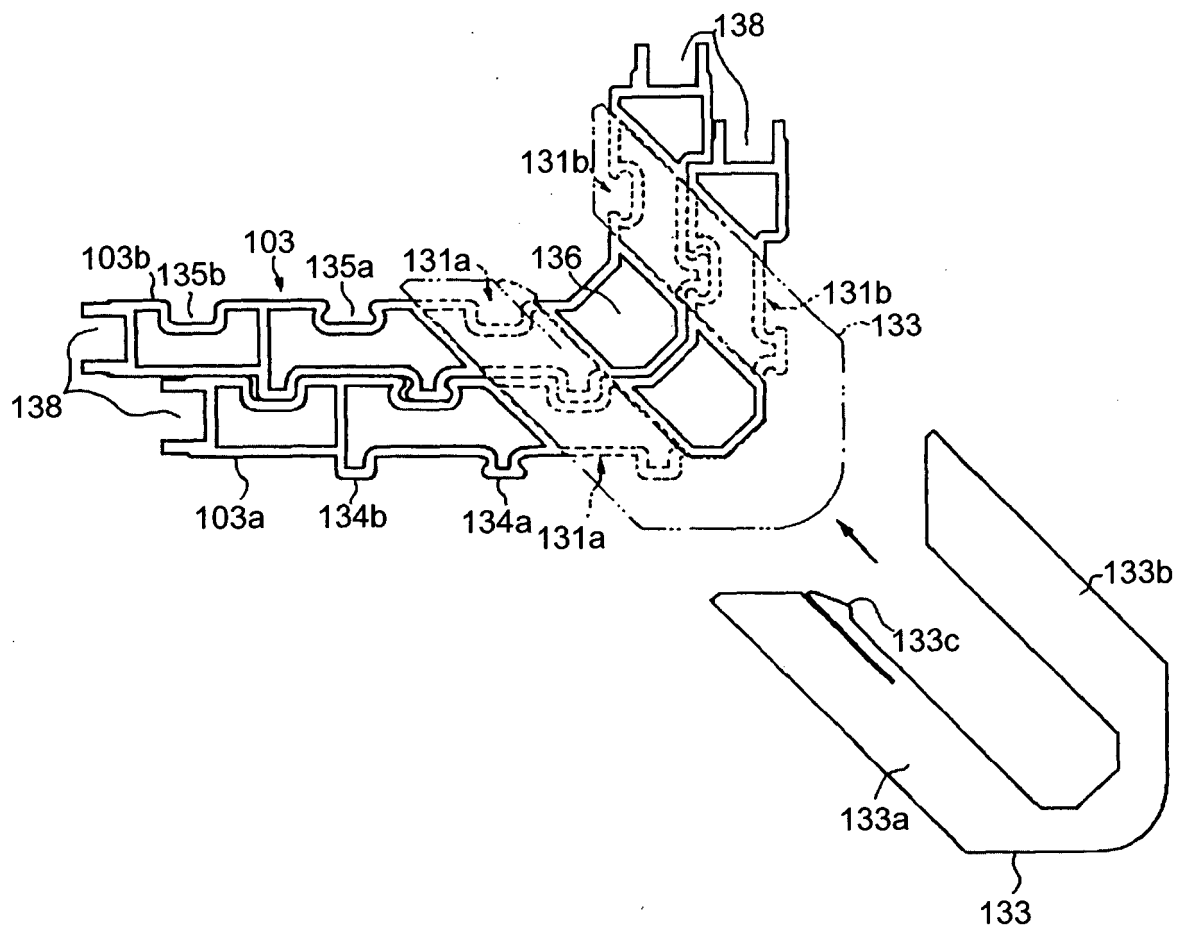


FIG.6

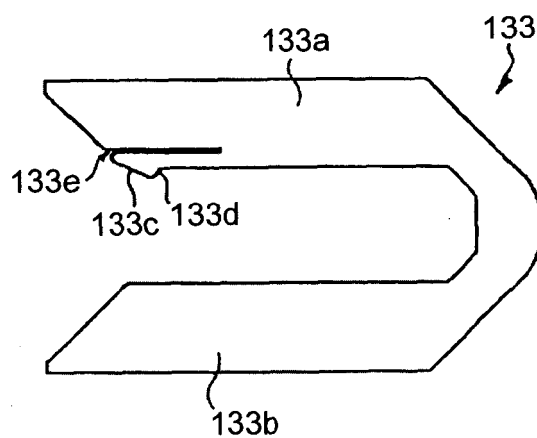


FIG.7

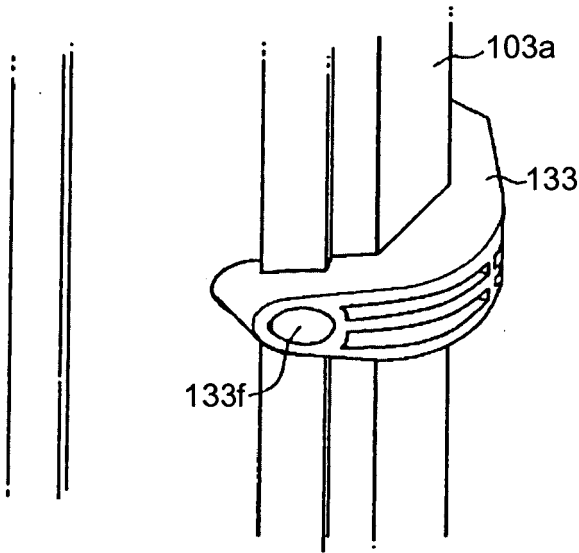


FIG.8A

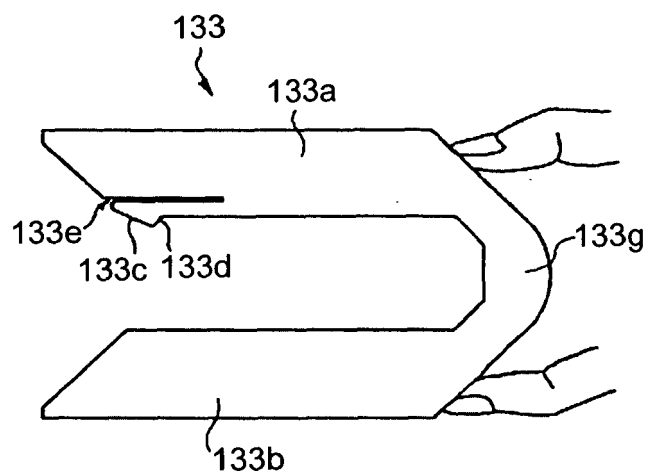


FIG.8B

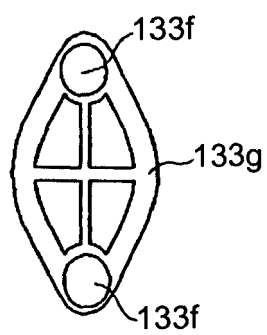


FIG.9

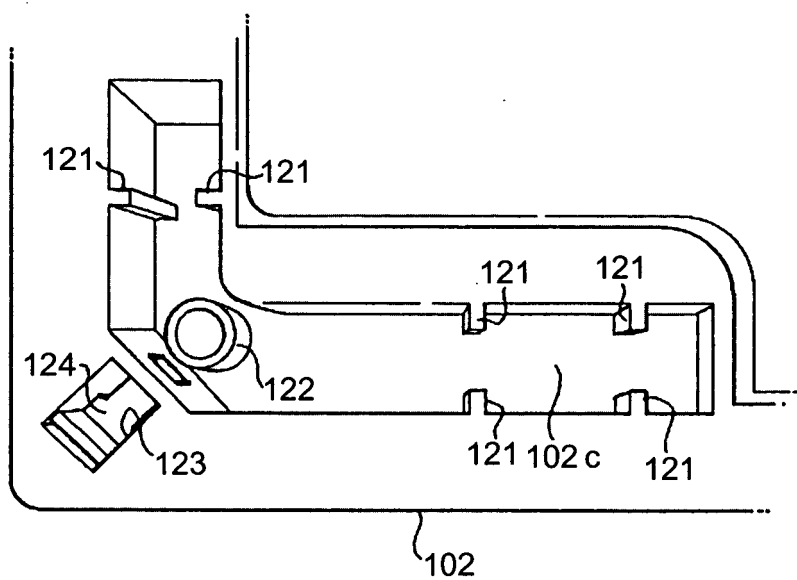


FIG.10

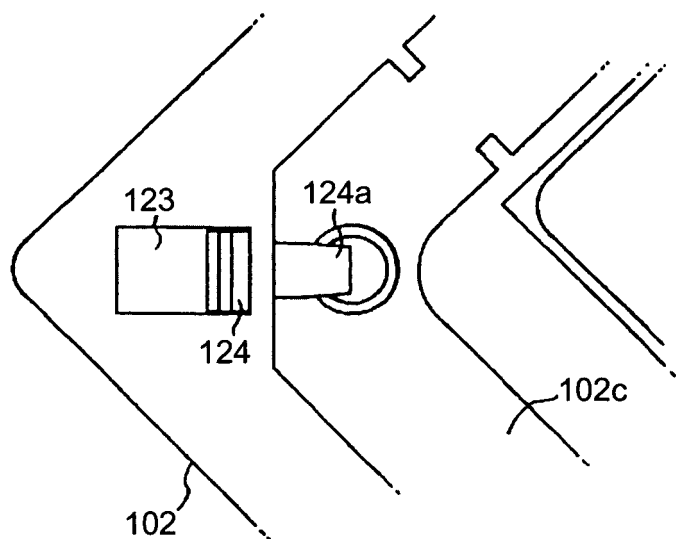


FIG.11

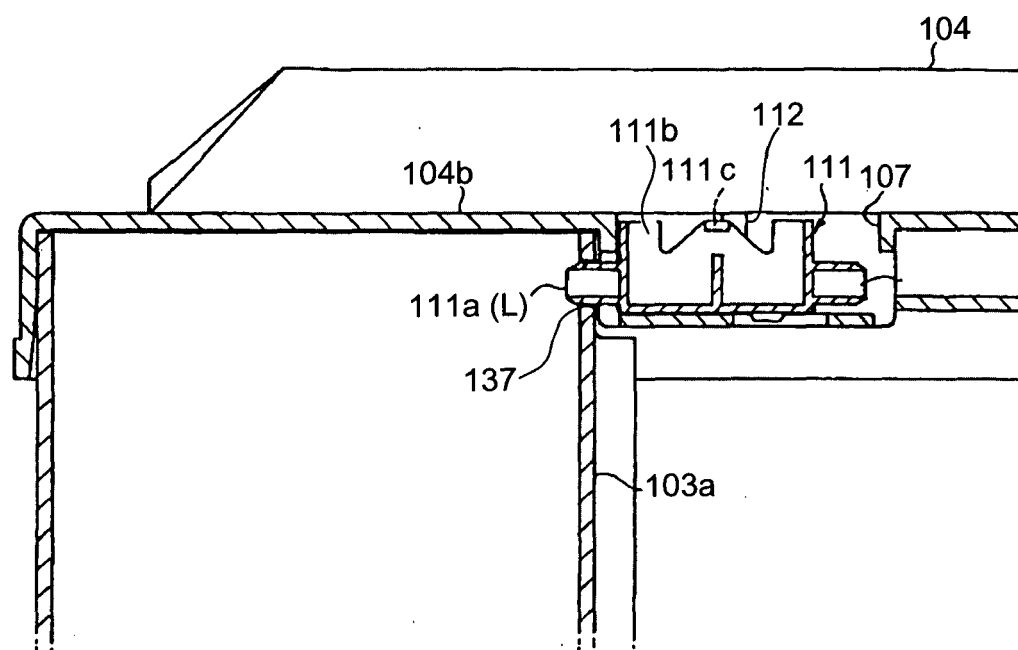


FIG.12

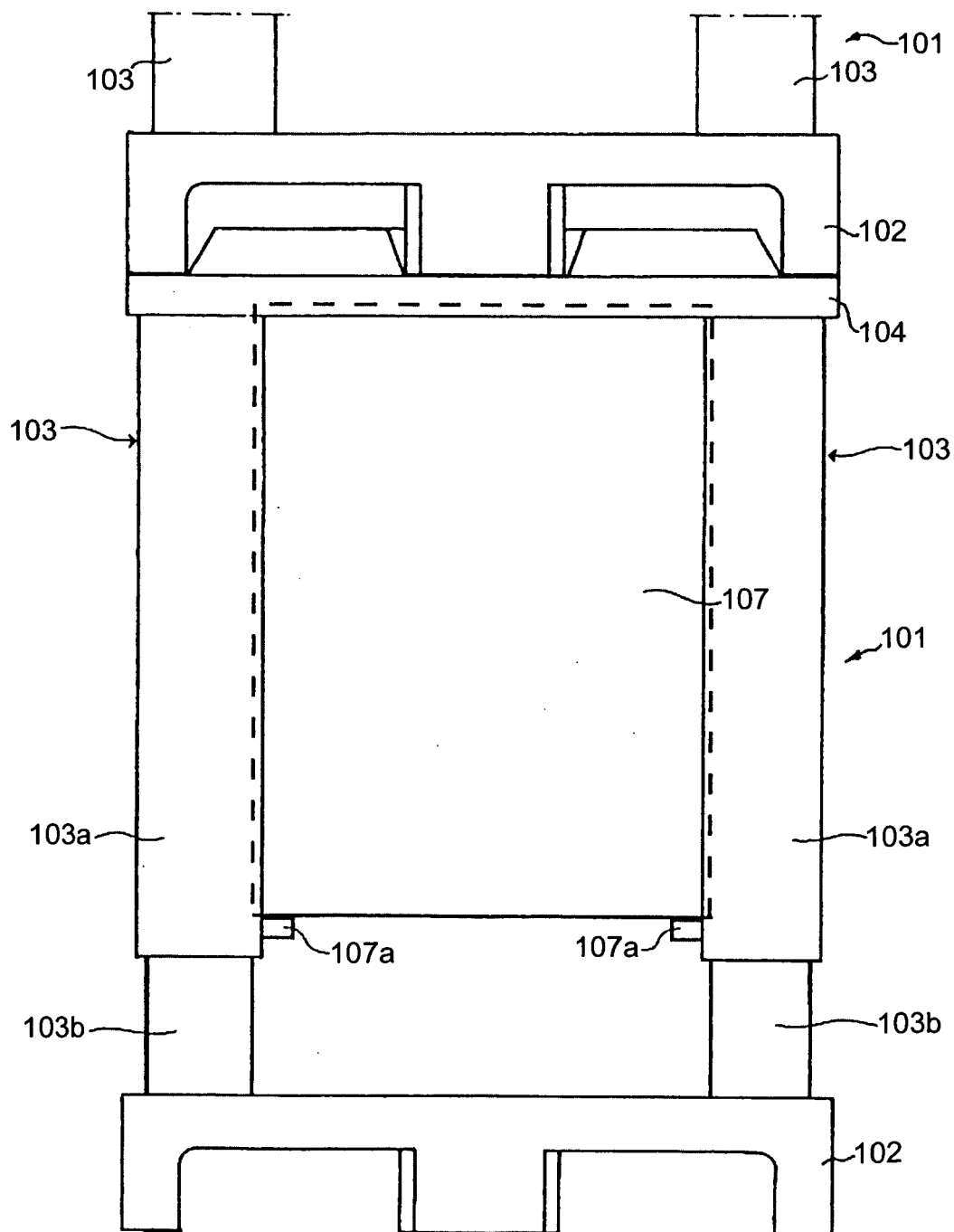


FIG.13

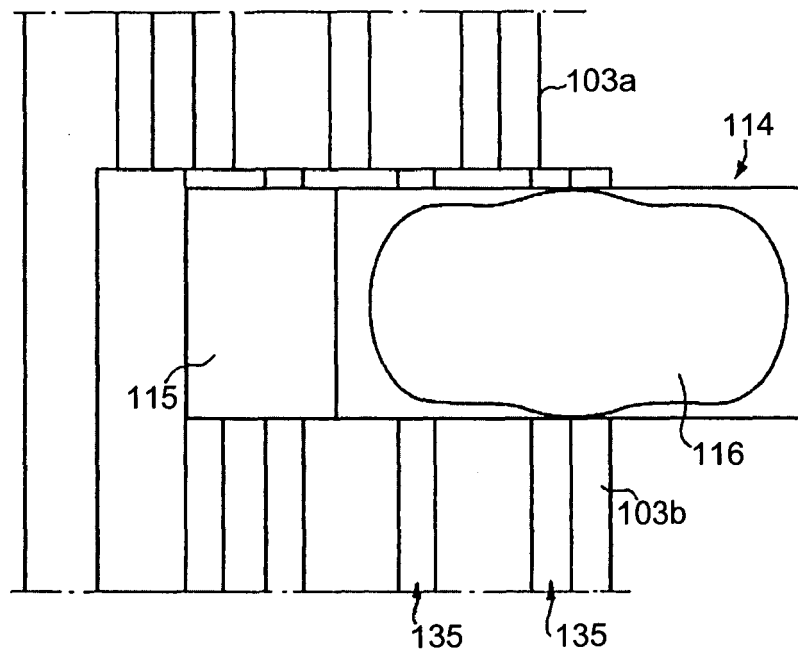


FIG.14

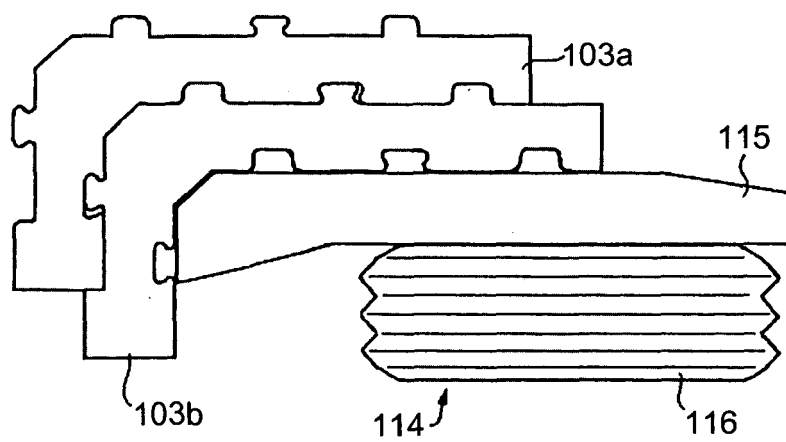


FIG.15

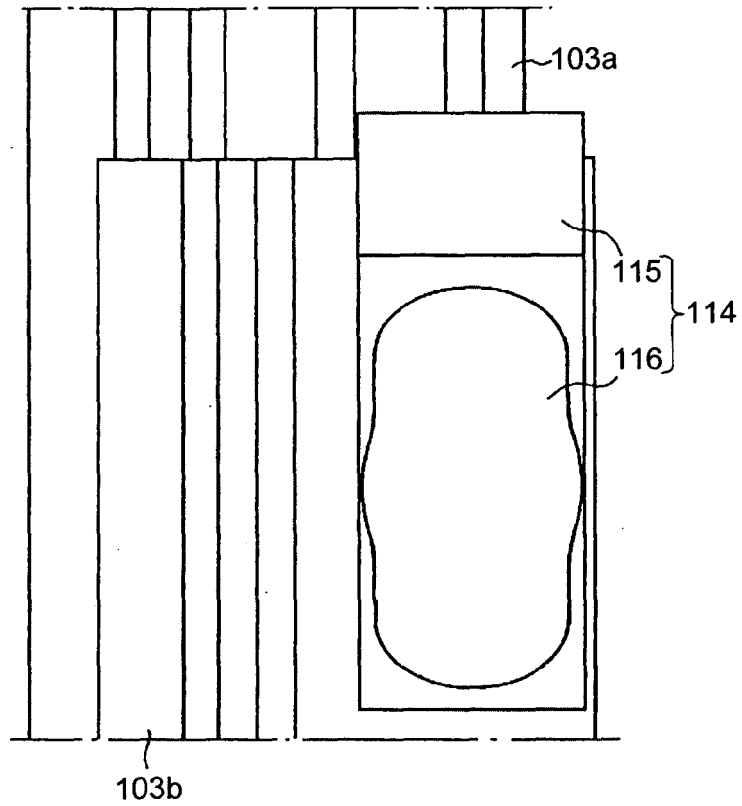


FIG.16

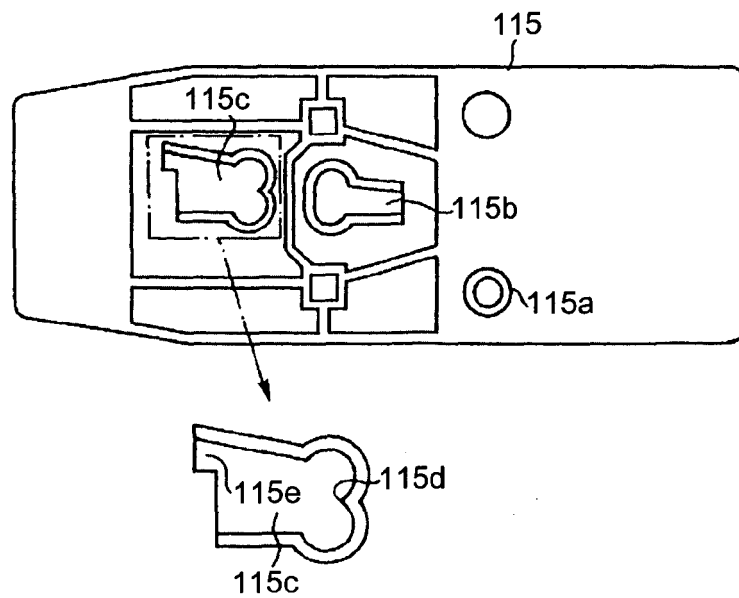


FIG.17A

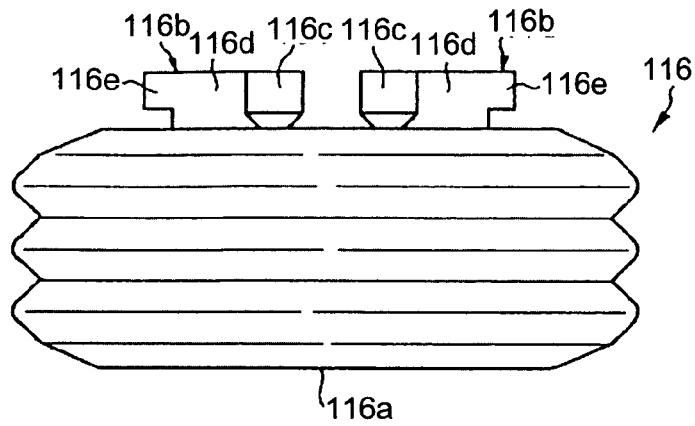


FIG.17B

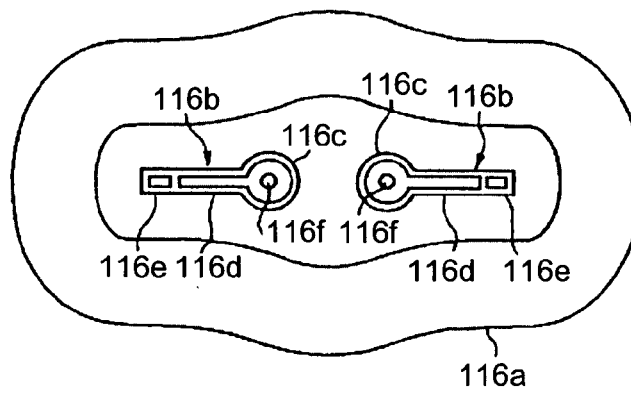


FIG.17C

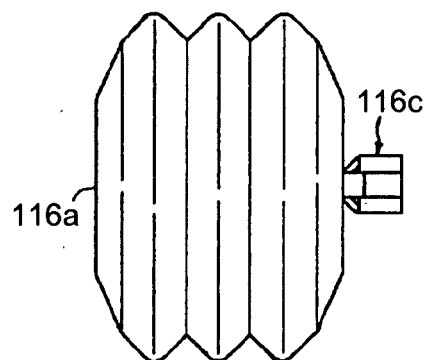


FIG.18

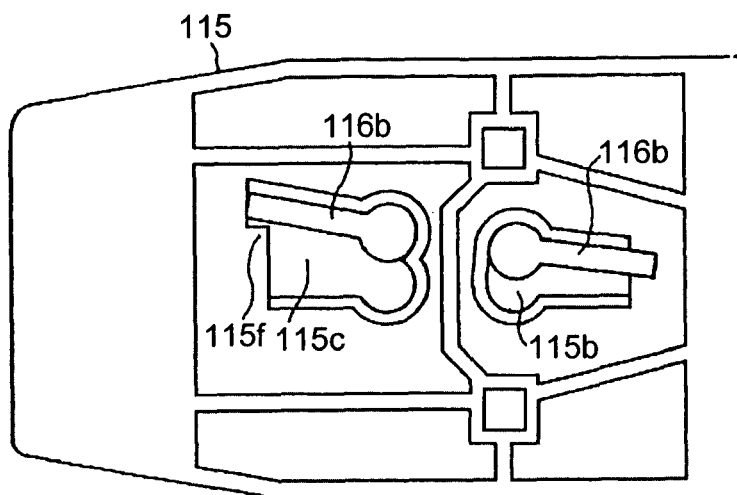


FIG.19

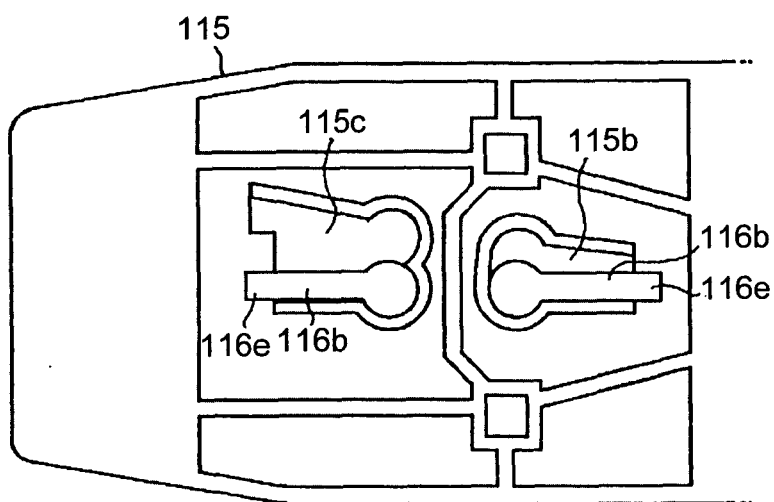


FIG.20

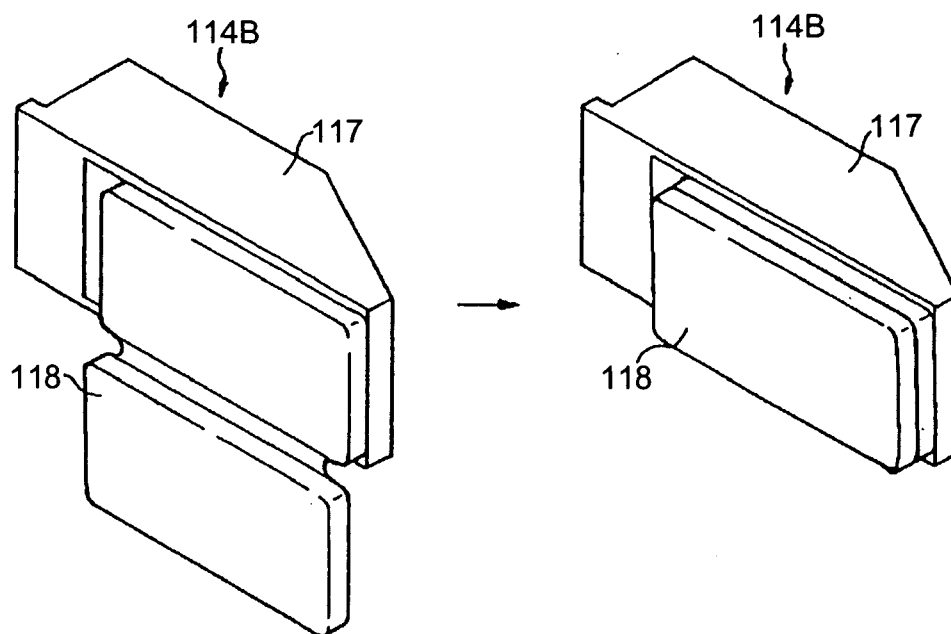


FIG.21A

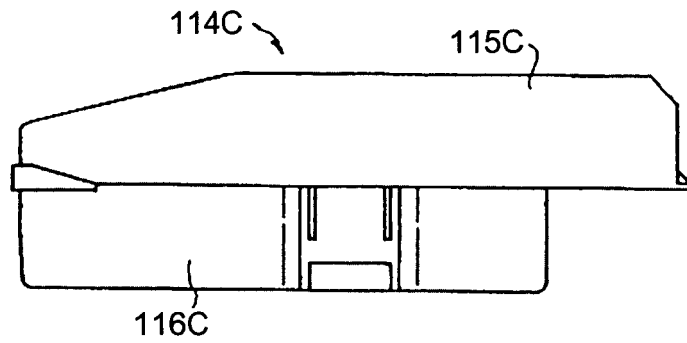


FIG.21B

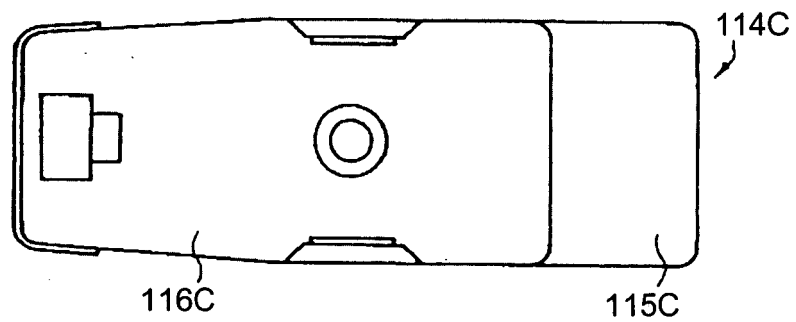


FIG.21C

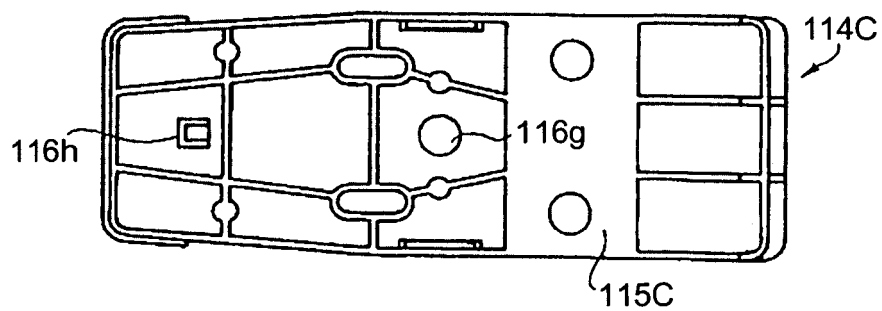


FIG. 22A

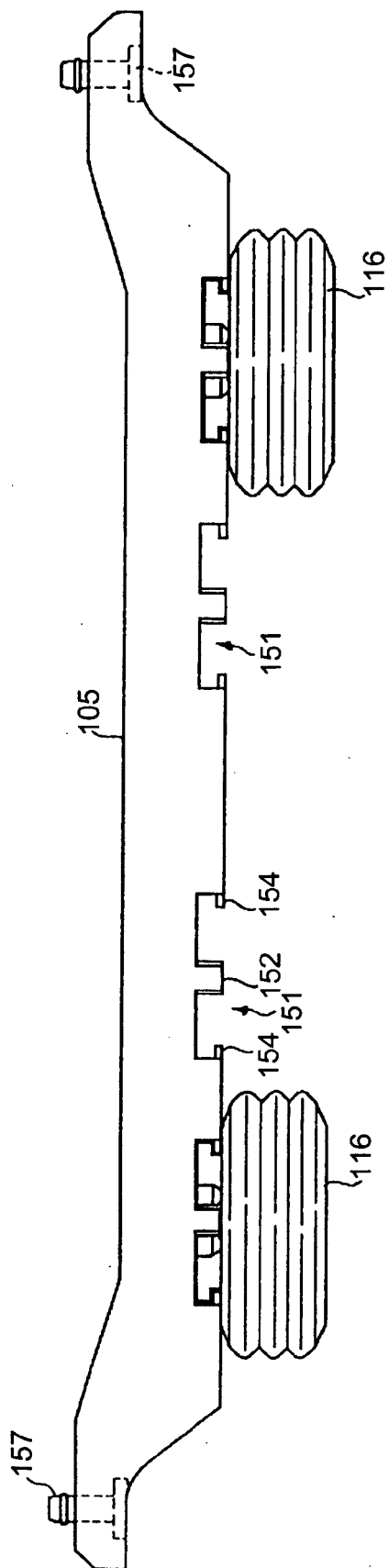


FIG.22B

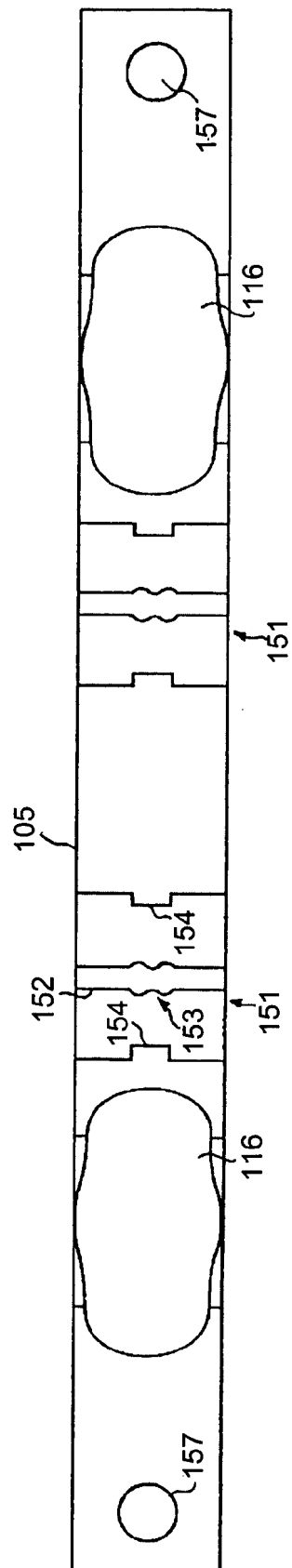


FIG.23A

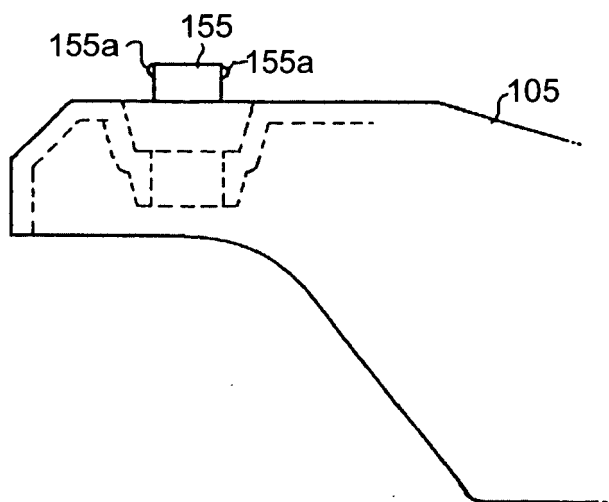


FIG.23B

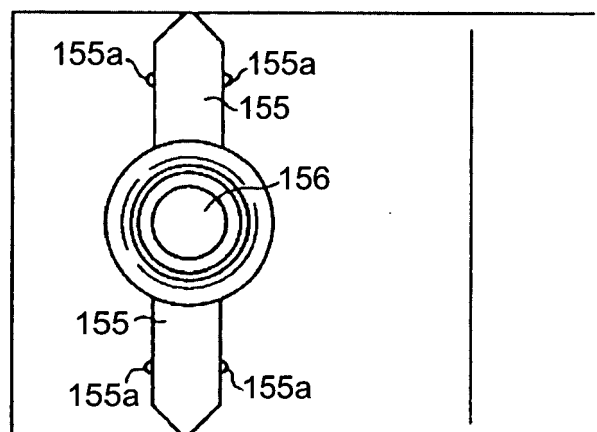


FIG.24

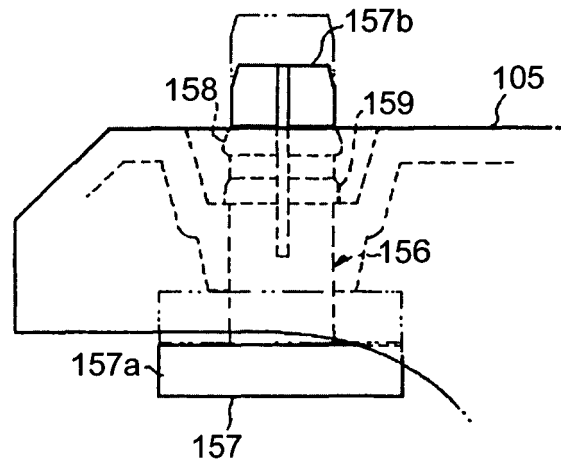


FIG.25

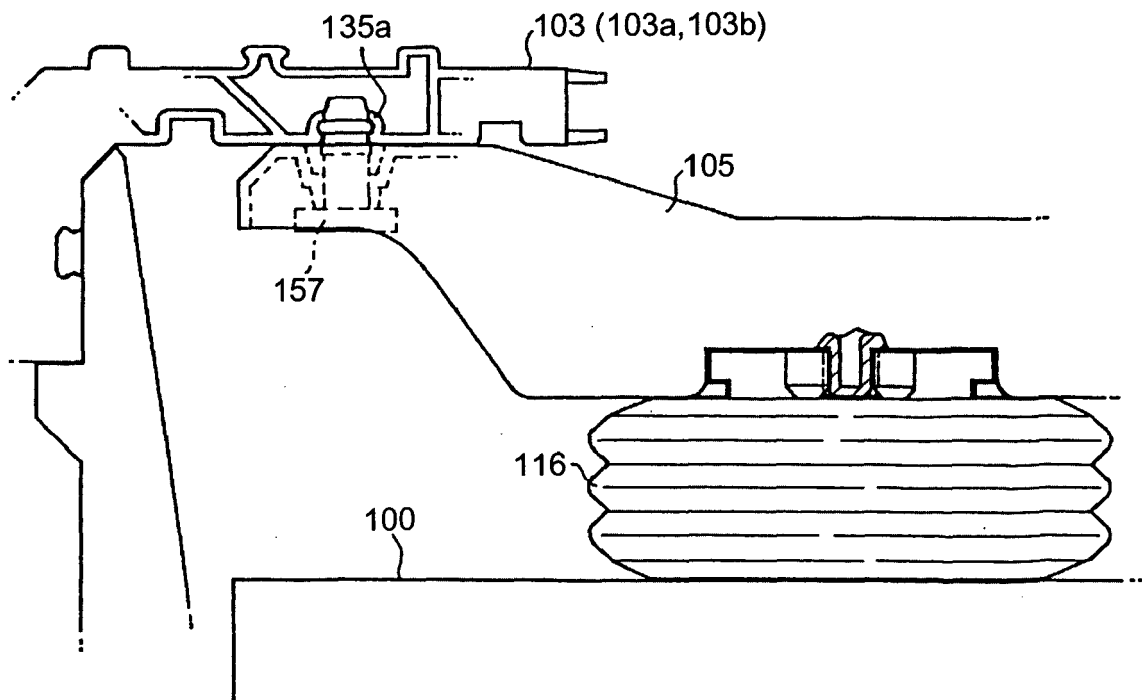


FIG.26

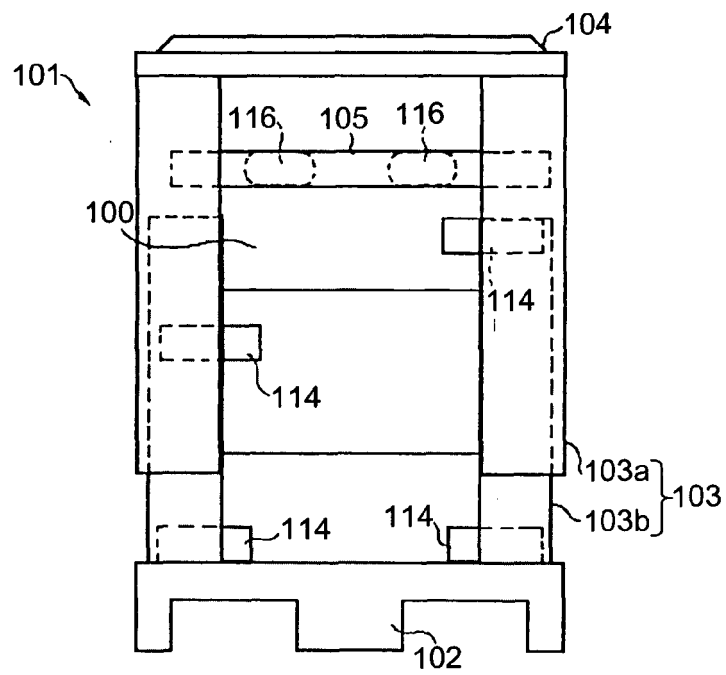


FIG.27

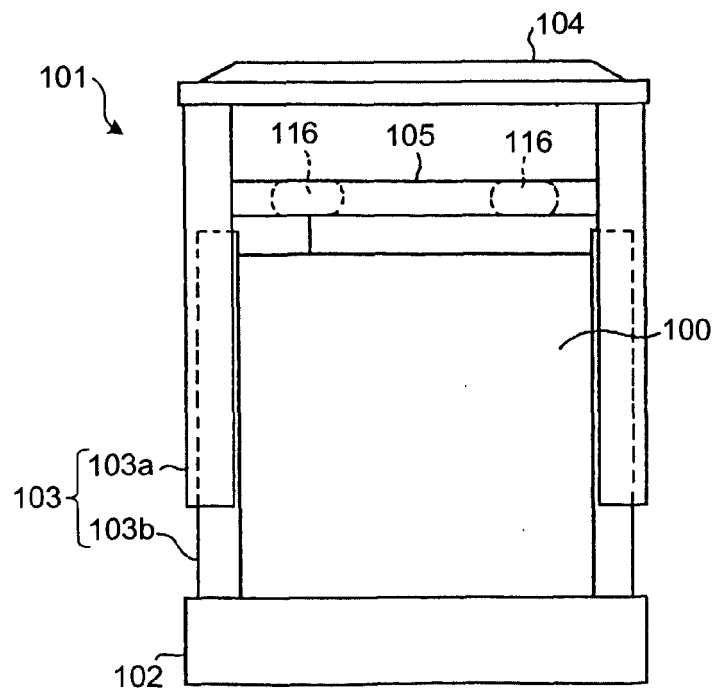


FIG.28

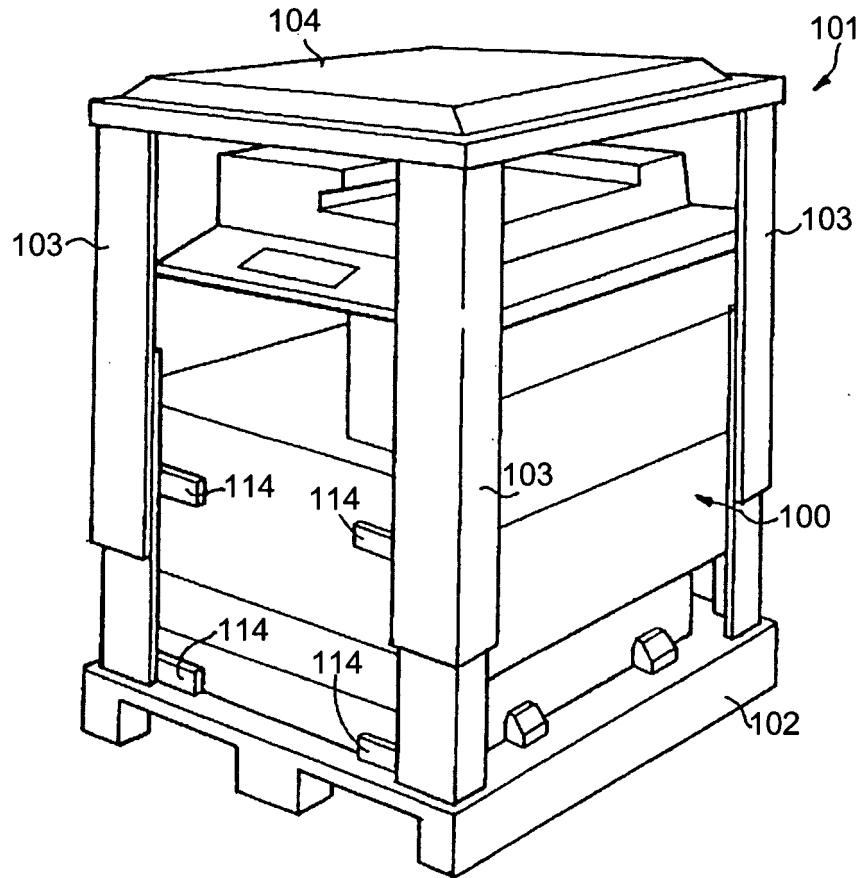


FIG.29

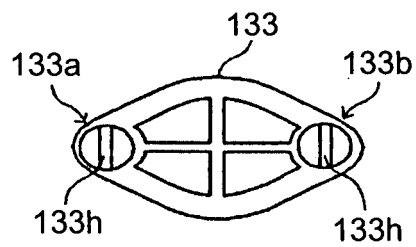


FIG.30

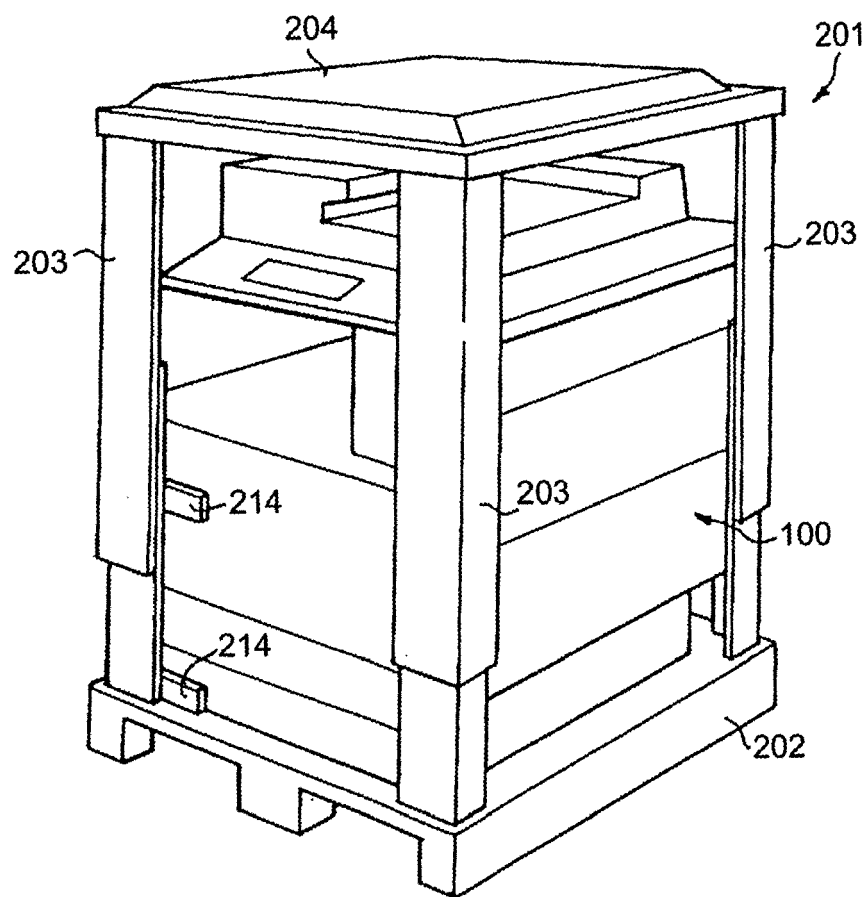


FIG.31

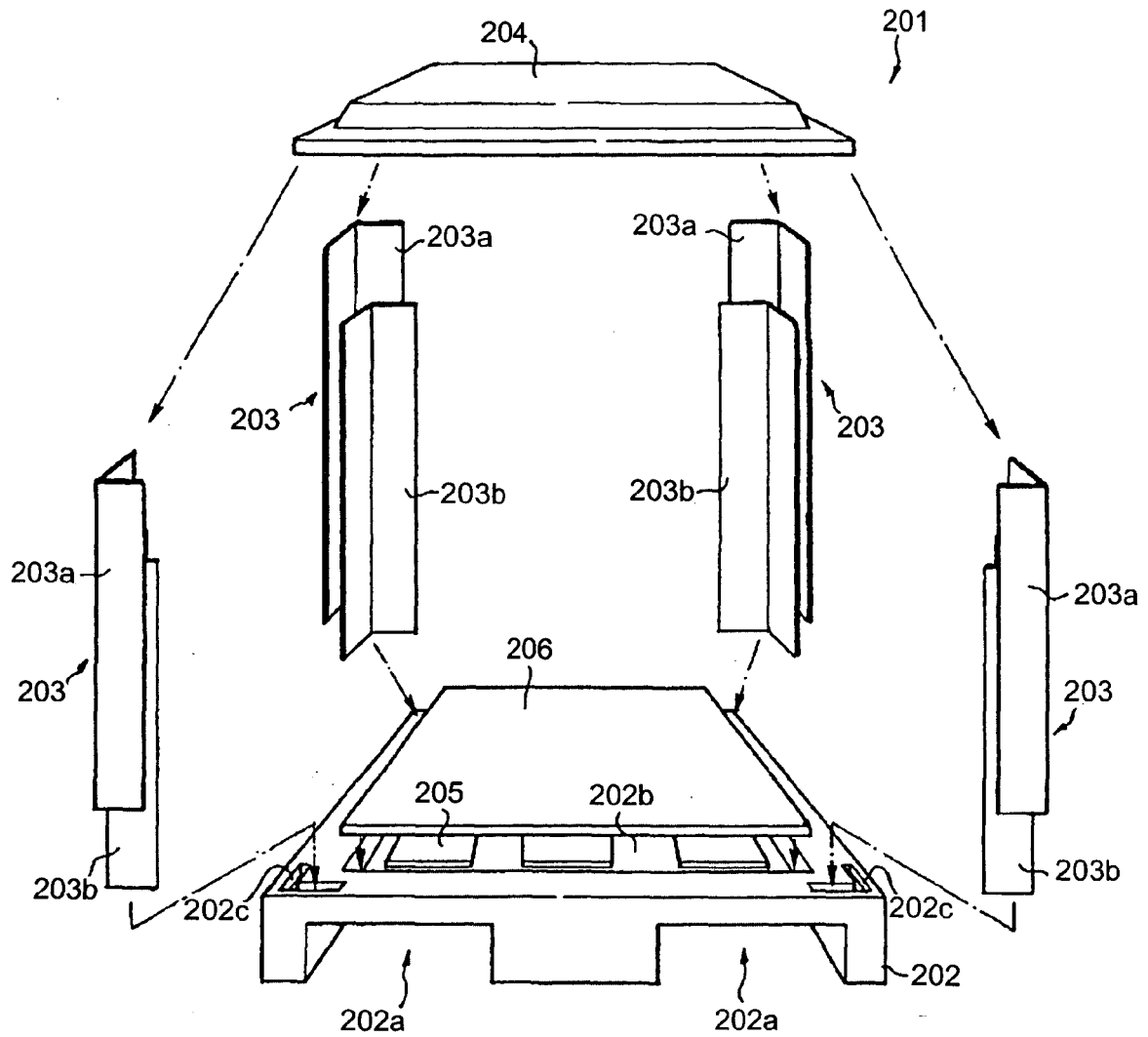


FIG.32

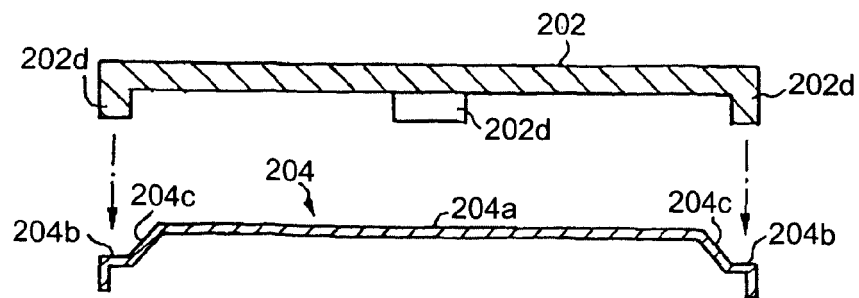


FIG.33

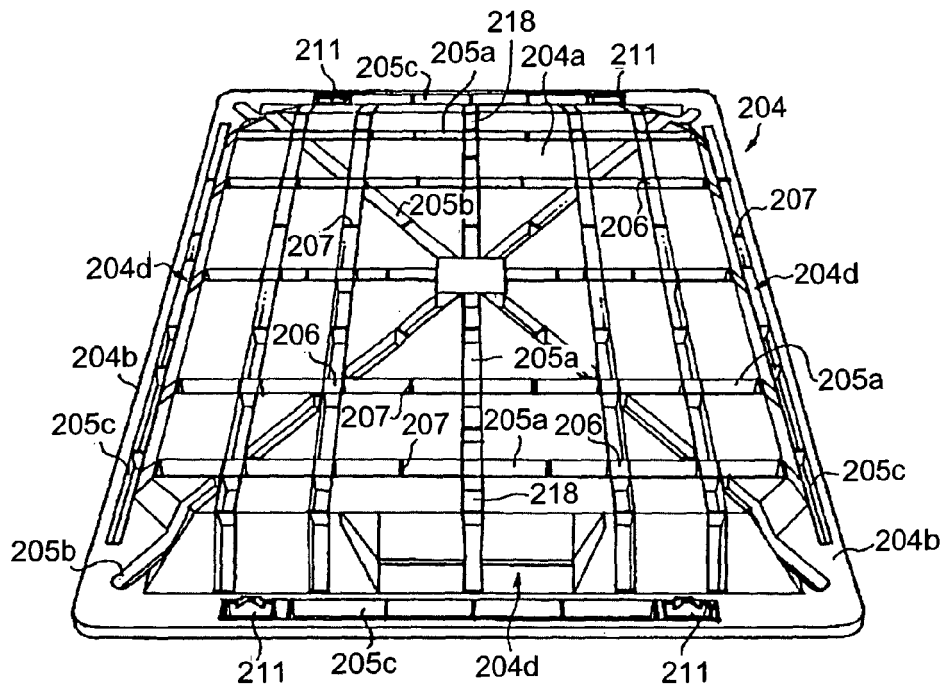


FIG.34

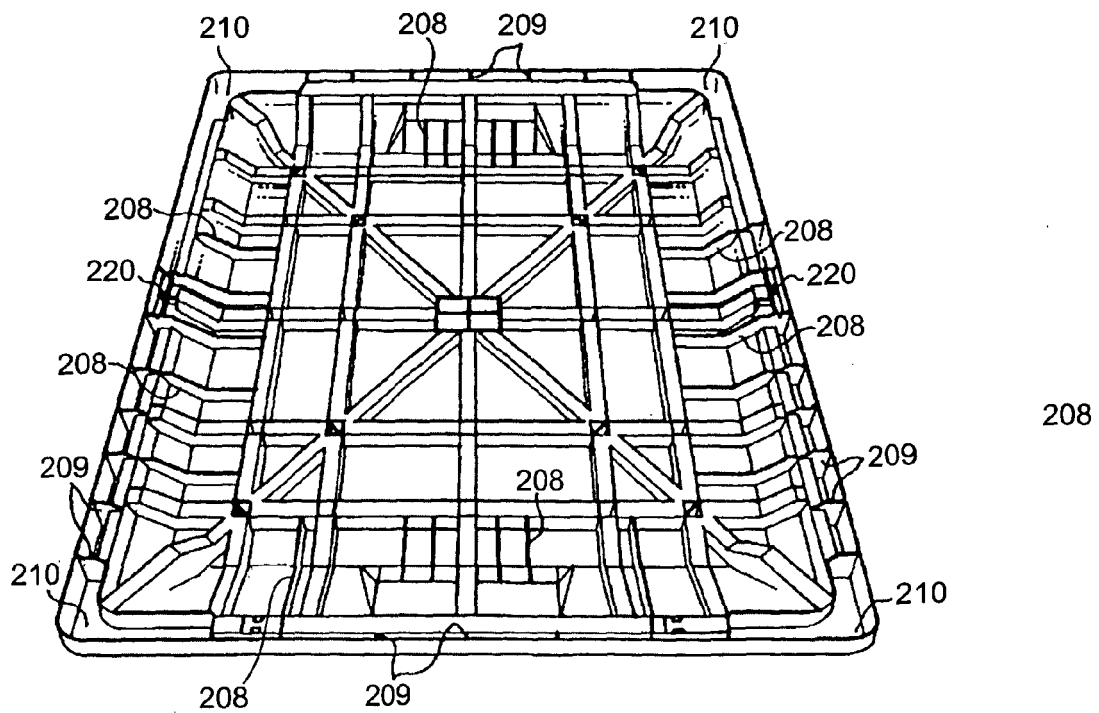


FIG.35

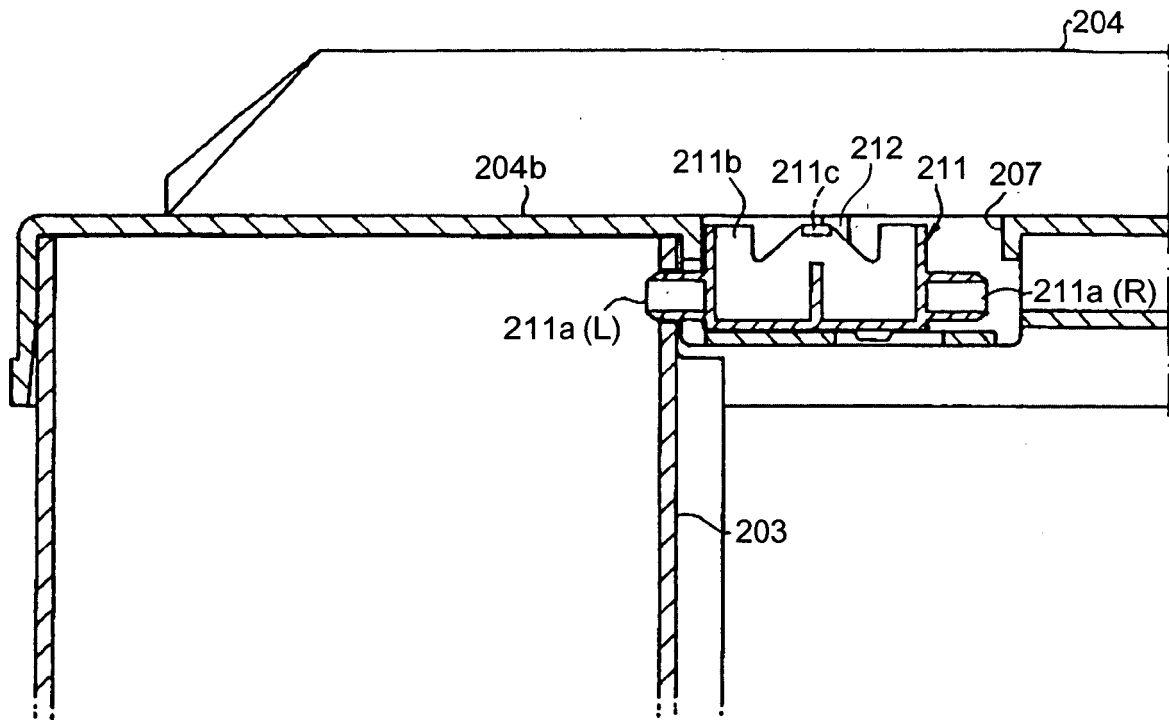


FIG.36

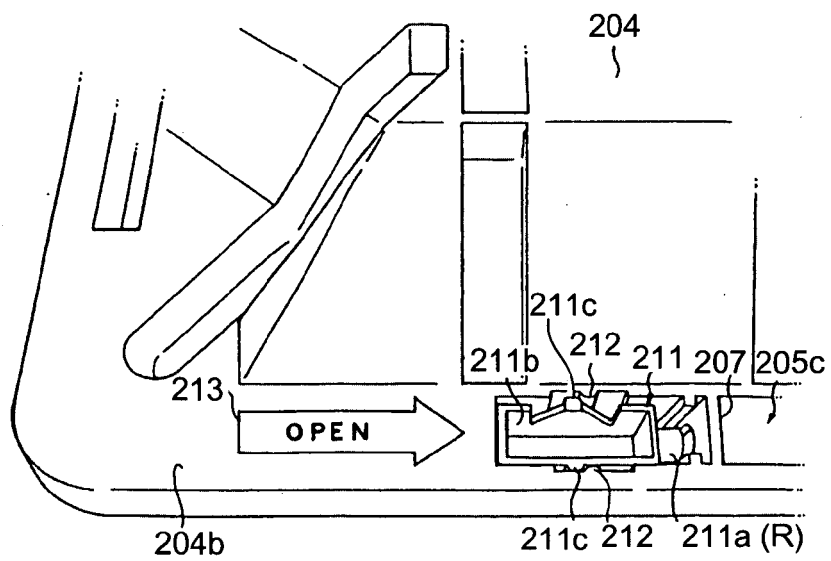


FIG.37

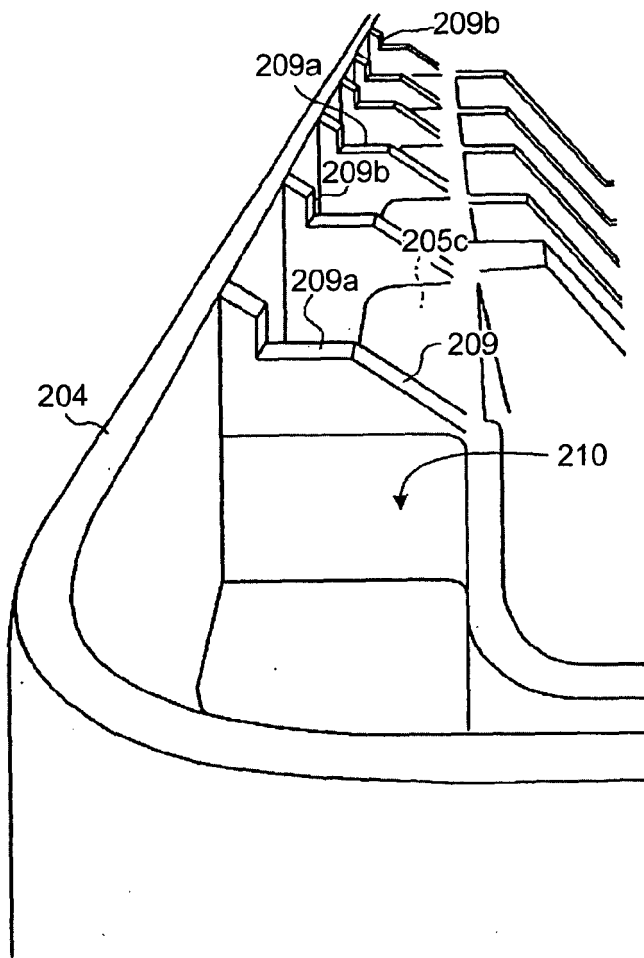


FIG.38

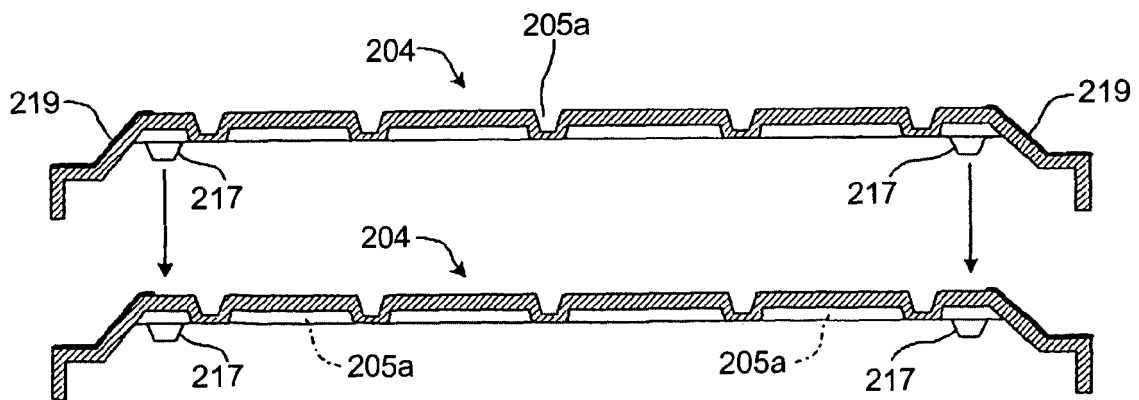


FIG.39

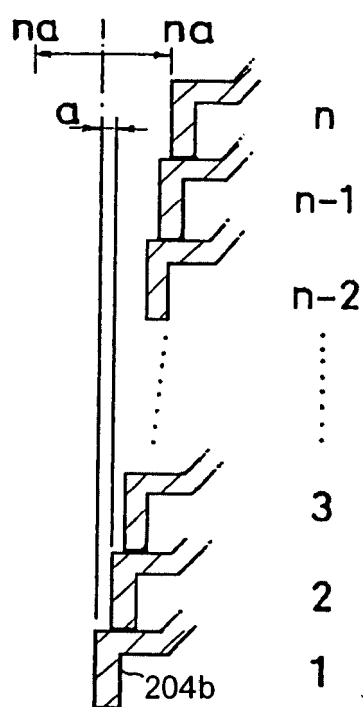


FIG.40A

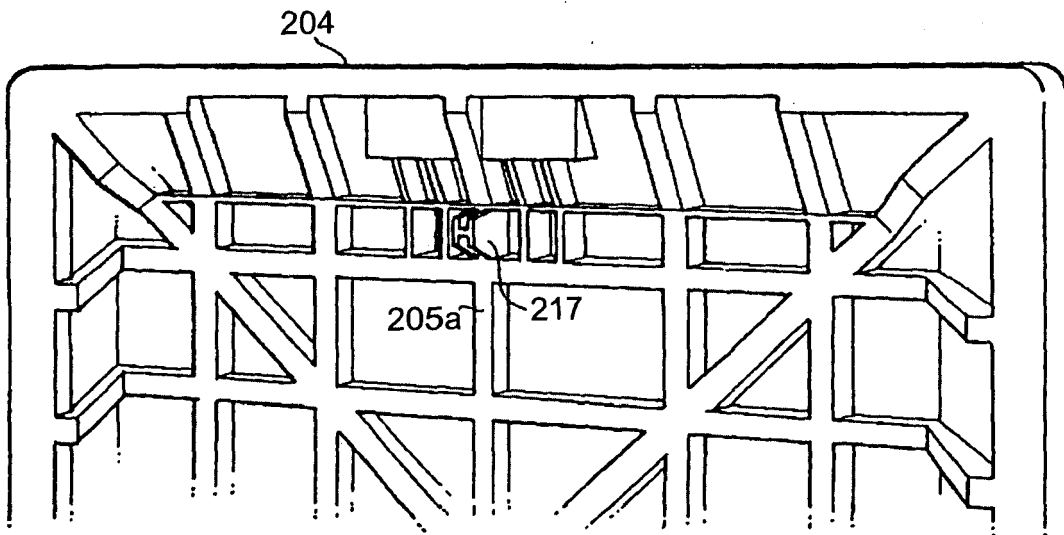


FIG.40B

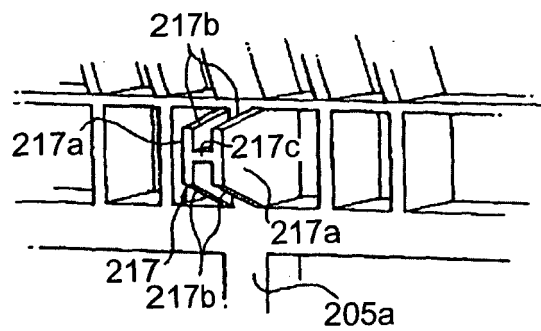


FIG.41

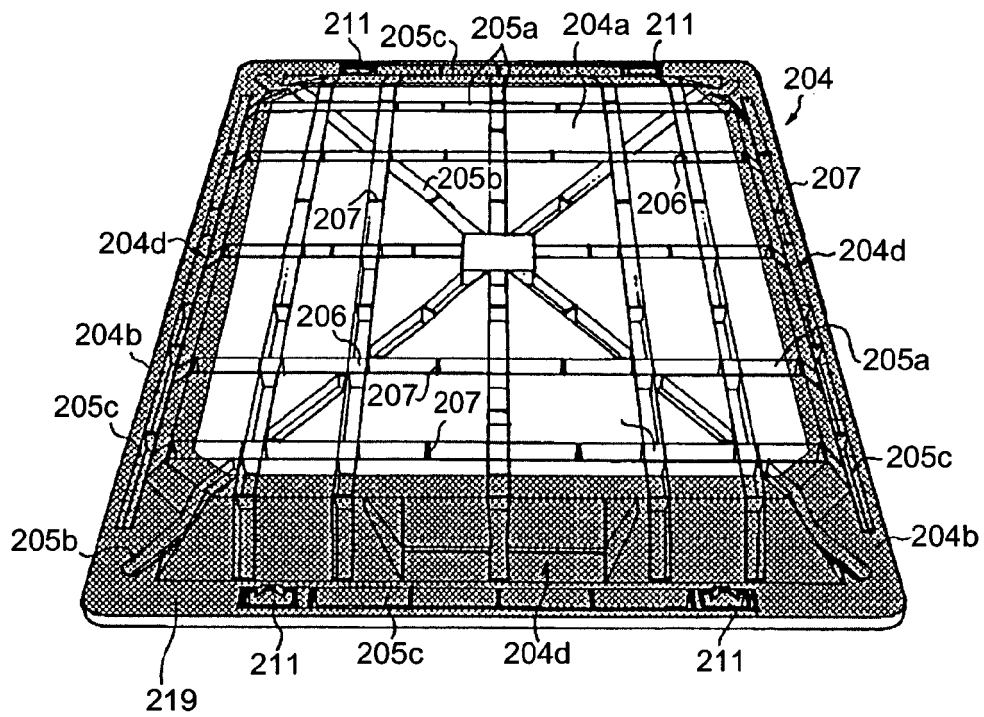


FIG.42

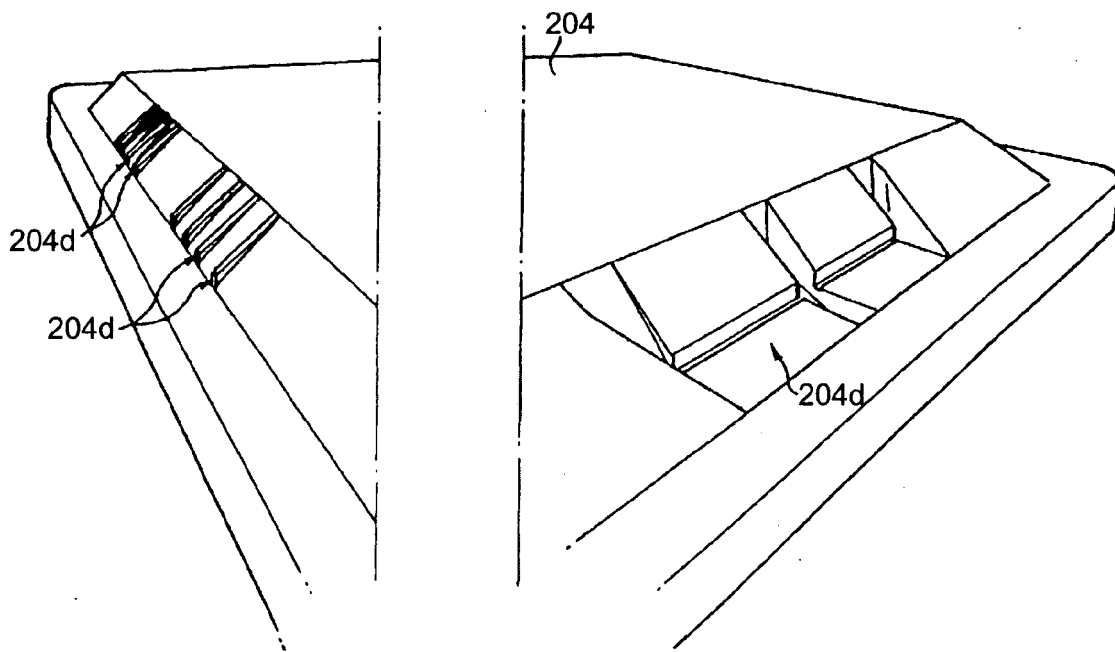


FIG.43

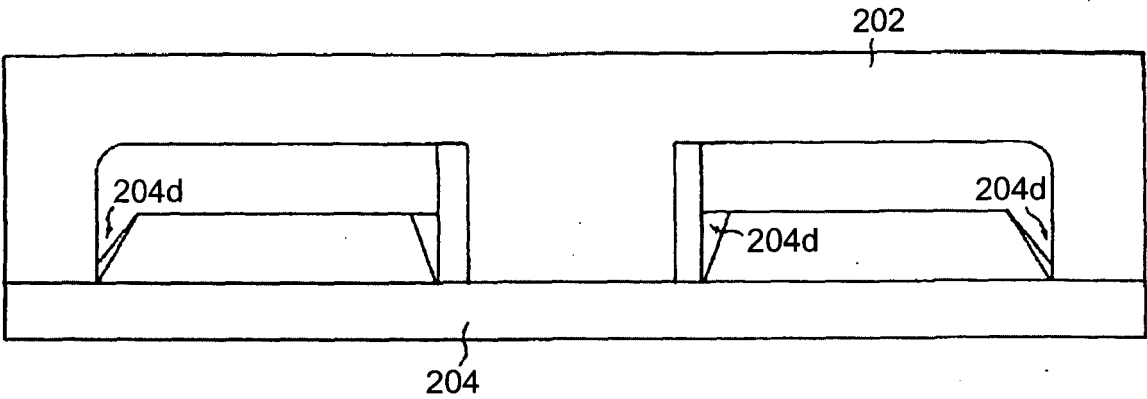


FIG.44

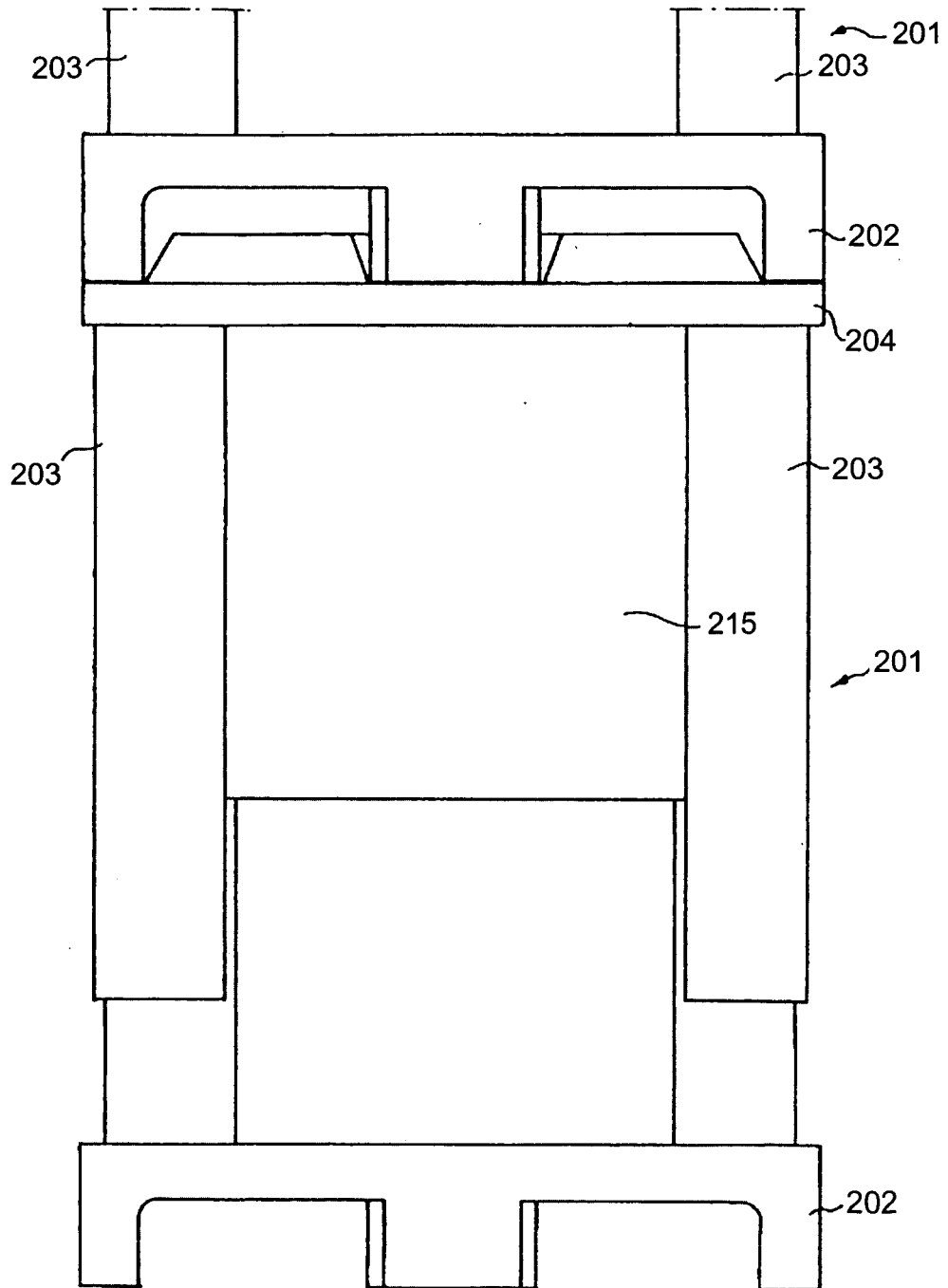


FIG.45

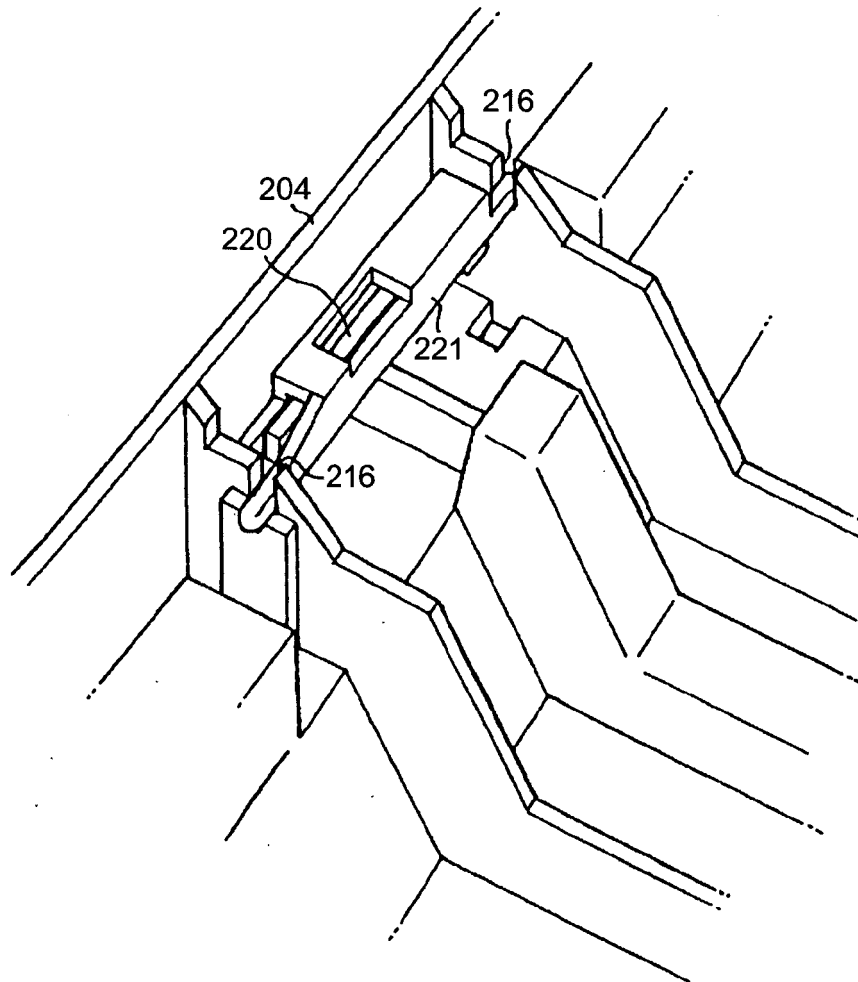


FIG.46

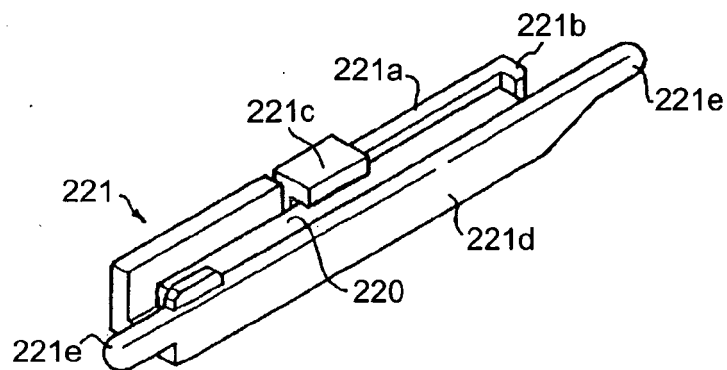


FIG.47

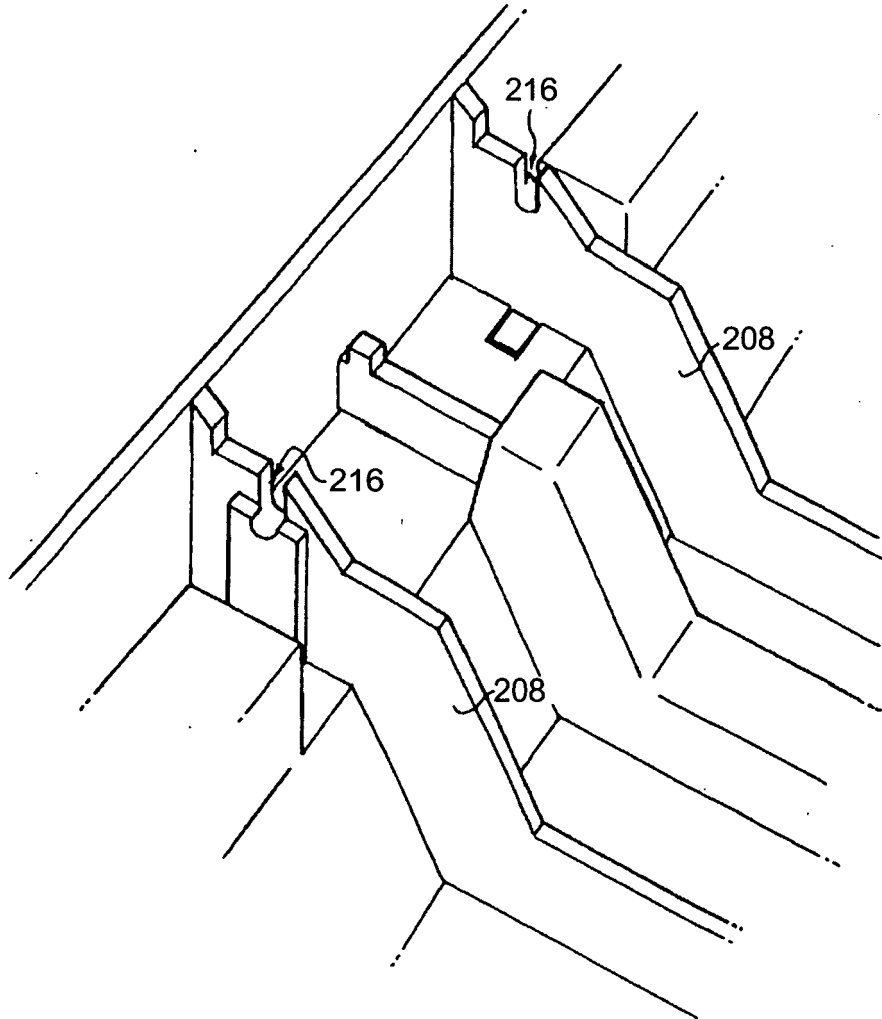


FIG.48

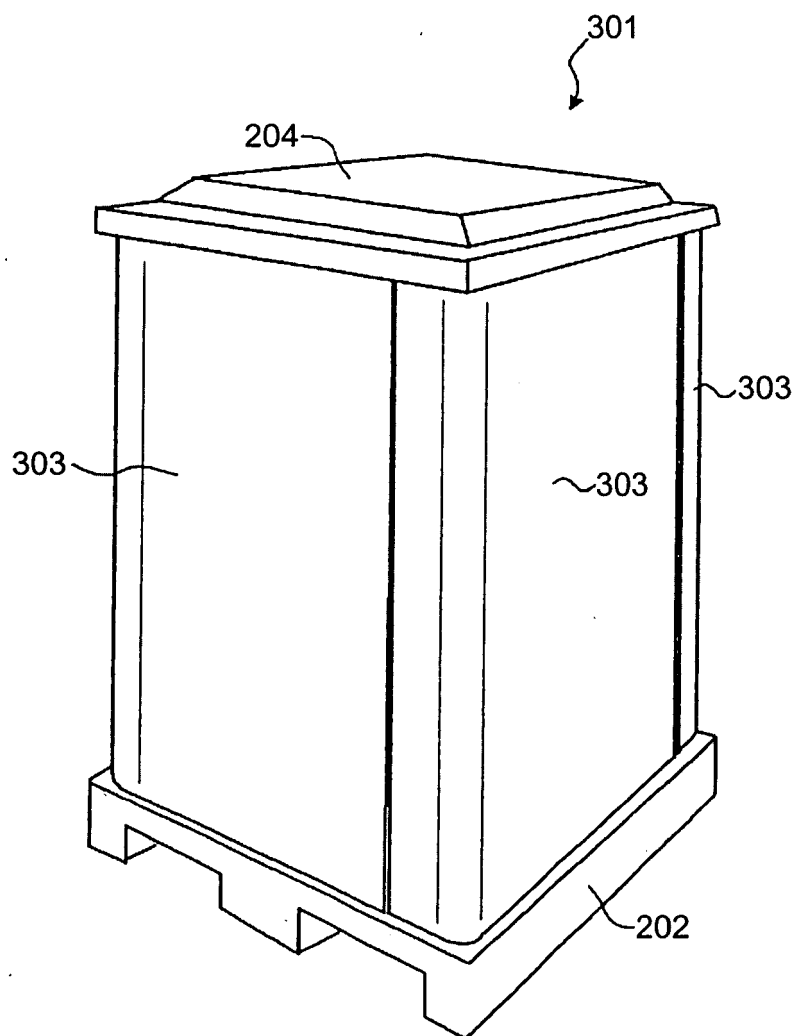


FIG.49

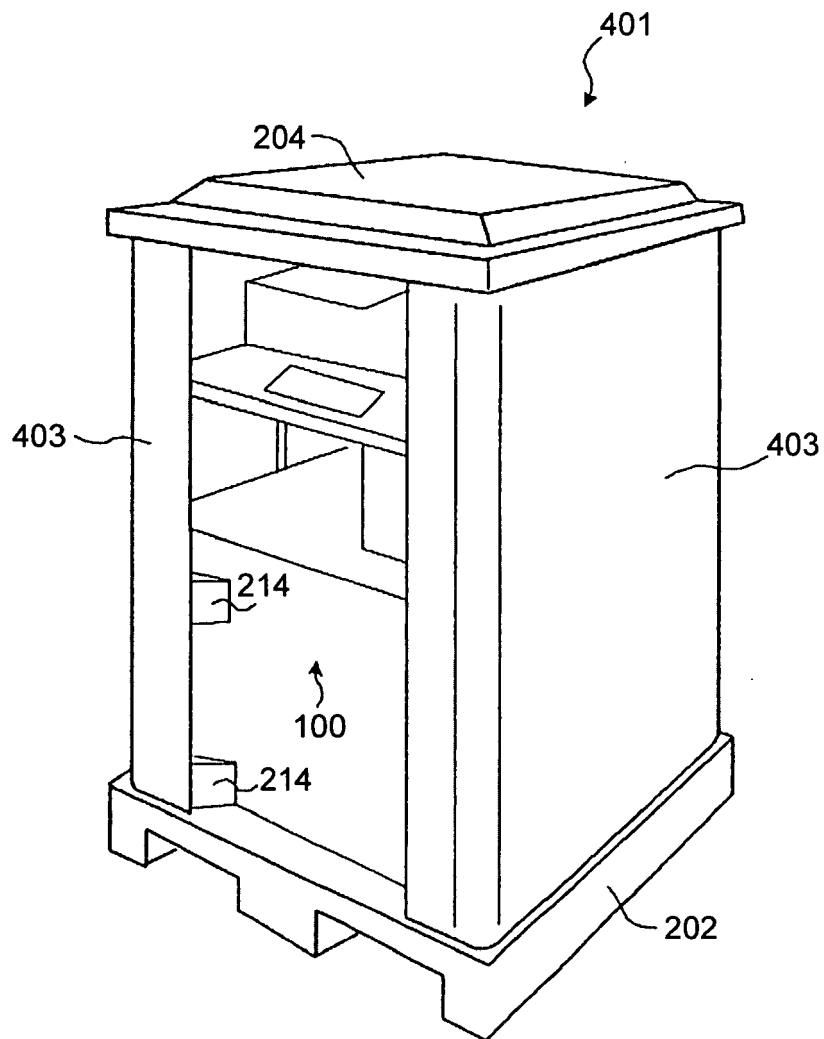


FIG.50

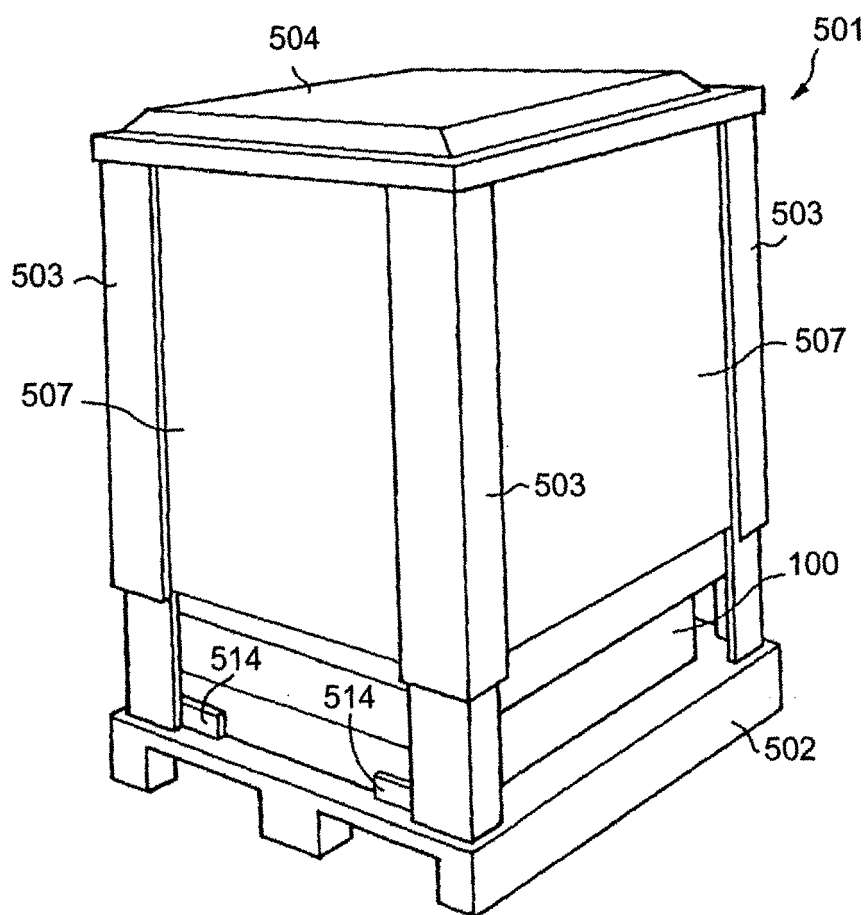


FIG.51

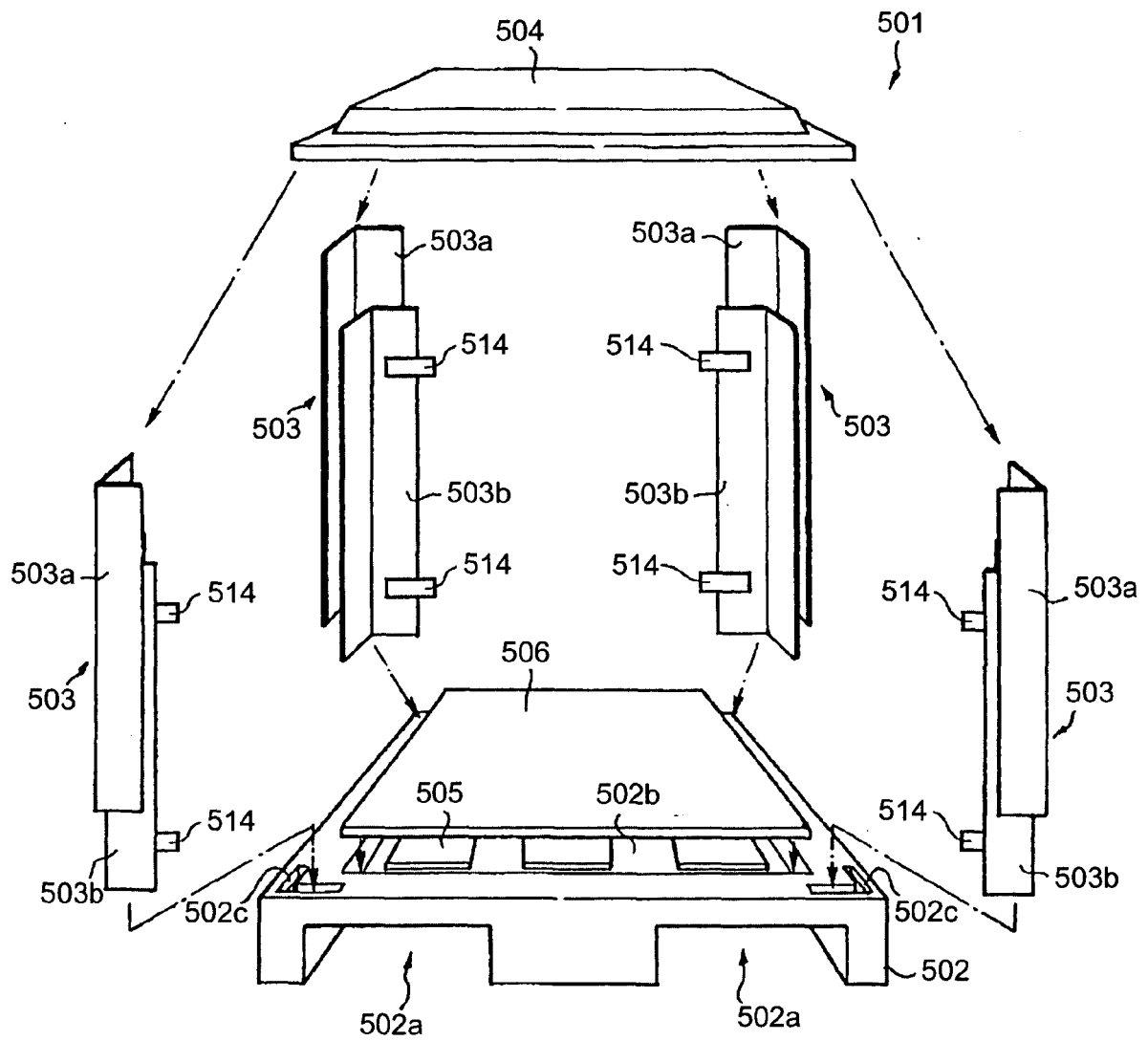


FIG.52

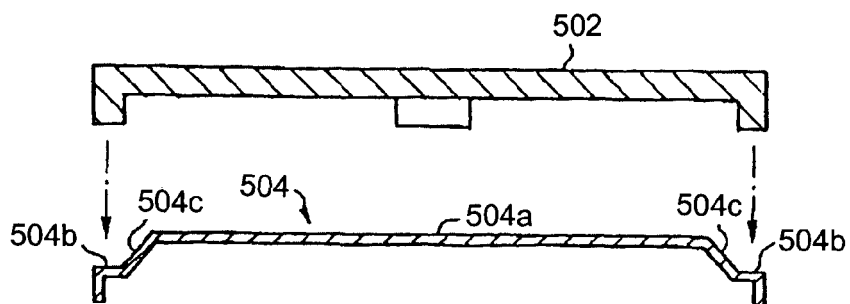


FIG.53

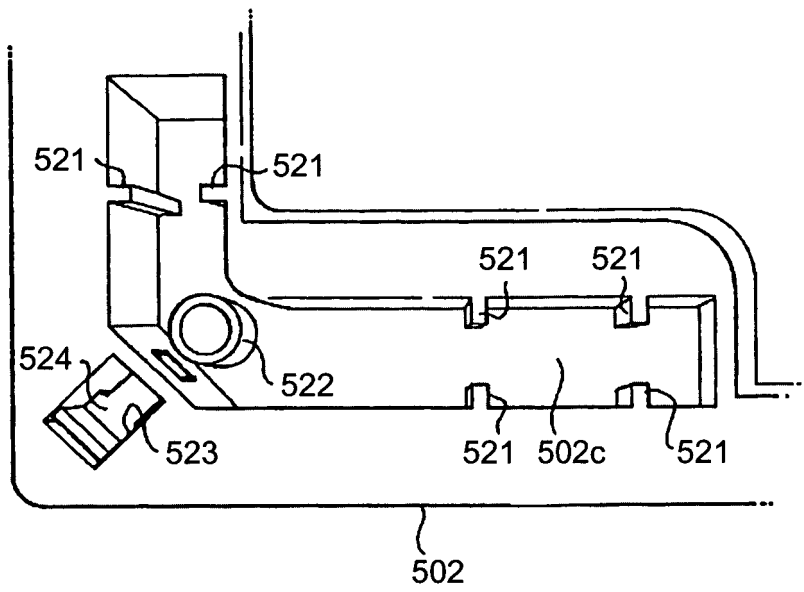


FIG.54

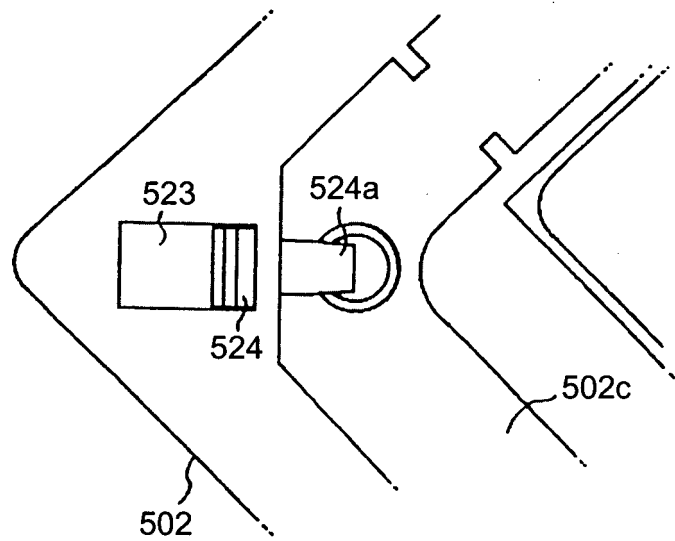


FIG.55

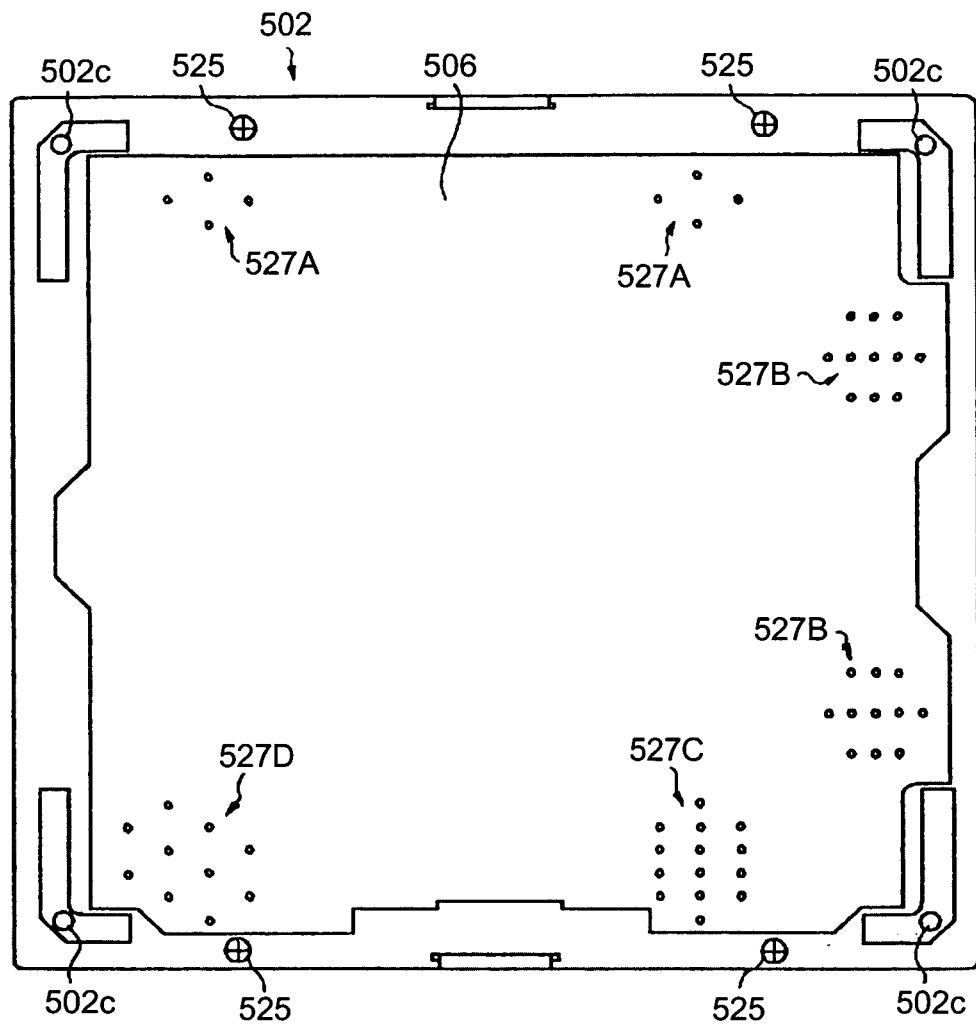


FIG.56

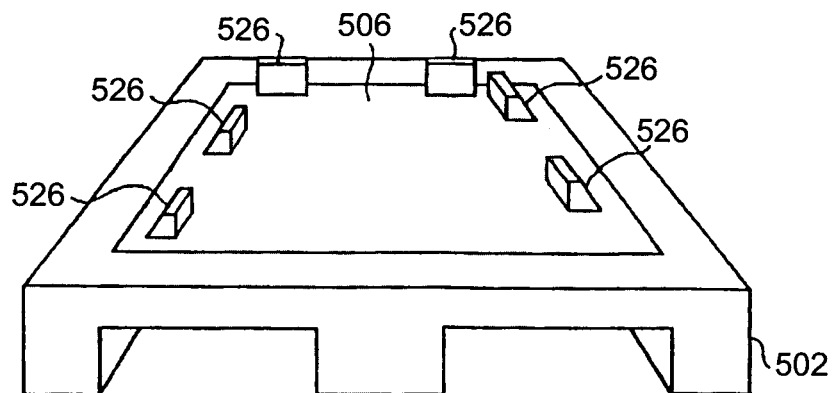


FIG.57A

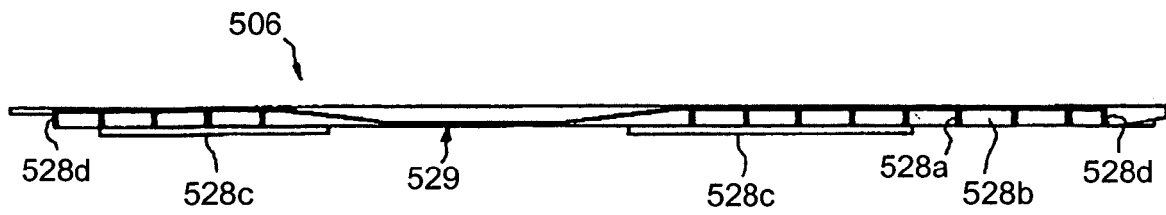


FIG.57B

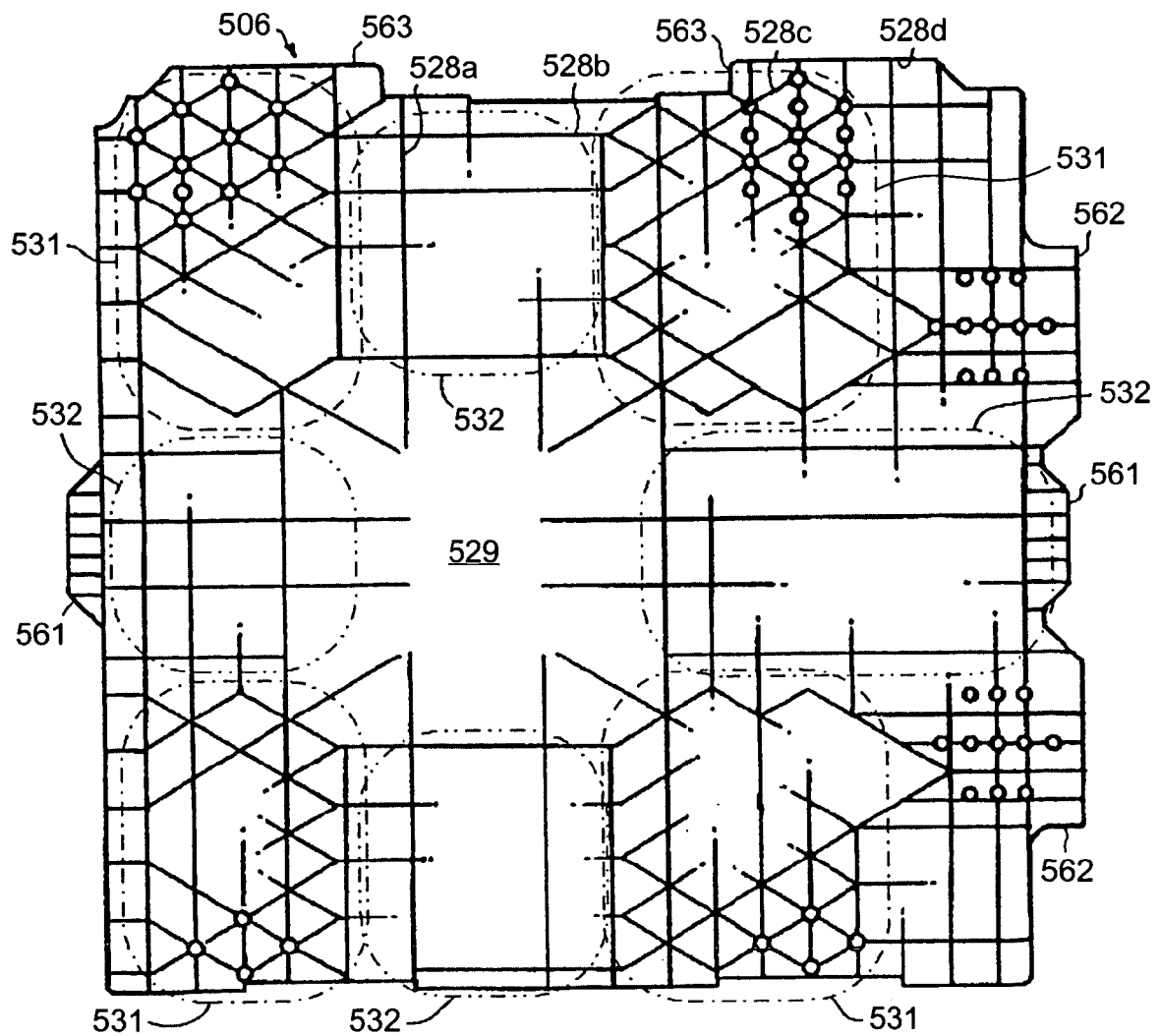


FIG.58

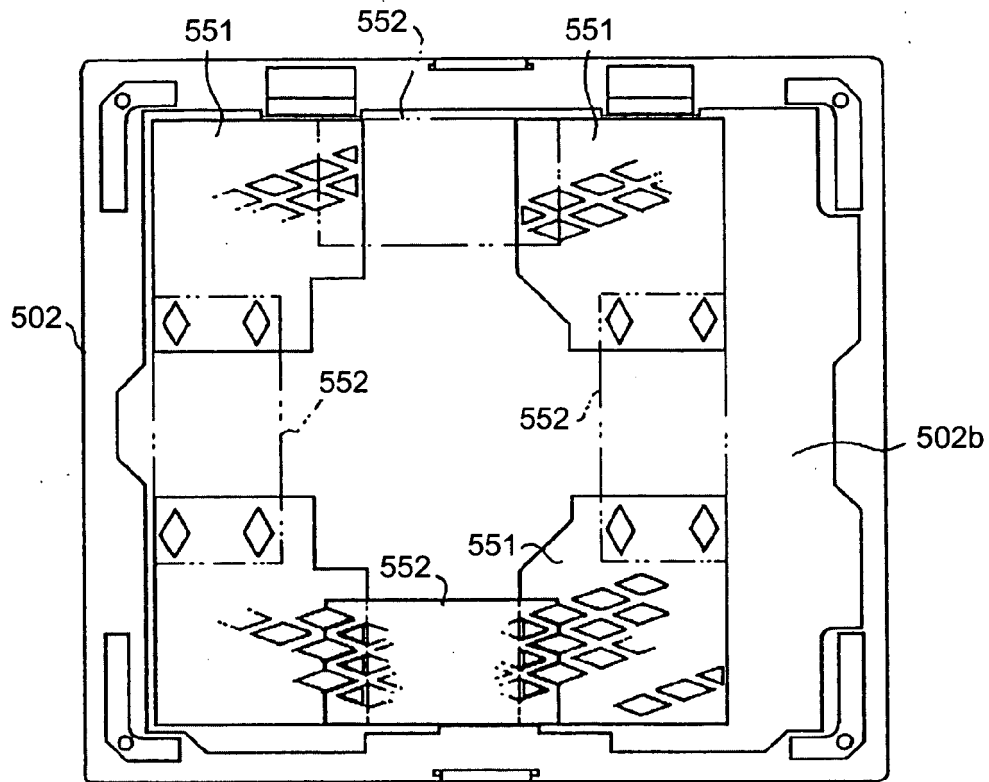


FIG.59

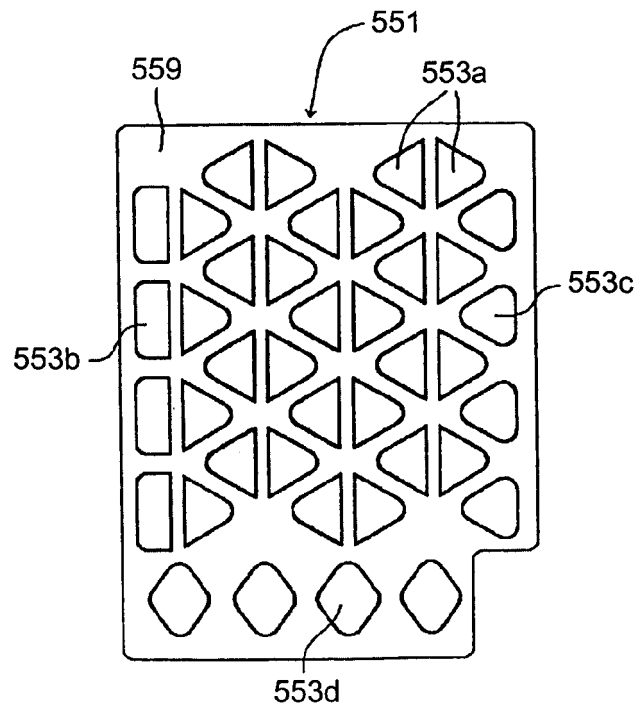


FIG.60A

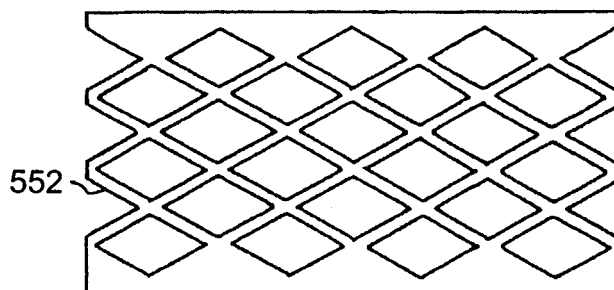


FIG.60B



FIG.61

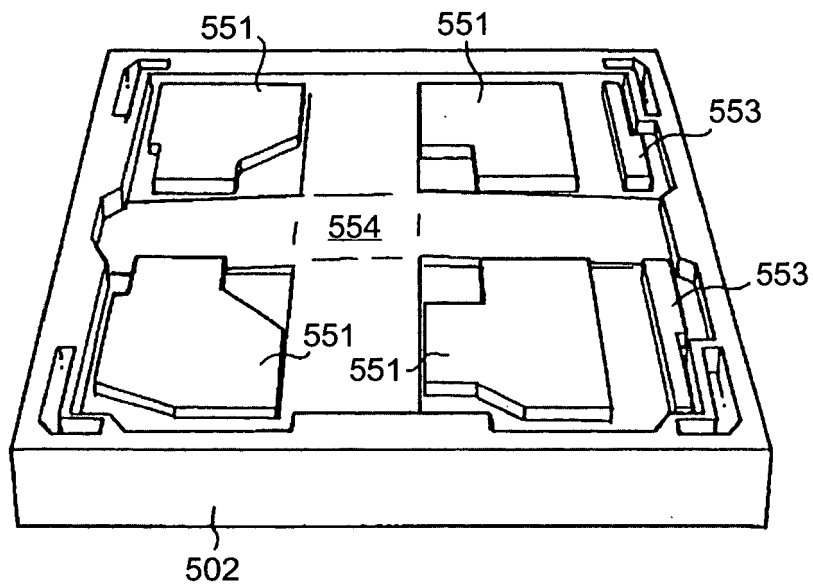


FIG.62

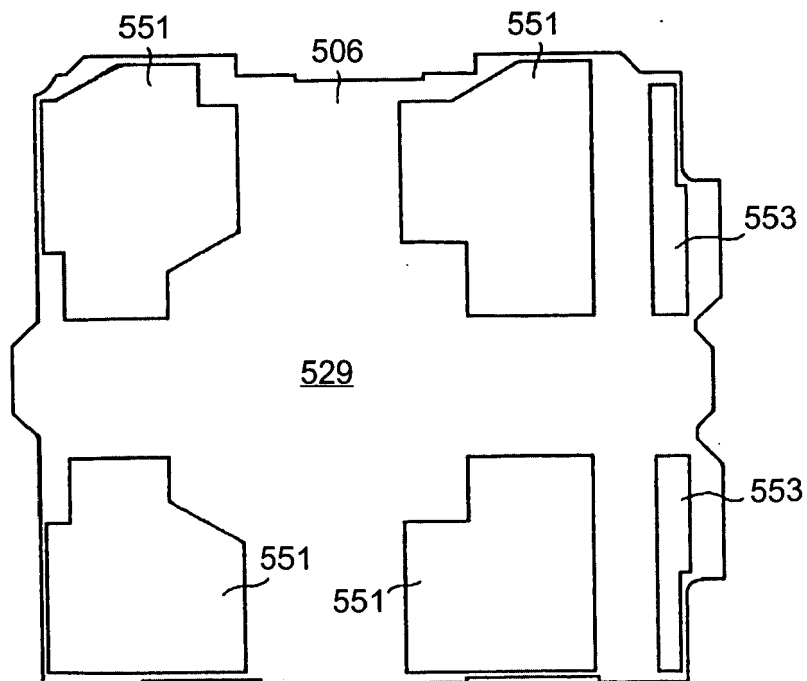


FIG.63A

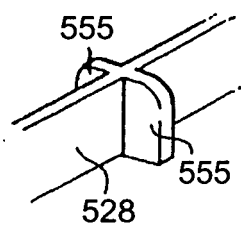


FIG.63B

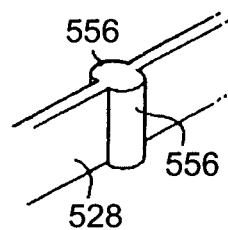


FIG.63C

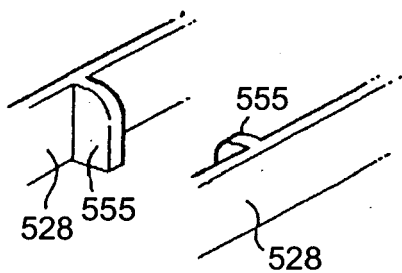


FIG.63D

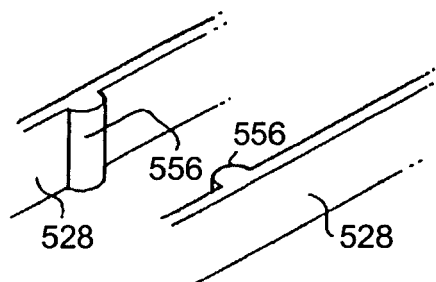


FIG.64

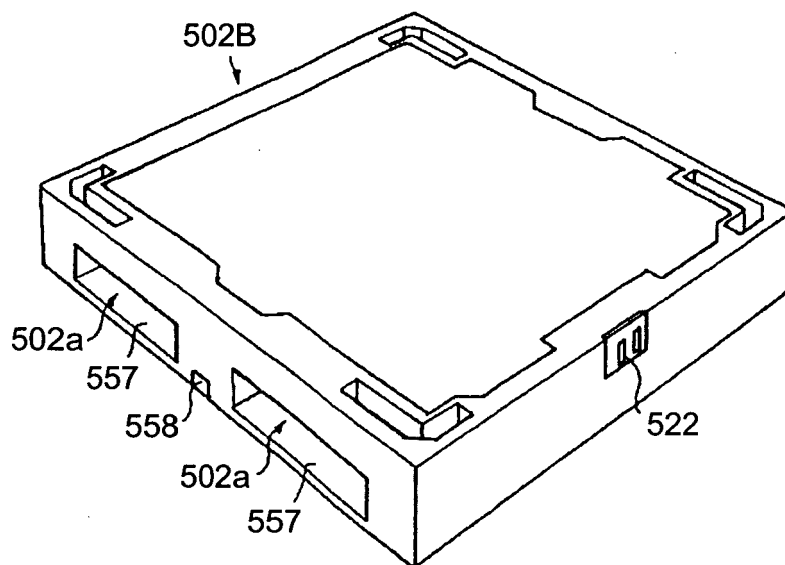


FIG.65

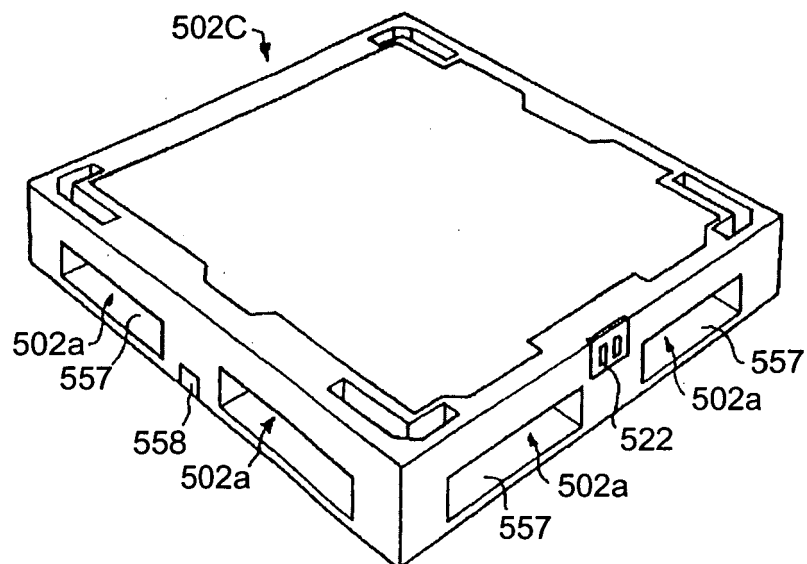


FIG.66

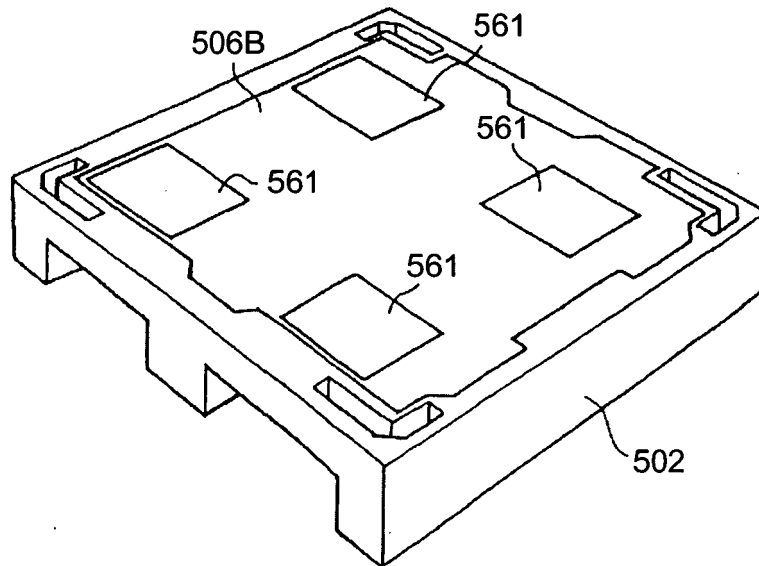


FIG.67

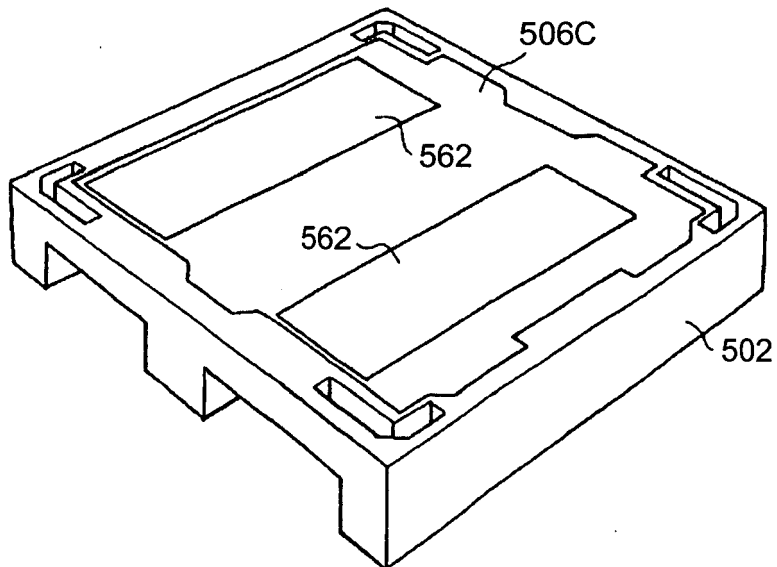


FIG.68

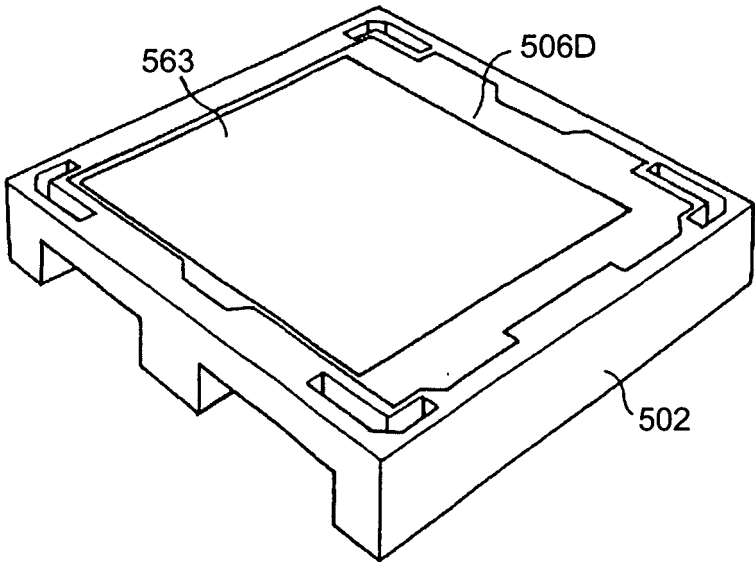


FIG.69

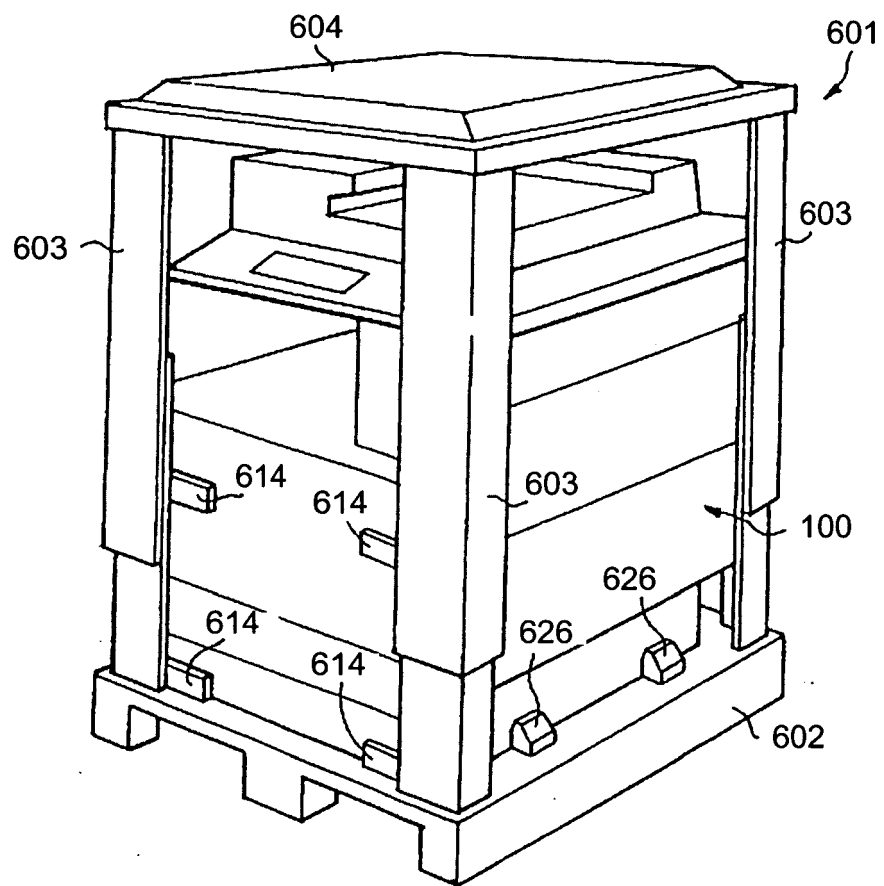


FIG.70

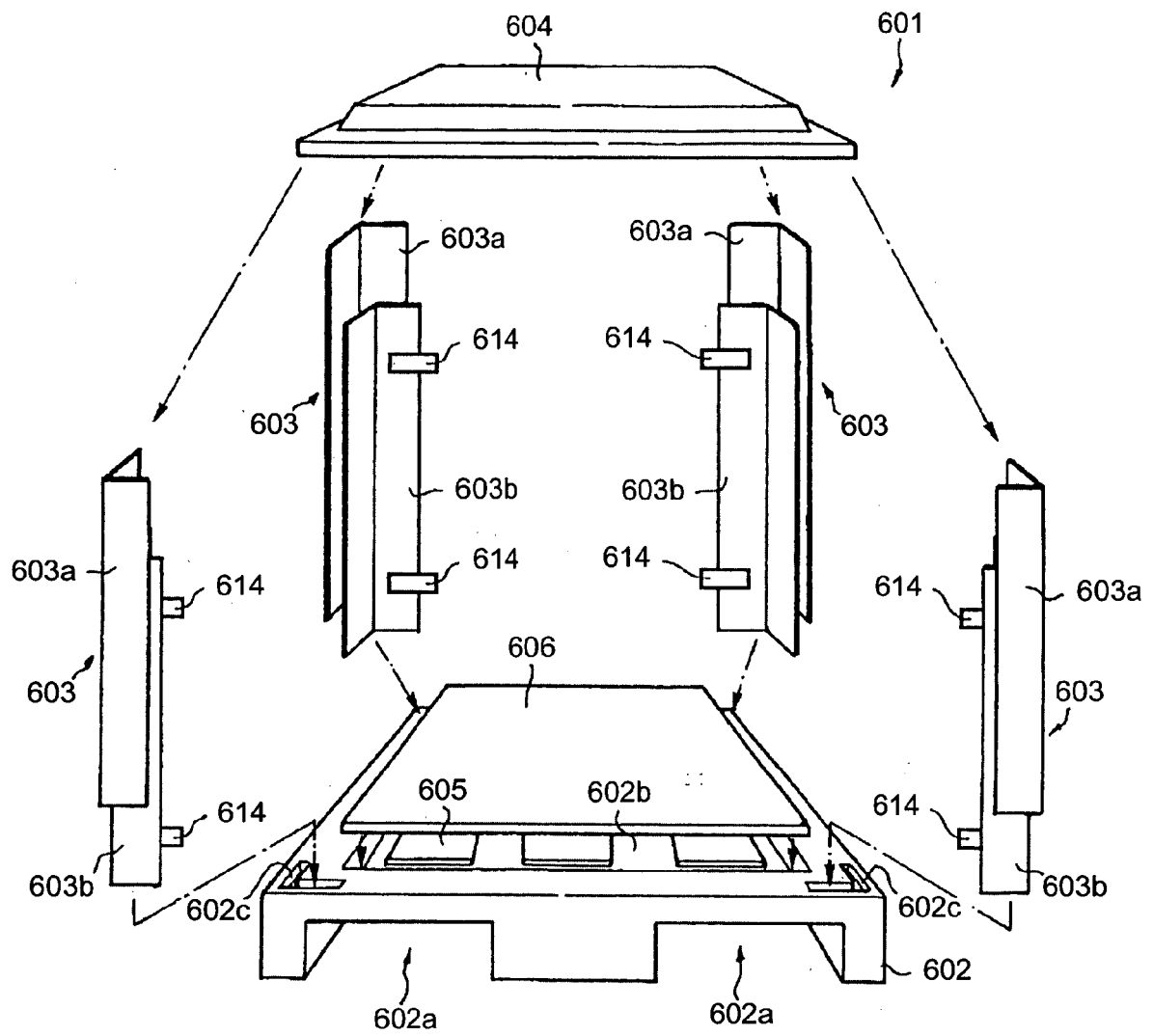


FIG.71

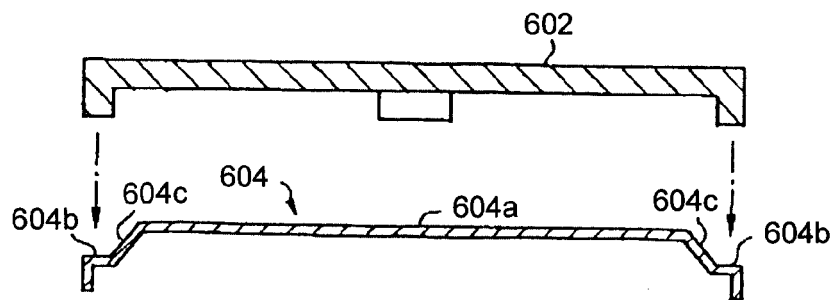


FIG.72

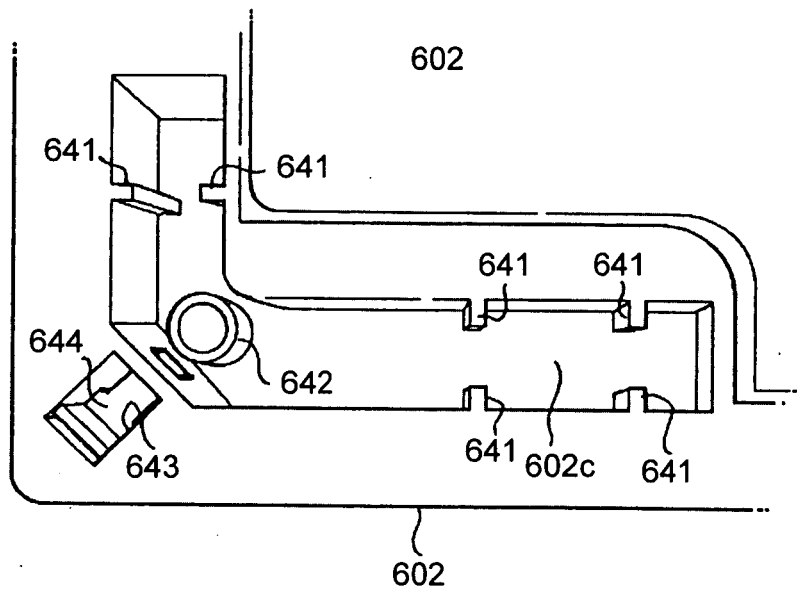


FIG.73

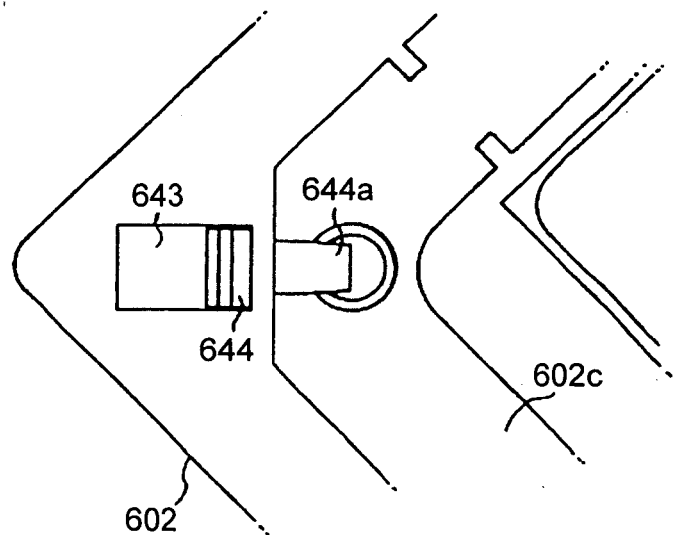


FIG.74

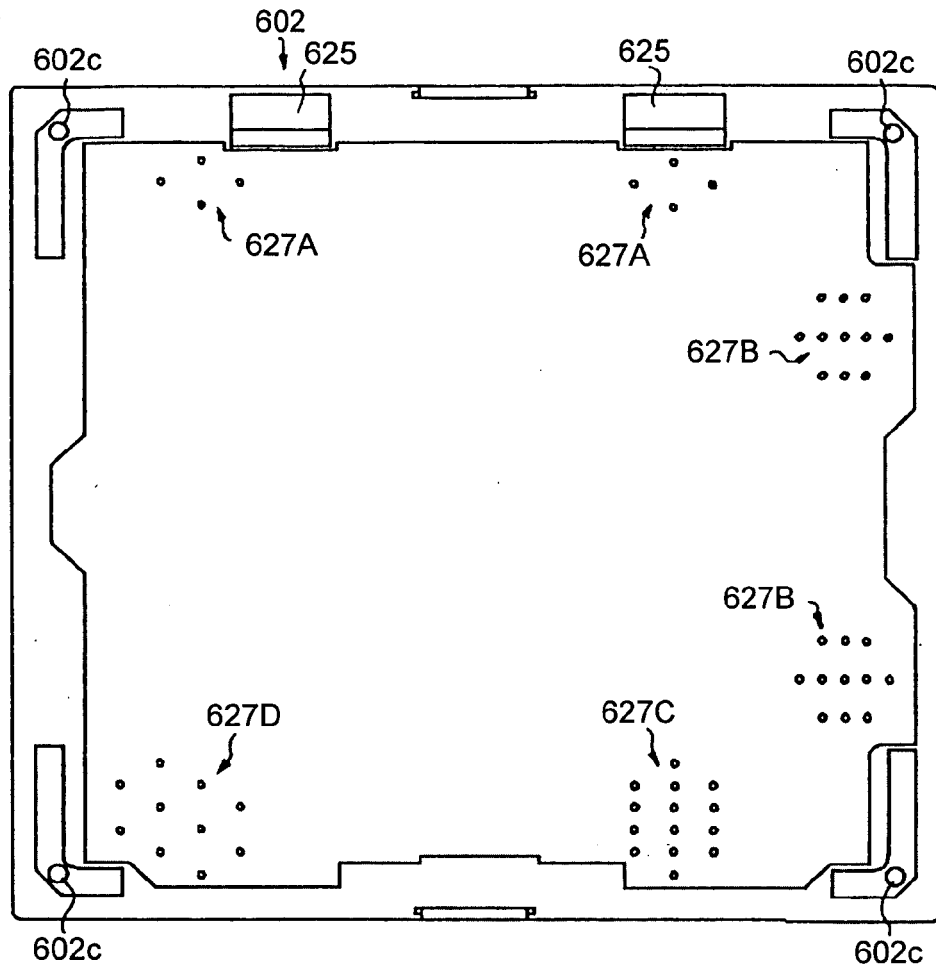


FIG.75

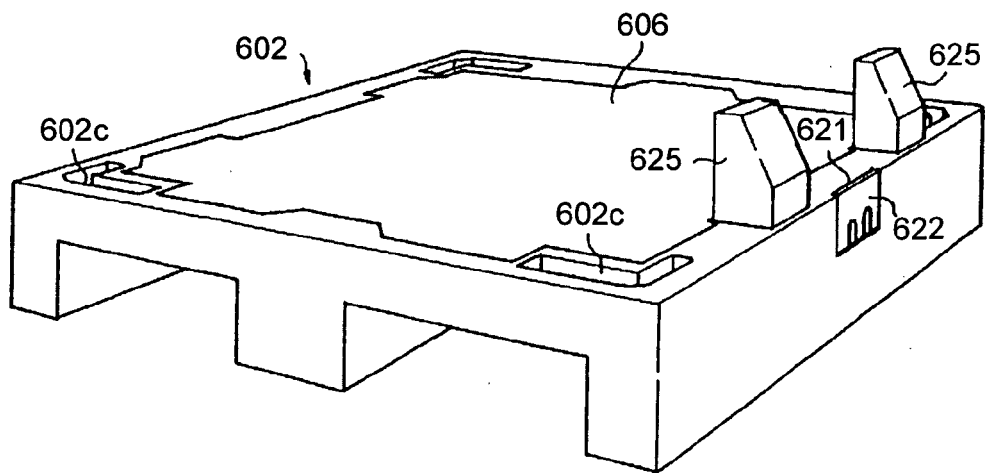


FIG.76

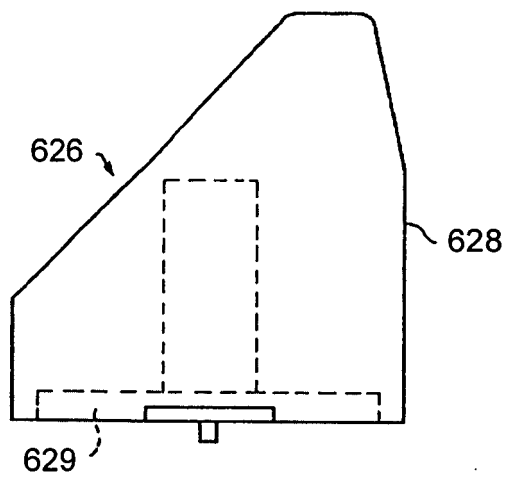


FIG.77

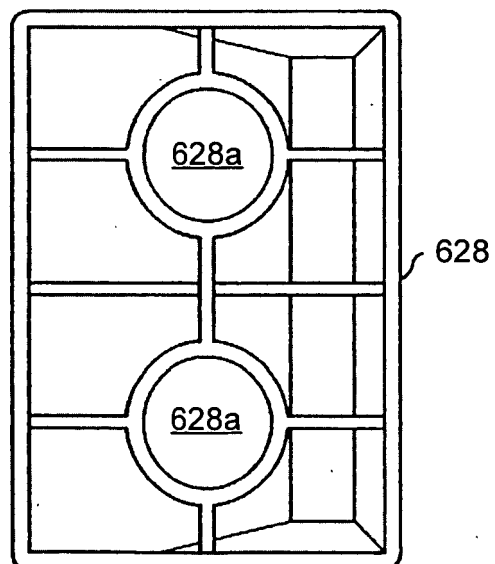


FIG.78A

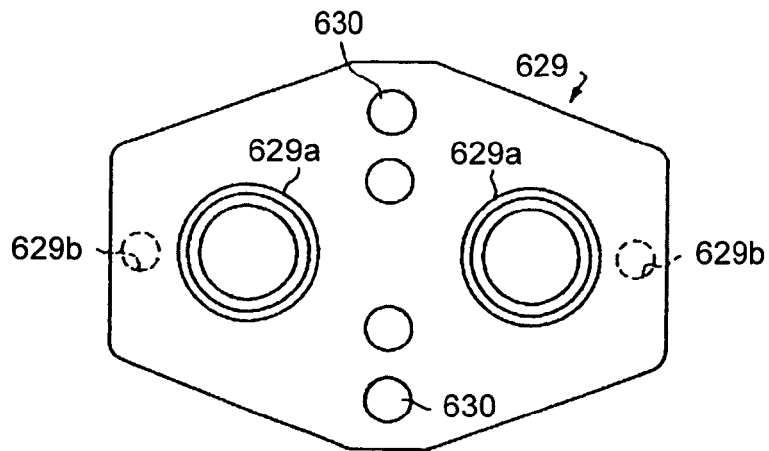


FIG.78B

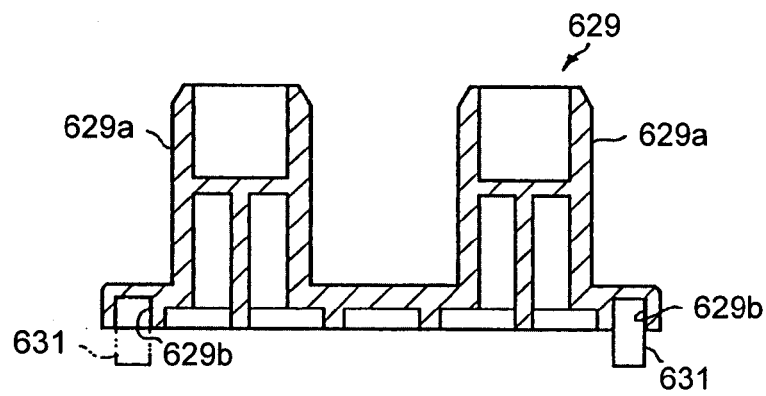


FIG.79

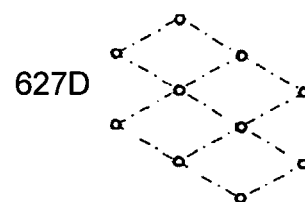
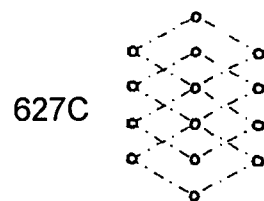
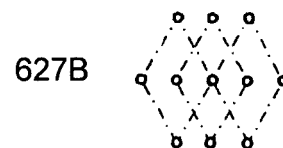
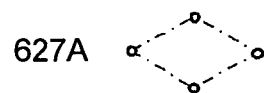


FIG.80

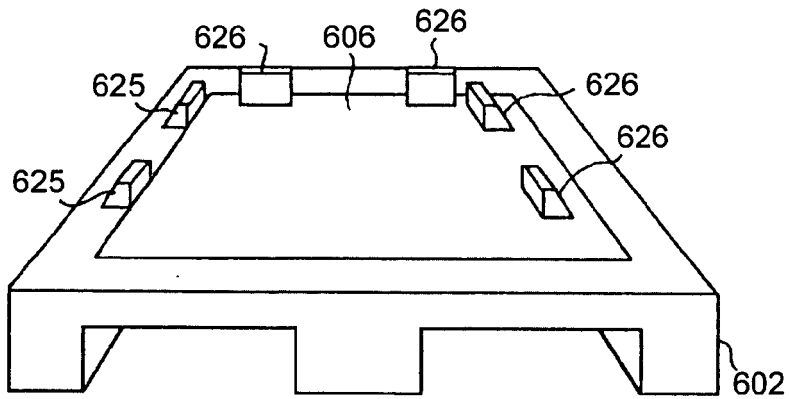


FIG.81

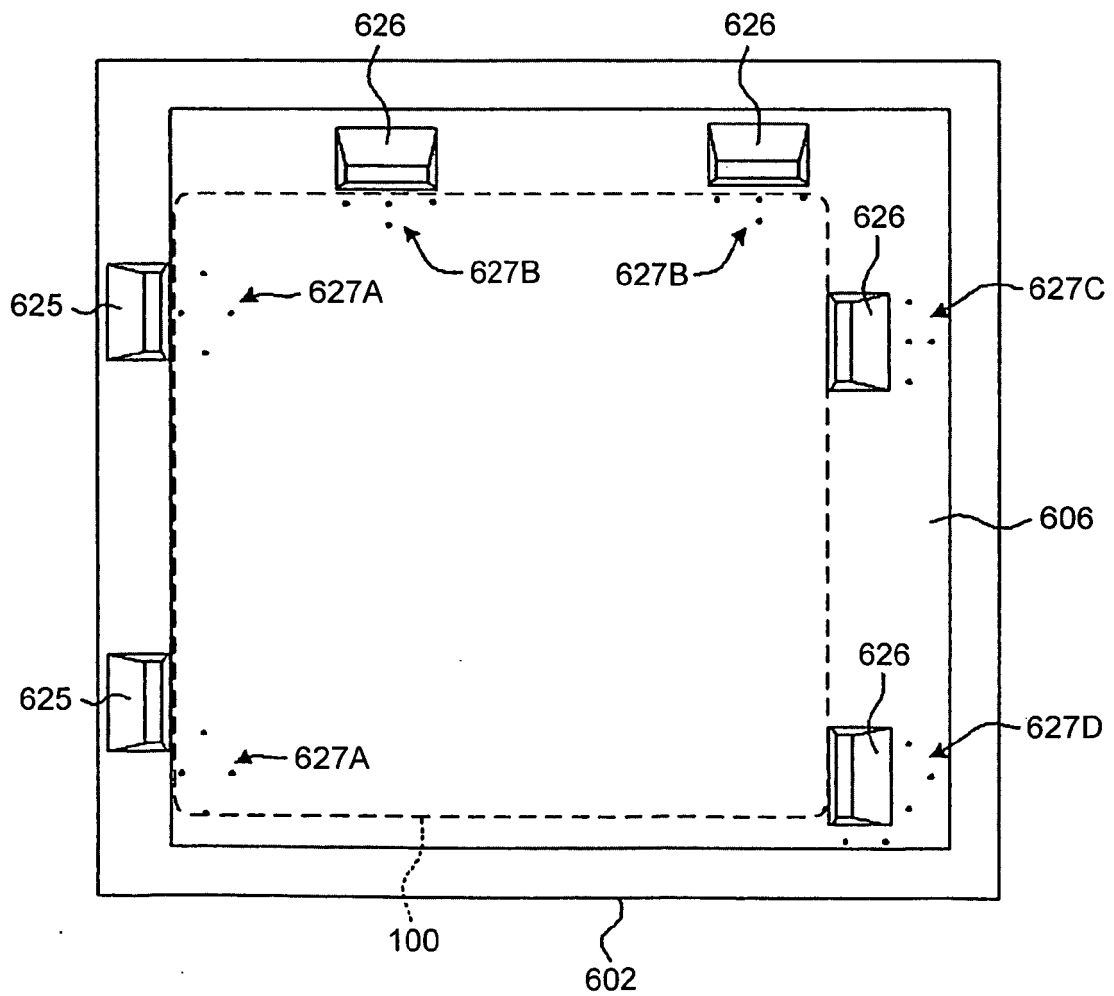


FIG.82

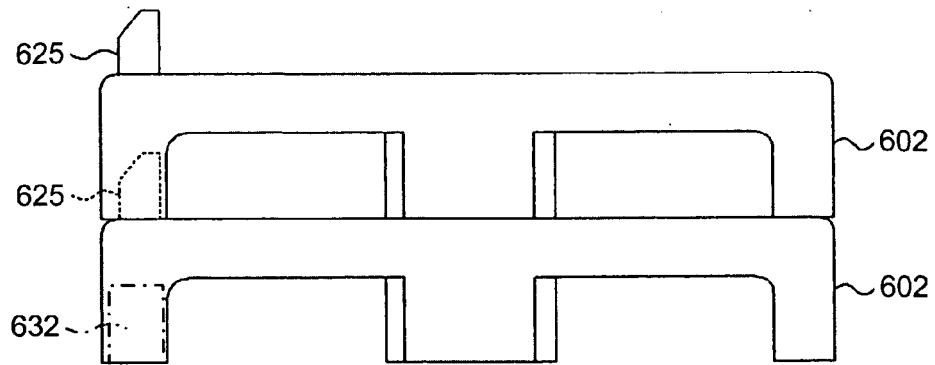


FIG.83

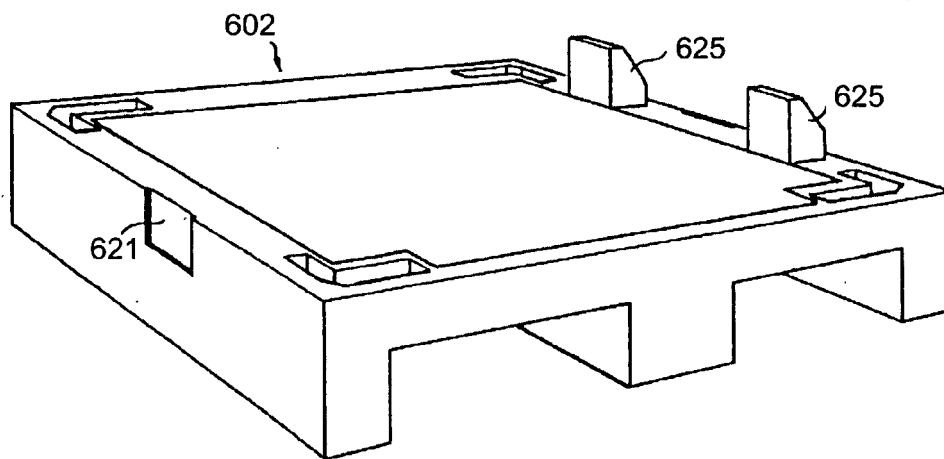


FIG.84

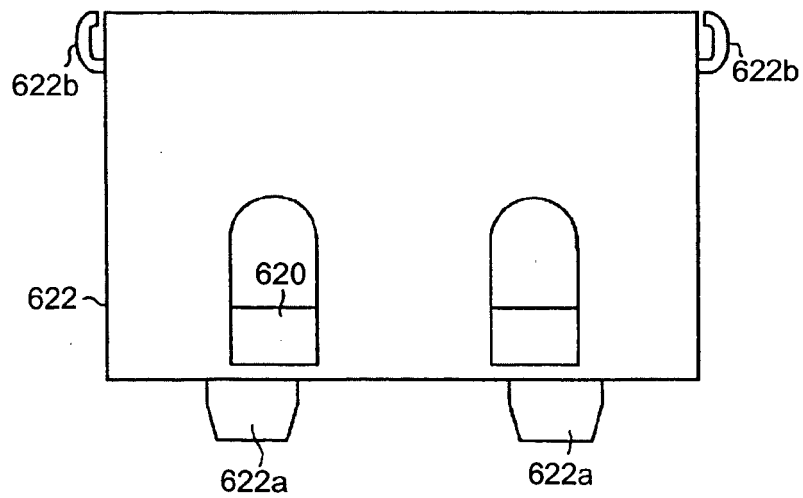


FIG.85

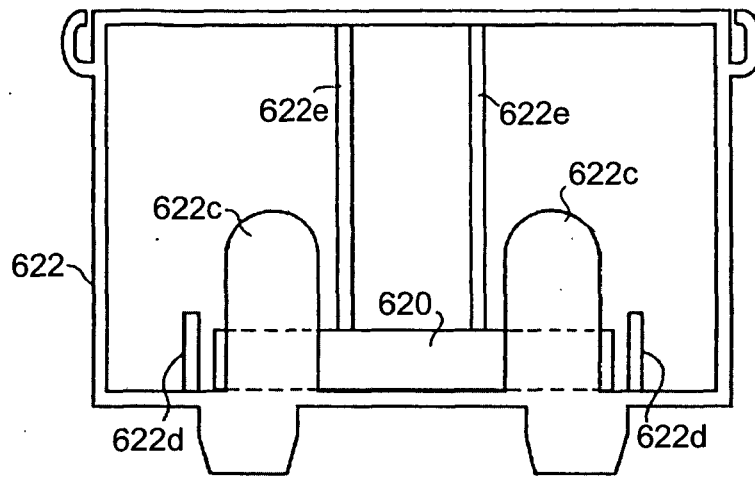


FIG.86

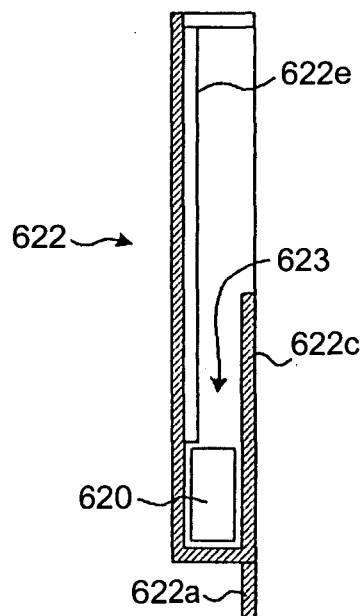
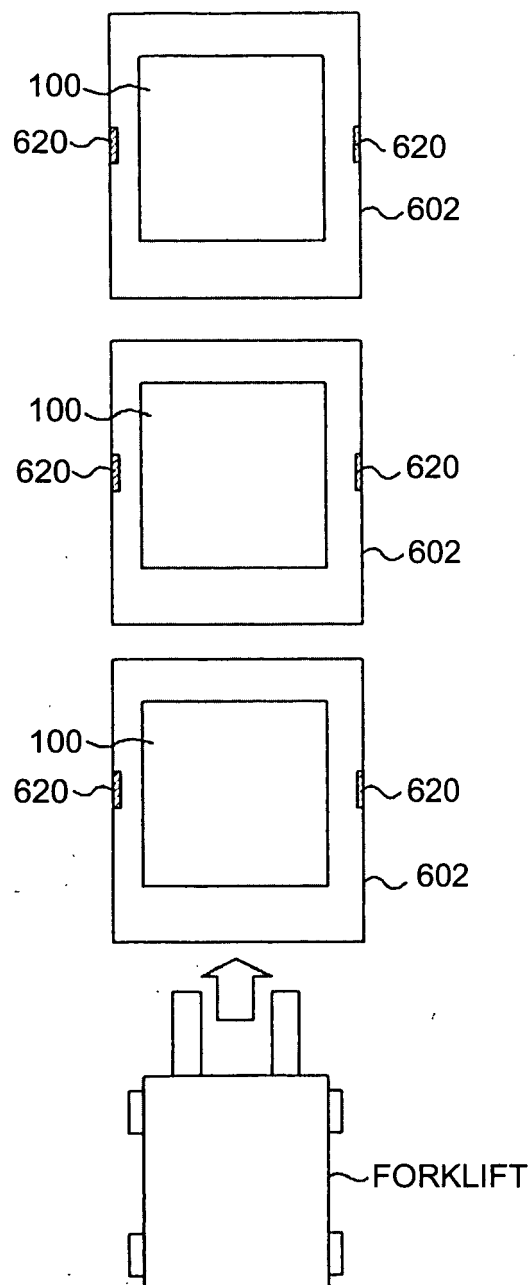


FIG.87





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# EUROPEAN SEARCH REPORT

Application Number  
EP 06 01 1216

| 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 0 841 254 A (LIMPAC STUCKI KUNSTSTOFFVERARBEITUNG GMBH)<br>13 May 1998 (1998-05-13)                                                                          | 1-4,10                                               | INV.<br>B65D19/38<br>B65D19/44          |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | * page 6, line 46 - page 7, line 1; claim 3; figure 15 *                                                                                                        | 7,8,11,16,17                                         |                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | DE 43 44 339 A1 (BOSCH-SIEMENS HAUSGERAETE GMBH, 81669 MUENCHEN, DE; BSH BOSCH UND SIEM) 29 June 1995 (1995-06-29)<br>* column 2, line 421 - line 50; figures * | 1,3,4,18                                             |                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | FR 2 763 923 A (DUPUIS JACQUES)<br>4 December 1998 (1998-12-04)<br>* abstract; figures *                                                                        | 1,3,4                                                |                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | DE 196 46 608 A1 (STUCKI KUNSTSTOFFWERK UND WERKZEUGBAU GMBH, 32107 BAD SALZUFLEN, DE) 20 May 1998 (1998-05-20)<br>* claim 5; figures *                         | 1-3                                                  |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | WO 2004/096661 A (ALMAR PACKAGING INTERNATIONAL INC; THORPE, JOHN, RICHARD; WOOD, RICHARD)<br>11 November 2004 (2004-11-11)<br>* paragraph [0034] *             | 10                                                   | TECHNICAL FIELDS SEARCHED (IPC)<br>B65D |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | US 3 968 895 A (BARNES, JR. ET AL)<br>13 July 1976 (1976-07-13)<br>* column 4, line 48 - line 51; figures *                                                     | 7,8                                                  |                                         |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | US 5 195 439 A (HARDER ET AL)<br>23 March 1993 (1993-03-23)<br>* abstract; figures *                                                                            | 11                                                   |                                         |
| D,X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | US 2002/008048 A1 (ISHIKAWA SAKAE ET AL)<br>24 January 2002 (2002-01-24)<br>* abstract *                                                                        | 19,20                                                |                                         |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | * paragraphs [0196], [0239], [0240]; figures 1,15,22,37,38 *                                                                                                    | 16,17                                                |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                 | 1,5,7,10                                             |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                 | -/--                                                 |                                         |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                 |                                                      |                                         |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                 | Date of completion of the search<br>8 September 2006 | Examiner<br>Zanghi, Amedeo              |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                                 |                                                      |                                         |

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EPO FORM 1503 03.82 (P04C01)



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# EUROPEAN SEARCH REPORT

Application Number  
EP 06 01 1216

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                        |                                  |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                          | Relevant to claim                | CLASSIFICATION OF THE APPLICATION (IPC) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -& PATENT ABSTRACTS OF JAPAN<br>vol. 2002, no. 03,<br>3 April 2002 (2002-04-03)<br>& JP 2001 315777 A (RICOH CO LTD),<br>13 November 2001 (2001-11-13)<br>* abstract * |                                  |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -----<br>GB 817 690 A (WHEELING STEEL CORPORATION)<br>6 August 1959 (1959-08-06)<br>* abstract; figures *                                                              | 7-9                              |                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -----<br>DE 296 19 630 U1 (STUCKI KUNSTSTOFFWERK<br>UND WERKZEUGBAU GMBH, 32107 BAD SALZUFLEN,<br>DE) 6 March 1997 (1997-03-06)<br>* the whole document *              | 1-4                              |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                        |                                  | TECHNICAL FIELDS<br>SEARCHED (IPC)      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                        |                                  |                                         |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                        |                                  |                                         |
| Place of search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                        | Date of completion of the search | Examiner                                |
| The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                        | 8 September 2006                 | Zanghi, Amedeo                          |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                                                        |                                  |                                         |

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EPO FORM 1503 03.82 (P04C01)



European Patent  
Office

Application Number

EP 06 01 1216

### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4,10

A packaging device comprising support members having first member and second member slidably fitted to each other so that a length of the support member can be adjusted (claim 1) wherein the first and second member have mutually shaped convex/concave portions fitted to each other slidably.

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2. claims: (1+5),6,16-20

A packaging device comprising support members having first member and second member slidably fitted to each other so that a length of the support member can be adjusted, further comprising locating means of an article.

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3. claims: (1+7).8,9

A packaging device comprising support members having first member and second member slidably fitted to each other so that a length of the support member can be adjusted, further comprising a reinforcement structure for the top plate

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4. claims: (1+11),12-15

A packaging device comprising support members having first member and second member slidably fitted to each other so that a length of the support member can be adjusted, wherein the base has a specific structure.

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 01 1216

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-09-2006

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|----|---------------------|----------------------------|---------------------|
| EP 0841254                                | A  | 13-05-1998          | AT 224841 T                | 15-10-2002          |
| DE 4344339                                | A1 | 29-06-1995          | DE 9416778 U1              | 23-02-1995          |
| FR 2763923                                | A  | 04-12-1998          | NONE                       |                     |
| DE 19646608                               | A1 | 20-05-1998          | NONE                       |                     |
| WO 2004096661                             | A  | 11-11-2004          | AU 2004201833 A1           | 18-11-2004          |
|                                           |    |                     | BR PI0409829 A             | 25-04-2006          |
|                                           |    |                     | EP 1620327 A1              | 01-02-2006          |
| US 3968895                                | A  | 13-07-1976          | NONE                       |                     |
| US 5195439                                | A  | 23-03-1993          | NONE                       |                     |
| US 2002008048                             | A1 | 24-01-2002          | NONE                       |                     |
| JP 2001315777                             | A  | 13-11-2001          | NONE                       |                     |
| GB 817690                                 | A  | 06-08-1959          | NONE                       |                     |
| DE 29619630                               | U1 | 06-03-1997          | NONE                       |                     |

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- JP 2005346171 A [0001]
- JP 2005334119 A [0001]
- JP 2005256596 A [0001]
- JP 2005251342 A [0001]
- JP 2005245920 A [0001]
- JP 2005190158 A [0001]
- JP 2002264815 A [0006] [0021] [0029]
- JP 2001315777 A [0007] [0008] [0012] [0015]  
[0022] [0030] [0031]
- JP 2001122378 A [0011]
- JP 3289083 B [0011]
- JP 2001 A [0013] [0013]
- JP 315777 A [0013]
- JP 122378 A [0013]
- JP 328908 A [0013]