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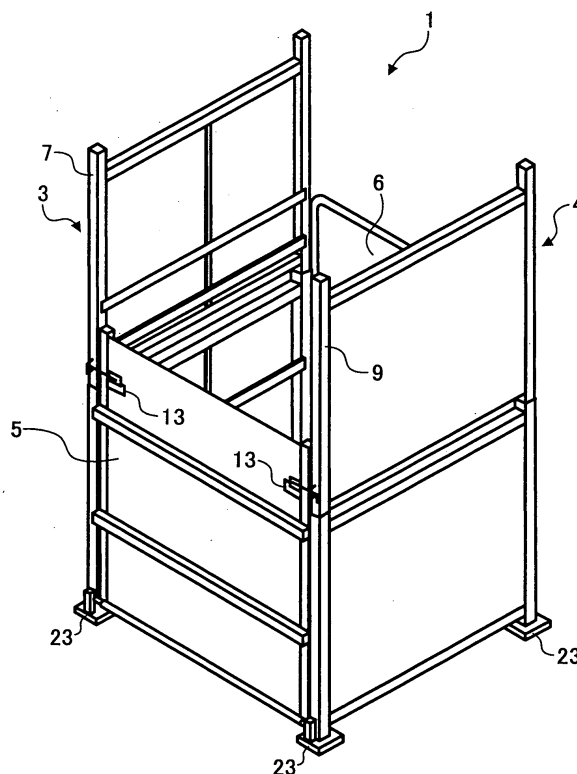
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(54) **Product conveying/Storing device**

(57) A product conveying/storing device (1) of the present invention includes a bottom plate (2) to be loaded with a desired product and a pair of upright side plates (3,4) facing each other. A fixing member (14) is removably supported between the side plates and configured to fix the product loaded on the bottom plate (2) in place.

FIG. 1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a product conveying/storing device for conveying and/or storing an image forming apparatus or similar product loaded thereon.

Description of the Background Art

[0002] It has been customary to deliver a copier, printer, facsimile apparatus or similar image forming apparatus to the user's station after wrapping it up with corrugated cardboard or similar packing material. While the user, received and unpacked the image forming apparatus, usually stores the packing material or discards it if not necessary, even packing materials applied to various products, including image forming apparatuses, should preferably be recycled from the resource saving standpoint.

[0003] However, a problem with conventional packing materials, including corrugated cardboard, is that they lack durability and cannot be repeatedly used for the transport or the storage of products. Another problem is that there must be prepared packing materials of various shapes and sizes each matching with a particular type of product, resulting in troublesome design and management and therefore high costs. This is particularly true with image forming apparatuses or similar products that vary in size and contour in accordance with the presence/absence of optional units although they may be of the same type.

[0004] In light of the above, an image forming apparatus, for example, may be delivered to the user's station by a pallet or a hand truck disclosed in, e.g., Japanese Patent Laid-Open Publication No. 2002-264815. A pallet or a hand truck is repeatedly usable and can be loaded with products of various shapes and sizes. However, when an image forming apparatus is simply loaded on a pallet or a hand truck, it is unstable and therefore apt to be scratched or otherwise damaged during conveyance. Further, a pallet or a hand truck is not suitable for storage because it cannot firmly hold a product loaded thereon.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to provide a product conveying/storing device capable of being recycled and firmly holding a product loaded thereon.

[0006] A product conveying/storing device of the present invention includes a bottom plate to be loaded with a desired product and a pair of upright side plates facing each other. A fixing member is removably sup-

ported between the side plates and configured to fix the product loaded on the bottom plate in place.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description taken with the accompanying drawings in which:

FIG. 1 is an external isometric view showing a product conveying/storing device embodying the present invention;

FIG. 2 is a view similar to FIG. 1, showing the product conveying/storing device with part thereof being held in an open position;

FIG. 3 is a fragmentary plan view showing side plates included in the illustrative embodiment;

FIG. 4 is a front perspective view showing the illustrative embodiment loaded with a product;

FIG. 5 is a fragmentary perspective view showing the internal arrangement of the illustrative embodiment;

FIG. 6 is a fragmentary plan view showing a fixing member included in the illustrative embodiment;

FIG. 7 is a fragmentary isometric view showing the end portion of the fixing member;

FIG. 8 is a fragmentary plan view demonstrating how a product is fixed in place in the illustrative embodiment;

FIG. 9 is an isometric view showing an alternative embodiment of the present invention; and

FIG. 10 is a view similar to FIG. 9, showing another alternative embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] Referring to FIGS. 1 and 2, a product conveying/storing device embodying the present invention is shown and generally designated by the reference numeral 1. As shown, the product conveying/storing device 1 includes a frame made up of a bottom plate or base 2, upright side plates 3 and 4 mounted on the bottom plate 2 and facing each other in the right-and-left direction, and end plates 5 and 6 also mounted on the bottom plate 2 and facing each other in the front-and-rear direction. The side plates 3 and 4 and end plates 5 and 6 surround the bottom plate 2 in the form of a quadrangular prism. The side plates 3 and 4 are fixed to both sides of the bottom plate 2. More specifically, as shown in FIG. 3, the side plates 3 and 4 respectively consist of front posts 7 and 9, rear posts 8 and 10, a plurality of ribs 11 connecting the front posts 7 and 9 and rear posts 8 and 10, and panels 12 mounted on the outside. In the illustrative embodiment, as FIG. 3 indicates by taking the left side plate 3 by way of example, the ribs 11, connecting the front and rear posts 7 and 8 or 9 and 10,

comprise three ribs 11a, 11b and 11c although the number and positions, or levels, of the ribs 11 are open to choice.

[0009] As shown in FIG. 2, the end plate or front end plate 5 is hinged to the posts 7 and 9 and angularly movable between a closed position shown in FIG. 1 and an open position shown in FIG. 2. When the front end plate 5 is moved to the open position, it forms a slope between the bottom wall 2 and the floor on which the conveying/storing device 1 is placed, allowing even a heavy product to be easily loaded and unloaded by hand. As shown in FIG. 1, catches 13 are mounted on the outer surface of the front end plate 5, so that the end plate 5 can be locked to the posts 7 and 9 at the closed position. While the rear end plate 6 may be fixed in position, it, in the illustrative embodiment, is hinged to the bottom plate 2 so as to be openable for facilitating necessary work. Catches identical with the catches 13 of the front end plate 5 are also mounted on the rear end plate 6, although not shown specifically.

[0010] FIG. 4 is a front view showing the product conveying/storing device 1 loaded with a product 100, which is implemented as a copier on which an ADF (Automatic Document Feeder) is mounted as an optional unit by way of example. As shown, two fixing members 14 are respectively positioned between the ribs 11a and 11c of the side plates 3 and 4 so as to fix the product 100 on the bottom plate 2 at the front side of the product 100, as will be described more specifically later. Two fixing members, not shown, identical with the fixing members 14 are positioned at the rear side of the product 100, too. Therefore, in the illustrative embodiment, the product 100 is fixed in place on the bottom plate 2 by four fixing members 14 in total. The product 100 should preferably be covered with, e.g., a plastic bag before the fixing members 14 are attached thereto, so that the product 100 can be protected from smearing or the like.

[0011] FIG. 5 shows the product conveying/storing device 1 in an unloaded condition. As shown in FIGS. 4 and 5, the fixing members 14 each is made up of a horizontal bar 15 and a pair of hooks 16 positioned at opposite ends of the bar 15 and each having a generally inversely U-shaped section. The fixing member 14 with this configuration is supported by the right and left ribs 11 with the right and left hooks 16 being hung on the ribs 11. The fixing member 14, thus supported by the right and left ribs 11, is slidable in the front-and-rear direction of the product conveying/storing device 1. A stop screw or stopping means 17 is attached to each hook 16. After the fixing member 14 has been slid on the ribs 11 to a desired position, the stop screws 17 attached to the hooks 16 are driven in to fasten the fixing member 14 to the ribs 11. The fixing member 14 thus fastened to the ribs 11 can be easily lifted away from the ribs 11 only if the stop screws 17 are loosened. At the time when the product 100 is mounted to the product conveying/storing device 1, the fixing members 14 are removed from the ribs 11 so as not to obstruct the product 100.

[0012] A product holding member 18 is mounted on the fixing member 14. As shown in FIG. 6, the product holding member 18 consists of a generally square, tubular support member 19 slidably mounted on the horizontal bar 15, a generally L-shaped member 20 fixed to one side of the support member 19, a shock absorbing material 21 adhered to the L-shaped member 20, and a stop screw or fixing means 22 positioned on the top of the support member 19. As shown in FIGS. 4 and 5, a pair of product holding members 18 each having the above configuration are mounted on each fixing member 14 symmetrically to each other in the right-and-left direction such that their shock absorbing members 21 face each other.

[0013] The product holding members 18 each are slidable in the lengthwise direction of the bar 15, i.e., the right-and-left direction as seen in the front view of FIG. 4. When a person, handling the product conveying/storing device 1, slides each product holding member 18 to any suitable position on the bar 15 in the right-and-left direction and then drives in the stop screw 22, the product holding member 18 is fixed in place on the bar 15 at the above position. The stop screws 17 and 20 each are provided with a head at one end, so that the person can drive or loosen the screw with fingers, i.e., without using any tool.

[0014] FIG. 7 is a fragmentary isometric view showing one of the product holding members 18 specifically. As shown, the shock absorbing member 21 adhered to the L-shaped member 20 is formed of foam urethane or similar elastic material and configured to contact one of four corners of the product 100. Such elastic, shock absorbing members 21, contacting the four corners of the product 100, cooperate to prevent the product 100 from being scratched or otherwise damaged.

[0015] FIG. 8 is a fragmentary plan view showing how the product holding member 18, positioned at the front left of the product conveying/storing device 1 by way of example, holds the product 100 in contact therewith. To fix the product 100 placed on the bottom plate 2, FIG. 2, the fixing member 14 is mounted to the right and left ribs 11. The fixing member 14 is slidable in the front-and-rear direction of the product conveying/storing device 1 while the product holding member 18 is slidable in the right-and-left direction of the same, as stated earlier. In this condition, a person, handling the product conveying/storing device 1, slides the fixing member 14 in the front-and-rear direction toward position where the product holding member 18 mounted thereon is capable of contacting one of four corners of the product 100, and slides the product holding member 18 to the above position in the right-and-left direction. Subsequently, the person drives in the stop screw 17 of the hook 16 and the stop screw 22 of the product fastening member 18 for thereby pressing the member 18 against the product 100.

[0016] The above operation is repeated with the other product holding member 18, not shown, located at the

right of the product conveying/storing device 1 and with the other fixing member 14, not shown, located at the rear of the device 1. As a result, the product 100 is firmly held by the product holding members 14 at four corners thereof on the bottom plate 2, FIG. 2.

[0017] Further, the illustrative embodiment includes two upper fixing members 14 and two lower fixing members 14, as state previously. The lower fixing members 14 retain the four corners of the product 100 for thereby more firmly fixing the product 100 in place. The front fixing members 14 and rear fixing members 14 may be positioned at the same level or at different levels in accordance with, e.g., the configuration of the product 100, as desired. Of course, the product holding members 18 mounted on each fixing member 14 may not be positioned symmetrically to each other in the right-and-left direction. Moreover, the production holding members 14 at the front and those at the rear may be different in position from each other. The crux is that the production holding members 18 be suitably positioned in accordance with the configuration and position of the product 100.

[0018] In the illustrative embodiment, the rear end plate 6 of the product conveying/storing device 1 is openable, as stated earlier. This allows the fixing members 14 to be easily mounted to the ribs 11 at the rear of the product 100 and then allows the product holding members 18 to be easily adjusted in position on the above fixing members 14.

[0019] As stated above, in the illustrative embodiment, the fixing members 14 are slidable in the front-and-rear direction while the product holding members 18 are slidable in the right-and-left direction. The product holding members 18 can therefore be adjusted in position in both of the front-and-rear and right-and-left directions in accordance with the shape and size and therefore the type or the kind of the product 100 mounted on the product conveying/storing device 1. Further, as shown in FIG. 2, the fixing members 14 are variable in level or height and therefore allow the product holding members 18 to be varied in height in matching relation to the shape and height of the product 100.

[0020] Moreover, the fixing members 14 are capable of firmly, stably fixing the product 1 in place on the bottom plate 2 and therefore protecting it from scratches or similar damage during conveyance or storage.

[0021] As shown in FIGS. 6 and 7, the inversely U-shaped hook 16 of each fixing member 14 vertically rises from the bar 15 at an angle of 90°. This, coupled with the fact that the stop screw 17 is positioned in the vicinity of the upper end of the hook 16, prevents the hook 16 and stop screw 17 from interfering with the L-shaped member 20 and shock absorbing member 21 that face the side face of the bar 15. It follows that the product holding members 18 can be moved as far as substantially the opposite ends of the bar 15 when the product 100 has great width, and the stop screws 17 and 22 can be easily driven in or loosened without any interference,

as desired. In addition, each shock absorbing member 21, having a generally L-shaped section, can press a plurality of surfaces of the product 100, i. e. , the front or the rear surface and one side surface contiguous therewith, fixing the product 100 in place more positively.

[0022] In the illustrative embodiment, the shock absorbing member 21, expected to directly contact the product 100, is formed of a material softer than the product 100 so as not to damage the product 100. On the other hand, the L-shaped member 20, supporting the shock absorbing member 21, is formed of iron, which is a hard, rigid material. The shock absorbing member 21 can therefore surely hold the product 100 despite that it is soft.

[0023] A plurality of fixing members, i. e. , the upper and lower fixing members 14 in the illustrative embodiment are assigned to a single surface of the product 100 so as to firmly fix the product 100 in place. Further, the fixing members 14 are so positioned as to retain two facing surfaces of the product 100, i.e. , the front and rear surfaces in the illustrative embodiment, also firmly fixing the product 100 in place. In the illustrative embodiment, the L-shaped shock absorbing members 21 can retain the product 100 at two side surfaces facing each other as well.

[0024] As shown in FIG. 1, the posts 7 through 10 each are provided with a leg 23 at the bottom, so that a space is formed between the underside of the bottom plate 2 and the floor. In this condition, a forklift can lift and transport the product conveying/storing device 1 loaded with the product 100 with its arms entering the above space. It follows that the product 100 loaded on the product conveying/storing device 1 can be easily handled even if when it is heavy.

[0025] FIG. 9 shows an alternative embodiment of the present invention. As shown, a product conveying/storing device, generally 1B, is identical with the product conveying/storing device 1, FIG. 1, except that a top plate 24 is fixed to the upper ends of the posts 7 through 10 and connects the opposite side plates 3 and 4. In FIG. 9, structural parts and elements identical with those shown in FIG. 1 are designated by identical reference numerals, and a detailed description thereof will not be made in order to avoid redundancy.

[0026] In the illustrative embodiment, the top plate 24, connecting the side plates 3 and 4, increases the mechanical strength of the entire device 1B for thereby further promoting the protection of a product, not shown, loaded on the device 1B. Further, a plurality of product conveying devices 1B can be stacked together in order to effectively use a limited space available for storage.

[0027] FIG. 10 shows another alternative embodiment of the present invention. As shown, a product conveying/storing device, generally 1C, is identical with the product conveying/storing device 1, FIG. 1, except that casters 25 are substituted for the legs 23. In FIG. 10, structural parts and elements identical with those shown

in FIG. 1 are designated by identical reference numerals, and a detailed description thereof will not be made in order to avoid redundancy.

[0028] In the illustrative embodiment, the casters 25 allow the product conveying/storing device 1C to be easily moved and therefore allow even a heavy product to be easily carried by the device 1C. In addition, the casters 25, like the legs 23, form a space between the underside of the bottom plate 2 and the floor, so that the product conveying device 1C can be transported by a forklift. If desired, the casters 23 may be mounted to the product conveying/storing device 1 of FIG. 1 also.

[0029] While the illustrative embodiments shown and described each include three ribs 11a through 11c arranged one above the other at each side of the product conveying/storing device, the number of ribs 11 is, of course, open to choice. For example, the ribs 11a through 11c may be replaced with a single rib or a number of ribs, e.g., five or ten ribs. With a number of ribs, it is possible to finely adjust the levels of the fixing members 14 for accommodating products of various sizes and shapes. In addition, such a number of ribs increase the mechanical strength of the side plates 3 and 4 and may serve as outside walls themselves.

[0030] In the illustrative embodiments, fixing means for fixing the fixing member 14 to the ribs 11 and fixing means for fixing the product holding members 18 to the bar 15 both are implemented as stop screws 17 and 22. The stop screws may, of course, be replaced with any other suitable fixing means, e.g., clamps or levers. Further, fixing means using the connection of different members or using an electromagnet may be substituted for the above fixing means.

[0031] The ribs 11, comprising flat bars in the illustrative embodiments, may alternatively be implemented as rods or circular or square pipes, in which the hooks of each fixing member 14 will be modified in shape in matching relation to the ribs. This is also true with the horizontal bar of each fixing member 14.

[0032] If desired, the positions of the fixing members 14 in the front-and-rear direction and the positions of the product holding members mounted on the fixing members 14 may be electrically adjusted in the front-and-rear direction and right-and-left direction, respectively. In such a case, by using sensors responsive to the position of the product, it is possible to automatically fix the product in place for thereby promoting rapid operation.

[0033] Furthermore, either one or both of the front end plate and rear end plate 6 may be omitted, if necessary.

[0034] In summary, it will be seen that the present invention provides a product conveying/storing device having various unprecedented advantages, as enumerated below.

(1) A fixing member is positioned between opposite side plates so as to securely hold a product loaded on a base, so that the product is prevented from moving or tilting during conveyance or storage and

therefore protected from damage. Further, the conveying/storing device can fix various kinds of products in place without resorting to exclusive parts, thereby reducing conveyance and storage costs.

(2) A plurality of fixing members are used to for firmly fixing a product in place and may be positioned at the front and rear of the product for more firmly fixing the product in place. Further, such fixing members may be positioned at different levels or heights at each of the front and rear of the product.

(3) The position of each fixing member is variable in the direction of height so as to cope with products of different sizes or heights and different shapes.

(4) Each fixing member is movable in the front-and-rear direction of the conveying/storing device so as to cope with products of various sizes, as seen in a plan view, and various shapes.

(5) A product holding member is mounted on each fixing member for holding a product and protecting it from damage. A plurality of holding members may be mounted on each fixing member for holding the product more firmly and configured to be movable in the widthwise direction of the conveying/storing device in matching relation to the size and shape of the product.

(6) A shock absorbing member is fitted on the portion of each product holding member expected to contact a product, protecting the product from scratches. The shock absorbing member may be configured to contact a plurality of surfaces of the product in order to fix the product more firmly. The shock absorbing member should preferably be configured to hold one corner of the product.

(7) An upright front end plate, positioned at the front of a product loaded on the base, protects the front surface of the product from damage and is openable to form a slope between the base and the floor on which the conveying/storing device is placed. The slope allows the product to be easily loaded and unloaded even when the product is heavy. This is also true with an upright rear end plate positioned at the rear of the product loaded on the base.

(8) A top plate connects the opposite side plates and covers the top of a product loaded on the base. The top plate not only protects the top of the product from damage, but also allows a plurality of conveying/storing devices to be stacked together for thereby promoting effective use of a limited space.

(9) Legs form a space between the base and the floor and allow the conveying/storing device loaded with a heavy product to be easily conveyed by a forklift. This is also true when casters are substituted for the legs.

[0035] Various modifications will become possible for those skilled in the art after receiving the teachings of the present disclosure without departing from the scope thereof.

Claims

1. A conveying/storing device including a base to be loaded with a product and a pair of upright side plates mounted on said base and facing each other,

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CHARACTERIZED BY

a fixing member supported between said side plates for fixing the product loaded on said base in place.

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2. The device as claimed in claim 1, **CHARACTERIZED IN THAT** said fixing member comprises a plurality of fixing members.
3. The device as claimed in claim 2, **CHARACTERIZED IN THAT** said fixing members are capable of being positioned at a rear and a front of the product.
4. The device as claimed in claim 3, **CHARACTERIZED IN THAT** said fixing members are capable of being positioned at different levels at the front of the product.

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5. The device as claimed in claim 3 or 4, **CHARACTERIZED IN THAT** said fixing members are capable of being positioned at different levels at the rear of the product.

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6. The device as claimed in any one of claims 1 through 5, **CHARACTERIZED IN THAT** said fixing member positioned between said side plates is variable in level.

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7. The device as claimed in any one of claims 1 through 6, **CHARACTERIZED IN THAT** said fixing member is movable in a front-and-rear direction of said device.

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8. The device as claimed in claim 7, **CHARACTERIZED IN THAT** fixing means is provided for fixing said fixing member at a desired position in the front-and-rear direction of said device.

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9. The device as claimed in any one of claims 1 through 8, **CHARACTERIZED IN THAT** a product holding member is mounted on said fixing member for holding the product.

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10. The device as claimed in claim 9, **CHARACTERIZED IN THAT** a plurality of product holding members are mounted on said fixing member for holding the product.

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11. The device as claimed in any one of claim 9 or 10, **CHARACTERIZED IN THAT** said product holding member is movable in a widthwise direction of said device.

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12. The device as claimed in claim 11, **CHARACTERIZED IN THAT** fixing means is provided for fixing said product holding member at a desired position in the widthwise direction of said device.
13. The device as claimed in any one of claims 9 through 12, **CHARACTERIZED IN THAT** a shock absorbing member is fitted on a portion of said product holding member contacting the product.
14. The device as claimed in claim 13, **CHARACTERIZED IN THAT** said shock absorbing member is configured to contact a plurality of surfaces of the product.
15. The device as claimed in claim 14, **CHARACTERIZED IN THAT** said shock absorbing member holds a corner of the product.
16. The device as claimed in claim 1, **CHARACTERIZED IN THAT** an upright front end plate is mounted on said base at a front of the product and openable.
17. The device as claimed in claim 16, **CHARACTERIZED IN THAT** said front end plate forms, when opened, a slop connecting said base and a floor on which said device is placed.
18. The device as claimed in claim 1, **CHARACTERIZED IN THAT** an upright rear end plate is mounted on said base at a rear of the product.
19. The device as claimed in claim 18, **CHARACTERIZED IN THAT** said rear end plate is openable.
20. The device as claimed in claim 1, **CHARACTERIZED IN THAT** a top plate connects said side plates in such a manner as to cover a top of the product.
21. The device as claimed in claim 1, **CHARACTERIZED IN THAT** legs are provided for forming a space between said base and a floor on which said device is placed.
22. The device as claimed in claim 1, **CHARACTERIZED IN THAT** casters protrude downward from said base for forming a spaced between said base and a floor on which said device is placed.

FIG. 1

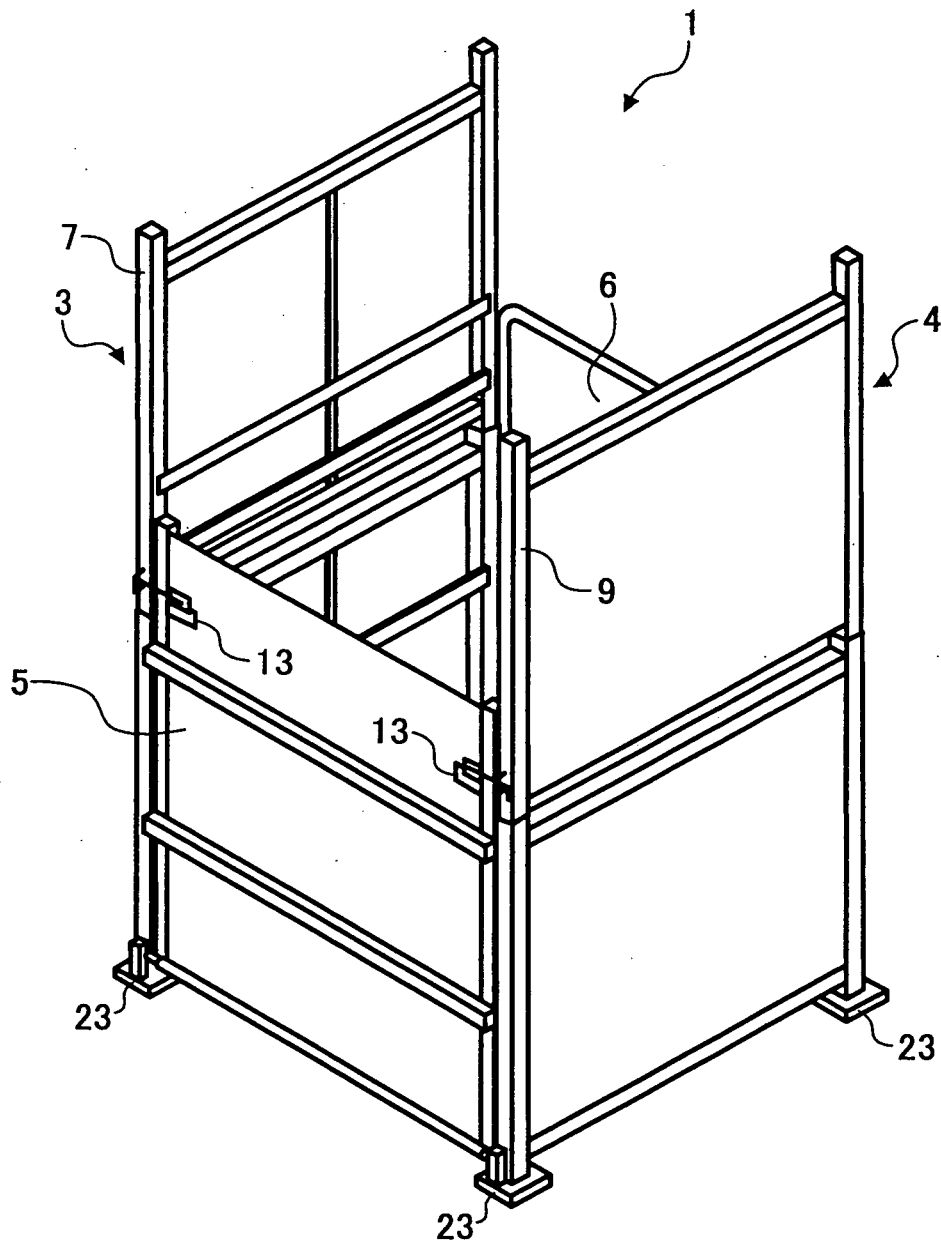


FIG. 2

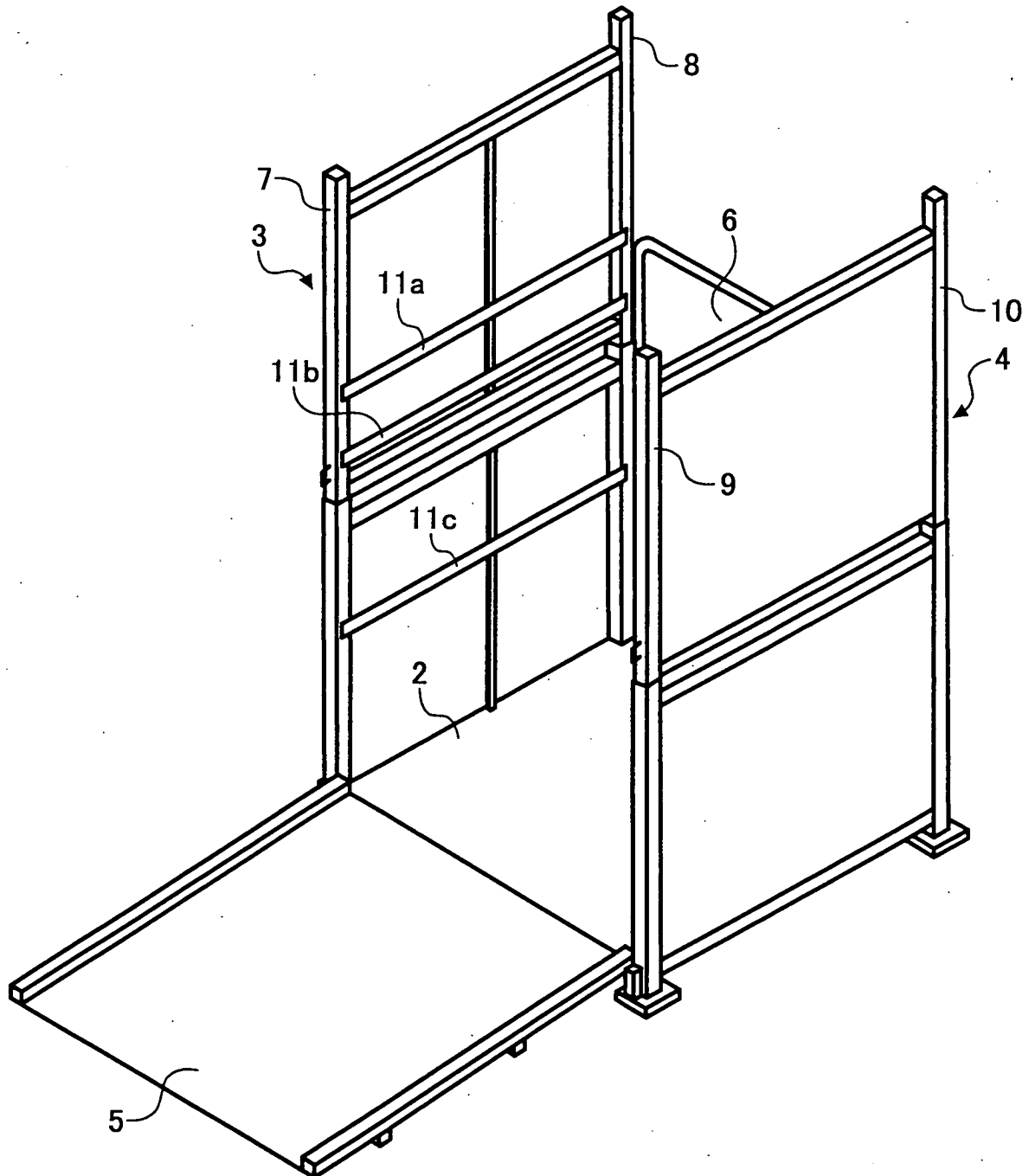


FIG. 3

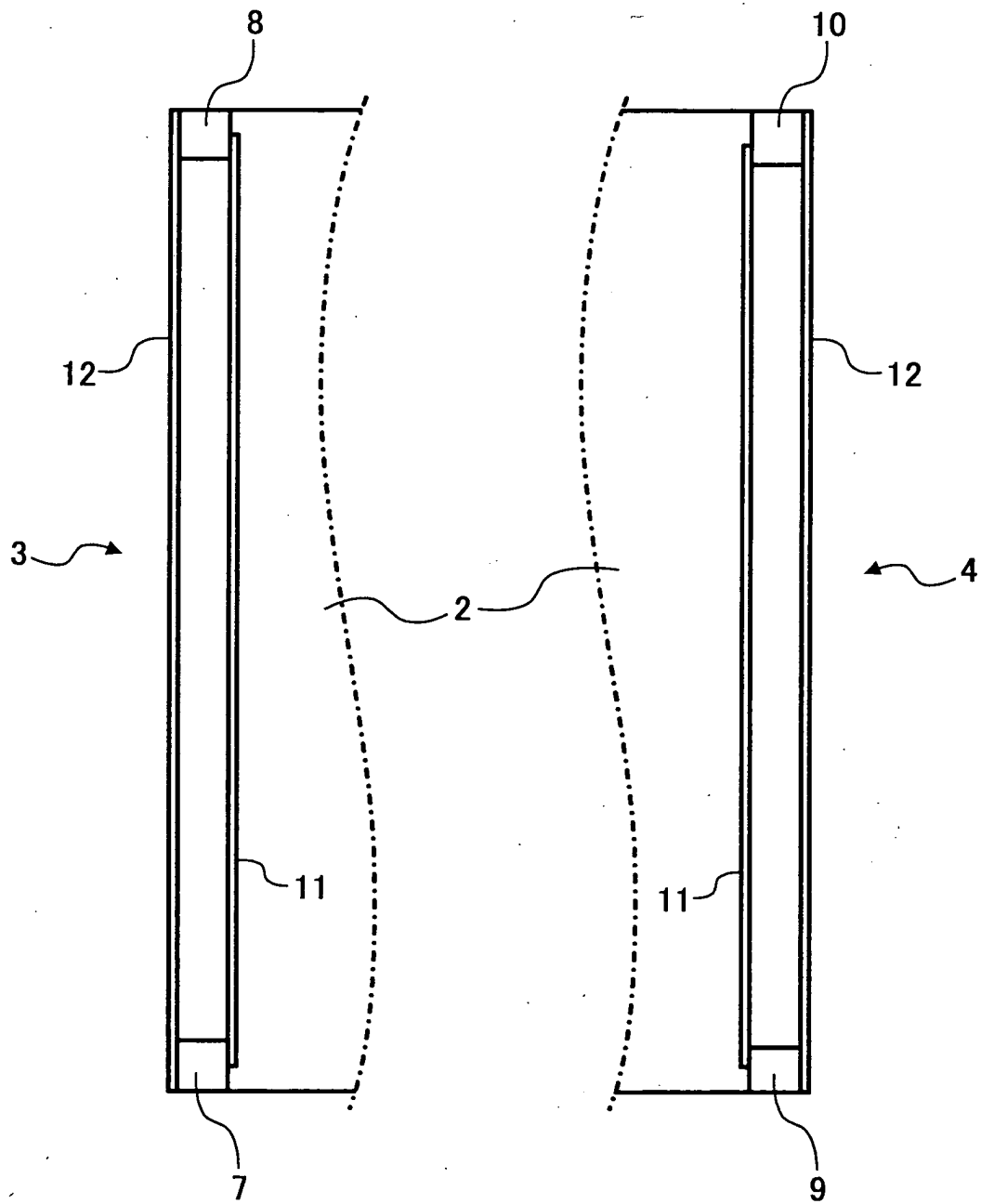


FIG. 4

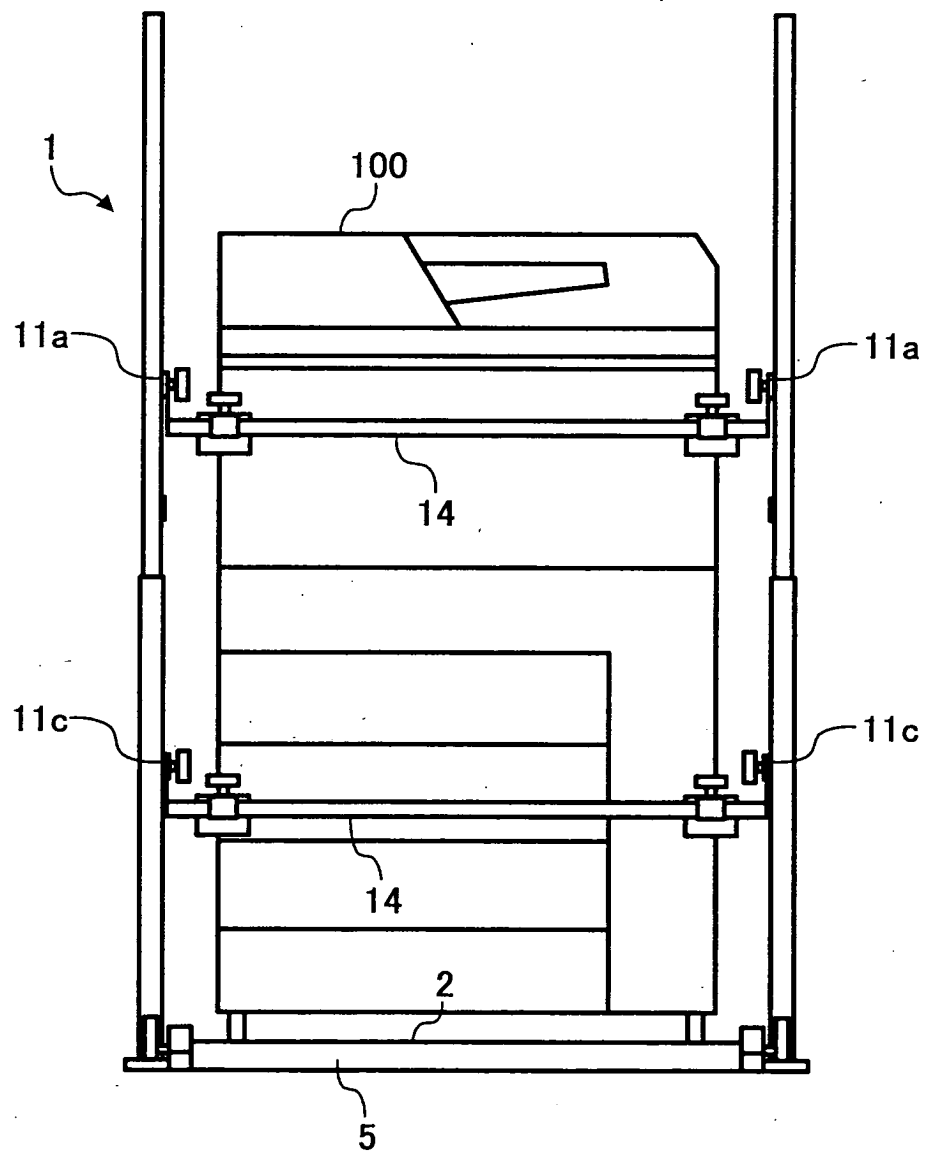


FIG. 5

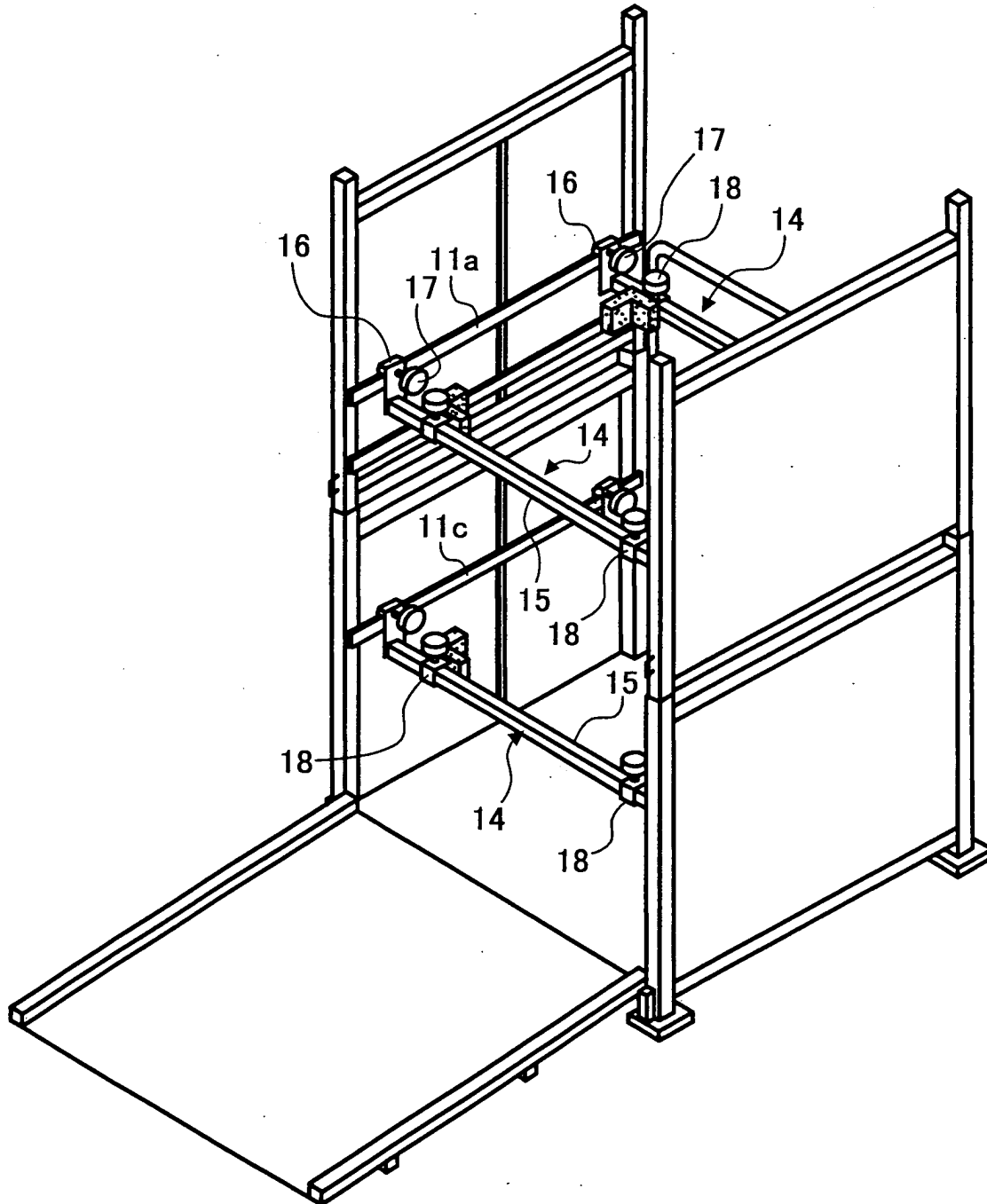


FIG. 6

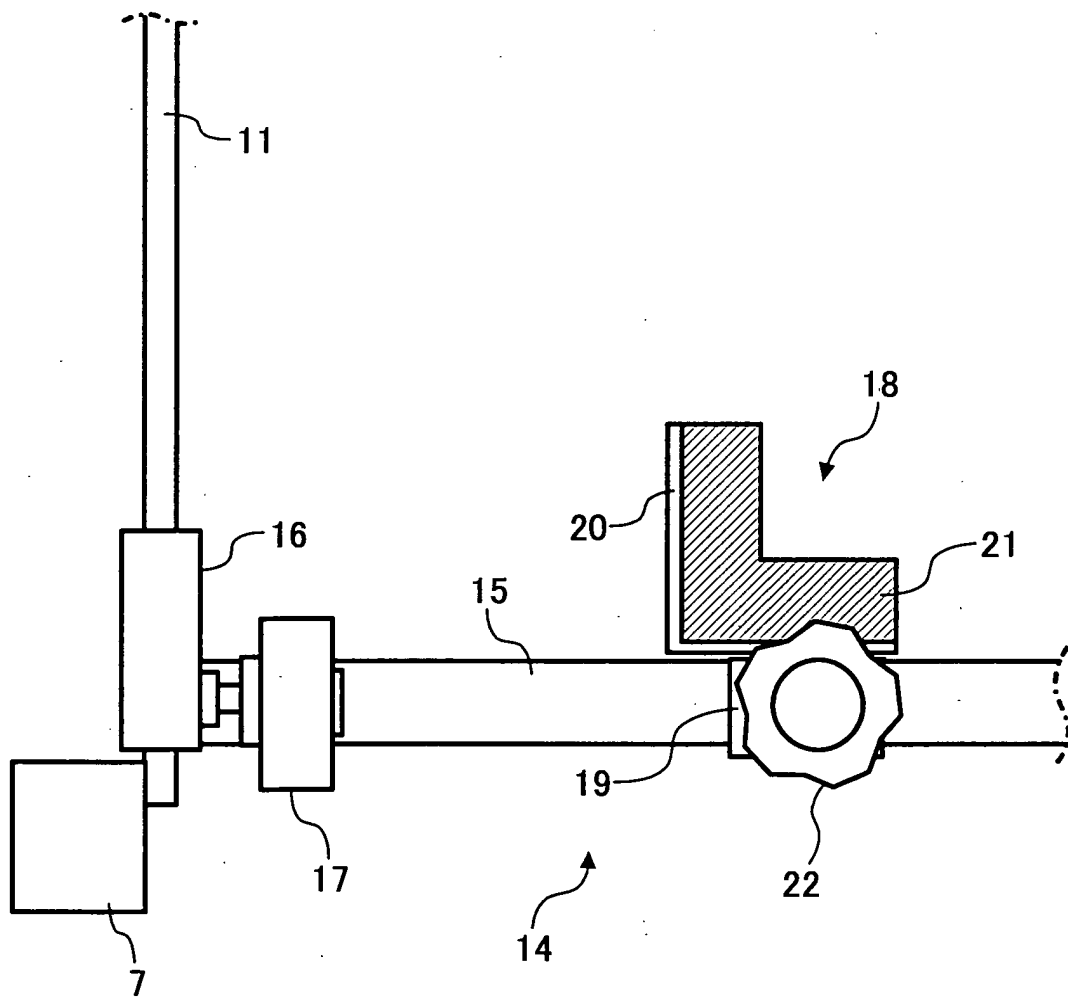


FIG. 7

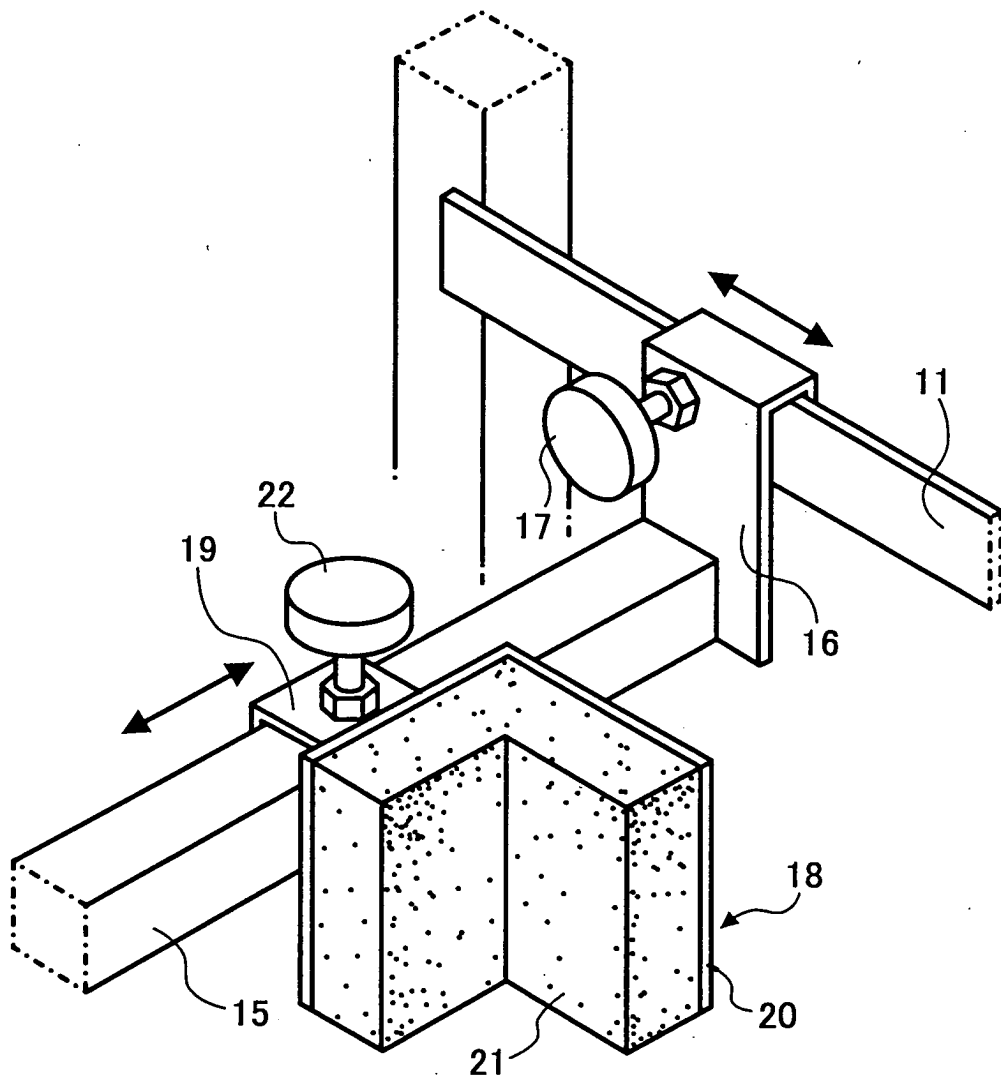


FIG. 8

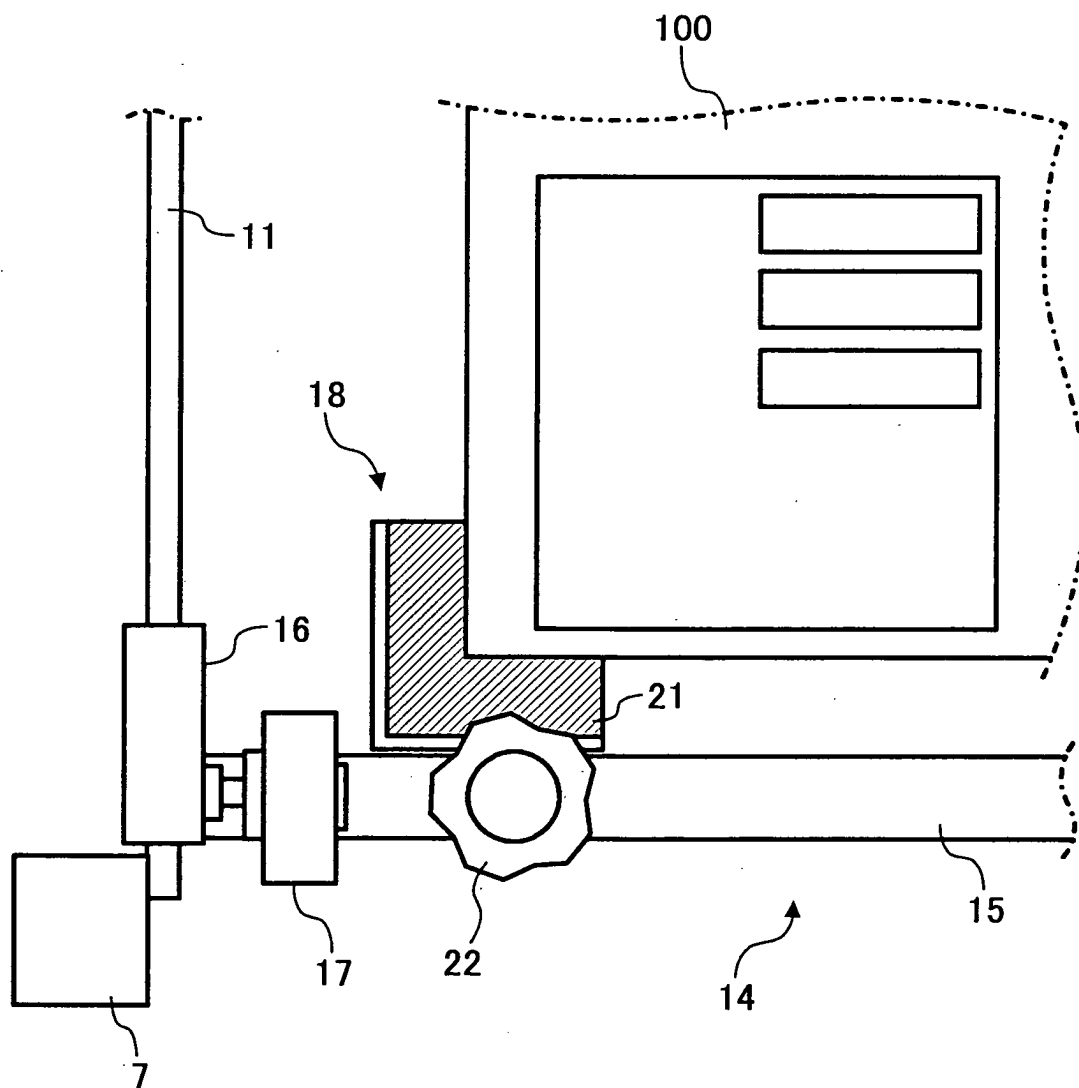


FIG. 9

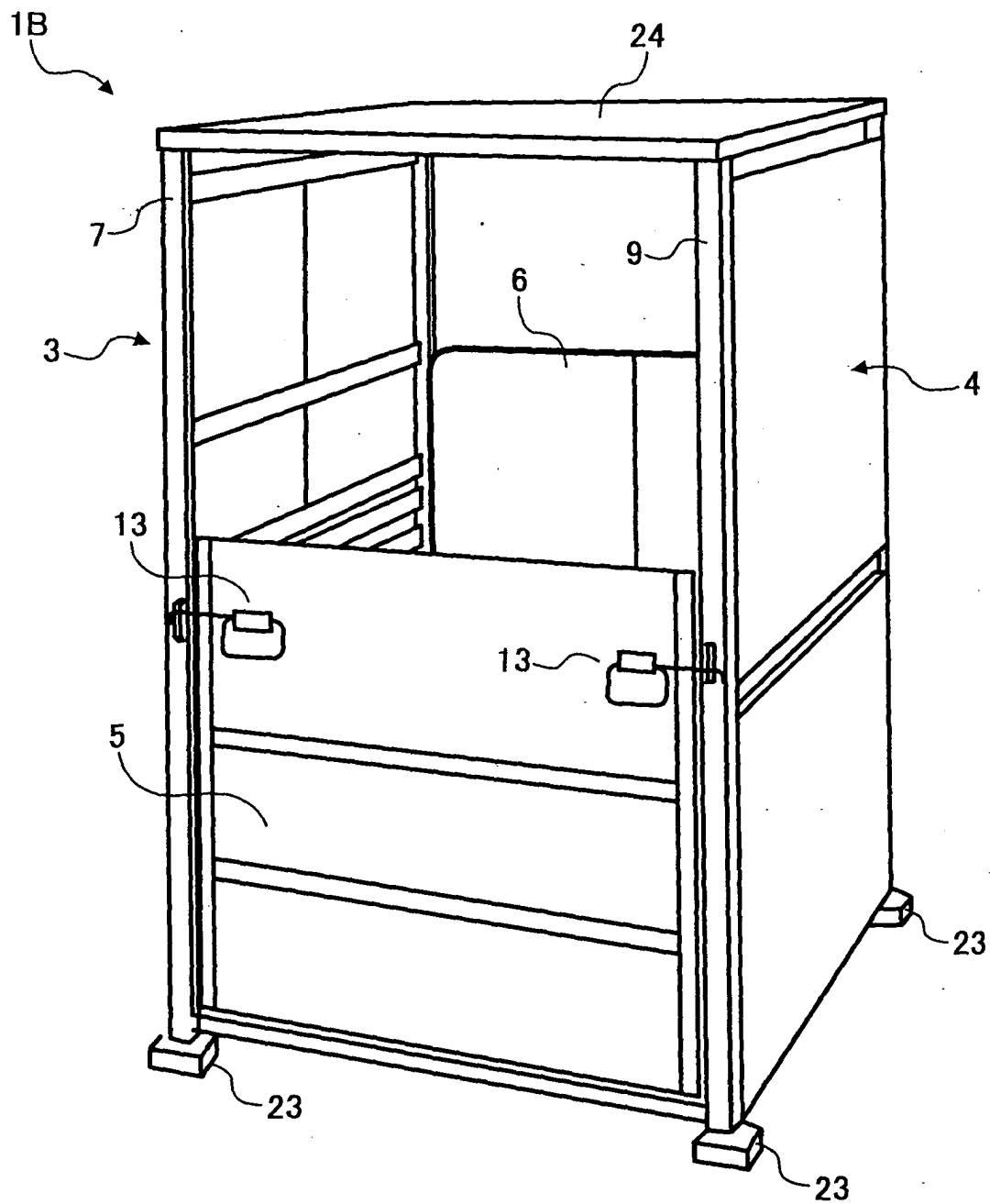
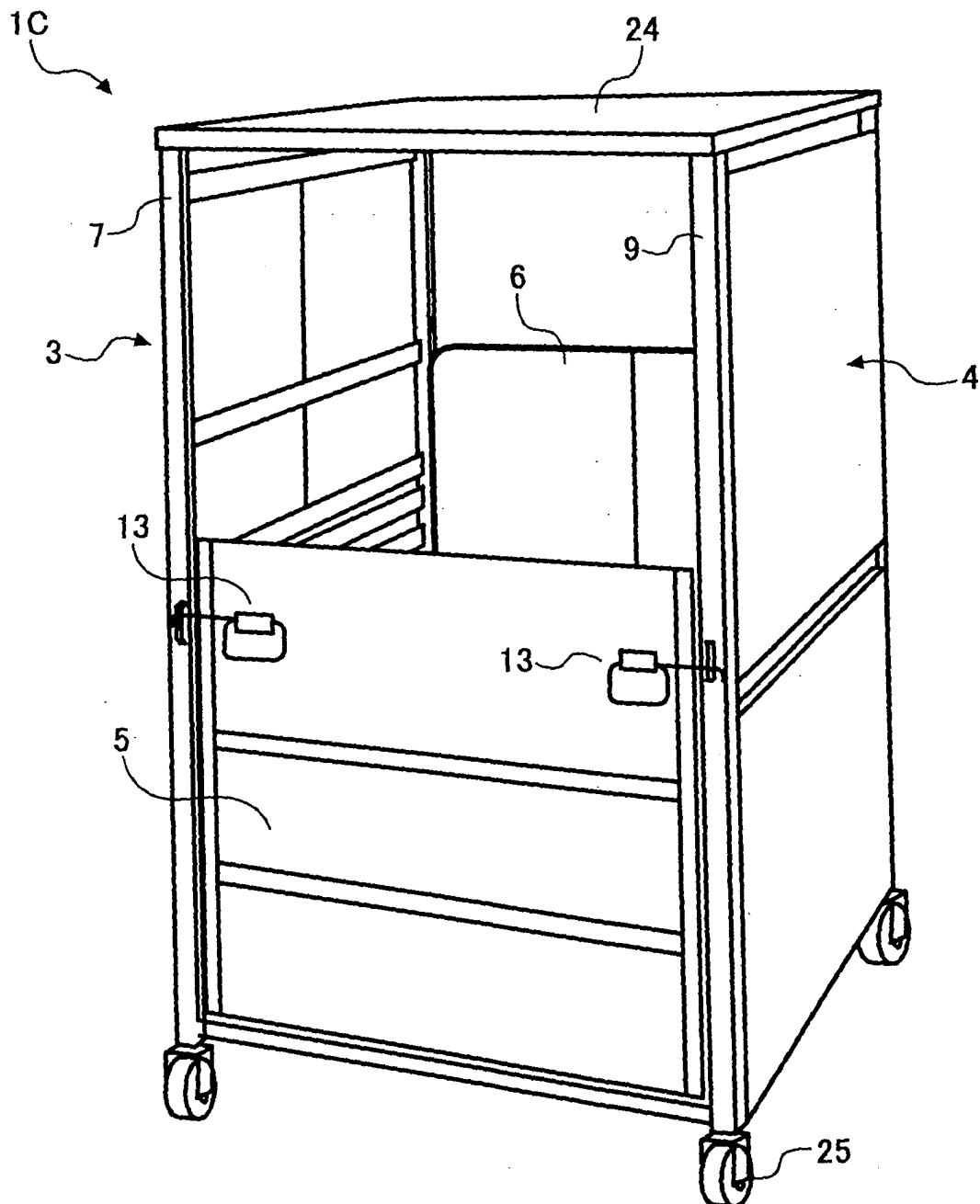


FIG. 10





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 00 0721

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 641 359 B1 (MARTI KERRY W ET AL) 4 November 2003 (2003-11-04) * abstract; figures 1-7 *	1-15, 20-22	B62B3/00
A	DE 43 07 340 A1 (HMB - HOLZMASCHINENBAU GMBH, 79199 KIRCHZARTEN, DE) 15 September 1994 (1994-09-15) * abstract; figures 1,6 *	1,4-6	
A	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 01, 14 January 2003 (2003-01-14) & JP 2002 264815 A (KORIAKOOPU:KK), 18 September 2002 (2002-09-18) * abstract; figure 1 *	1,16-19	
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		2 June 2005	Lindner, V
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

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

EP 05 00 0721

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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02-06-2005

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