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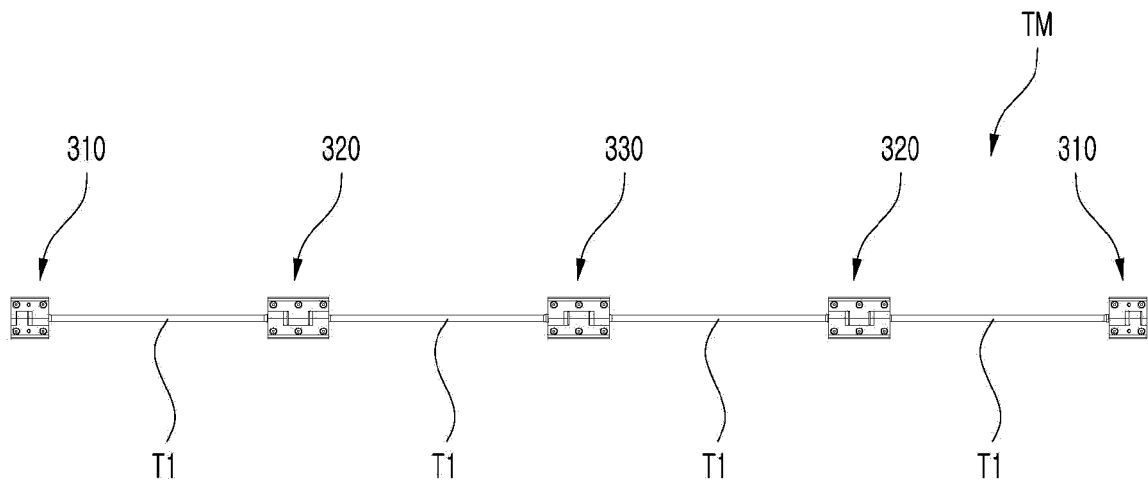
(54) **FOLDABLE CONTAINER INCLUDING TORSION BAR MODULE FOR COLLAPSING SIDE PANEL**

(57) The present disclosure relates to a foldable container including a torsion bar module, including: first hinges 310 provided at both outermost ends of the torsion bar module; a plurality of torsion bars arranged between the first hinges; and a second hinge 320 and a third hinge 330 inside the first hinges, with which both ends of the torsion bars are coupled and arranged. The second hinge 320 includes a second torsion bar mounting member 321 and a second support member 323, wherein the second torsion bar mounting member 321 receives the torsion bars to be inserted and mounted therein from both sides and is coupled to the bottom plate, and the second support member 323 receives the second torsion bar mount-

ing member 321 to be relatively rotatably coupled thereto and is coupled to the side panel, and the third hinge 330 includes a third torsion bar mounting member 331 and a third support member 333, wherein the third torsion bar mounting member 331 receives the torsion bars to be inserted and mounted therein from both sides and is coupled to the side panel, and the third support member 333 receives the third torsion bar mounting member 331 to be relatively rotatably coupled thereto and is coupled to the bottom plate.

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【 FIG. 15】



Description

BACKGROUND

Technical Field

[0001] The present disclosure relates to a foldable container that can be folded by use of a torsion bar, and specifically, to a technology for folding a container in 1/4 in a height direction by including a torsion bar provided at a lower end of a side wall panel of the container, and removing a top plate so as to easily fold the side wall panel, and then re-coupling the top plate, and more specifically, to a structure of a torsion bar under the side panel.

Background Art

[0002] In general, a container has a shape of a large box formed of metal plates and is mainly used for cargo transportation. Such a container is sized according to a certain standard and is widely used for its advantage that it not only allows ease of cargo storage and transport, but also can protect the cargo loaded therein. Containers are transported individually by dedicated large cargo vehicles or transported in large quantities by a dedicated train or a dedicated vessel. However, when transported by the modes of transport, whether the containers are loaded with cargo or empty without cargo therein, they occupy the same space of transport.

[0003] Therefore, when the containers without the cargo loaded therein are transferred to another place or stored in a certain place, the containers in their fixed volume cause a problem that they unnecessarily occupy a large volume, thus taking a large amount of transportation space and transportation costs. In other words, after the containers loaded with the cargo have transported the cargo, when they are stored or retrieved in empty state, the containers with such invariable volume take up a large amount of space and costs for storage and transportation.

[0004] In particular, when transferring a container using a large cargo vehicle, since one container is mounted on one cargo vehicle and transported, transportation efficiency may decrease and transportation cost may greatly increase. In addition, since the container occupies a very large amount of space, when several containers are stacked, there is a risk of an accident due to the height of the stacked containers.

[0005] In order to improve this, in the related art, a foldable container that can save stacking space and can be folded for easy and convenient transportation of empty containers has been disclosed.

[0006] A foldable container according to the related art has been disclosed in Korean Patent Publication No. 10-1064803, Korean Patent Publication No. 10-1439073, and Korean Patent Publication No. 10-1489626. Referring to these, both side plates be-

tween the bottom plate and the roof plate are configured as an upper plate and a bottom plate, in which the upper plate and the bottom plate, the upper plate and the roof plate, and the bottom plate and the bottom plate are pivotally coupled to each other by a plurality of hinge devices so as to be folded to each other. Such a hinge device is configured to include hinge blocks provided on each of the plates folded to each other, and connection blocks for connecting these hinge blocks, in which the hinge blocks and the connection blocks are hingedly coupled through hinge pins respectively.

[0007] However, since the foldable container according to the related art includes, for the hinge device, the hinge blocks installed on each of the plates to be folded to each other, the connecting blocks connecting the respective hinge blocks, and the hinge pins that hingedly couple the respective hinge blocks and the connecting blocks, there are shortcomings that the entire structure of the hinge device is complex, heavy, and not easy to manufacture and mount.

SUMMARY

Technical Problem

[0008] In order to solve the problems of the related art described above, an object of the present disclosure is to provide a structure that allows the side walls of a foldable container to be easily folded by manpower.

[0009] In addition, another object of the present disclosure is to provide a method of folding a side wall of a container while a top plate is removed, with a structure for folding a side wall of a container, in which the method includes placing a torsion bar at a lower end of a side wall panel and utilizing the torque of the torsion bar to allow the side wall to be smoothly folded.

Technical Solution

[0010] The present disclosure provides a foldable container equipped with a torsion bar module for folding a side panel, in which the container includes: a bottom plate; a top plate; side wall panels including a front panel, a rear panel, and a side panel provided between the bottom plate and the top plate, and a torsion bar module TM provided at a lower end to rotate the side panel, in which the top plate is completely detachably coupled to the side wall panel,

in which the torsion bar module includes: first hinges 310 provided at both outermost ends of the torsion bar module; a plurality of torsion bars arranged between the first hinges; and a second hinge 320 and a third hinge 330 inside the first hinges, with which both ends of the torsion bars are coupled and arranged. and the second hinge 320 includes a second torsion bar mounting member 321 and a second support member 323, wherein the second torsion bar mounting member 321 receives the torsion bars to be inserted and mounted therein from both sides

and is coupled to the bottom plate, and the second support member 323 receives the second torsion bar mounting member 321 to be relatively rotatably coupled thereto and is coupled to the side panel, and the third hinge 330 includes a third torsion bar mounting member 331 and a third support member 333, wherein the third torsion bar mounting member 331 receives the torsion bars to be inserted and mounted therein from both sides and is coupled to the side panel, and the third support member 333 receives the third torsion bar mounting member 331 to be relatively rotatably coupled thereto and is coupled to the bottom plate.

[0011] The present disclosure further includes a second upper connecting member 322 that couples the second support member 323 of the second hinge to the side panel, and a second lower connecting member 324 that couples the second torsion bar mounting member 321 of the second hinge to the bottom plate, in which the second upper connecting member 322 is rotated together with the side panel rotated in a folding process, and the second lower connecting member 324 is coupled to the bottom plate and not rotated in the folding process.

[0012] The present disclosure further includes a third lower connecting member 334 that couples the third support member 333 of the third hinge to the bottom plate, and a third upper connecting member 332 that couples the third torsion bar mounting member 331 of the third hinge to the side panel, in which the third upper connecting member 332 is rotated together with the side panel rotated in a folding process, and the third lower connecting member 334 is coupled to the bottom plate and not rotated in the folding process.

[0013] The present disclosure is characterized in that the plurality of torsion bars are arranged in a line on a same axis between the first hinges at the both outermost ends, four of the torsion bars are arranged between the first hinges at the both outermost ends, and the second hinge and the third hinge are alternately arranged.

Advantageous Effects

[0014] According to the present disclosure, with the structure described above, after the top plate of the container is removed with a forklift, the side wall panel can be easily folded simply by manpower and the height can be reduced by 1/4 in the folded state such that four containers can be folded and stacked, and thus the effects of easy storage and movement of the containers are provided.

BRIEF DESCRIPTION OF THE DRAWING

[0015]

FIG. 1 illustrates an overall appearance of a foldable container according to the present disclosure.

FIG. 2 illustrates the foldable container from which a top plate is removed according to the present disclosure.

closure.

FIG. 3 illustrates a first side panel of the foldable container being folded according to the present disclosure.

FIG. 4 illustrates a second side panel of the foldable container being folded according to the present disclosure.

FIG. 5 illustrates a front panel of the foldable container being folded according to the present disclosure.

FIG. 6 illustrates a rear panel of the foldable container being folded according to the present disclosure.

FIG. 7 illustrates the foldable container fully folded according to the present disclosure.

FIG. 8 illustrates a structure of a torsion bar provided in a longitudinal direction between a side panel and a bottom plate of the foldable container according to the present disclosure,

FIG. 9 is a graph showing the relative magnitudes of a moment and a torque according to the present disclosure, in which the moment is generated based on the weights of the first and second side panels of the foldable container during folding, and the torque is generated by the torsion bar.

FIG. 10 illustrates the overall process of folding and unfolding the foldable container according to the present disclosure.

FIG. 11 illustrates a partial lower portion of the bottom plate of the foldable container according to the present disclosure.

FIG. 12 illustrates a rotation support member of the foldable container according to the present disclosure.

FIGS. 13 and 14 are explanatory diagrams illustrating the operating principle of the rotation support member and the torsion bar of the foldable container according to the present disclosure.

FIG. 15 illustrates a torsion bar module supporting the folding operation of the side panel of the foldable container according to the present disclosure.

FIG. 16 is an exploded perspective view of the torsion bar module of FIG. 15.

FIGS. 17 to 19 are enlarged views of indicated portions X, Y, and Z of FIG. 16.

BEST MODE

[0016] FIG. 1 illustrates an overall appearance of a foldable container according to the present disclosure, in which the side wall panel of the container is in a vertically unfolded state, which will be referred to herein as a "stand-up state" or an "unfolded state" for convenience. FIG. 2 illustrates the foldable container from which a top plate is removed according to the present disclosure, FIG. 3 illustrates a first side panel of the foldable container being folded according to the present disclosure, FIG. 4 illustrates a second side panel of the foldable container being folded according to the present disclosure, FIG. 5

illustrates a front panel of the foldable container being folded according to the present disclosure, FIG. 6 illustrates a rear panel of the foldable container being folded according to the present disclosure, and FIG. 7 illustrates the foldable container fully folded according to the present disclosure, which will be referred to herein as a "folded state" for convenience. FIG. 8 illustrates a structure of a torsion bar provided in a longitudinal direction between a side panel and a bottom plate of the foldable container according to the present disclosure, FIG. 9 is a graph showing the relative magnitudes of a moment and a torque according to the present disclosure, in which the moment is generated based on the weights of the first and second side panels of the foldable container during folding and the torque is generated by the torsion bar, and FIG. 10 illustrates the overall process of folding and unfolding the container. It is designed such that the use of a forklift is necessary only in the process of removing or lifting the top plate, while all other operations are possible with human power. Since the forklift is present anywhere in the field where containers are loaded or moved, even when there are some operations that use the forklift, it will not cause any problem in the efficiency of work.

[Foldable Container Structure and Folding Method]

[0017] A foldable container of the present disclosure (hereinafter, it may be referred to as "container") has a bottom plate 110, a top plate 120 spaced apart above the bottom plate 110, and a side wall panel 130 vertically installed on a side between the bottom plate 110 and the top plate 120. The side wall panel 130 includes four vertically-arranged panels, which will be referred to as a front panel 131, a rear panel 135, a first side panel 137, and a second side panel 139, respectively. Posts P for bearing the load of the container in the vertical direction are provided on edges of the rectangles of the front panel 131 and the rear panel 135, respectively.

[0018] The feature of the foldable container according to the present disclosure is that the four side wall panels 130 can be simply folded by manpower using a torsion bar provided at the lower end, while the top plate 120 is completely removed using a forklift. That is, when the side wall panel is folded by the moment due to its self weight, the torque generated from the twisting torsion bar applies a rotational force opposite to the moment due to self weight, thereby allowing the it to be folded smoothly.

[0019] First, a method for folding a container according to the present disclosure will be described.

[0020] For the container of the present disclosure, the process of lifting the top plate 120 using a forklift is performed. A plurality of coupling members 125, to which the forks of the forklift are inserted and coupled, are provided on the top plate, that is, on an upper surface of the top plate of the container in a transverse direction. Hereinafter, the transverse direction of the container refers to the width direction of the container, and the longitudinal

direction of the container refers to the direction from the front panel toward the rear panel. In addition, FIG. 2 illustrates the top plate completely lifted up by the forklift (illustration of the forklift is omitted for convenience of description). The characteristic of the present disclosure is that the top plate 120 is first completely separated from the side wall panel 130 by the forklift, as illustrated in FIG. 2. This is completely different from the related art where the folding operation is performed with the top plate remaining attached to the side wall panel. The top plate removed by the forklift is moved to the side of the container and positioned.

[0021] Then, the first side panel 137 is folded as illustrated in FIG. 3, and the second side panel 139 is folded over the first side panel 137 as illustrated in FIG. 4. According to the present disclosure, in order to fold the first and second side panels, first and second torsion bars T1 and T2 are positioned under the first and second side panels. This will be described with reference to the detailed illustration in FIG. 8. Since the first side panel and the second side panel are folded by the same principle as each other and it is also the same that four of the first and second torsion bars are arranged along the longitudinal direction of the container, only the process of folding the second side panel (simply, "side panel") will be described below as an example.

[0022] Referring to FIG. 8, a torsion bar module TM is illustrated, which includes a second torsion bar T1 coupled between the bottom plate 110 and the side panel 139 of the container to provide an axis of rotation operation of the side panel and also to store an elastic force when the side panel is rotated. In the description of FIG. 8, the second torsion bar is also simply referred to as a torsion bar. The torsion bar module TM includes the torsion bar T1 and a hinge member 300 that fixes the torsion bar. The hinge member 300 is coupled to the bottom plate 110 and the side panel 139, respectively, and receives the torsion bar T1 inserted and coupled thereto.

[0023] The foldable container of the present disclosure is characterized in that the side panel can be easily folded or stood up by the interaction between the torsion bar and the hinge member, and the principle of rotating the first side panel, the structure of the torsion bar module, and the like will be separately described below in detail.

[0024] FIG. 5 illustrates a front panel of the foldable container being folded according to the present disclosure, and FIG. 6 illustrates the rear panel of the foldable container being folded according to the present disclosure.

[0025] According to the present disclosure, in order to fold the front and rear panels, third and fourth torsion bars T3 and T4 are positioned under the front and rear panels. Since the third torsion bar positioned under the front panel and the fourth torsion bar positioned under the rear panel have the same principle of operation during rotation, and the third torsion bar and the fourth torsion bar are the same that two are arranged along the transverse direction of the container, only the process of fold-

ing the rear panel 135 will be described below as an example. Meanwhile, the principle of the rotation of the rear panel, the torque of the fourth torsion bar, and the like will be separately described in detail in the [Rotation Operation of Rear Panel and Torsion Bar] provided below.

[0026] FIG. 7 illustrates the top plate 120 is placed by a forklift onto the top of the container in the fully folded state, which will be referred to herein as a "folded state" for convenience. In order to place the top plate 120 in the correct position in the folded state, in the present disclosure, L-shaped corner support members 150 positioned at four corners of the bottom plate 110 are adopted.

[0027] Referring to FIG. 6, the corner support members 150 are L-shaped members formed at the four corners of the bottom plate 110, and have a first support surface 151 and a second support surface 153 that are perpendicular to each other. The corner support members 150 serve to support, from the outside, the corner ends of the posts P of the front panel and the rear panel when the container is in the unfolded state, and serve to support the four corners of the top plate 120 placed on the container when the container is in the folded state.

[Rotation Operation of Side Panel and Torsion Bar]

[0028] The structure of the torsion bar of FIG. 8 and the graph of FIG. 9 will be described. The graph of FIG. 9 shows the moment M generated by the self weight of the container in the process of changing the rotation angle of the bottom plate 110 from 0° to 90°, and the torsional elastic energy resulting from the rotation of the first torsion bar, that is, the torsion bar torque T. In the graph, the horizontal axis represents the rotation angle of the first side panel of the container, and the vertical axis represents the torque. Referring to the graph, the relationship of the moment and the torque according to the angle in the rotation process is divided into three sections: Section A, Section B, and Section C.

[0029] Section A is a process of starting the folding operation of the side wall of the container, and in this section, the torsion bar torque T is formed to be greater than the moment M generated by the self weight of the container. This can be achieved by mounting the first torsion bar T1 that is twisted at a predetermined angle in a reverse direction in advance, while the first side panel 137 is in the stand-up position. That is, the first torsion bar is twisted by a predetermined angle (about 7° in the present disclosure) in advance in the reverse direction to the direction in which the first torsion bar will be twisted as the first side panel is rotated (This will be referred to herein as "preliminary torque" for convenience). The reason for doing this is to allow the first side panel in the stand-up state to receive torque by the torsion bar in a reverse direction to the folding direction such that it can be maintained in a stable stand-up state. That is, this is to prevent the first side panel 137 from being suddenly rotated and collapsed from the stand-up state. In this

example, for the folding operation of the first side panel, it is necessary to apply a force from the outside, and to be specific, the force needs to be applied up to an angle corresponding to the point X in the graph. In the present disclosure, by selecting a torsion bar of an appropriate specification, and the like, the amount of necessary force is appropriately adjusted so as to allow a rotation up to the X point by pushing only with human force.

[0030] Section B is a section in which the moment M due to the self weight of the first side panel is greater than the torsion bar torque T, and is a section in which the folding operation is performed by the self weight without requiring a separate external torque. However, the smaller the difference between the moment M and the torsion bar torque T in this section (the smaller the size of the arrow in the B section of the graph), the smoother the first side panel folds.

[0031] Section C is a process in which the rotation operation of the first side panel is finished, and in this section, the torsion bar torque T is slightly larger than the moment M generated by the self weight. That is, while it requires additional external force to achieve the fully folded state, because the additional external force is small, it is sufficient for a human to press the first side panel from above.

[0032] According to the present disclosure, the torque value of the torsion bar is appropriately selected in consideration of the magnitude of the moment value generated by the self weight of the side wall panel, such that the external power (torque) is required only at the beginning and the end of the folding operation, and the size of the required external power is also sufficiently adjustable by human power.

[0033] According to the present disclosure, even when the top plate is removed, the first side panel maintains the vertical position in a self-supporting state due to the preliminary torque of the torsion bar itself. Then, it requires only a little external force to rotate it to the X point, after which the rotation operation is automatically performed by the self weight of the side panel. Then, it requires a human to apply the external force only in the last predetermined section of the rotation operation to make the folded state. In the present disclosure, the points X and Y were appropriately selected in order to provide the necessary preliminary torque while reducing Section B, that is, reducing the size of the arrow.

[Rotation Operation of Rear Panel and Torsion Bar]

[0034] FIG. 11 illustrates a partial lower portion of the bottom plate of the foldable container according to the present disclosure, and illustrates the lower portion adjacent to the rear panel 135. FIG. 12 illustrates a rotation support member according to the present disclosure, and FIGS. 13 and 14 are explanatory diagrams illustrating the operating principle of the rotation support member and the torsion bar.

[0035] In general, since most of the vertical load of the

container is born by the post (P in FIG. 12) positioned on the side of the front panel 131 and the rear panel 135, the strength of the front panel 131 and the rear panel 135 is important, and therefore, the load they receive is much greater than that of the first and second side panels. Therefore, in order to enable the rotation operation of the front panel and the rear panel by human force, the torsion bar provided for this and its arrangement structure are important. According to the present disclosure, in order to rotate the front panel 131 and the rear panel 135, the third and fourth torsion bars T3 and T4 are provided. Since the front panel 131 and the rear panel 135 are the same as each other in both the rotation operation and the principle, the rear panel 135 and the fourth torsion bar T4 will be described below as an example.

[0036] Two of the fourth torsion bars T4 are arranged side by side on the bottom plate 110 of the container in the transverse direction, and only one of them is illustrated in FIG. 11. One end of the fourth torsion bar T4 is coupled by serration to a fixed coupling part 110b fixed to the frame of the bottom plate 110, and the other end of the fourth torsion bar is coupled to a rotation support member 200 while passing through the outer frame of the bottom plate.

[0037] The rotation support member is an L-shaped member, with one end being coupled to a post coupling point 220 at the post P spaced apart from the lower end of the rear panel by a predetermined distance, and the other end being coupled to the fourth torsion bar T4 at a bottom plate coupling point 210 located on the side spaced apart from the end of the bottom plate by a predetermined distance (it is fixedly coupled using a separate connecting member between the fourth torsion bar and the other end). The corner of the post P is supported from the outside by the corner support member 150.

[0038] As described above, the rear panel and the front panel are subjected to a greater load than the side panel, while the width of the container in the transverse direction is smaller than the length in the longitudinal direction, and accordingly, since the third and fourth torsion bars must have higher torsional torque, in consideration of the lifespan of the third and fourth torsion bars and also the load of the front panel and the rear panel, the present disclosure adopts the L-shaped rotation support member for their rotation operation.

[0039] Referring to the rotation operation of the rear panel 135, the rotation operation is performed based on the third torsion bar located on the side spaced apart from the end of the bottom plate by a predetermined distance as the reference axis, which is different from the rotation of the side panel that is performed based on the axis located immediately thereunder. The rotation support member has the following roles and functions.

[Ensuring stability]

[0040] In the description of the rotation operation of the side panel, it is described that the first and second torsion

bars twisted by a predetermined angle in advance are mounted to provide the "preliminary torque" in order to ensure stability (to prevent the side panel from being suddenly rotated and collapsed from the stand-up state).

[0041] However, stability is ensured by the rotation support member 200 without requiring the "preliminary torque" to be applied to the fourth torsion bar T4 involved in the rotation of the rear panel.

[0042] That is, in FIG. 13, the rear panel is supported by the corner support member 150 supporting the outer corner of the lower end thereof, so that the rotation in the direction of the arrow A is constrained, and further, the rotation in the direction B is also constrained by the rotation support member 200 and its self load (that is, in the absence of the rotation support member, rotation occurs in the direction B). For the side panel, the preliminary torque is applied to the torsion bar to prevent the inward folding operation, but for this rear panel, even when the preliminary torque is not applied to the torsion bar, the rotation operation is kept from occurring, thereby ensuring stability. In other words, in order for the rear panel 135 to be rotated inward, it requires to apply the external force up to the point where the post coupling point 220 is located directly above the bottom plate coupling point 210, and therefore, the rear panel is maintained in a stable state unless the external force is applied (FIG. 14). In the actual operation of folding the rear panel, the rear panel is rotated by pushing from the outside by the power of a human by the angle θ shown in FIG. 14. When the rear panel is rotated beyond the angle shown in FIG. 14, the rear panel is gently folded by the mutual relationship between the moment M by the self weight of the rear panel and the torsion bar torque T by the fourth torsion bar, which has already been described with reference to the folding operation of the side panel.

[Ensuring Durability of Torsion Bar]

[0043] Since it is difficult to expect the effect of torsional elastic energy any more when the twist angle of the torsion bar exceeds the point where plastic deformation occurs, the torsion bar should be twisted only at an angle below which plastic deformation does not occur, and even at an angle at which plastic deformation does not occur, it is still advantageous to prevent excessive twisting in consideration of the lifespan.

[0044] It has been described that according to the present disclosure, stability is ensured by the rotation support member 200 even without the "preliminary torque" applied to the fourth torsion bar of the container. This has the effect of reducing the amount of twist of the fourth torsion bar as a result. For example, when a 7° torsion angle is provided in the initial state (side panel stand-up state) to provide the preliminary torque to the side panel, in the folded state in which the side panel is completely rotated by 90°, there is the effect that the first and second torsion bars have a torsion angle of 97°.

[0045] Meanwhile, according to the present disclosure,

the fourth torsion bar of the rear panel does not have a preliminary torque due to the existence of the rotation support member 200, and the fourth torsion bar is in a state where there is no torsion in the state illustrated in FIG. 14 (in this state, the post coupling point 220 is located directly above the bottom plate coupling point 210). In this state, when the rear panel is completely rotated and folded, the twist angle of the fourth torsion bar is (90 - 0), and the maximum twist angle is significantly reduced. This leads to the effect of increasing the life of the fourth torsion bar.

[0046] The rotation support member is provided equally on the front panel and the rear panel, and includes a first rotation support member coupled to the front panel and a second rotation support member coupled to the rear panel.

[Structure and Operating Principle of Torsion Bar Module]

[0047] FIG. 15 illustrates a torsion bar module supporting the folding operation of the side panel of the foldable container according to the present disclosure, FIG. 16 is an exploded perspective view of the torsion bar module of FIG. 15, and FIGS. 17 to 19 are enlarged views of indicated portions X, Y, and Z of FIG. 16.

[0048] The torsion bar module TM is provided on the lower sides of the first side panel and the second side panel, respectively, and in the following description, the one provided on the second side panel 139 will be described as an example. The torsion bar module TM includes the torsion bar T1 and the hinge member 300 that fixes the torsion bar. The hinge member 300 is a member into which the torsion bar T1 is inserted, and it is coupled to the bottom plate 110 and the side panel 139. respectively.

[0049] According to the present disclosure, the hinge member 300 includes first hinges 310 positioned at the outermost sides of the torsion bar module to receive the torsion bar T1 to be inserted and mounted therein from either a left side or a right side, and second hinges 320 and a third hinge 330 positioned in the middle of the torsion bar module to receive the torsion bar to be inserted and mounted therein from both sides.

[0050] Referring to FIGS. 15 to 17, the first hinge 310 includes a first torsion bar mounting member 311 to receive the torsion bar T1 to be inserted and mounted therein from one of the left and right sides, and a first support member 313 to which the first torsion bar mounting member 311 is relatively rotatably coupled. A shaft 311a of the first torsion bar mounting member 311 is inserted into a hole of the first support member 313 so as to be relatively rotatable therein. In addition, the first torsion bar mounting member 311 is coupled to a first upper connecting member 312, and the first support member 313 is coupled to a first lower connecting member 314. The first upper connecting member 312 is coupled to the lower end of the side panel 139 rotated during the folding process

to be rotated together, and the first lower connecting member 314 is a member that is coupled to the bottom plate 110 and is not rotated.

[0051] Referring to FIGS. 15, 16 and 18, the second hinge 320 includes a second torsion bar mounting member 321 to receive the torsion bar T1 to be inserted and mounted therein from both the left and right sides, and a second support member 323 to which the second torsion bar mounting member 321 is relatively rotatably coupled. A shaft 321a of the second torsion bar mounting member is inserted into a hole of the second support member 323 so as to be relatively rotatable therein. In addition, the second support member 323 is coupled to a second upper connecting member 322, and the second torsion bar mounting member 321 is coupled to a second lower connecting member 324. The second upper connecting member 322 is coupled to the lower end of the side panel 139 rotated during the folding process to be rotated together, and the second lower connecting member 324 is a member that is coupled to the bottom plate 110 and is not rotated.

[0052] Referring to FIGS. 15, 16 and 19, the third hinge 330 includes a third torsion bar mounting member 331 to receive the torsion bar T1 to be inserted and mounted therein from both the left and right sides, and a third support member 333 to which the third torsion bar mounting member 331 is relatively rotatably coupled. A shaft 331a of the third torsion bar mounting member 331 is inserted into a hole of the third support member so as to be relatively rotatable therein. In addition, the third torsion bar mounting member 331 is coupled to a third upper connecting member 332, and the third support member 333 is coupled to a third lower connecting member 334. The third upper connecting member 332 is coupled to the lower end of the side panel 139 rotated during the folding process to be rotated together, and the third lower connecting member 334 is a member that is coupled to the bottom plate 110 and is not rotated.

[0053] The second hinge 320 and the third hinge 330 have a similar structure to each other, except the difference that the torsion bar mounting member on which the torsion bar is mounted is coupled to the side panel at the second hinge and coupled to the bottom plate at the third hinge.

[0054] Since serrations are formed at both ends of the torsion bar, the torsion bar is coupled by serration to the first to third hinges. In addition, the torsion bar is coupled in a structure such that, in the process that the side panel of the container is rotated and folded, one coupling part is rotated and the other coupling part is not rotated. As a result, the first torsion bar T1 is twisted, accumulating the rotational elastic energy and applying a rotational force opposite to the direction of the rotational force of the moment generated by self weight, thereby preventing the side panel from being suddenly folded by the self weight and ensuring a smooth folding operation.

[0055] The present disclosure is characterized in that the first to third hinges are alternately arranged with each

other. Specifically, first, the first hinges 310 are disposed at the outermost sides of the torsion bar module TM, and the second hinges 32 and the third hinge 330 are mounted in the middle, alternately between the first hinges on the outermost sides. Referring to FIG. 15, according to the present disclosure, the torsion bar module includes four torsion bars in a line, and the hinge structure between the torsion bars has an arrangement structure of "first hinge 310 - second hinge 320 - third hinge 330 - second hinge 320 - first hinge 310". According to the structure of alternate arrangement as described above, the serration coupling portions of the torsion bars mounted on both sides of the second hinge are not rotated during the folding process of the container, and all of the serration coupling portions of the torsion bars mounted on both sides of the third hinge are rotated during the container folding process, and as a result, the manufacturing process is convenient.

[0056] The first torsion bar mounting member 311, the second torsion bar mounting member 321, and the third torsion bar mounting member 331 are coupled to the lower portion of the side panel to be rotated together with the side panel 139 being rotated during the folding process of the container. The first support member 313, the second support member 323, and the third support member 333 are coupled to the bottom plate 100 and are not rotated during the container folding process. Therefore, when the container folding is completed, each of the first to third torsion bar mounting members is in a state rotated by 90 degrees relative to the first to third support members, and all of the torsion bars positioned between the first to third torsion bars are in a state twisted by 90 degrees.

Claims

1. A foldable container equipped with a torsion bar module for folding a side panel, the container comprising: a bottom plate; a top plate; side wall panels including a front panel, a rear panel, and a side panel provided between the bottom plate and the top plate, and a torsion bar module TM provided at a lower end to rotate the side panel, wherein the top plate is completely detachably coupled to the side wall panel, the torsion bar module comprising:

first hinges 310 provided at both outermost ends of the torsion bar module;
a plurality of torsion bars arranged between the first hinges; and
a second hinge 320 and a third hinge 330 inside the first hinges, with which both ends of the torsion bars are coupled and arranged, wherein the second hinge 320 includes a second torsion bar mounting member 321 and a second support member 323, wherein the second torsion bar mounting member 321 receives the torsion bars

to be inserted and mounted therein from both sides and is coupled to the bottom plate, and the second support member 323 receives the second torsion bar mounting member 321 to be relatively rotatably coupled thereto and is coupled to the side panel, and the third hinge 330 includes a third torsion bar mounting member 331 and a third support member 333, wherein the third torsion bar mounting member 331 receives the torsion bars to be inserted and mounted therein from both sides and is coupled to the side panel, and the third support member 333 receives the third torsion bar mounting member 331 to be relatively rotatably coupled thereto and is coupled to the bottom plate.

2. The foldable container according to claim 1, further comprising:

a second upper connecting member 322 that couples the second support member 323 of the second hinge to the side panel; and
a second lower connecting member 324 that couples the second torsion bar mounting member 321 of the second hinge to the bottom plate, wherein the second upper connecting member 322 is rotated together with the side panel rotated in a folding process, and the second lower connecting member 324 is coupled to the bottom plate and not rotated in the folding process.

3. The foldable container according to claim 1, further comprising:

a third lower connecting member 334 that couples the third support member 333 of the third hinge to the bottom plate; and
a third upper connecting member 332 that couples the third torsion bar mounting member 331 of the third hinge to the side panel, wherein the third upper connecting member 332 is rotated together with the side panel rotated in a folding process, and the third lower connecting member 334 is coupled to the bottom plate and not rotated in the folding process.

4. The foldable container according to claim 1, wherein the plurality of torsion bars are arranged in a line on a same axis between the first hinges at the both outermost ends.
5. The foldable container according to claim 4, wherein four of the torsion bars are arranged between the first hinges at the both outermost ends.
6. The foldable container according to claim 1, wherein

the second hinge and the third hinge are inside the first hinge and alternately arranged.

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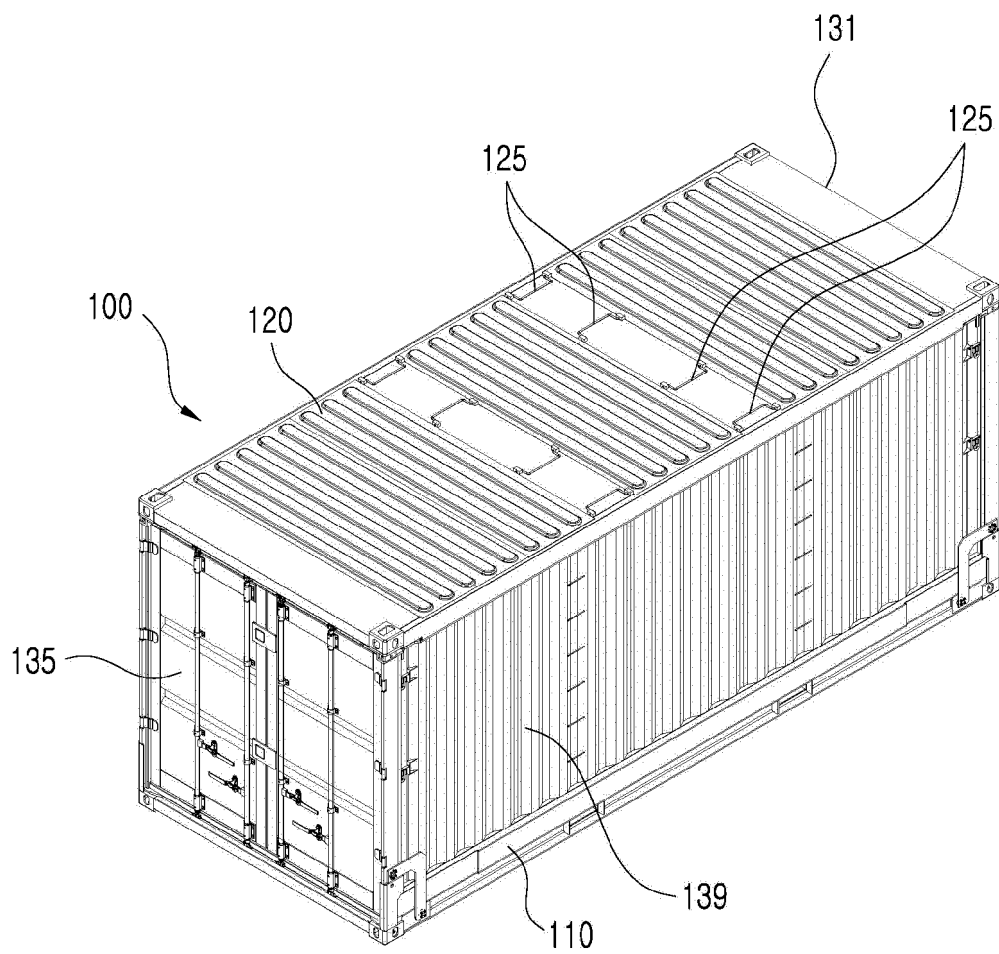
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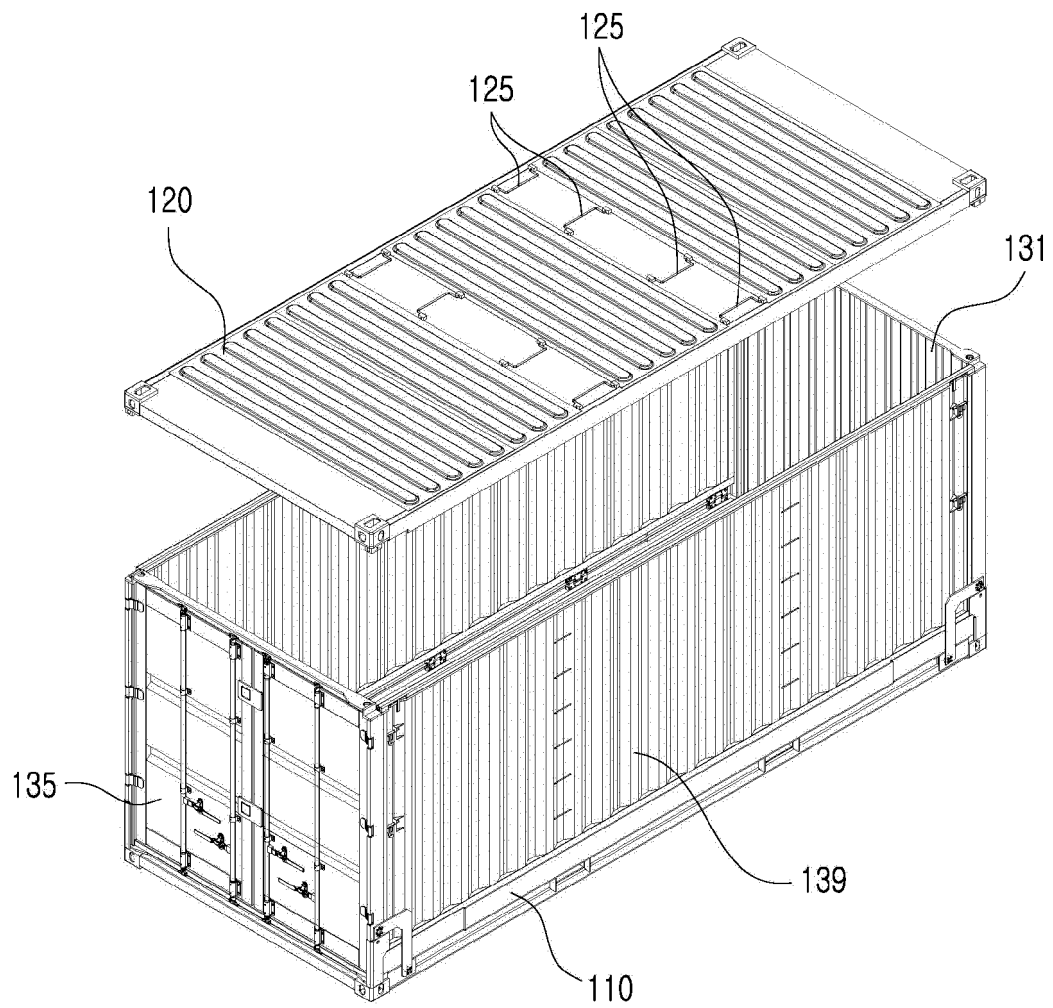
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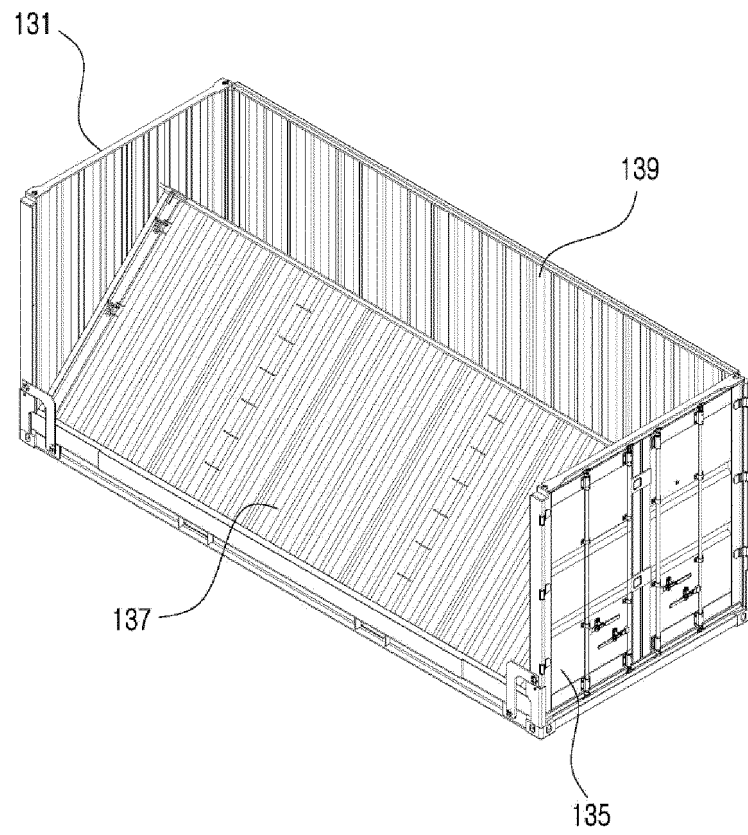
[FIG. 1]



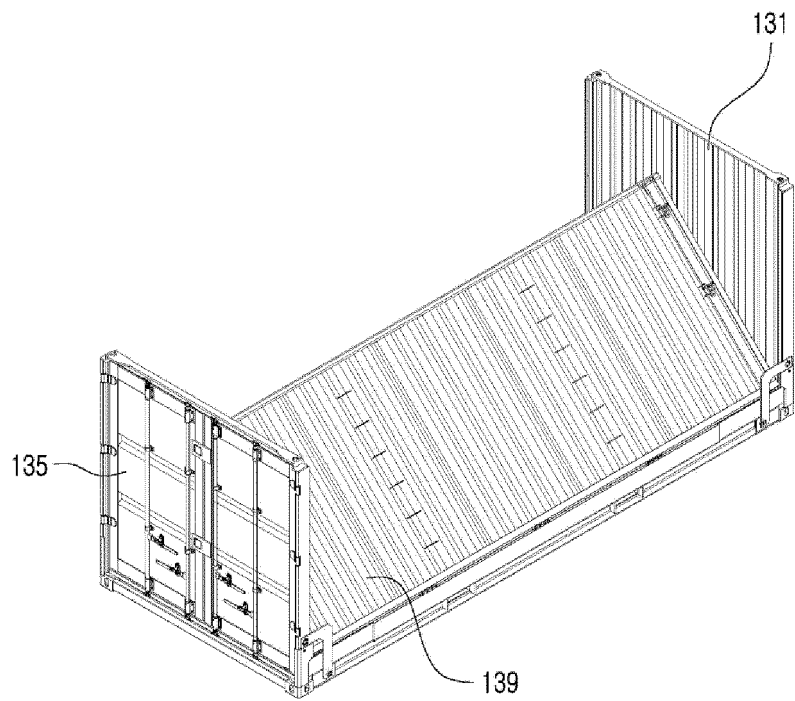
[FIG. 2]



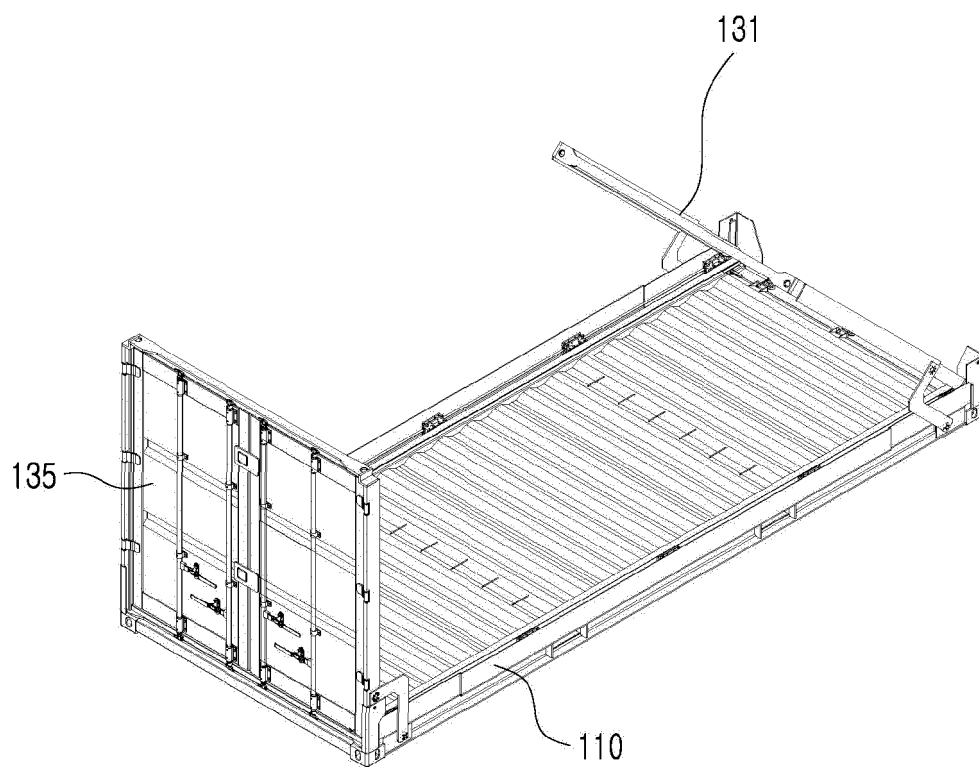
[FIG. 3]



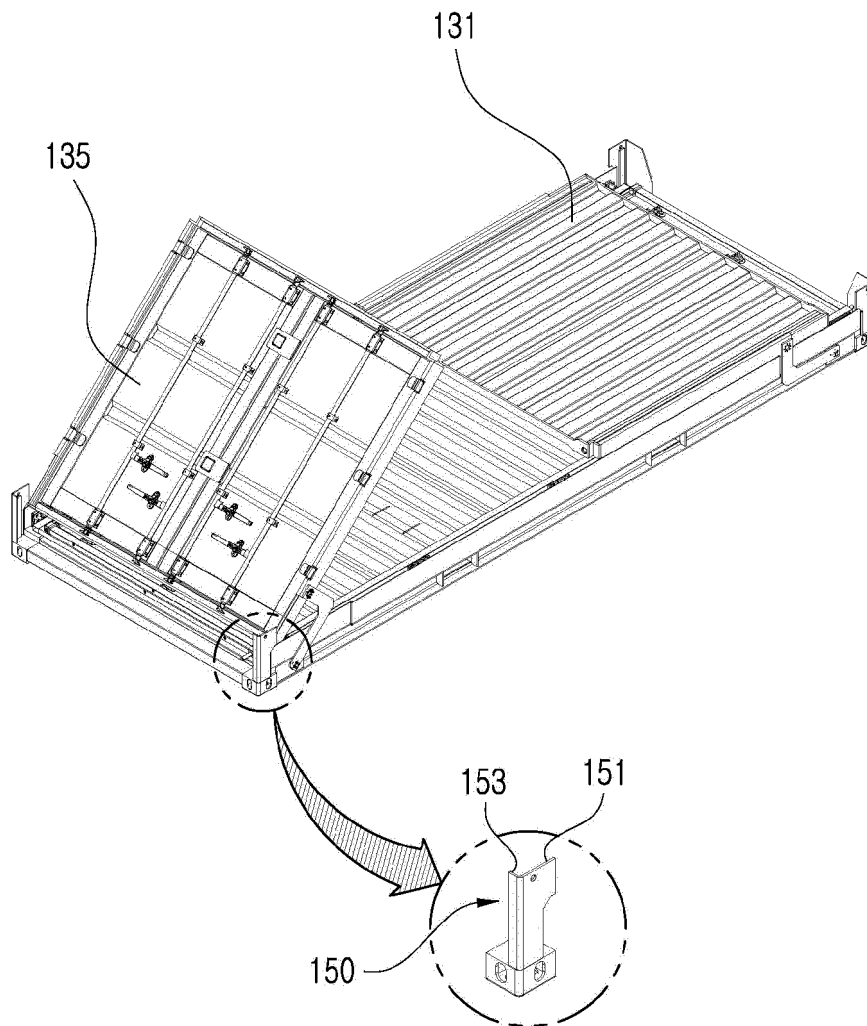
[FIG. 4]



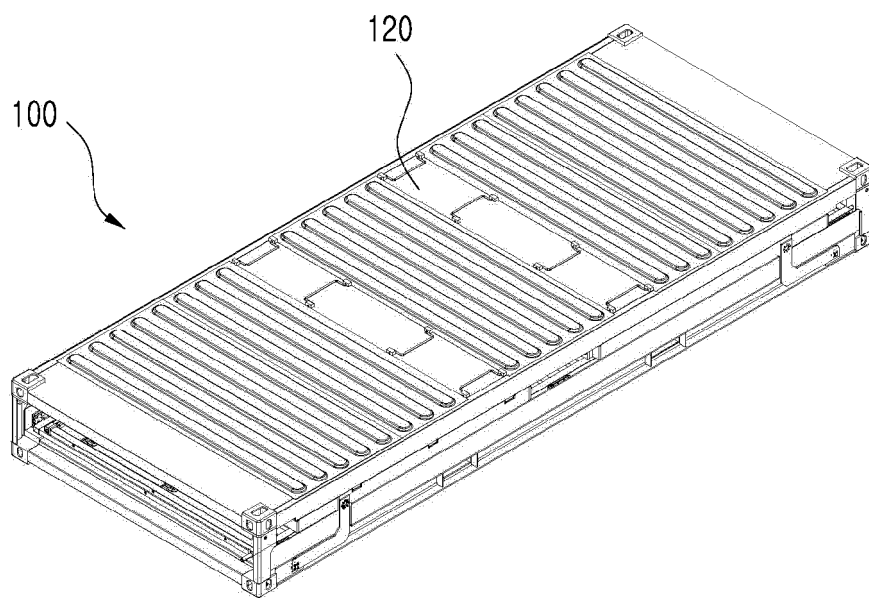
[FIG. 5]



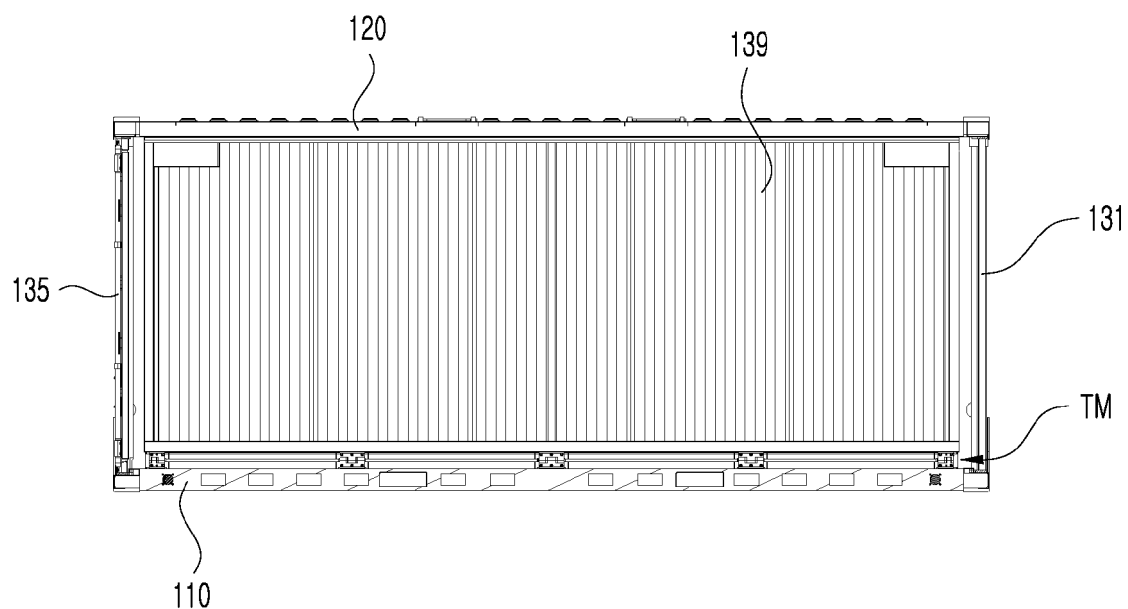
[FIG. 6]



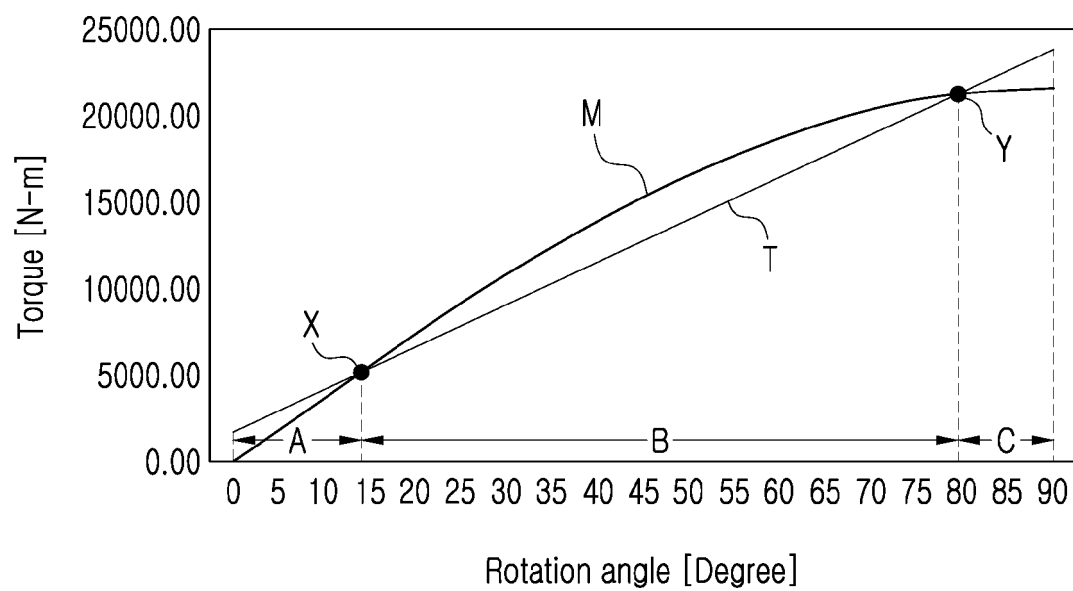
[FIG. 7]



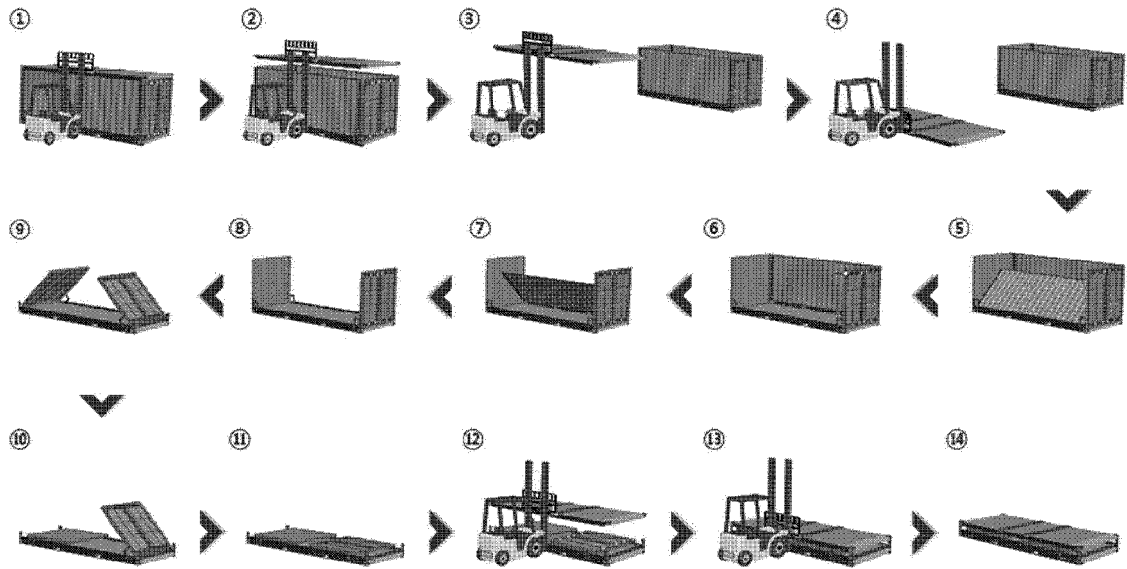
[FIG. 8]



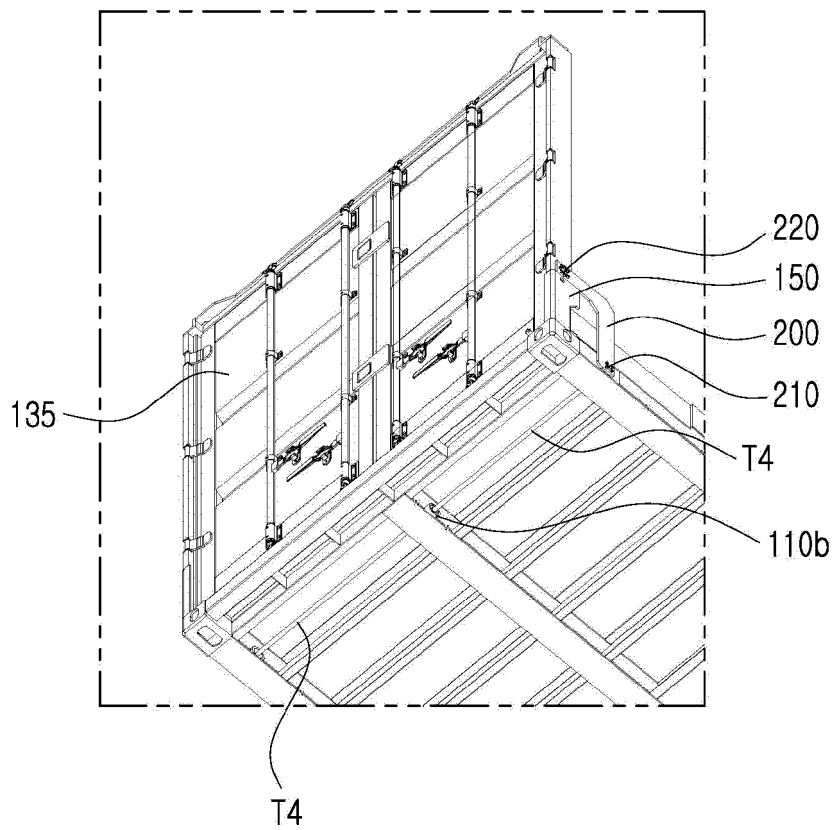
[FIG. 9]



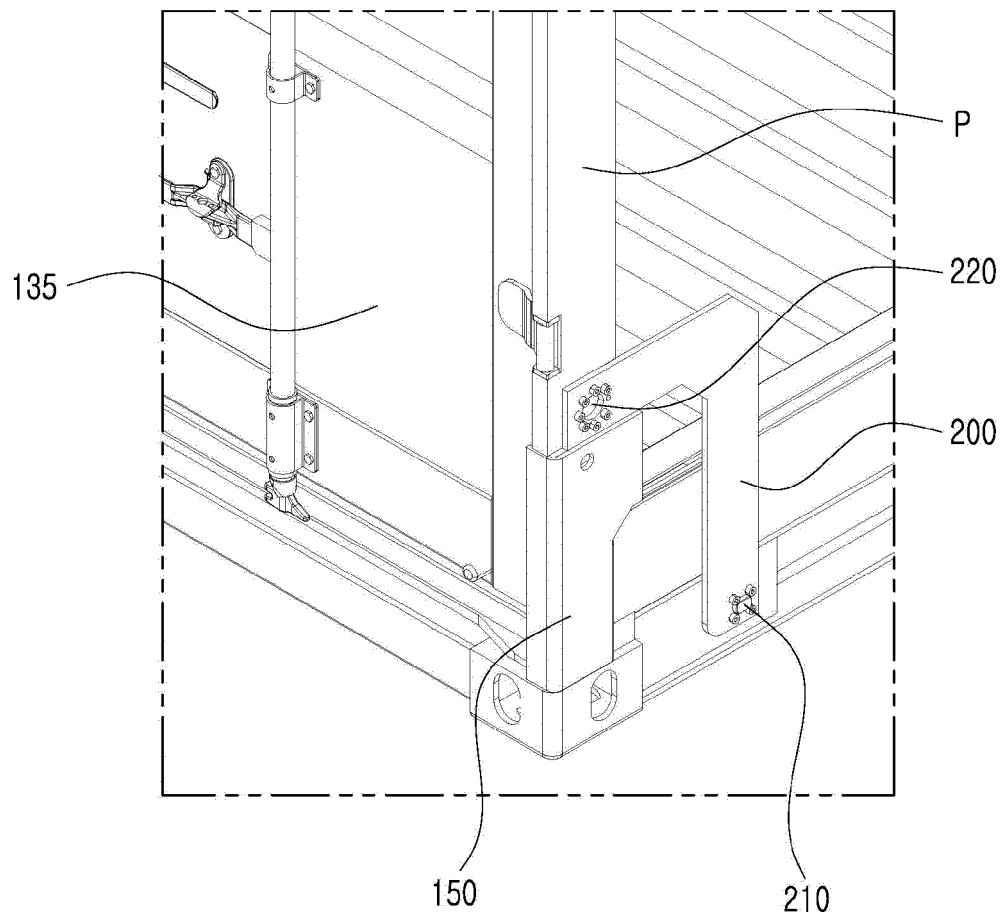
[FIG. 10]



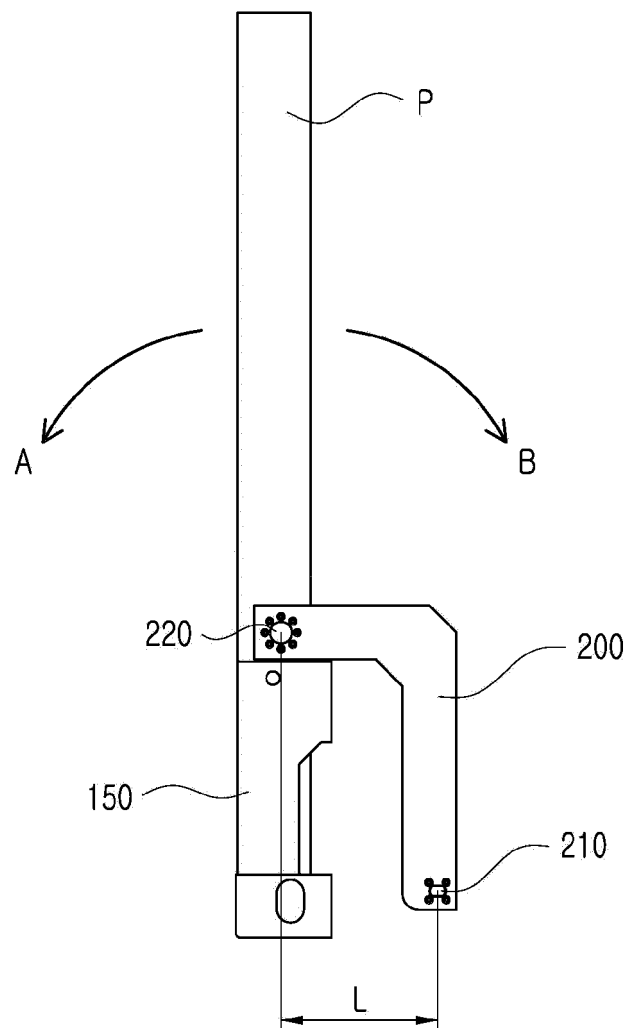
[FIG. 11]



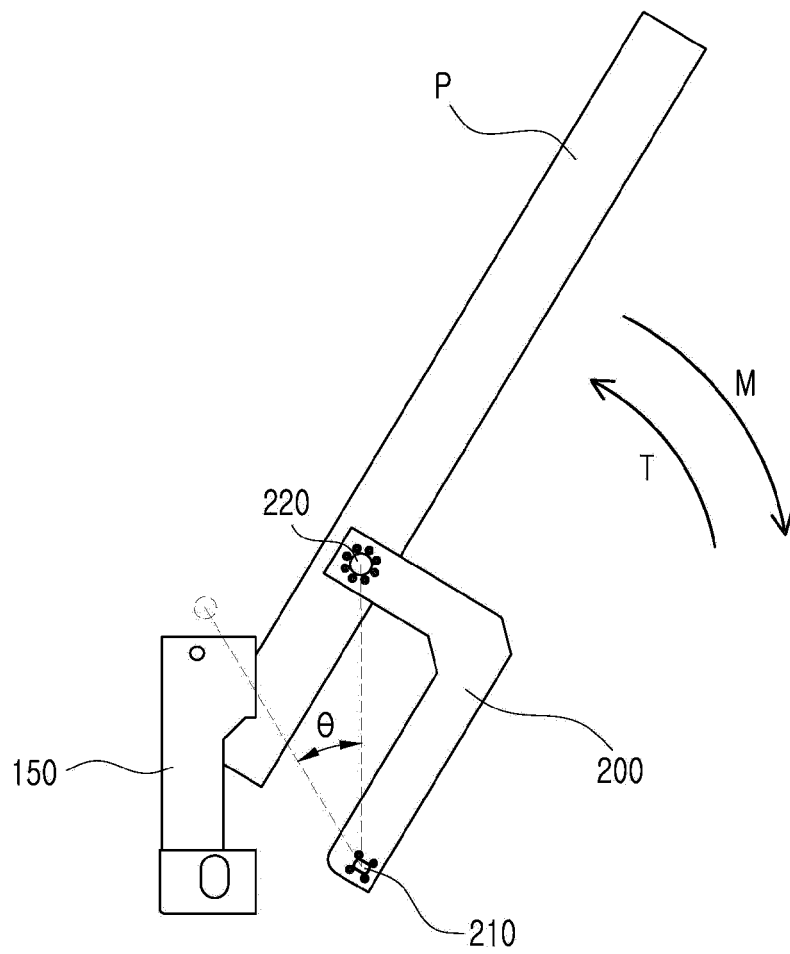
[FIG. 12]



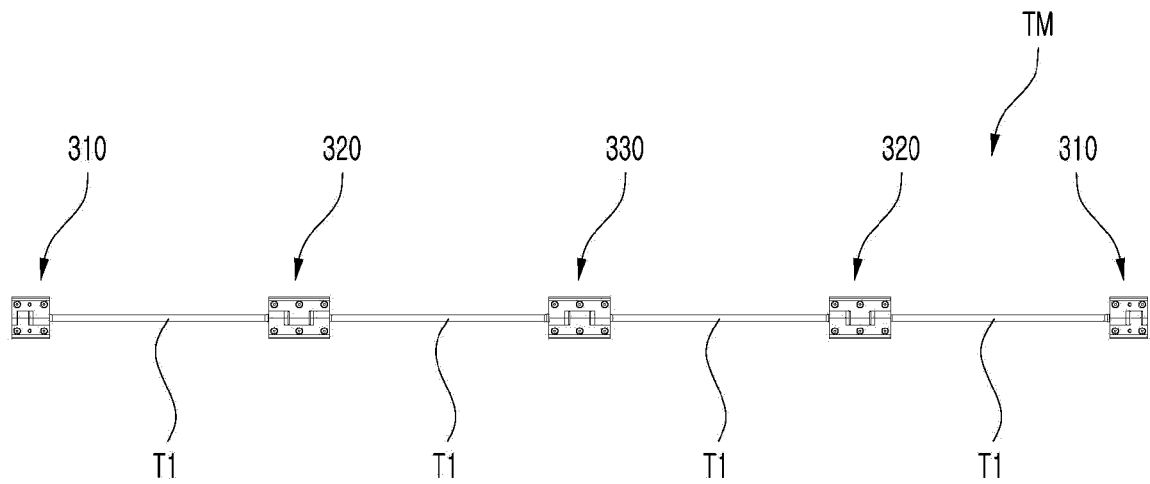
[FIG. 13]



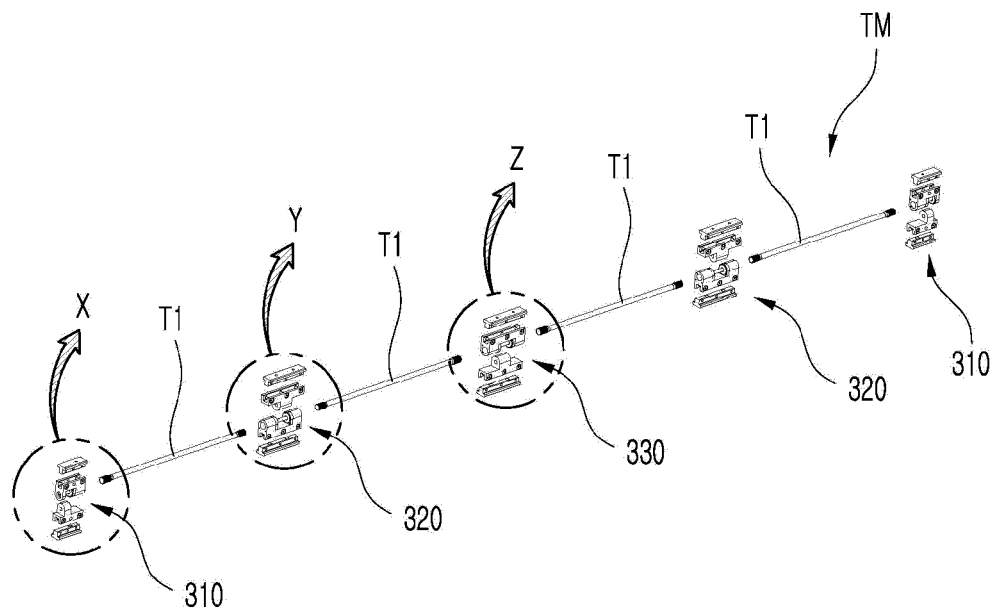
[FIG. 14]



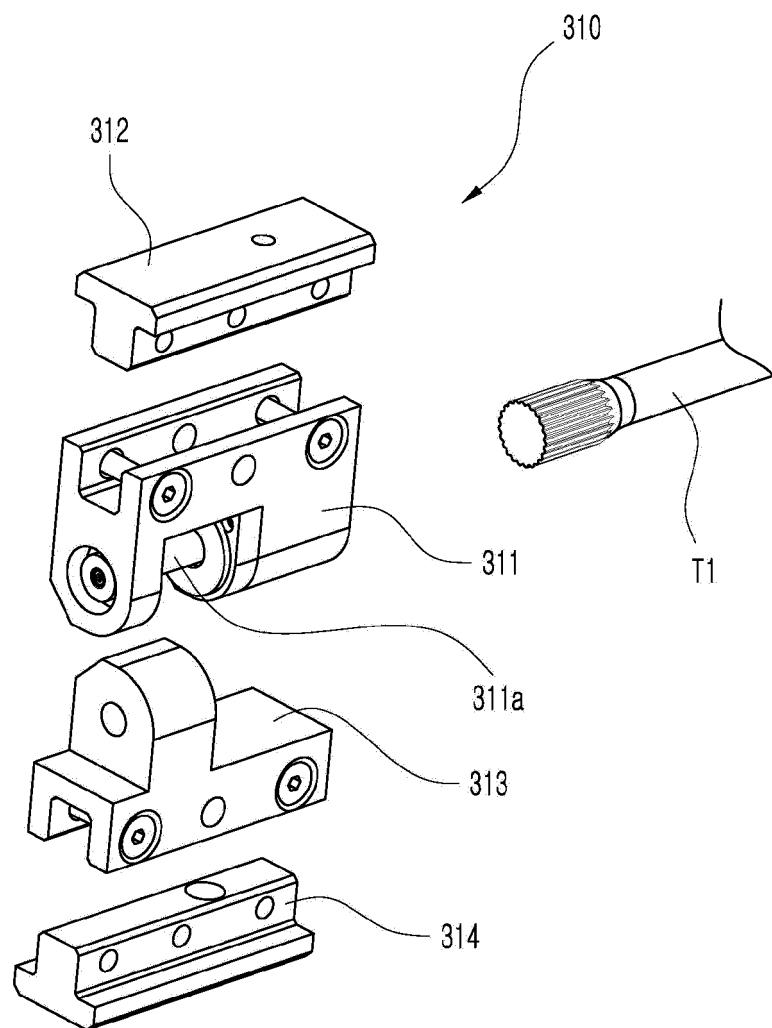
【 FIG. 15】



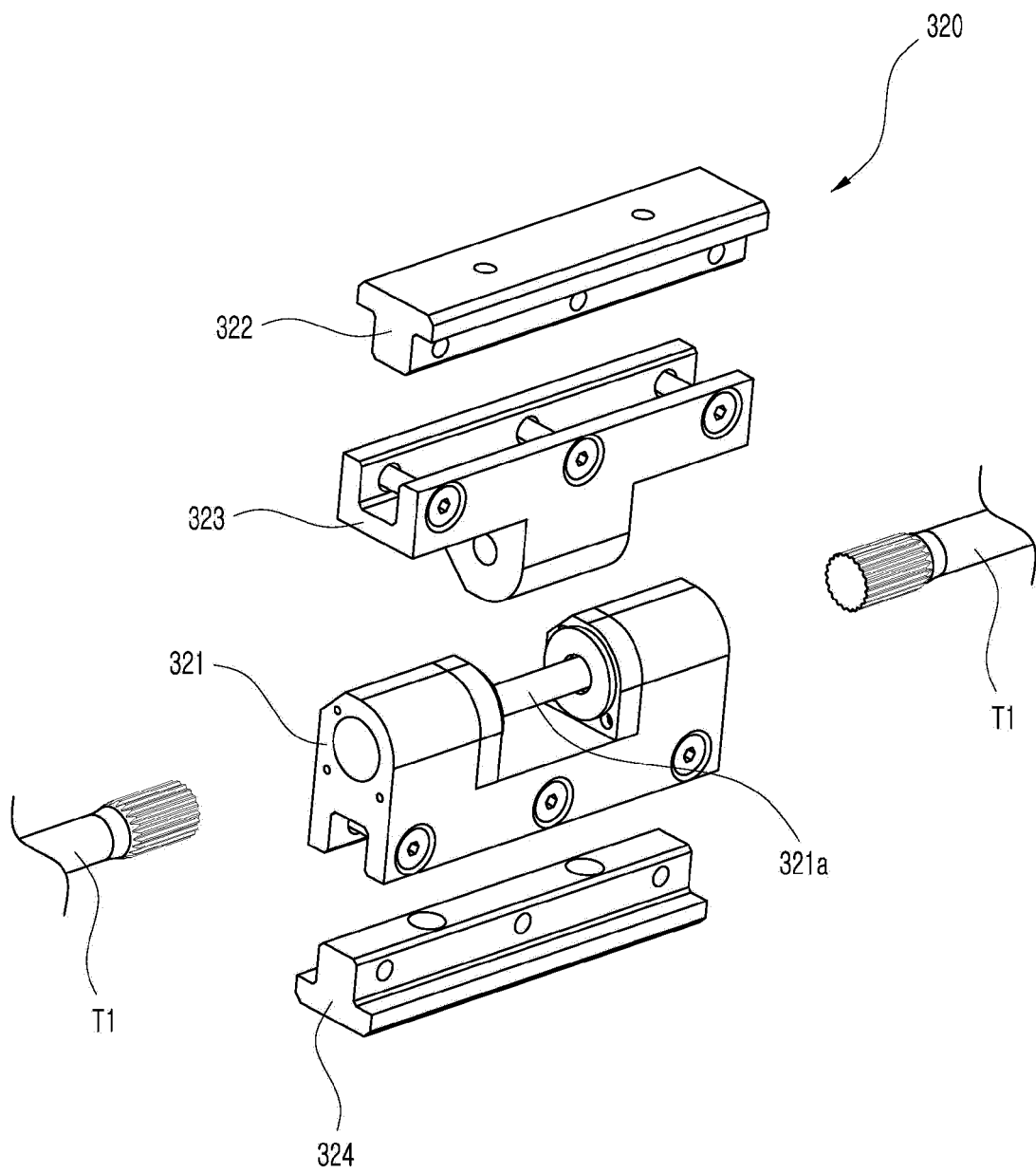
【FIG. 16】



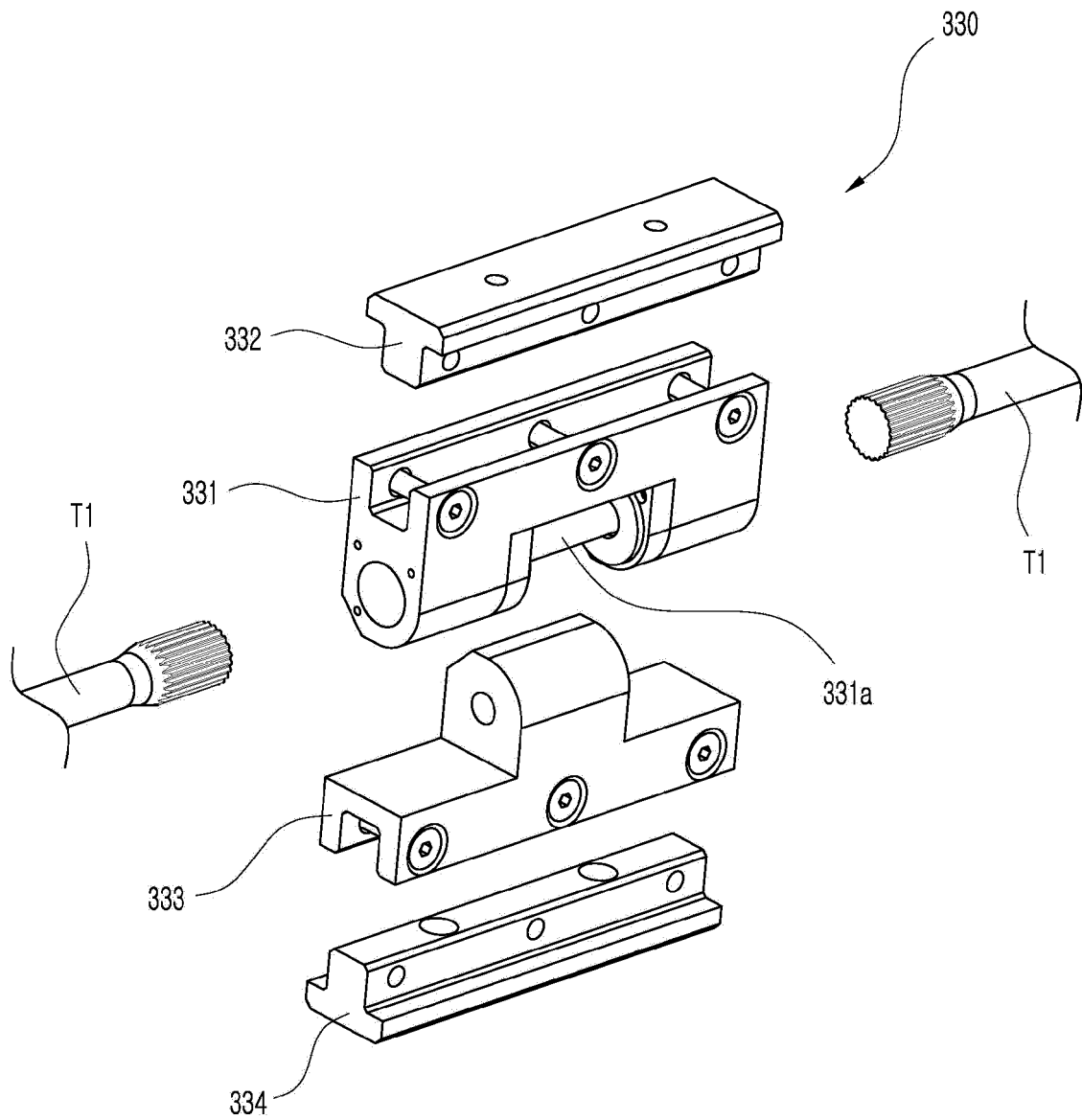
【FIG. 17】



【FIG. 18】



【FIG. 19】



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2020/000320

A. CLASSIFICATION OF SUBJECT MATTER

B65D 88/52(2006.01)i, B65D 88/12(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D 88/52; B65D 19/08; B65D 6/16; B65D 6/18; B65D 90/00; B65D 90/02; F16C 11/04; B65D 88/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above

Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: collapsible, container, torsion bar module, hinge, mounting member, support member

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 20-2012-0006461 U (KOREA CONTAINER POOL CO., LTD.) 20 September 2012 See paragraphs [0024]-[0025] and figures 1 and 4-6.	1-6
Y	KR 10-1439073 B1 (KOREA CONTAINER POOL CO., LTD.) 15 September 2014 See paragraphs [0033], [0035] and [0038] and figures 2 and 7a.	1-6
A	KR 10-2017-0118363 A (KOREA CONTAINER POOL CO., LTD. et al.) 25 October 2017 See claims 1-5 and figures 1-7.	1-6
A	KR 10-1749490 B1 (CHUNGBUK NATIONAL UNIVERSITY INDUSTRY-ACADEMIC COOPERATION FOUNDATION) 21 June 2017 See claims 1, 3-4 and 8 and figures 3-4.	1-6
A	CN 103482256 A (TAIYUAN GANGYU LOGISTICS ENGINEERING CO., LTD.) 01 January 2014 See claims 1-2 and figures 1-5.	1-6

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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“&” document member of the same patent family

Date of the actual completion of the international search

16 APRIL 2020 (16.04.2020)

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2020/000320

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 20-2012-0006461 U	20/09/2012	None	
KR 10-1439073 B1	15/09/2014	None	
KR 10-2017-0118363 A	25/10/2017	WO 2017-179773 A1	19/10/2017
KR 10-1749490 B1	21/06/2017	KR 10-2017-0064424 A	09/06/2017
CN 103482256 A	01/01/2014	CN 103482256 B	06/05/2015

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REFERENCES CITED IN THE DESCRIPTION

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- KR 101064803 [0006]
- KR 101439073 [0006]
- KR 101489626 [0006]