



(51) International Patent Classification:

B65D 88/52 (2006.01) **B65D 19/16** (2006.01)
B65D 19/18 (2006.01) **B65D 6/18** (2006.01)
B65D 19/12 (2006.01) **B65D 90/08** (2006.01)

(21) International Application Number:

PCT/AU2010/000712

(22) International Filing Date:

9 June 2010 (09.06.2010)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2009902628 9 June 2009 (09.06.2009) AU

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: A CONTAINER HAVING COLLAPSIBLE WALLS, AND METHODS FOR COLLAPSING AND ERECTING THE SAME

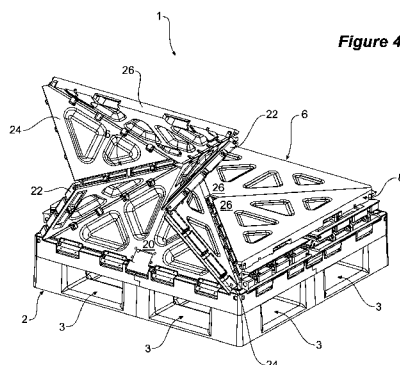


Figure 4

(57) Abstract: This invention relates to a container comprising a base, and a plurality of side wall assemblies, where each side wall assembly is comprised of a plurality of pivotally interconnected triangular elements, and each side wall assembly is adapted to fold from an erected state in which each side wall assembly is upstanding from the base, to a collapsed state in which a remainder of the elements in a respective side wall assembly sit atop a first element thereof, and each of the collapsed side wall assemblies sit alongside one another and atop the base. Associated methods for erecting and collapsing the container are also disclosed.



A CONTAINER HAVING COLLAPSIBLE WALLS, AND METHODS FOR COLLAPSING AND ERECTING THE SAME

FIELD OF THE INVENTION

This invention relates to a container for the storage and/or transport of goods and in particular to a container which can be folded into a smaller size when it has been emptied of goods, so that it consumes less volume when returned for refilling or reuse.

PRIORITY

This patent application claims priority from:

- Australian Provisional Patent Application 2009902628, titled "A CONTAINER HAVING COLLAPSIBLE WALLS, AND METHODS FOR COLLAPSING AND ERECTING THE SAME", and filed on 9 June 2009.

The entire content of this application is hereby incorporated by reference.

BACKGROUND

A shortcoming associated with some collapsible containers is that different designs have been required for different applications. That is, a container intended for contents of high specific gravity was, out of necessity, of a substantially different design and construction to a container intended for contents of low specific gravity.

A further problem with one class of known collapsible containers is that the side wall panels are pivotally connected to the base and they fold over so as to lay one atop the other atop a base. A problem with this is that the side wall panels must be different sizes (the lowest panel in the stack being the longest, and the uppermost the shortest), so they are not interchangeable.

In a further class of containers the side wall panels must be separated from the base and then laid atop this. A problem with this is that it is possible to lose one or more wall panels.

It is an object of the present invention therefore to provide a container which substantially ameliorates one or more of the above identified difficulties associated with known containers, or which at the least is a useful alternative to known containers.

Other objects and advantages of the present invention will become apparent from the following description, taken in connection with the accompanying drawings, wherein, by way of illustration and example, an embodiment of the present invention is disclosed.

SUMMARY OF THE INVENTION

In one aspect of this invention there is proposed a container comprising a base, and a plurality of side wall assemblies, where each side wall assembly is comprised of a plurality of pivotally interconnected triangular elements, and each side wall assembly is adapted to fold from an erected state in which each side wall assembly is upstanding from the base, to a collapsed state in which a remainder of the elements in a respective side wall assembly sit atop a first element thereof, and each of the collapsed side wall assemblies sit alongside one another and atop the base.

That is, each of the collapsed side wall assemblies sit alongside one another and atop the base without overlap between the collapsed side wall assemblies.

In one form, a side wall assembly comprises a lowermost element, this being the first element, four side elements, and an uppermost element.

In one form, the lowermost and uppermost elements are isosceles triangles of substantially the same shape and size, and the side elements are also isosceles triangles, each approximately one half the size of the upper and lowermost elements.

In one form, each side wall assembly is connected to the base by virtue of the lowermost element being pivotally attached to the base, and so the folding action when collapsing the container is a combined inward and downward action with respect to the base.

In one form, the container comprises a lid which is adapted to sit atop the erected walls of the container.

In one form, the base is square, and the container comprises four side wall assemblies.

In one form, each wall assembly comprises a first locking means adapted to lock the wall assembly to an adjacent wall assembly, and a second locking means adapted to lock the lid to the wall assembly.

In a further aspect, the invention may be said to include a container comprising a base, a plurality of side wall assemblies that are adapted to fold from an erected state in which each side wall assembly is upstanding from the base, to a collapsed state, each side wall assembly being comprised of a plurality of pivotally interconnected triangular elements, where selected edges of each element in a side wall assembly have profiles that create engagement between that element and an adjacent element in that wall assembly when the wall assembly is erected.

In a further aspect, the invention may be said to include a container comprising a base, a lid, and a plurality of side wall assemblies that are adapted to fold from an erected state in which each side wall assembly is upstanding from the base, to a collapsed state, wherein each of the base, lid and the side wall assemblies are comprised of a plurality of smaller, interconnected elements that are adapted to be removed and replaced if damaged.

In a further aspect, the invention may be said to include a method for collapsing the above described container, the method including the steps of:

- unlocking and removing the lid from the container;
- unlocking each wall assembly from its adjacent wall assemblies;
- folding each wall panel assembly down; and
- positioning the lid atop of the folded down wall assemblies.

In a further aspect, the invention may be said to include a method for erecting the above described container, the steps for the method being the reverse of the method for collapsing the container described above.

In a further aspect, the invention may be said to include a container comprising a base, and a plurality of side wall assemblies, where each side wall assembly is comprised of a plurality of pivotally connected elements, where contiguous edges of at least two adjacent elements incorporate means for controlling relative rotation between the two elements about the contiguous edges thereof.

In one form, said means transmits torque between said adjacent elements.

In one form, said means comprises meshing splines.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawing. The invention is capable of embodiments in addition to those described and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein, as well as the abstract, are for the purpose of description and should not be regarded as limiting.

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate certain embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for designing other structures, methods, and systems for carrying out the several purposes of the present invention. It is important, therefore, to recognise that the claims should be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of this invention it will now be described with respect to an exemplary embodiment which shall be described herein with the assistance of drawings wherein:

Figure 1 is a perspective view of an exemplary container in an erected state;

Figure 2 is a perspective view of the exemplary container of Figure 1 in its folded state;

Figures 3 through 9 illustrate progressive stages of erection of the exemplary container from its folded state to its erected state;

Figure 10 is an exploded view of a side wall assembly from the exemplary container in Figures 1 through 9;

Figure 11 is a perspective view of a side element from the side wall assembly of Figure 10;

Figures 11a through 11f are cross-sectional views through a pivotal connection as exists between any two elements in the side wall assembly of the exemplary container, illustrating progressive stages of erection of the side wall assembly;

Figure 12 is a perspective view of the base of the container in Figure 1;

Figure 13 is a perspective view of a foot module from the base in Figure 12;

Figure 14 is a view of the underside of the foot module in Figure 13;

Figure 15 is a perspective view of a plate module from the base in Figure 12;

Figure 16 is a view of the underside of the plate module in Figure 15;

Figure 17 is a detailed perspective view of the lid for the exemplary container in Figure 1, and Figures 17a and 17b are segments of this lid;

Figure 18 is a detail view of the lid locking means;

Figure 19 is a detail view of the side wall (or lateral) locking means;

Figure 20 is a perspective view of a side wall assembly according to a further embodiment; and

Figure 21 is a perspective view of the side wall assembly in Figure 20, where this is viewed from the opposing side to that illustrated in Figure 20.

In the following description, like reference characters designate like or corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

Referring now to Figure 1, where there is illustrated a container 1 comprising a square base 2, four side wall assemblies, and a lid 4 seated atop the side wall assemblies. Three of the four side wall assemblies 6 are identical. A fourth side wall assembly 8 differs from the three identical side wall assemblies 6 only in as much as it incorporates provisions for an outlet (such as for fluidised materials) at 10.

Unless otherwise stipulated, all of the components of this exemplary container 1 are moulded from a suitable engineering plastic. It should be apparent however that other materials may be used, including, although possibly less desirably, metals, composites and timbers.

An advantage of engineering plastic is its reduced cost when compared with steel. Moreover, steel requires a protective surface finish that breaks down with use, making the containers unsightly and susceptible to corrosion.

The base 2 (see Figure 12) is constructed like a pallet, with apertures 3 for fork lift tines. The base 2 is an assembly comprised of four almost identical plate modules 50 and four identical foot modules 52. Each foot module 52 has a square footprint with an upwardly extending rectilinear column 56 at each corner thereof, each column being connected to another two columns 56 by a web 57. A square plate module 50 sits atop the columns 56 of the foot module 52 and interlocks therewith, so that an upper surface of the plate forms the floor of the container 1. Each foot module 52 and plate module 50 has edge features along two intersecting edges 51, 53 thereof such that each module 50 and 52 is adapted to interlock with like modules along these edges in order to form the base 2.

An advantage of constructing the base 2 in this modular fashion is that if one or more modules 50 or 52 should be damaged such as by impact from a forklift tine or the accidental dropping of the container 1, then any damaged modules 50 and/or 52 can be replaced.

Extending upwardly from the upper surfaces of base plate modules 50 along two intersecting edges thereof are a plurality of spaced apart hinge pin supports 58 (see Figures 12 and 15). These hinge pin supports 58 have aligned apertures 59 passing through them, so that a hinge pin 60 may be passed through the hinge pin supports 58 of a pair of interconnected base modules 50 for the purpose of retaining a side wall assembly 6, 8 thereto.

Referring now to Figure 10, each side wall assembly 6, 8 is comprised of a plurality of pivotally interconnected triangular elements, these being a triangular lowermost element 20, four triangular side elements 22 and 24, and a triangular uppermost element 26.

The lowermost 20 and uppermost 26 elements are isosceles triangles of substantially the same shape and size; the side elements 22 and 24 are also isosceles triangles, each approximately one half the size of the upper 20 and lowermost 26 elements, where diagonally opposing side elements 22 and 24 are substantially identical. By virtue of this geometry, each side wall assembly 6, 8, incorporates a pair of diagonally intersecting 'fold lines' extending between the corners thereof so as to form an 'X', and a horizontal fold line extending across the wall assembly, so that the three fold lines intersect near the geometric centre of the wall assembly 6, 8, in this case. The geometry of the elements and their fold lines contributes not only to the advantageous manner in which the side wall assembly folds, but also to the way in which loads are transmitted through the elements of these side wall assemblies.

The lowermost element 20 of each side wall assembly 6 and 8 is pivotally attached to the base 2 of the container 1 along a longest edge thereof. Lowermost element 20 includes hook shaped hinge portions 21 which are sized and positioned along the longest edge thereof so as to interleave with the hinge pin supports 58 of base plate modules 50. These hook shaped hinge portions 21 define aligned apertures 23, so that the hinge pin 60 may be passed through the hook shaped hinge portions 21 for the purpose of pivotally connecting the side wall assemblies 6, 8 to the base plate modules 50.

One each of the side elements 22, 24 is pivotally attached to one each of the remaining (equal length) sides of the lowermost element 26. A further side element 22, 24 is pivotally connected to each of the first two side elements 22, 24. The uppermost element 26 is pivotally connected to one each of the further side elements 22, 24 along its sides of equal length. Each of these elements 20 through 26 is connected to the other elements in the side wall assembly 6, 8 via a series of spaced apart links 40.

Each link 40 has a pair of parallel holes 42 passing there through, there being one of the holes 42 toward each end of the link 40.

A plurality of spaced apart recesses 44 are provided in edges of elements that are to be connected with other elements via these links 40. Each of these recesses 44 is sized so as to accept an end of a link 40.

Those edge portions 46 of elements that are between and/or to either side of recesses 44 have aligned apertures passing through them so that a further hinge pin 60 (see Figure 11) may be passed through both these edge portions 46 and the links 40 thereby pivotally connecting these.

Where a series of links 40 is pivotally connected to an element in the above described fashion at each end thereof, then these elements become pivotally connected by the links 40 and hinge pins 60.

In this way, each side wall assembly 6, 8 is adapted to fold from an erected state in which the side wall assembly is upstanding from the base 2 (as illustrated in Figures 1 and 9), to a collapsed state in which a remainder of the elements 22, 24 and 26 in a respective wall assembly 6, 8 sit atop the lowermost element 20, which in turn sits atop the base 2 (as illustrated in Figure 3).

A significant feature of the exemplary container is that at least two edges of each element in a wall assembly have profiles that permit some degree of interlock between that element and an adjacent element when the wall assembly 6, 8 is erected.

Referring now to Figures 11a through 11f, where there is illustrated a series of cross-sectional views through a pivotal connection 100 as exists between any two elements in the side wall assembly 6, 8. In these figures, link 40 is represented by a solid line extending between the two pivot points A and B.

Each of the pair of elements is equipped with one of a matching pair of edge profiles 102 and 104, where a first profile 102 is characterised by an outwardly projecting ridge 106, and the second profile is characterised by a recess 108 which is sized and shaped so as to accept the ridge 106 therein when the wall assembly 6, 8 is erected.

In Figures 11a through 11f the element having the recess 108 is the uppermost of the two elements, and the element having the outwardly projecting ridge 106 is the lowermost of the two elements, but it will be readily apparent that this can be reversed, so that the element having the recess 108 is the lowermost of the two elements.

Each of the matching pair of edge profiles 102 and 104 incorporates a rounded portion 110 that extends between (so as to blend) a first side 112 of each element (which may be either of an inner side or an outer side depending on the elements) to either of the ridge 106 or recess 108 in the end profile 102 or 104 respectively.

Extending between the ridge 106 and a second side of the lower element is a ledge 111.

Extending between the recess and a second side of the upper element is a shoulder 112 which, when the wall assembly is erected, is adapted to abut against the ledge 111 of the lower element.

Referring now to Figure 11a, where the two elements are illustrated lying down (i.e. the container 1 is in its folded state), the upper element laying atop of the lower element (in this case), and the first sides (again, in this case) of the two elements being in contact. As erection of the wall assembly is commenced in Figure 11b, the curved surfaces of the two elements bear against and rotate relative to one another, and this continues through Figures 11c through 11e, until the ridge 106 locates within the recess 108 and the shoulder abuts 112 against the ledge 111 as shown in Figure 11f, this being when the side wall assembly 6, 8 is erected.

It can be seen in Figure 11f that the joint created between the two elements permits one element to rotate through 180 degrees relative to the other, the joint locking if any attempt is made to force its rotation beyond this 180 degrees.

Referring now to Figures 20 and 21, where there is illustrated a side wall assembly 6a that is very nearly the same as the side wall assembly 6 discussed above, but with one important distinction. The rounded portions 110 of each of edge profiles 102 and 104 extending in at least the regions between links 40 of selected panels incorporate a series of teeth or splines 300 extending lengthwise along them. The teeth or splines 300 of adjacent elements (20a and 22a, and 24a and 26a respectively) mesh and transmit rotational torque between these elements so that the erection and collapse of side wall assembly 6a (i.e. the relative rotation between the two elements about the contiguous meshing edges thereof) occurs in a very controlled, progressive and precise fashion, with all elements in the side wall assembly 6a reaching both the fully erected and fully collapsed state at exactly the same time.

The rounded portions 110 of each of edge profiles 102 and 104 of elements 22a and 24a do not incorporate these teeth or splines 300 (although optionally they may do), as their inclusion is not necessary for the purpose of effecting controlled, progressive and precise erection and collapse of side wall assembly 6a. Moreover, the incorporation of splines 300 at these points may create an internal pinching hazard for container contents, where such a pinching hazard would prove especially perilous for liquid carrying plastic bags within the container.

Similar to the base 2, the lid 4 is an assembly comprised of four identical plate modules 4a that may be either hot plate welded or mechanically fastened together. Each lid module incorporates a moulded retaining corner detail 5, which allows for registration of stacked units.

An additional locking exists between the lowermost 20 and uppermost 26 elements of each wall assembly 6, 8, as the adjacent apexes of these respective elements incorporate features that are adapted to interlock as the wall assembly approaches the erected position, and remain interlocked whilst the wall assembly is erect. Lowermost element 20 incorporates an integrally formed pin portion 20a at its apex, and the uppermost element 26 an integrally formed, c-shaped recess 26a at its apex that is adapted to accept the pin portion 20a of the lowermost element 20 therein in a releasably engageable fashion.

Referring now to Figure 1, where it can be seen that each wall assembly comprises a first locking means 200 adapted to lock one wall assembly (such as wall assembly 6 in Figure 1) to an adjacent wall assembly (such as wall assembly 8 in Figure 1); this then being in effect a 'lateral' locking means. For each wall assembly then there are two such lateral locking means, one in a lower side element 22 on the left hand side of the wall assembly 6 or 8, and a second in an upper side element 22 on the right hand side of the wall assembly 6 or 8, because, in this exemplary embodiment, diagonally opposing side elements are identical. Each lateral locking means 200 comprises a latch 202 operated pin 204 which acts to capture the adjacent wall assembly. In this way, each wall assembly 6 or 8 is locked to adjacent wall assemblies 6 or 8 along both edges thereof, and at the top and bottom of each edge thereof via each of the upper 22 and

lower 22 side elements thereof, this then providing secure lateral locking between side wall assemblies 6 and 8.

Referring now to Figures 18, 18a and 18b, where it can be seen that each wall assembly 6, 8 comprises a second locking means 220 adapted to lock the lid 4 to this. This lid locking means 220 comprises a lever 222 which is pivotally attached to the lid 4 at a first end, the handle having a lug 224 projecting there from which registers in an arcuate track 226 formed into an uppermost element of the side wall assembly 6 or 8. Rotation of the handle through 90 degrees from a horizontal orientation to a vertical one moves the lug 224 along and down the track 226 so that the side wall assembly 6 or 8 (and so the remainder of the container) captures the lid 4. In this exemplary embodiment, there are two such levers 222 spaced apart on each side of the lid 4, and the uppermost element of each side wall assembly incorporates two spaced apart tracks 226, one each to accept a lever lugs 224.

Figure 2 illustrates a collapsed container (i.e. a container that has been folded down into its collapsed state) with its lid 4 removed (lid 4 can be laid atop side wall assemblies 6 and 8).

In Figure 3, a first side wall assembly 6 is shown in its early stages of erection. It is clear from Figure 3 that when the container was collapsed flat as in Figure 2, that:

- the uppermost element 26 is laid atop upper side elements 22, 24;
- the upper side elements 22, 24 are laid atop lower side elements 22, 24;
- the lower side elements 22, 24 are laid atop lowermost element 20; and
- the lowermost element 20 is laid atop base 2.

In Figure 4, this first side wall assembly 6 is illustrated further but not fully erected. It is clear from Figure 4 that:

- the lowermost element is pivoting upwardly;
- the side elements 22 and 24 are simultaneously pivoting upwardly and outwardly;
- the uppermost element 26 is pivoting upwardly.

In Figure 5 the first side wall assembly 6 is shown fully erected. It is clear from Figure 5 that this side wall assembly 6 is adapted to stand erect without support from other side wall assemblies 6, 8. This is due to the interlock that exists between adjacent elements in the side wall assembly, which was discussed in detail above.

In Figure 6 a second side wall assembly 8 is illustrated partially but not fully erected. In Figure 7 this second wall is illustrated fully erected and locked to the first erected side wall.

In Figures 8 and 9 a third and fourth wall respectively have been erected and locked to adjacent walls. With all four side walls erected and interlocked, the erected container can be filled and the lid applied and locked in position.

An advantage of this exemplary container 1 is its modular construction, so that if one element in the container is damaged and rendered inoperable, that element (or just a portion thereof) may be easily replaced. If just a portion (e.g. a side element 22) of an element (e.g. side wall assembly 6) is damaged, then that portion can be replaced without necessitating the replacement of the entire element.

A further advantage is that the container 1 is adapted to fold down in to a very compact state whilst employing side panel assemblies which are substantially identical and therefore interchangeable.

A further advantage of the container 1 is that it may be modified by the use of strengthened hinge pins 60 to increase its strength and thereby increase its load carrying capacity. Where a container is to carry lighter loads, lower strength hinge pins 60 made of low grade plastic, aluminium or the like may suffice. Where a container is to carry heavy loads however, higher strength hinge pins 60 of steel, engineered plastic, reinforced plastic or composites may well be required. An advantage of the container 1 then is that the pins 60 of the container can be interchanged as required.

Throughout the specification and the claims that follow, unless the context requires otherwise, the words “comprise” and “include” and variations such as “comprising” and “including” will be understood to imply the inclusion of a stated integer or group of integers, but not the exclusion of any other integer or group of integers.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgement of any form of suggestion that such prior art forms part of the common general knowledge.

It will be appreciated by those skilled in the art that the invention is not restricted in its use to the particular application described. Neither is the present invention restricted in its preferred embodiment

with regard to the particular elements and/or features described or depicted herein. It will be appreciated that various modifications can be made without departing from the principles of the invention. Therefore, the invention should be understood to include all such modifications in its scope.

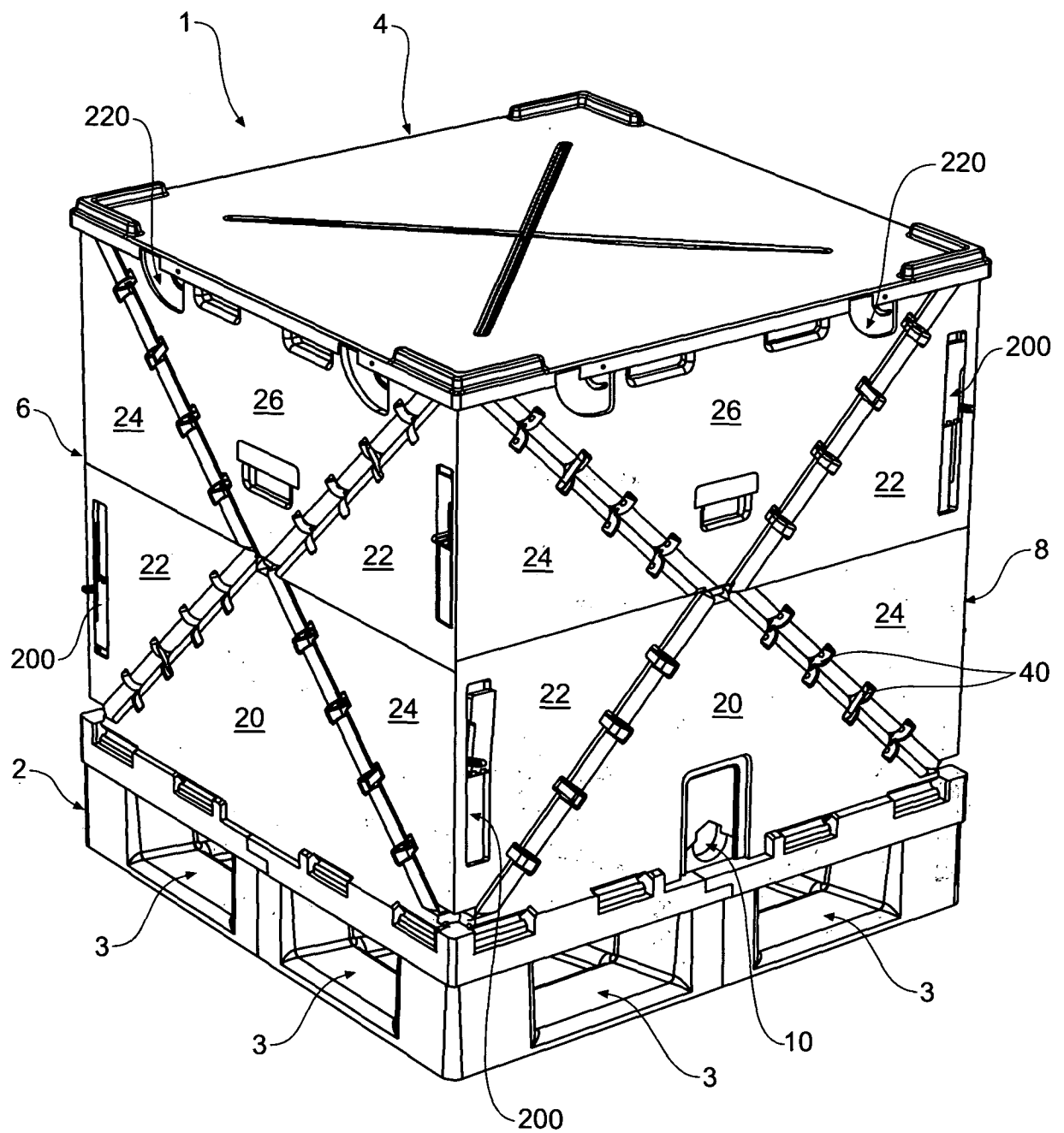
CLAIMS:

1. A container comprising a base, and a plurality of side wall assemblies, where each side wall assembly is comprised of a plurality of pivotally interconnected triangular elements, and each side wall assembly is adapted to fold from an erected state in which each side wall assembly is upstanding from the base, to a collapsed state in which a remainder of the elements in a respective side wall assembly sit atop a first element thereof, and each of the collapsed side wall assemblies sit alongside one another and atop the base.
2. The container of claim 1, wherein each of the erected side wall assemblies is adapted to fold from a rectilinear shape when erected, to a triangular shape when collapsed.
3. The container of either of claims 1 or 2, wherein the base and each of the erected side wall assemblies is square.
4. The container as in any one of the preceding claims, wherein each of the base and the side walls is approximately the same size.
5. The container as in any one of the preceding claims, wherein there is a side wall assembly for each side of the base.
6. The container of any one of claims 3 through 5, wherein each of the erected side wall assemblies is adapted to fold from the square shape when erected, to a triangular shape that is approximately one quarter of the size of the square shape when collapsed.
7. The container as in any one of the preceding claims, wherein each side wall assembly comprises a lowermost element, this being the first element, four side elements, and an uppermost element, where the lowermost and uppermost elements are isosceles triangles of substantially the same shape and size, and the side elements are also isosceles triangles, each approximately one half the size of the upper and lowermost elements.
8. The container of claim 7, wherein the two side elements on either side of the side wall assembly are pivotally connected along a fold line extending across the assembly.
9. The container of either of claims 7 or 8, wherein each side wall assembly is connected to the base by virtue of the lowermost element being pivotally attached to the base, and the folding action when collapsing the container is a combined inward and downward action with respect to the base.

10. The container as in any of the preceding claims, wherein each side wall assembly comprises a first locking means adapted to lock the wall assembly to an adjacent wall assembly.
11. The container as in any of the preceding claims, wherein contiguous edges of at least two adjacent side wall assembly elements incorporate means for transmitting rotational torque between said adjacent elements.
12. The container of claim 11, wherein said means comprises meshing teeth or splines.
13. The container as in any of the preceding claims, wherein this comprises a lid which is adapted to sit atop the erected walls of the container.
14. The container of claim 13, wherein at least one side wall assembly comprises a second locking means adapted to lock the lid to the wall assembly.
15. The container as in any of the preceding claims, wherein at least one side wall assembly for this comprises at least two adjacent elements having contiguous edges incorporating means for controlling relative rotation between the two elements about the contiguous edges thereof.
16. The container of claim 15, wherein said means transmits torque between said adjacent elements.
17. The container of either of claims 15 or 16, wherein said means comprises meshing teeth or splines.
18. A container comprising a base, and a plurality of side wall assemblies, where each side wall assembly is comprised of a plurality of pivotally interconnected triangular elements, and each side wall assembly is adapted to fold from a rectilinear shape when erected, to a triangular shape when collapsed, so that each of the collapsed side wall assemblies can sit alongside one another atop the base.
19. A container comprising a base, and a plurality of side wall assemblies, where each side wall assembly is comprised of a plurality of pivotally connected elements, where contiguous edges of at least two adjacent elements incorporate means for controlling relative rotation between the two elements about the contiguous edges thereof.
20. The container of claim 19, wherein said means transmits torque between said adjacent elements.

21. The container of either of claims 19 or 20, wherein said means comprises meshing teeth or splines.
22. A method for collapsing the container as in any one of claims 1 to 17, the method including the steps of:
- unlocking and removing the lid from the container;
 - unlocking each wall assembly from its adjacent wall assemblies;
 - folding each wall panel assembly down; and
 - positioning the lid atop of the folded down wall assemblies.
23. A method for erecting the above described container, the steps for the method being the reverse of the method for collapsing the container of claim 22.
24. A side wall assembly for a container comprising a plurality of pivotally interconnected triangular elements that are adapted to fold from a rectilinear shape to a triangular shape.
25. The side wall assembly of claim 24, wherein the side wall assembly is adapted to fold from a square shape to a triangular shape approximately one quarter the size of the square shape.

1/19

**Figure 1**

2/19

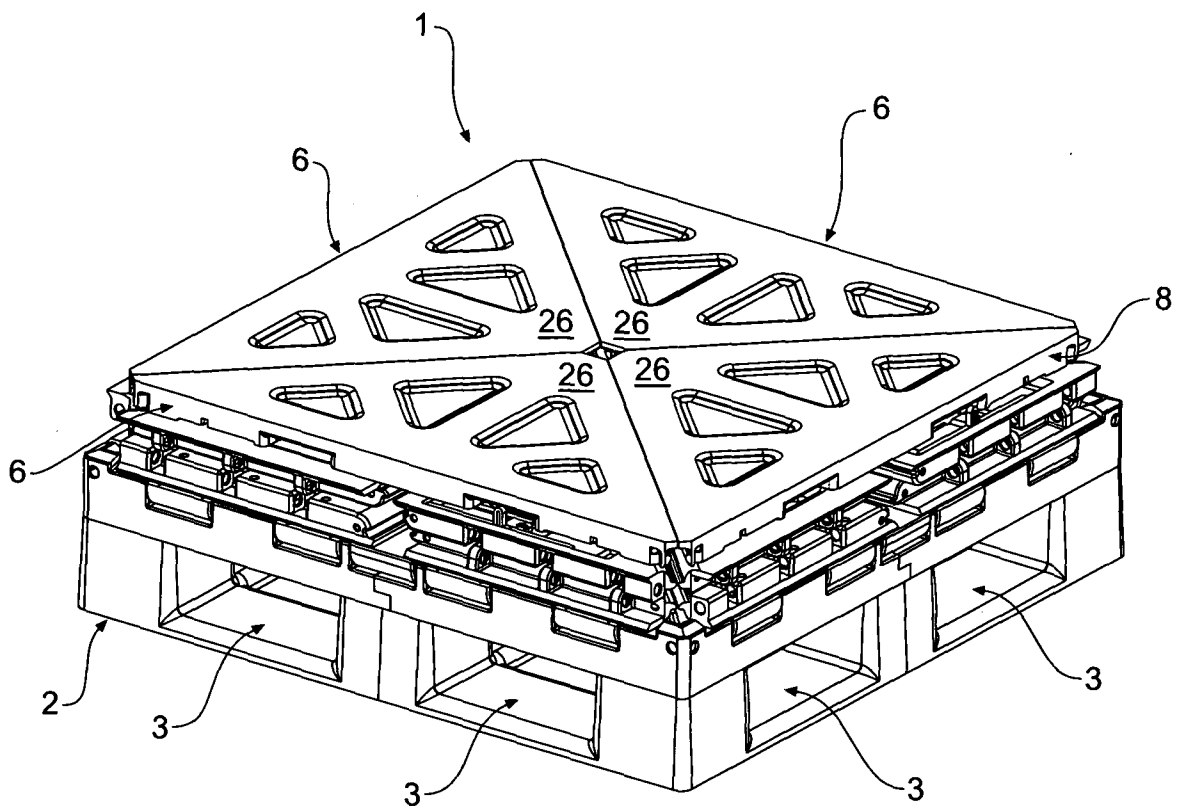


Figure 2

3/19

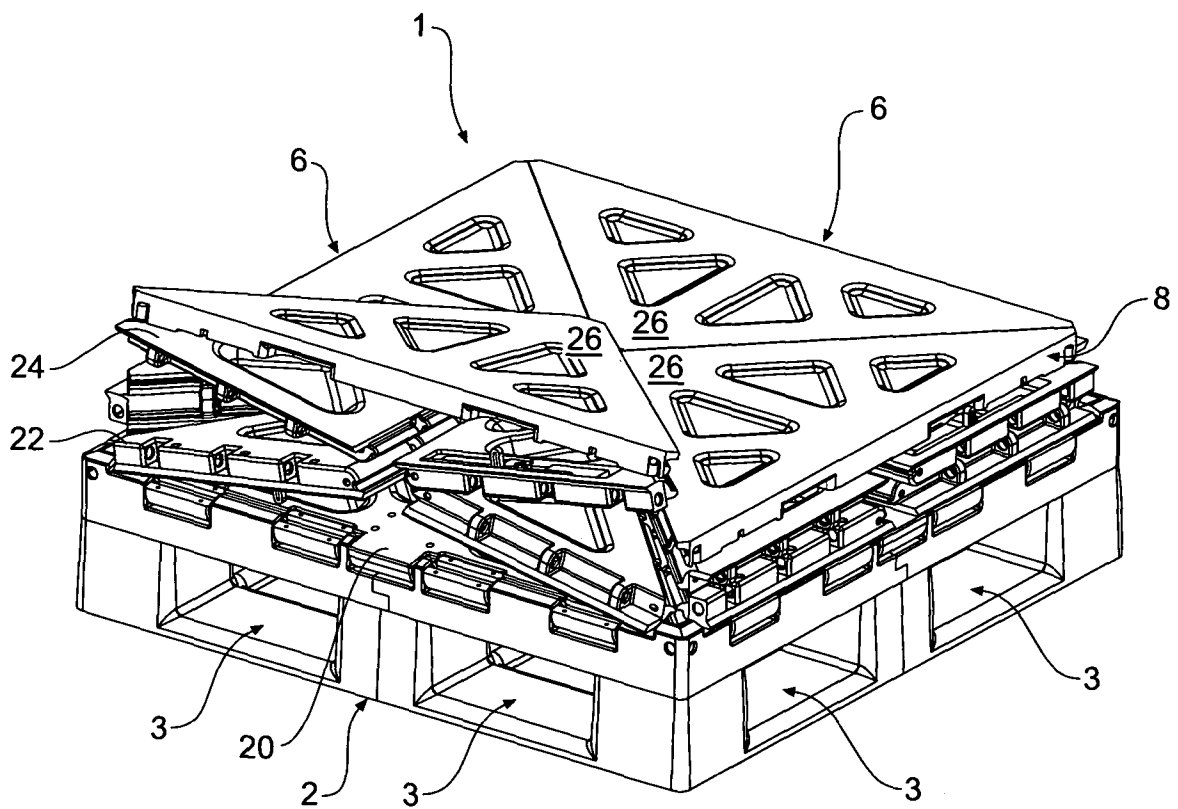


Figure 3

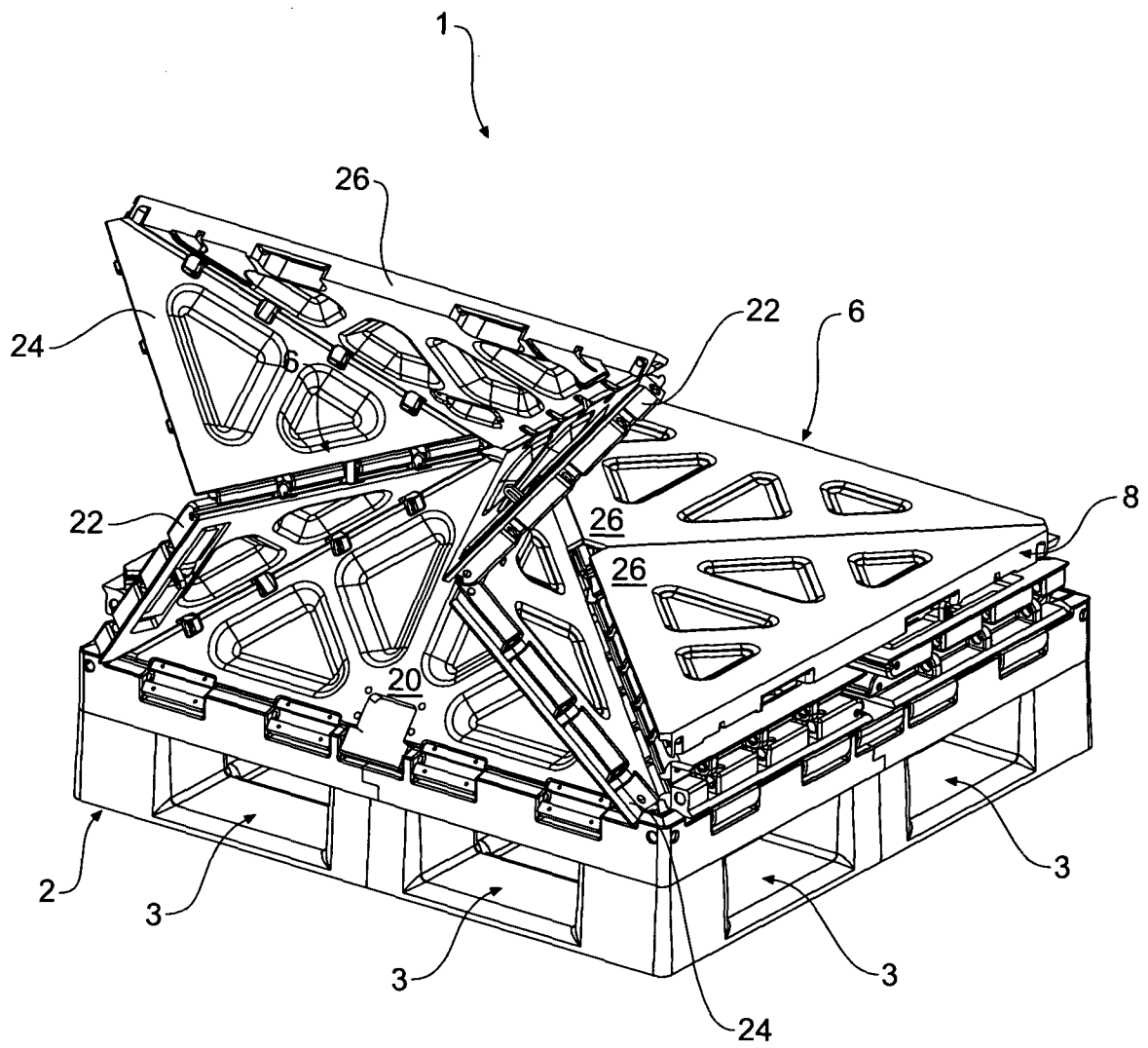


Figure 4

5/19

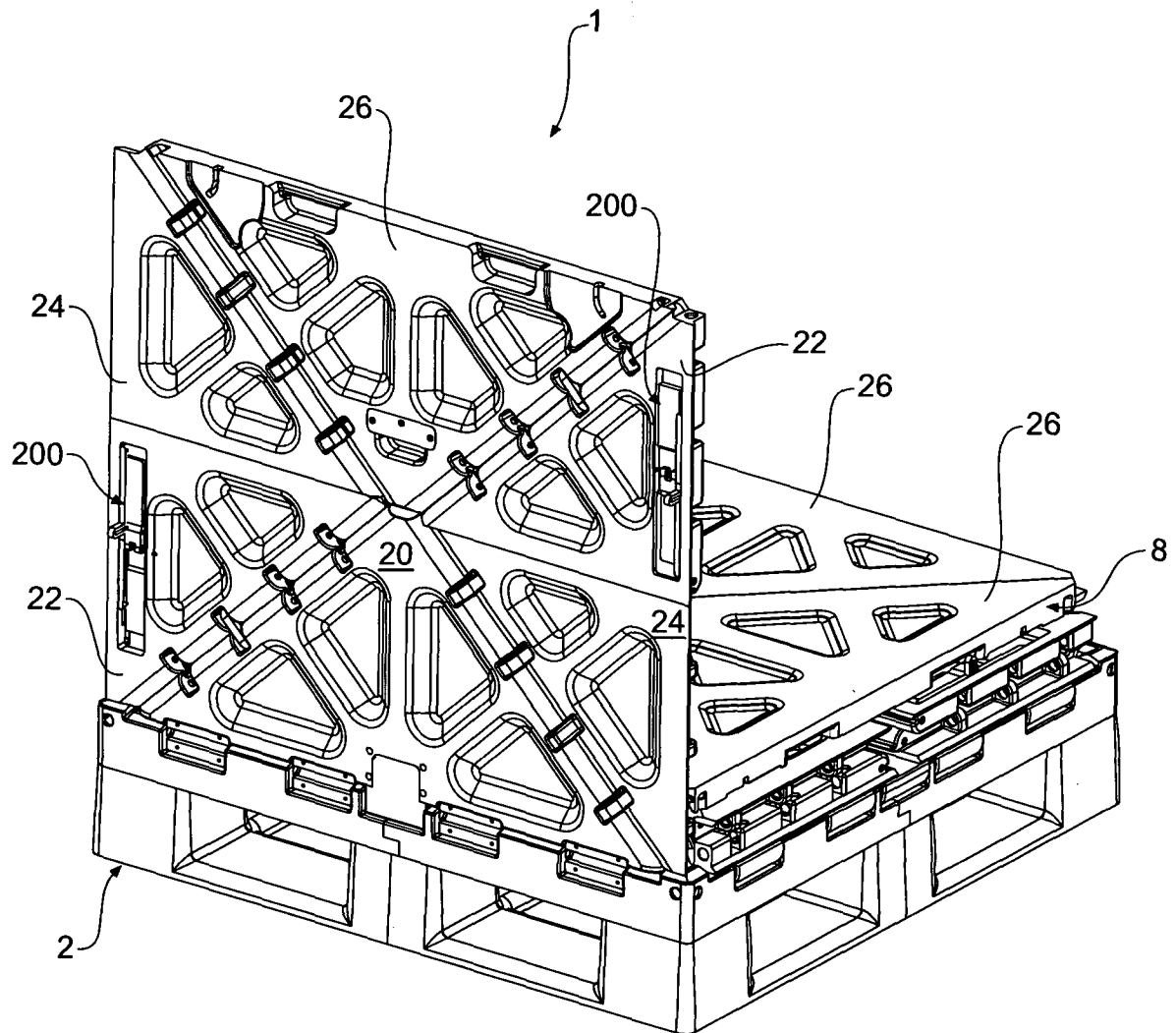


Figure 5

6/19

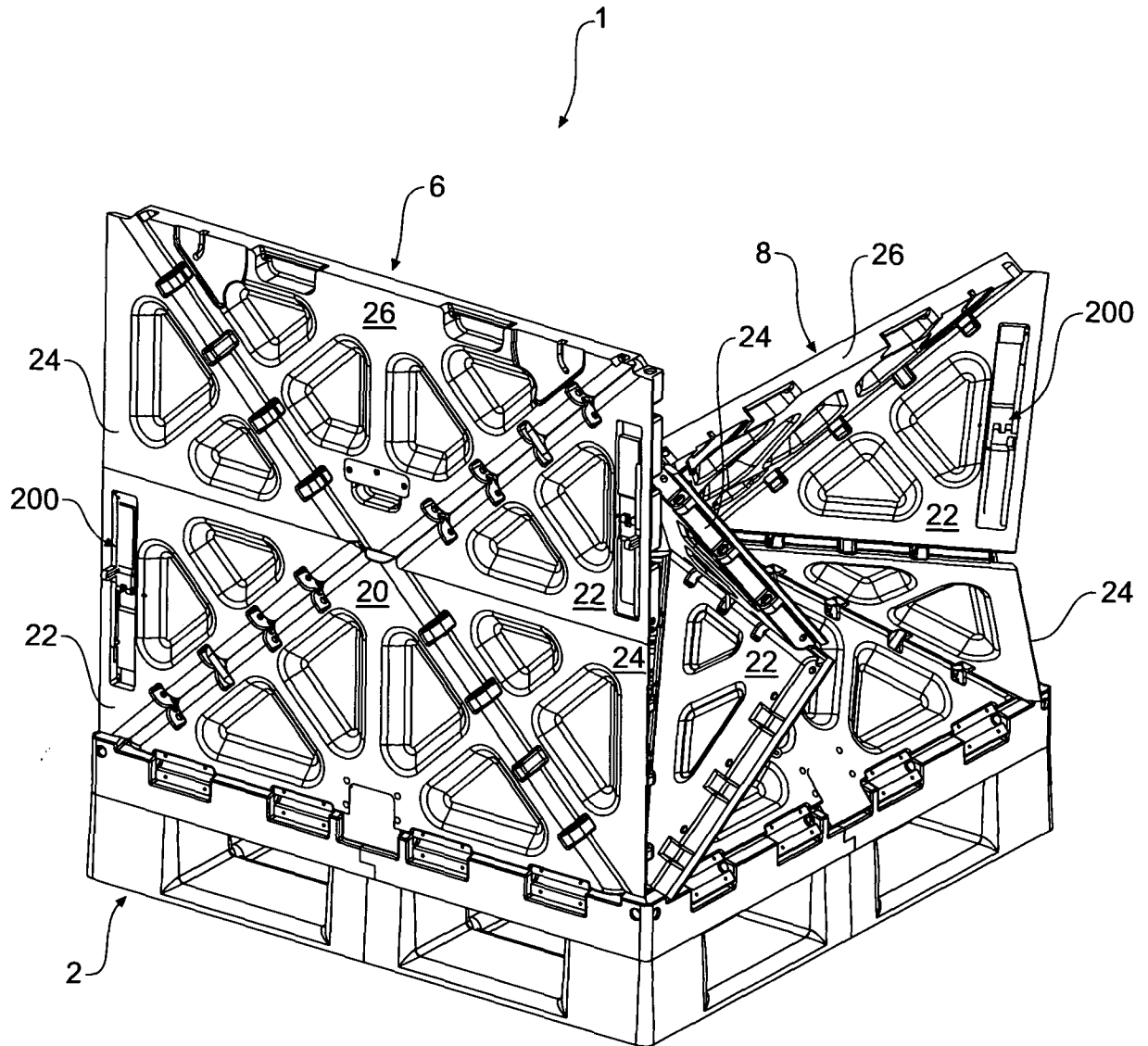


Figure 6

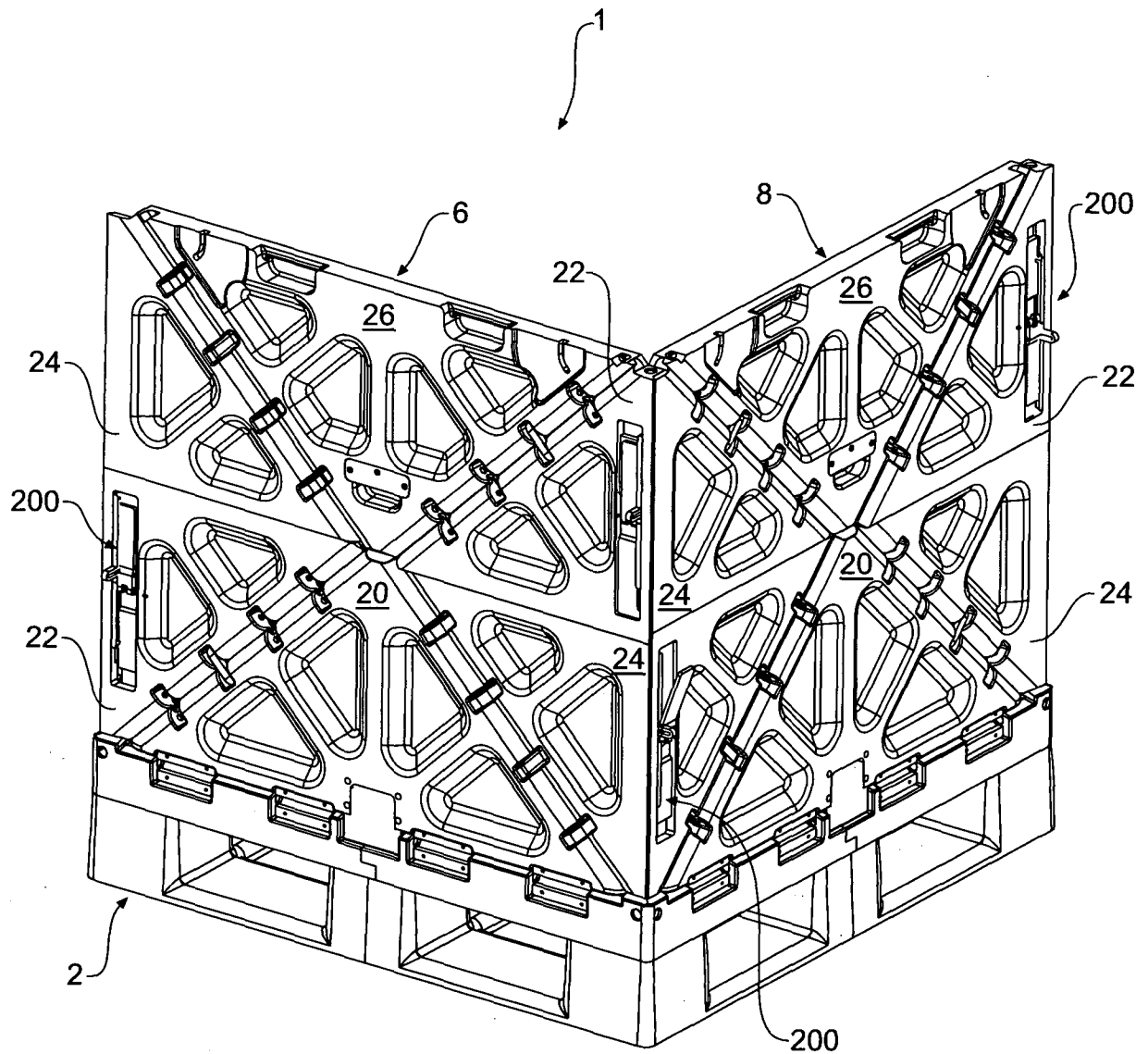


Figure 7

8/19

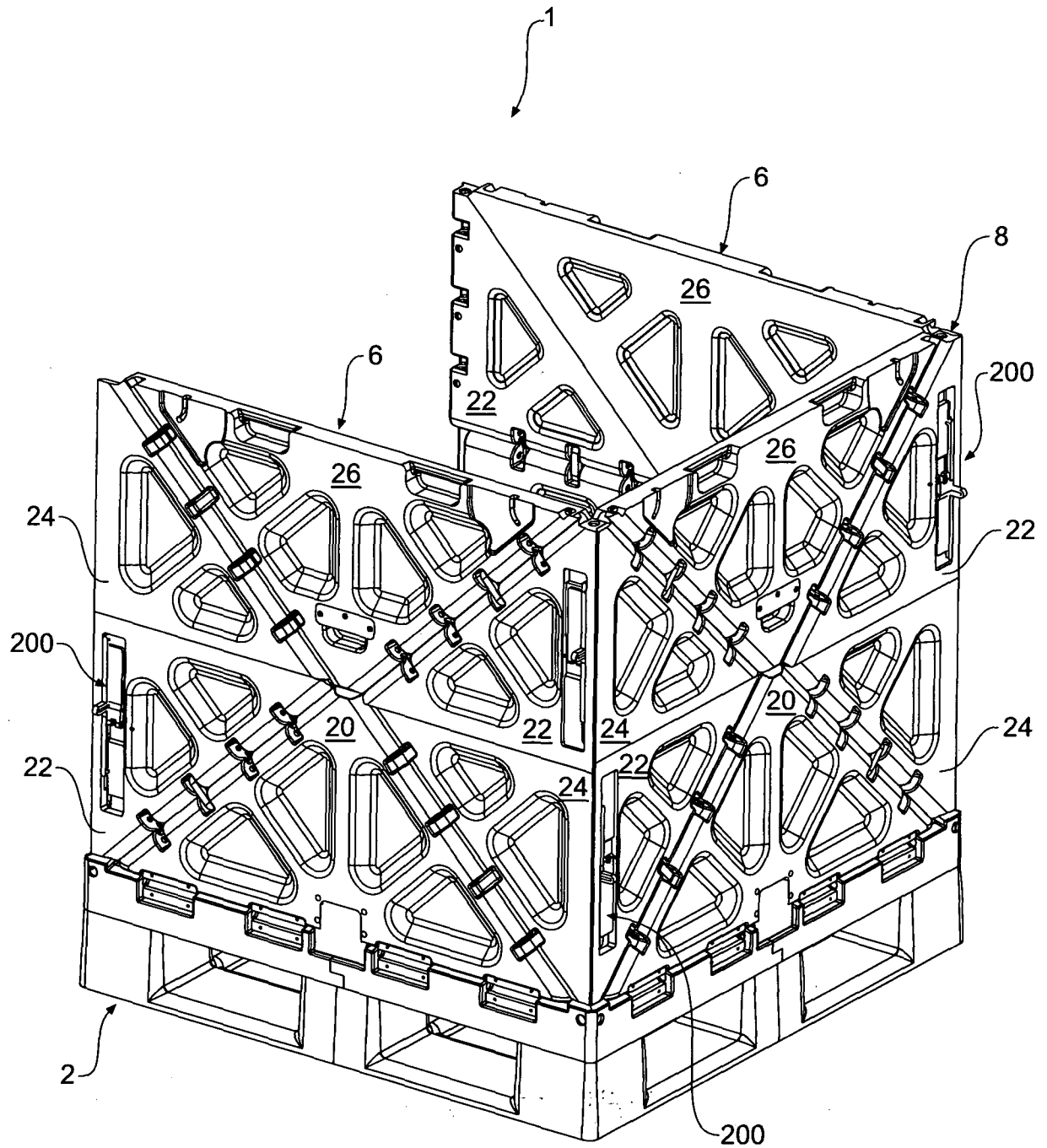
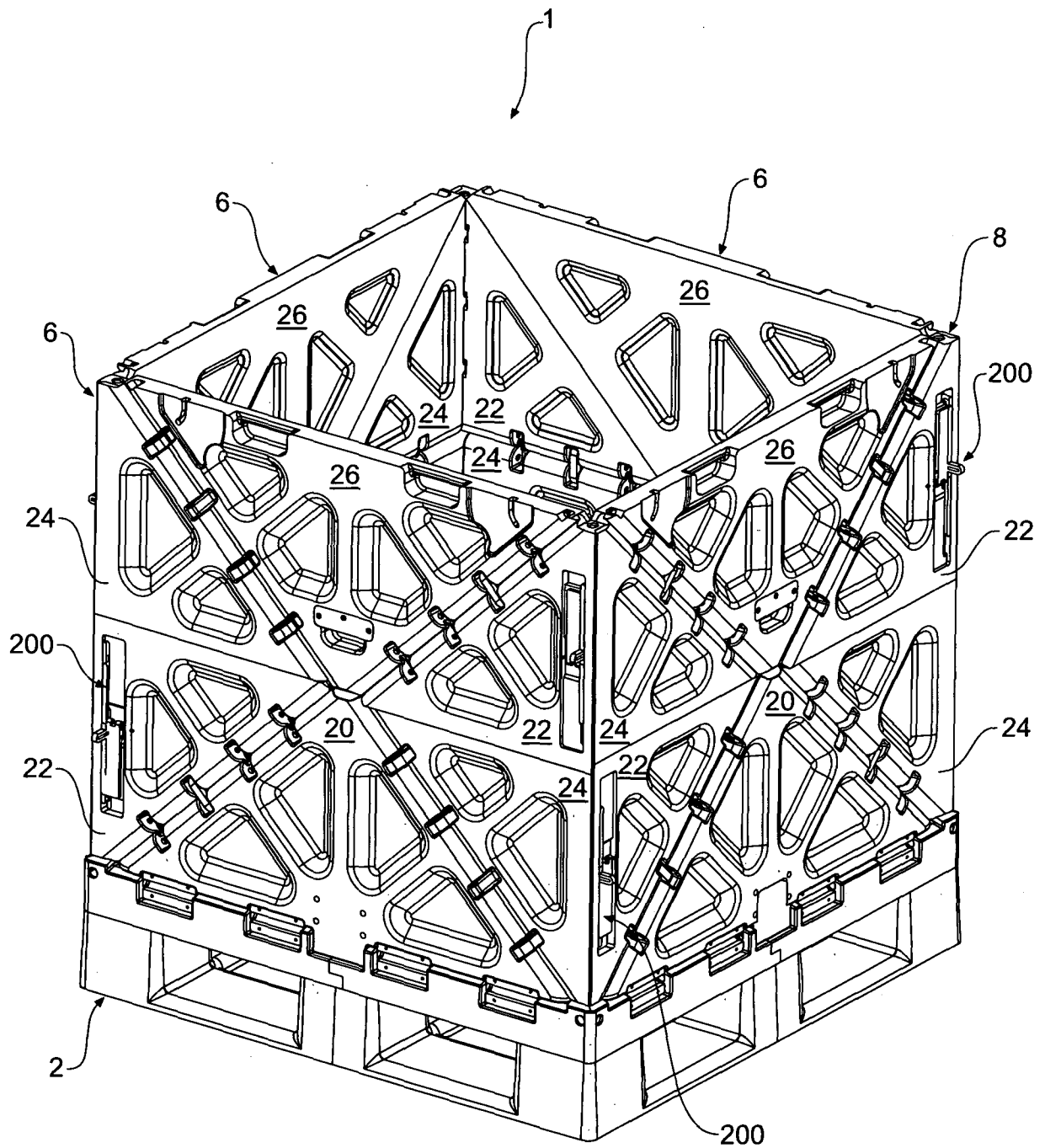


Figure 8

9/19

**Figure 9**

10/19

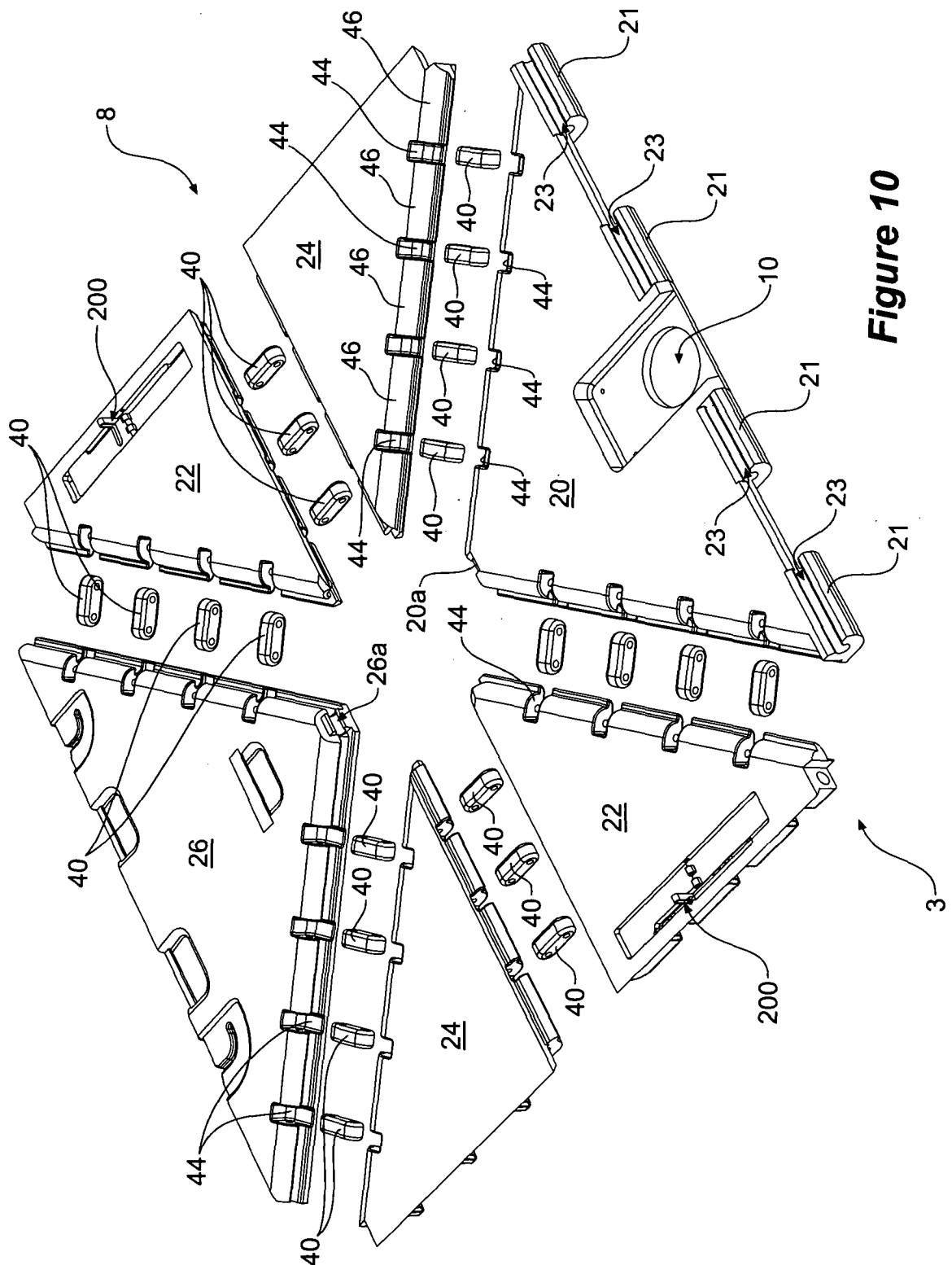


Figure 10

11/19

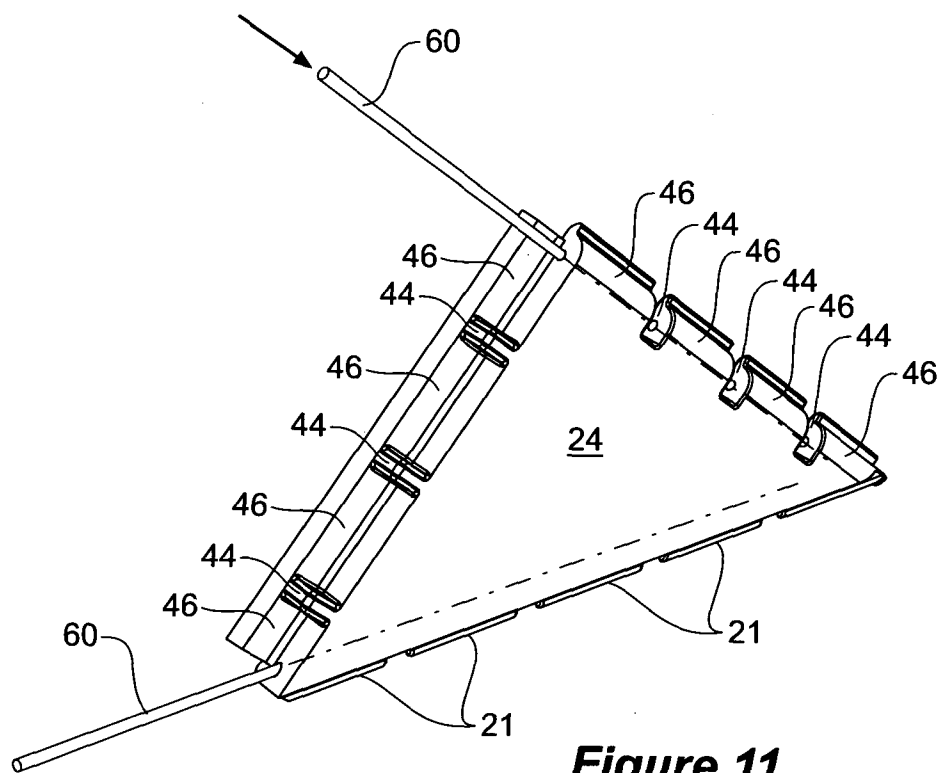


Figure 11

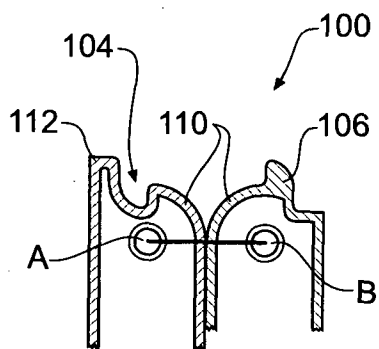


Figure 11a

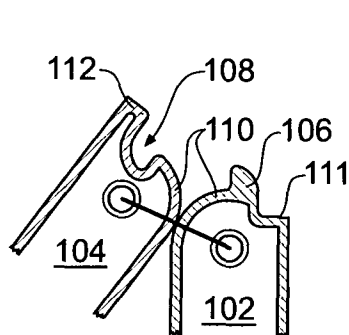


Figure 11b

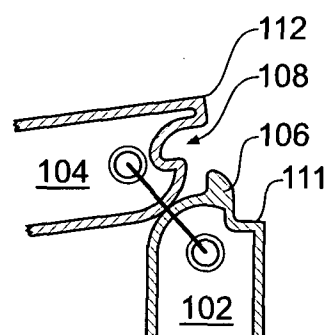


Figure 11c

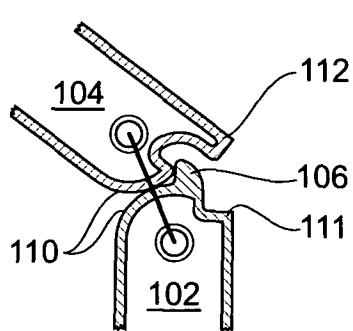


Figure 11d

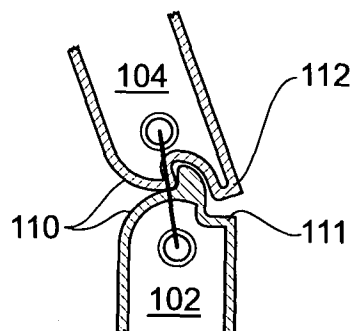


Figure 11e

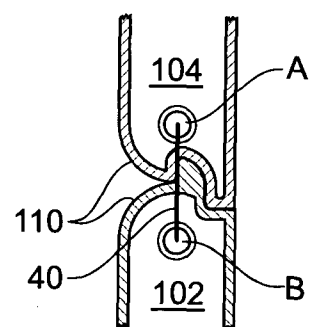


Figure 11f

12/19

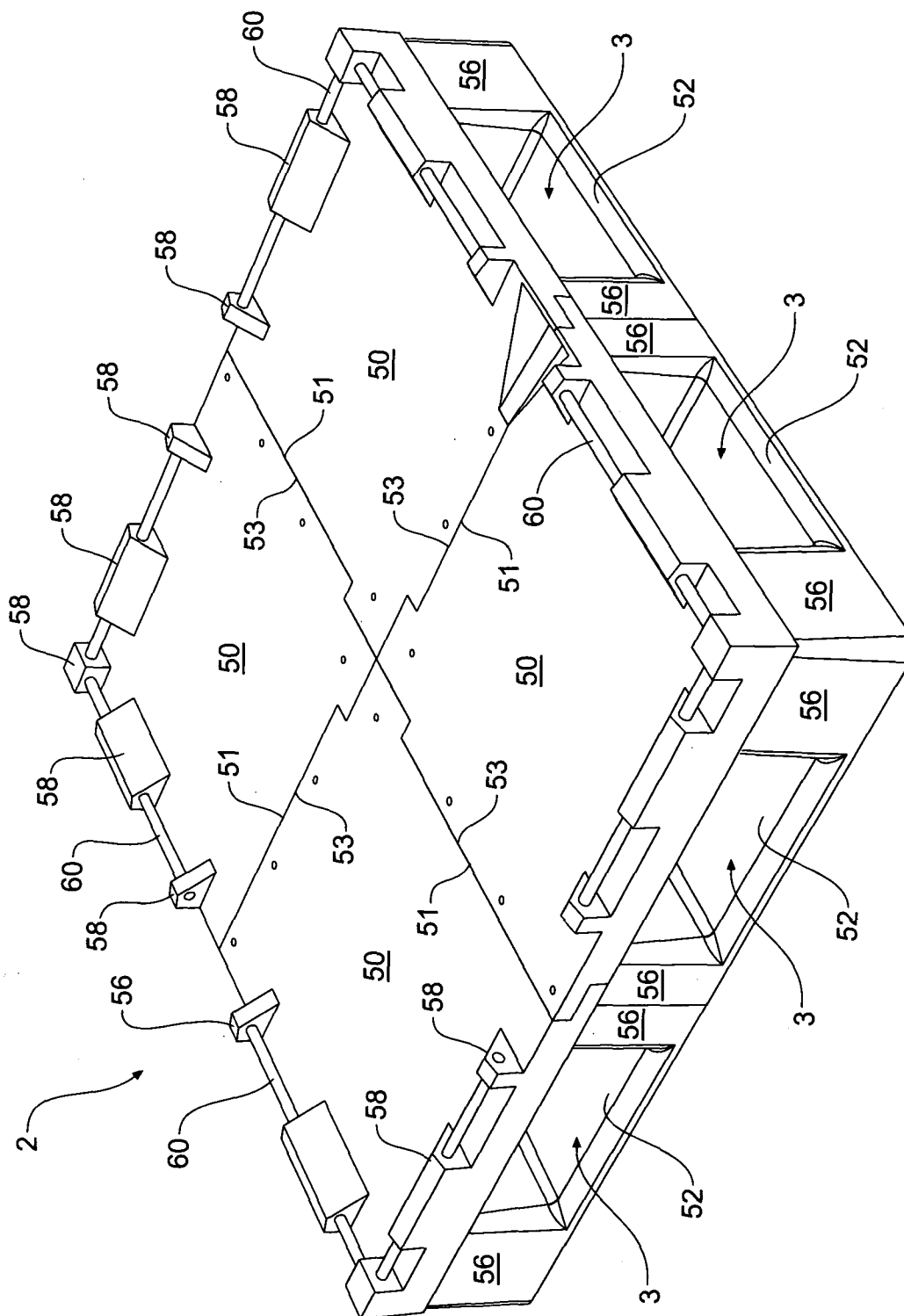


Figure 12

13/19

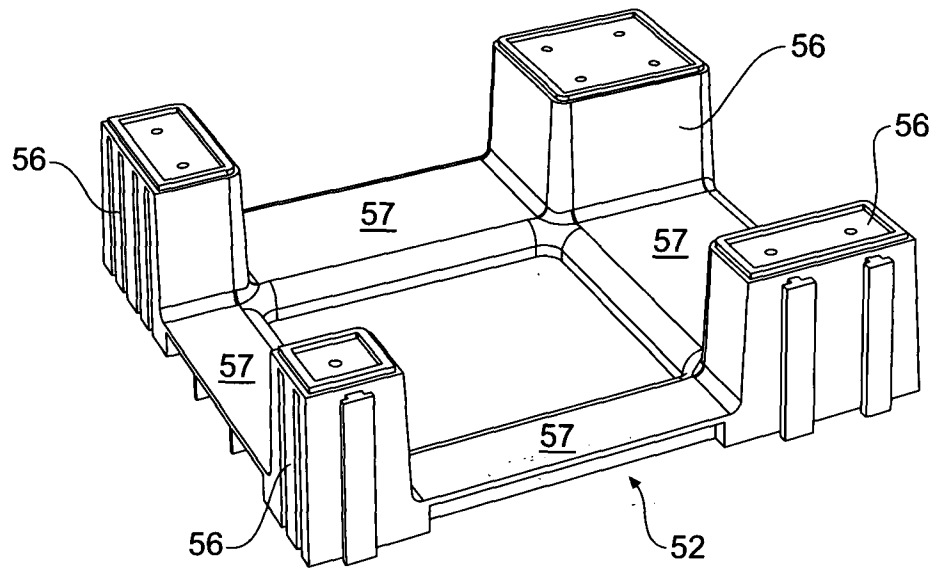


Figure 13

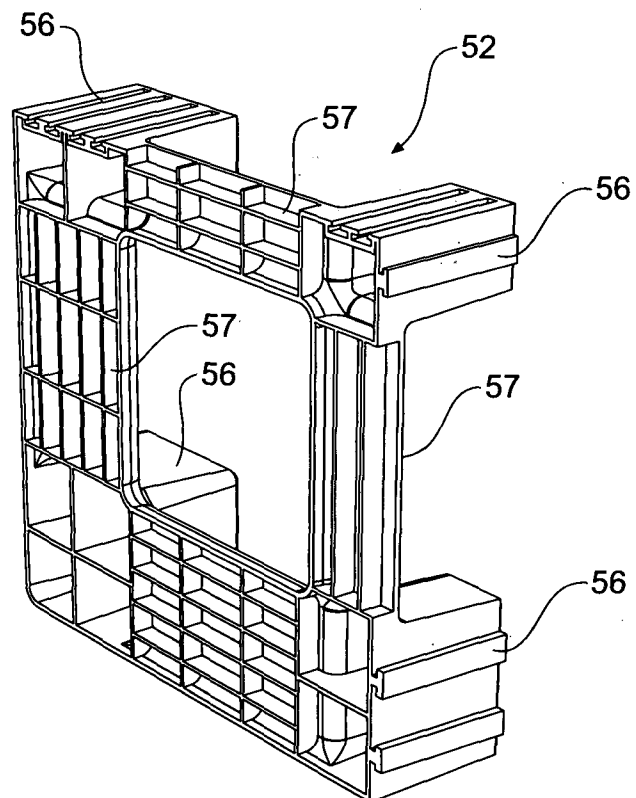


Figure 14

14/19

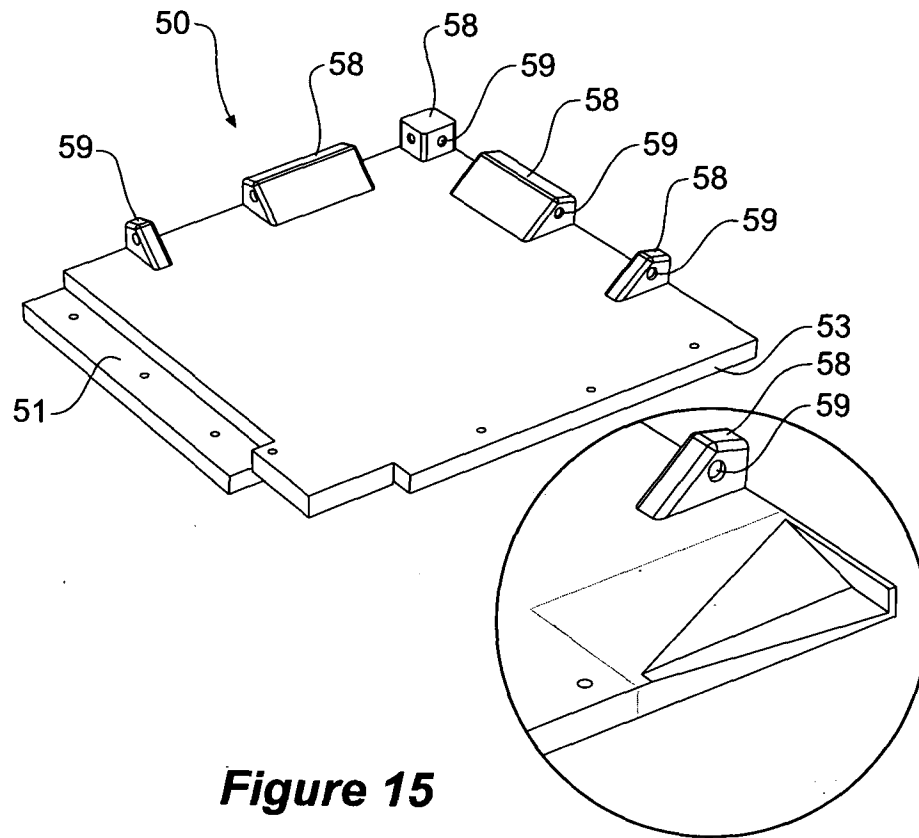


Figure 15

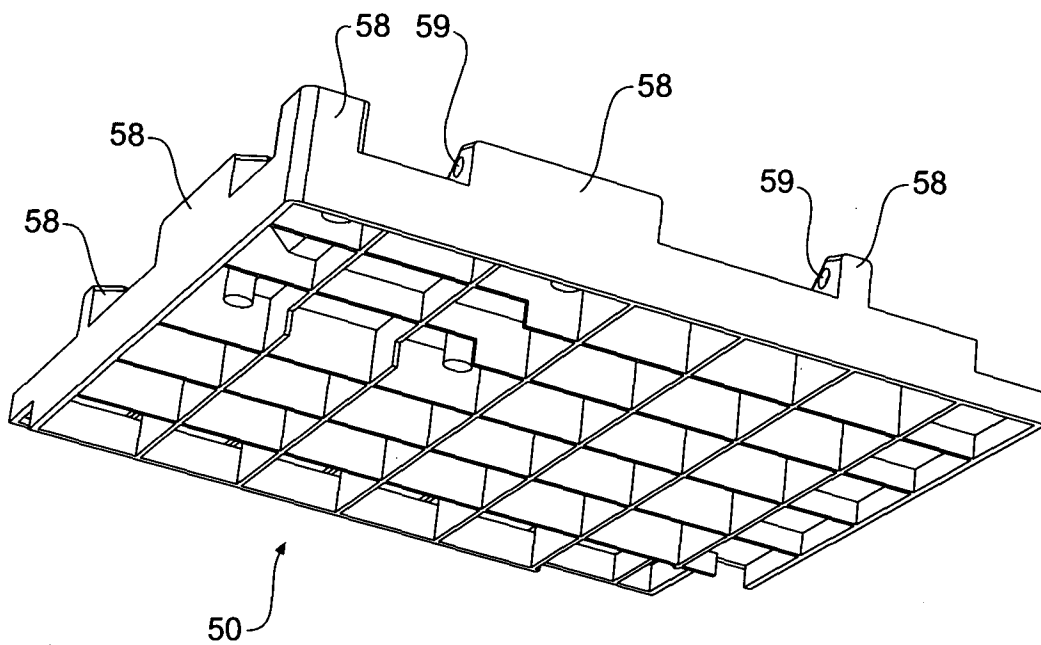


Figure 16

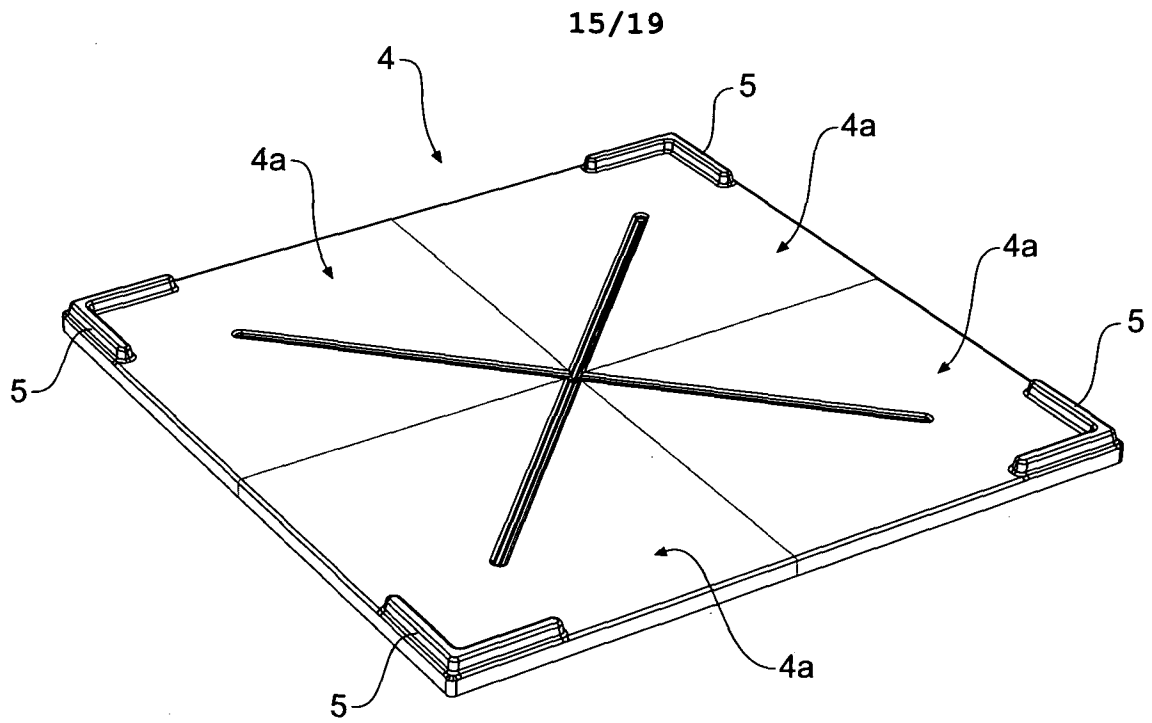


Figure 17

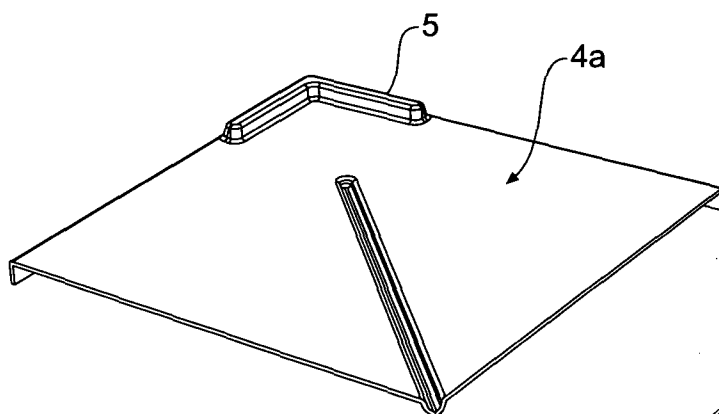


Figure 17a

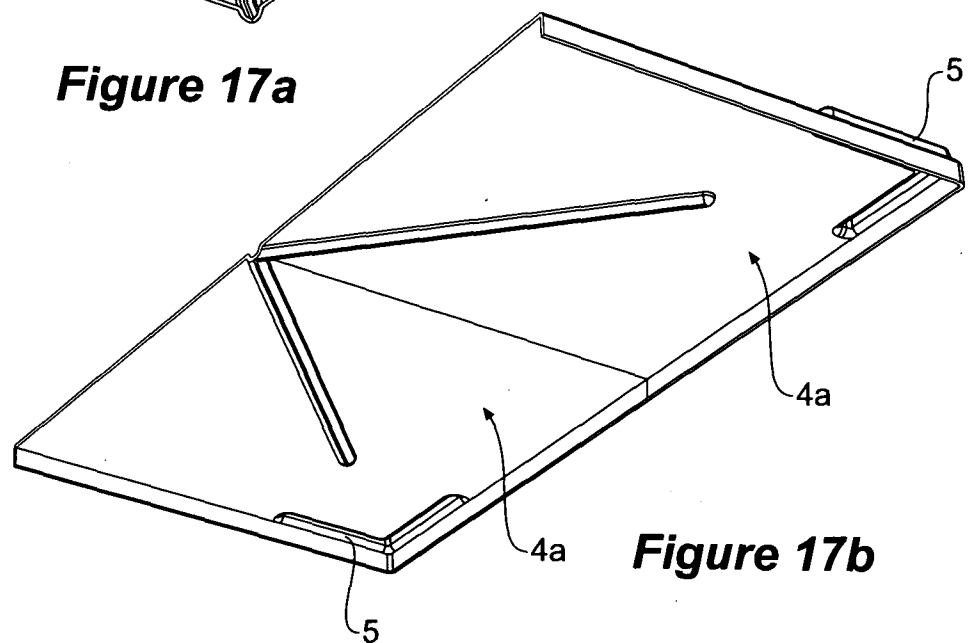


Figure 17b

16/19

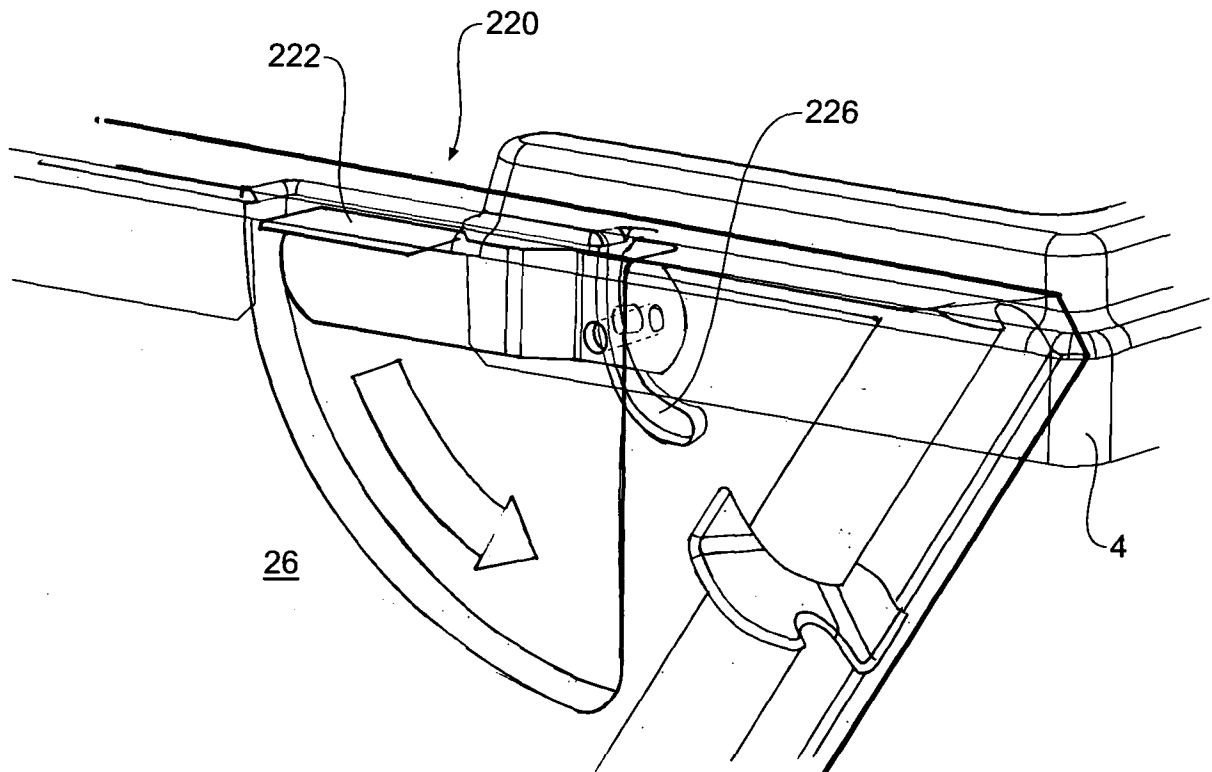


Figure 18

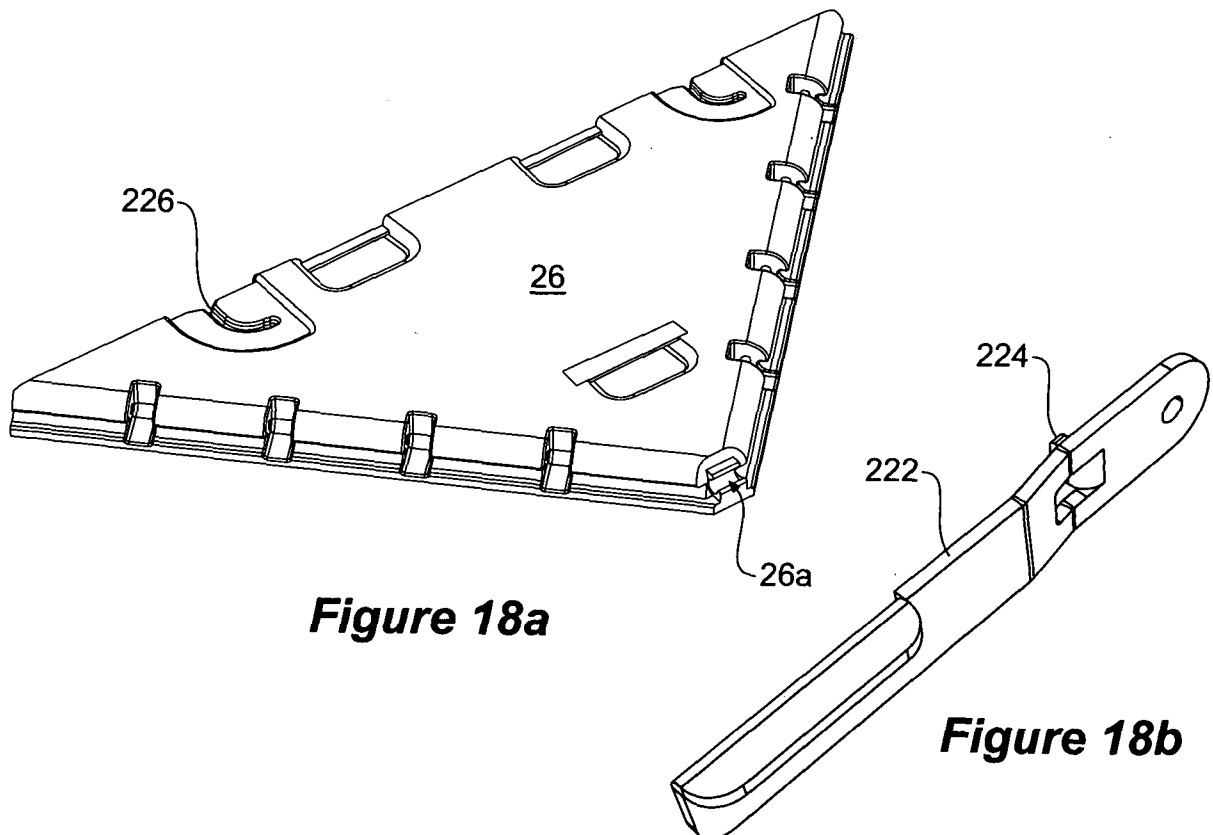


Figure 18a

Figure 18b

17/19

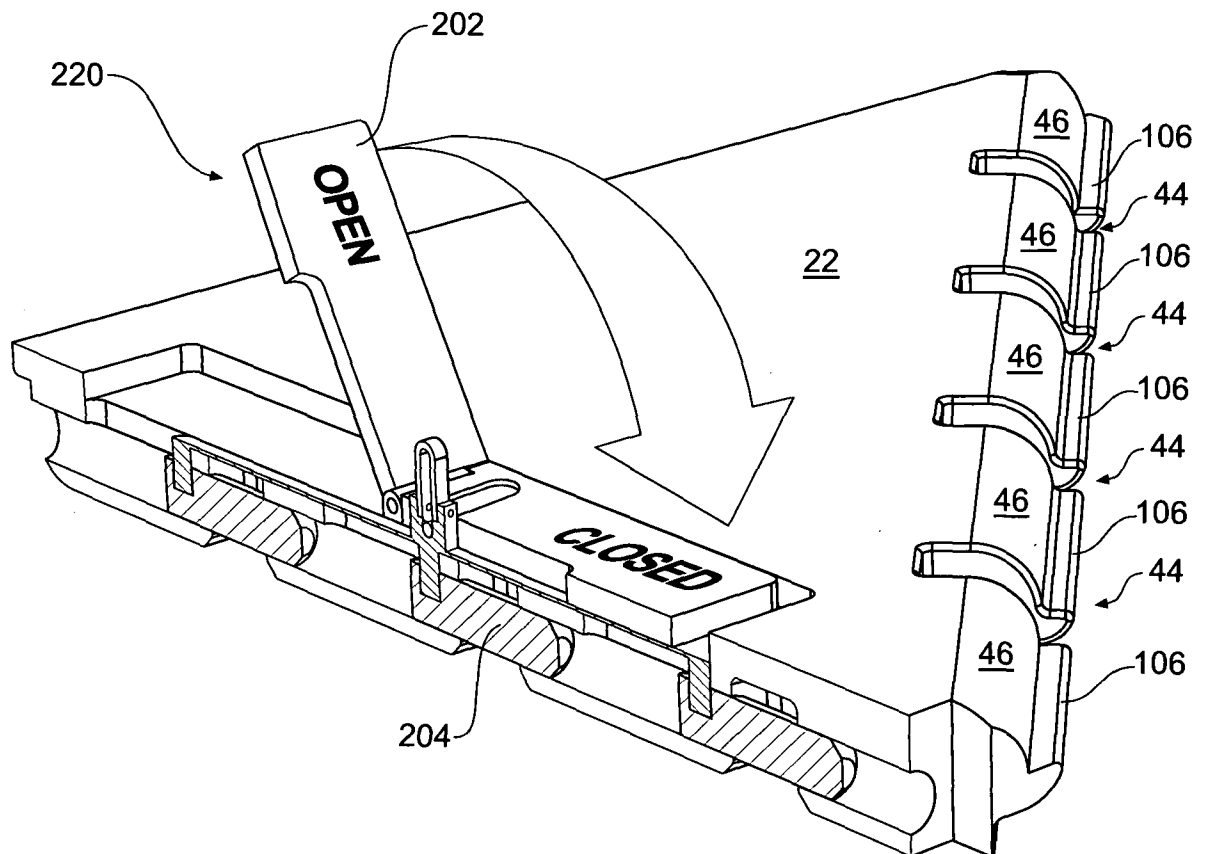


Figure 19

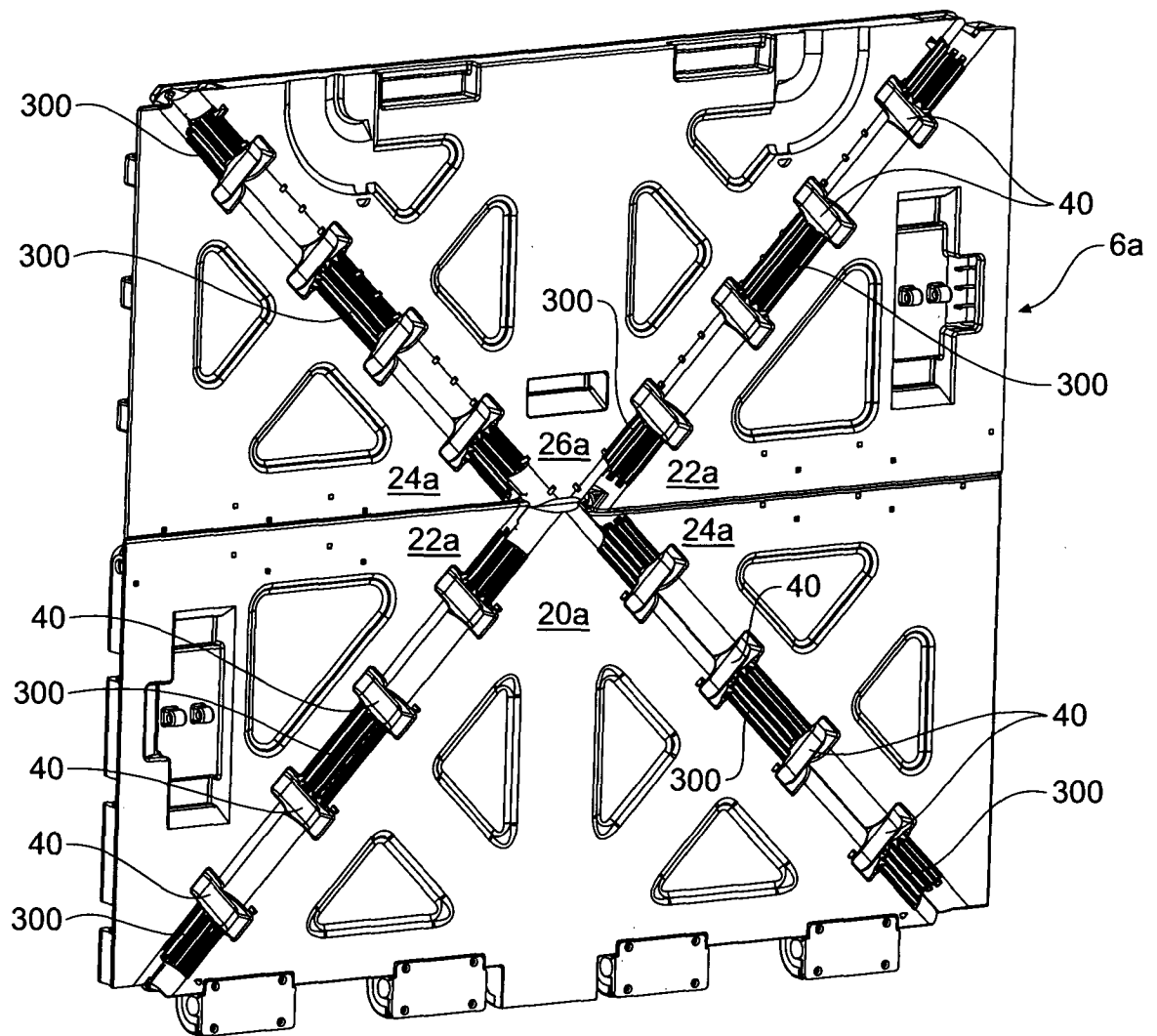
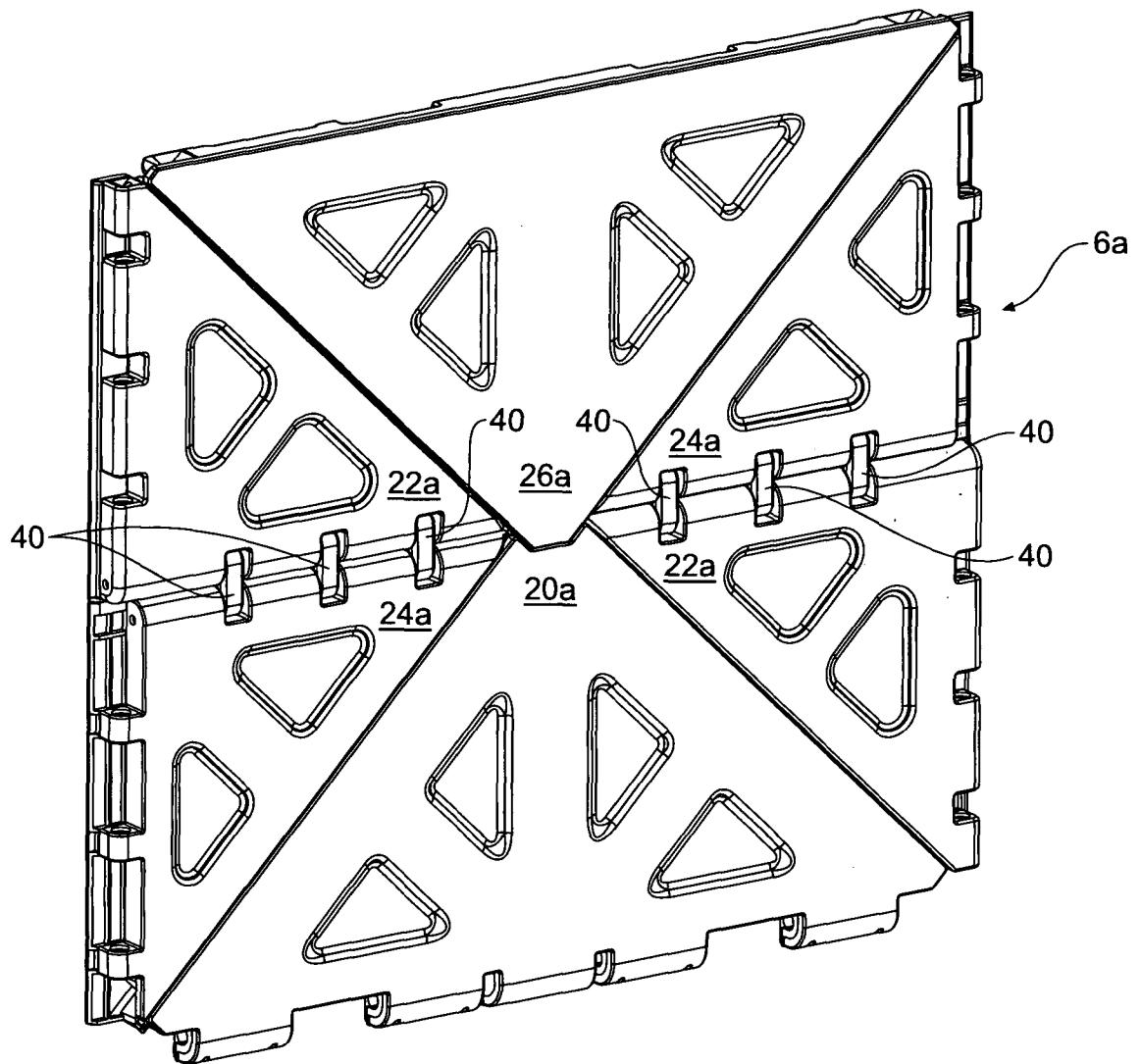


Figure 20

19/19

**Figure 21**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2010/000712

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

B65D 88/52 (2006.01)

B65D 19/18 (2006.01)

B65D 19/12 (2006.01)

B65D 19/16 (2006.01)

B65D 6/18 (2006.01)

B65D 90/08 (2006.01)

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)

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

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

EPODOC, WPI, IPC, ECLA: B65D6, B65D88, B65D90, B65D19 and keywords: side, wall, collapse, triangular and like words

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0224563 A1 (TURVEY et al.) 13 October 2005 Abstract, figures 1, 2, 18, 19 and 29D, paragraphs [0008], [0009], [0046], [0055] and [0068]	1, 3-5, 10, 13, 14, 22-24
X Y	US 1202253 A (VITT) 24 October 1916 Figure 1, page 1 lines 86-104	24 1, 2, 5, 10, 13, 14, 18
X Y	US 3376994 A (FLINN, JR) 9 April 1968 Figures 1-6, column 3 lines 43-63	24 1, 2, 5, 10, 13, 14, 18
Y	WO 1992/015490 A1 (GREEN) 17 September 1992 Figures 1 and 2, page 3-4	1, 2, 5, 10, 13, 14, 18

☐ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
10 September 2010/20 September 2010

Date of mailing of the international search report 27 SEP 2010

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2010/000712

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

[See Supplemental Box I]

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-18 and 22-25

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2010/000712

Supplemental Box I

(To be used when the space in any of Boxes I to IV is not sufficient)

Continuation of Box No: III

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

In assessing whether there is more than one invention claimed, I have given consideration to those features which can be considered to potentially distinguish the claimed combination of features from the prior art. Where different claims have different distinguishing features they define different inventions.

This International Searching Authority has found that there are different inventions as follows:

- Claims 1 to 18 and 22 to 25 define a side wall assembly for a container comprising a plurality of pivotally interconnected triangular elements. It is considered that the side wall assembly for a container comprising a plurality of interconnected triangular elements comprises a first distinguishing feature.
- Claims 19 to 21 define a container comprising a plurality of side wall assemblies comprised of pivotally interconnected elements, where contiguous edges of at least two adjacent elements incorporate means for controlling relative rotation between the two elements about the contiguous edges. It is considered that a container comprising a plurality of side wall assemblies comprised of pivotally interconnected elements, where contiguous edges of at least two adjacent elements incorporate means for controlling relative rotation between the two elements about the contiguous edges comprises a second distinguishing feature.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

The only feature common to all of the claims is plurality of pivotally interconnected elements. However this concept is not novel in the light of:

US 5161709 A (OESTREICH, JR.) 10 November 1992

This means that the common feature can not constitute a special technical feature within the meaning of PCT Rule 13.2, second sentence, since it makes no contribution over the prior art.

Because the common feature does not satisfy the requirement for being a special technical feature it follows that it cannot provide the necessary technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention *a posteriori*.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2010/000712

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US 2005/0224563	CA 2563072	CA 2579189	CA 2613841
	CA 2634884	CA 2634890	CA 2634985
	CA 2634994	US 2006/0138203	US 7631799
	US 7699212	US 2007/0241173	US 2007/0241174
	US 2007/0246519	US 2008/0000901	US 2008/0035717
	WO 2005/100170		
US 1202253	NONE		
US 3376994	NONE		
WO 1992/015490	NONE		
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.			
END OF ANNEX			