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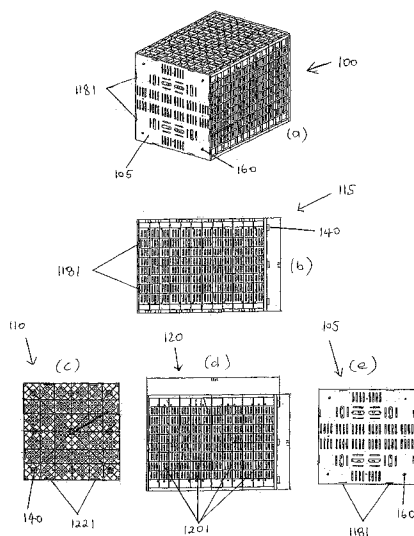


Figure 1

(57) Abstract: The present invention provides a collapsible packaging system comprising a lid; a base; and four sides each comprising one or more side panels; wherein the side panels are releasably interlocked using male and female connecting portions to form an assembled packaging system; and wherein the packaging system may be collapsed from an assembled state to a collapsed state into individual components which are stackable in a substantially flat configuration.



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"Packaging system"

Cross-Reference to Related Applications

The present application claims priority from Australian Provisional Patent Application No 2007906627 filed on 5 December 2007, the content of which is
5 incorporated herein by reference.

Field of the Invention

The present invention relates to the field of packaging systems, containers and the like and specifically to a collapsible and reusable packaging system particularly
10 suitable for, but not limited to, use in the long-haul transport of fruit and vegetables.

Background of the Invention

Fruit, vegetables, products or articles of manufacture are usually transported in containers and sometimes over quite long distances. Such containers are typically
15 constructed of disposable materials such as paper, cardboard, wood or other materials which are rapidly decreasing resources. After these containers have reached the end of their destination, as they are disposable, they are usually discarded to landfill. Another drawback with such containers is that they are of relatively low strength and are subject to failure during transport thereby compromising the quality of the transported product.

20 Recyclable containers, while not discarded to landfill, nevertheless require sorting and shipping to other facilities in the recycling process, which contribute to pollution during chemical treatment processes.

Other shipping or long-haul transport containers are composed of reusable materials such as plastic and are usually reused several times before they are disposed
25 of. However, before these plastic containers can be reused, they require shipping back to their original location. Since these plastic containers may occupy the same volume of space whether they are full or empty, shipping these plastic containers back to their original location, means that the same amount of space in the shipping vehicle is required to ship them back as is required to ship them to the destination location. This
30 necessitates that such vehicles be dedicated to ship such plastic containers back to their original location for their reuse. This also becomes a waste of resources.

Whilst corrugated containers have been popular for use in transporting products such as fruit and vegetables in the past, more recently, large chain retailers are promoting RPC's (returnable plastic crates) as an integral part of their business
35 operations. In such operations, RPC's ranging in internal volume of about 10 litres to about 40 litres are provided to the fruit and produce growers. Typically, existing

RPC's have average dimensions (mm) 150H x 385W x 578L, and range in weight from about 1.8 to about 2.4 kg. This compares unfavourably to a weight of about 0.9 kg for corrugated packaging of comparable volume, wherein the greater weight of existing RPC's significantly adds to the transport costs.

5 Accordingly, there is a need in the art for a transport container that is lightweight, strong, able to accommodate large loads (up to and even above 1000 kg) per container, and cost effective to utilise, transport and manufacture.

Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is solely for the purpose of providing a
10 context for the present invention. It is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed before the priority date of each claim of this application.

15 Summary of the Invention

The present invention provides a collapsible packaging system comprising:

a lid;

a base; and

four sides each comprising one or more side panels; wherein

20 the side panels are releasably interlockable using male and female connecting portions located on the side panels to form an assembled packaging system; and wherein

the packaging system may be collapsed from an assembled state to a collapsed state into individual components which are stackable in a substantially flat
25 configuration.

In another aspect, the invention provides a collapsible packaging system that is a container.

In the collapsed state, the packaging system is comprised of a number of individual (or separate) components that are able to be easily assembled without the
30 need to use special tools or permanent attachment means such as, for example, hinges or latches. This has the advantage of allowing the components to be arranged and stacked in a more compact and substantially flat configuration. Another advantage is that none of the male/female connectors comprise permanent fixing means, for example, a hinge, which is subject to wear and therefore requires frequent repair or
35 replacement. By virtue of its unique construction and design, the packaging system of

the invention is easy to assemble and is relatively hardwearing and inexpensive to manufacture.

Preferably, the lid, base and side panels are formed by injection moulding from a plastic selected from any one of high density polyethylene (HDPE), PE8008 + 5000S
5 (40%), PE80064, Enforcing Polypropylene (PP) or PP340. A preferred material is HDPE. Preferably also, the packaging system is moulded so that one or more of the base, lid, and side panels comprise holes which provide ventilation and also decrease the weight of the packaging system. In a particularly preferred embodiment, the packaging system is moulded such that each of the base, lid and side panels comprise
10 holes.

The packaging system in addition to the lid and the base, comprises four sides with the two opposing sides comprising male side panels having male connecting portions and the other two opposing sides comprising female panels having female connecting portions.

15 Preferably, each male side panel comprises one or more male connecting portions which are able to be received by female connecting portions located on each of the female side panels thereby enabling the male side panels to be interlocked substantially at right angles with the female side panels. In a preferred embodiment, each male side panel comprises six male connecting portions, three of which are
20 located on a left side of the panel and the other three located on a right side of the panel. It will be appreciated that in this configuration, the female side panel will also have six corresponding female connecting portions which are able to receive the male connecting portions, three of which are located on a left side of the male side panel and the other three located on a right side of the male side panel.

25 In addition to the male or female connecting portions located on the left and right sides of the side panels, the male or female side panels have one or more male or female locking portions located on a top or a bottom edge of the panel. Preferably, the male side panel has two male locking portions located on its bottom edge and two female locking portions located on its top edge. In this configuration, the female side
30 panel similarly has two male locking portions located on its bottom edge and two female locking portions located on its top edge. As such, two or more side panels are able to be positioned above and secured to any number of side panels to thereby vary the height of the packaging system. In a preferred embodiment, each side of the packaging system comprises four or five side panels interlocked with each other as
35 described above, however it will be appreciated that any number of side panels may be used per side as required.

Preferably, the base of the packaging system comprises a topside and an underside, wherein the underside comprises one or more projections. Preferably, the base has located on its underside 9 projections configured in a 3x3 arrangement. In a preferred embodiment, the projections are at least about 40 mm in length, preferably
5 between about 40 mm and 45 mm in length, most preferably about 43 mm in length.

The base may further comprise at least two recessed portions on its underside and located around its perimeter able to accommodate a forklift tyne. Preferably the base comprises eight recessed portions on its underside, two of which portions are located per perimeter side.

10 Preferably, the base further comprises male or female locking portions located on its topside which are able to receive, or be received by, respective male or female locking portions located on the edge of the side panels. In a preferred embodiment, the base comprises female locking portions, more preferably eight female locking portions (two on each side of its topside) which receive and are adapted to releasably interlock
15 the male locking portions located on the edge of each of the four side panels.

Once the packaging system is packed with articles, for example, fruit, the lid may simply be rested and supported on the edges of the side panels. The whole packaging system may then be shrink-wrapped to ensure the lid and contents are secured during transport. Alternatively, the packaging system of the invention provides
20 means whereby the lid may also be releasably secured to the side panels. In a preferred embodiment, this is achieved by the use of a locking system that is similar to that used to releasably secure the base to the side panels.

Accordingly, in one embodiment, the invention further provides a packaging system wherein the lid, having a topside and an underside, also has located on its
25 underside male or female locking portions which are able to be releasably secured with male or female locking portions located on the edge of the side panels. In a preferred embodiment, the lid comprises eight male locking portions (two on each side of its underside) which receive and are adapted to interlock with the female locking portions located on each edge of the four side panels.

30 In a preferred embodiment, all of the side panels have substantially identical dimensions of height, length and width. In order to further strengthen the assembled system and to allow the side panels to be interlocked with each other, the lid and/or the base, the male locking portions located on the top or bottom edges of the side panels each comprise a cavity through which a plug is inserted once the male locking portion
35 is inserted into a female locking portion. In this embodiment, storage recessed portions

are located on side panels in which the plugs are able to be stored when the packaging system is in the collapsed state.

In an embodiment on the invention, the lid may further comprise one or more clips which are received by clip receiving portions located on the edge of some or all of the side panels. Such clips advantageously allow the lid to be secured onto the uppermost side panels even when the packaging system is overloaded with articles, for example, fruit.

In order to provide yet further strength to the packaging system, the base may be reinforced with a lightweight steel frame. Preferably, the lightweight steel frame runs along the perimeter of the base and more preferably has additional cross-struts. Preferably also, reinforcing ribs are moulded into the components of the packaging system. Preferably, such ribs are moulded at positions experiencing high regions of stress upon loading, such as, at a male/female interlocking points between components, for example, interlocking points between two side panels.

When the system is in the collapsed state, the base preferably supports the lid and side panels wherein the lid and side panels are packed on top of the base in a substantially flat orientation. In a preferred embodiment, the collapsed and packed system is secured by means of at least one longitudinal member that is passed through an aperture on the underside of the base. Preferably, four longitudinal members are each passed through a corner projection (or foot) located on the underside of the base wherein each corner projection (or foot) has an aperture through its centre. In this embodiment, corresponding apertures are located on each of the lid and side panels which are aligned with the apertures located on the base when the packaging system is in a collapsed state and through which the longitudinal member may be passed. In a particularly preferred embodiment, the longitudinal member is a bolt, however, alternative longitudinal members such as wire, a rod or such like members may be used to secure the collapsed and packed system.

In another aspect, the invention provides a packaging system comprising;
a lid having dimensions of about 1170mm x 1170mm;
a base having dimensions of about 1170mm x 1170mm;
and four sides comprising one or more side panels each having dimensions of about 385mm x 1170mm.

Preferably, the packaging system according to invention is capable of carrying a load of about 1000 kg, and preferably comprises four or five panels per side and weighs, respectively, about 60 or 70 kg when in an unloaded state (including lid, base and all side panels).

Preferably, the lid, base, and side panel components are all fabricated so that at least one side of each component has a substantially smooth, flat surface which are faced inward with the packaging system is in the assembled state.

The packaging system of the invention may be used to package a variety of
5 articles, for example, book or bolts etc, however, is preferably used to package and transport produce such as fruit and vegetables. Preferably, the packaging system is used to package and transport produce such as, for example, bananas, pineapples, apples, pears, kiwi fruit, capsicum, carrots, etc. In a particularly preferred embodiment, the packaging system of the invention is used to transport bananas.

10 It will be appreciated that in another embodiment, the present invention also extends to a base and its use as, for example, a pallet. In this regard, it will be appreciated that the base is a lightweight reinforced structure which is capable of accommodating one or more forklift tynes by means of a plurality of projections extending from the underside of the base thereby providing a clearance between the
15 base underside and the ground. Accordingly, in another aspect, the present invention provides a base comprising:

a topside and an underside; wherein

the base is moulded from a lightweight plastic material and is further reinforced with a lightweight steel frame, and wherein

20 the base further comprises a plurality of projections extending from the underside of the base.

Preferably, the projections are at least about 40 mm in length, more preferably between about 40 mm and 45 mm in length, most preferably about 43 mm in length. The base may further comprise at least two recessed portions on its underside and
25 located around its perimeter. Preferably the base comprises eight recessed portions on its underside, two of which portions are located per perimeter side.

The base may further comprise male or female locking portions located on its topside. Such male or female locking portions are able to receive or be inserted into corresponding male or female locking portions located on the edge of the side panels.
30 In a preferred embodiment, the base comprises eight female locking portions (two on each side of its topside) which are adapted to receive the male locking portions located on the edge of each of the four side panels.

The present invention also provides a packaging assembly comprising the use of a packaging system according to the invention.

35 The present invention also provides a method of packaging and transporting articles comprising the use of a packaging system according to the invention.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

5

Brief Description of the Drawings

Figure 1 shows (a) a perspective view of the packaging system according to an embodiment of the invention; (b) one of the sides of the system shown in figure 1(a);
10 (c) the underside of the bottom portion of the system shown in figure 1(a); (d) another side of the system shown in figure 1(a) and (e) the topside of the top portion of the system shown in figure 1(a).

Figure 2 shows a perspective view of the system of figure 1, showing, in particular the
15 bottom portion and the projections (feet) extending from the bottom portion.

Figure 3 shows a perspective view of the system of figure 1 showing the ventilation holes more clearly on the top portion and sides.

20 Figure 4 shows (a) the topside of the bottom portion and (b) the underside of the bottom portion of the system of figure 1.

Figure 5 shows (a) the topside of the top portion and (b) the underside of the top portion of the system of figure 1.

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Figure 6 shows the internal side of a male side panel of the system of figure 1 detailing the male connecting portions on the side panel.

Figure 7 shows the external side of the male side panel of figure 6.

30

Figure 8 shows the internal side of a female side panel of the system of figure 1 detailing the female connecting portions on the side panel.

Figure 9 shows the external side of the female side panel of figure 8.

35

Figure 10 shows the system of figure 1 in a collapsed and packed state in (a) a perspective view; (b) in plan view from the bottom; (c) in plan view from the side and (d) in plan view from the top.

- 5 Figure 11 shows a reinforcing clip in accordance with an embodiment of the invention.

Figure 12 shows an exploded view of the clipping mechanism according to an embodiment of the invention that allows the lid to be secured to the side panels.

- 10 Figure 13 shows an exploded view of a portion of the system showing, in particular, the clip storage recess and reinforcing ribs.

Figure 14 shows (a) the reinforcing frame used to strengthen the base and (b) the reinforcing frame *in situ* in the base.

15

Detailed Description of Embodiments of the Invention

The packaging system in accordance with the invention is collapsible and reusable, the components of which are preferably made by injection moulding from a variety of materials. Such materials should be relatively lightweight yet strong enough
20 to avoid warping or buckling under high loadings, when lifted by a forklift or under high ambient temperatures. Possible materials include, but are not limited to, high density polyethylene (HDPE), PE8008 + 5000S (40%), PE80064, Enforcing Polypropylene (PP) or PP340, however, a preferred material is HDPE.

After the fruit, vegetables, products or raw materials are transported to their
25 destinations in the packaging system of the present invention, the system may be collapsed down to a substantially flat, compact package that occupies a minimal volume compared to conventional packaging systems. The system in an embodiment of the invention in the collapsed state is shown in figure 10. The collapsed flat package may be easily stacked and transported to its original location occupying a minimal
30 space on the transport vehicles once collapsed which advantageously results in the conservation of space within the transport vehicle. Such conservation of space translates into significant cost savings not only those paying for the transport (freight) costs, but also for the users of the packaging system of the invention, for example, the fruit growers in the case of the transport of fruit. The packaging system of the
35 invention also has a number of associated environmental benefits such as, for example, the avoidance of having to dispense of conventional containers to landfill after each use

and the ability to transport greater loads per packaging system (or per truck load) thereby reducing the number of truckloads required.

In an embodiment depicted in figures 1 through to 10, the packaging system 100, named by the inventors and to be known as SureStakTM, comprises: a top portion (lid) 105, a bottom portion (base) 110 and sides 115 and 120, with each side 115, 120 comprising four male side panels 1151 and four female side panels 1201.

Referring to figures 6, 7, 8 and 9, the male side panels 1151 have male connecting portions 118 which are received by female connecting portions 122 located on each of the female side panels thereby enabling the male side panels 1151 to be interlocked substantially at right angles with the female side panels 1201. As can be seen in figures 6 and 7, the male locking portion 118 comprises a shaft and a head and in this embodiment, the shaft and head together define a male connecting portion of a generally "T-shaped" configuration. As shown in figures 8 and 9, the female panel comprises female connecting portions 122 that are dimensioned to receive and interlock male connecting portion 118. The female connecting portion in the embodiment depicted in figures 8 and 9 has a cavity comprising a shaft and a head of a corresponding "T-shaped" cavity. To interlock the male and female panels substantially at right angles to one another, the head on the male locking portion 118 is received by the head on the female connecting portion 122 and the shaft of the male connecting portion 118 is then slid into the shaft of the female connecting portion 122. To release the male and female panels, the male connecting portion 118 is slid along the shaft of the female connecting portion 122 so that the head of the male connecting portion 118 may be removed from the head of female connecting portion 122. It will be appreciated that whilst the shaft and the head of connecting portions 118, 122 in the embodiment depicted in figures 6 to 9 is generally of a "T-shaped" configuration, the head on the male connecting portion 118 may be in the form of different shapes ranging from a flange, a bar, a boss or the like.

It can be seen that male side panel 1151 and female side panel 1201 each have further male locking portions 1181 and female locking portions 1221 as shown in figures 6 to 9. Male locking portions 1181 and female lock portions 1221 allow the side panels 1151 and 1201 to be positioned or vertically stacked on top of each other so as to thereby vary the height of the system. Similar female locking portions 1221 are located on the bottom portion (base) 110 (see figure 4) and male locking portions 1181 the top portion (lid) 105 (see figure 5). Accordingly, female locking portions 1221 on the base 110 are able to receive male locking portions 1181 on side panels 1151 or 1201. Similarly, female locking portions 1221 on side panels 1151 or 1201 are able to

receive male locking portions 1181 on lid 105. This thereby allows the base 110 or lid 105 to be releasably secured to side panels 1151, 1201. It will be appreciated, however, that in alternative embodiments of the invention, various arrangements of the male/female locking portions may exist, for example, the base may comprise male locking portions and the lid may comprise female locking portions as an alternative to the embodiment shown in figures 1 to 10. Accordingly, by the use of male/female locking portions on the side panels, the base and the lid, in combination with the male and female connecting portions on the side panels, the collapsible and reusable packaging assembly of the present invention is easy to assemble and collapse without the need for tools or special skills or instructions.

Referring to figures 11 and 13, in order to further strengthen and lock the components of the assembled system 100, plugs 170 (shown in figure 11) are slotted into cavities 1182 located on male locking portions 1181 (see figure 13). As can also be seen from figure 13, when the system is in the collapsed state, plugs 170 may be stored in recessed storage portions 172 located on side panels 1151 (see figure 7) and 1201 (see figure 9). In the embodiment shown in figure 11, plug 170, which is fabricated from a material that is able to flex under applied pressure, has body 173 and arms 175 which are able to be pinched towards body 173 and inserted into cavity 1182 located on male locking portion 1181 that is received by, and protrudes from, female locking portion 1221 when two side panels are stacked. Once plug 170 is inserted into cavity 1182 and the pinching pressure is removed, arms 175 spring back to their resting position thereby locking the two side panels and stabilising the system.

In order to further allow the lid to be secured to the side panels, clips 162 (see figure 12) are further provided on the lid (as shown in figure 5) which may be forced and clipped into corresponding clip receiving portions 165 (see figures 7, 8 and 9) located on each of side panels 1151 and 1201. Clips 162 located on the lid 105 advantageously allow lid 105 to be secured onto the uppermost side panels 1151, 1201 even when the system is overloaded with articles, for example, fruit. This is achieved by the insertion of clip 162 located on the underside of the lid 105 into clip receiving portions 165 located on the top side edges of side panels 1151 and 1201. By virtue of their resilient and flexible construction, clips 162 flex as they are forced and inserted into clip receiving portions 165. Ridge 163 located on clip 162 snap locks into clip receiving portion 165. To release the lid, pressure is applied to clip 162 to disengage and thereby release the engagement of ridge 163 with clip receiving portion 165 and the clip 162 is then pushed back through clip receiving portion 165.

In the embodiment of figures 1 to 10, although not shown in these figures, base 110 may be reinforced with a lightweight steel frame 190 (as shown in figure 14) so as to further strengthen the packaging system. Preferably, the lightweight steel frame runs along the perimeter of the base 110 and thereby reinforces the sections where side panels 1151 and 1201 connect with base 110. In the embodiment shown in figure 14, the steel frame not only runs along the perimeter of the base 110, but also has a cross strut configuration with two further sections 195 and 196 providing extra reinforcement.

It will be appreciated that although only two sides 115, 120 of the system are shown in figure 1, the sides directly opposite sides 115, 120 are identical in form and function.

As shown in figures 1 to 10 and 13, the base 110, lid 105 and side panels 1151, 1201 all have holes 130 which serve a number of purposes. By virtue of holes 130, the packaging system is lighter compared to conventional RPC's based on an internal (holding) volume to volume comparison. The holes 130 also have the advantage of providing ventilation by allowing adequate airflow through the system which is particularly advantageous in the fruit ripening process during storage and transport.

When conventional RPC's are loaded with produce and need to be moved or unloaded from a transport vehicle, they are usually stacked on a pallet wherein the pallet is designed to accommodate forklift tynes which lift and move the pallet loaded with one or more RPCs. In the embodiment shown in figures 1 through 10, the assembly is advantageously able to accommodate the tynes of a forklift by the use of projections (feet) 140 located on the underside of the base 110 thereby providing a clearance between the base 110 and the ground on which the base rests. The base 110 in this embodiment is further formed with recessed portions 155 which accommodate forklift tynes. Accordingly, by virtue of the unique construction of the base, this is able to serve as a pallet and so there is no need for the extra expense and storage space associated with the purchase and use of separate pallets. It can also be seen from figure 4 that base 110 in this embodiment has two recessed portions 155 per side which advantageously allows access of the forklift tynes from any side of the base (ie four-side entry) as opposed to only two-side entry with conventional pallets used in the art.

Referring to figure 4, the base 110 preferably comprises 9 projections (feet) aligned in a 3x3 configuration as shown more clearly in figures 1(c) and 2, however, it will be appreciated that greater or fewer projections may be used depending on the dimensions of the system. Preferably also, the feet are at least about 35 mm to about 45

mm high, preferably about 43 mm high, thereby allowing the tynes of a forklift to be accommodated by the clearance between the ground and the system base.

The packaging system according to the invention is preferably fabricated by a moulding process, for example, by injection or rotational moulding from high density polyethylene (HDPE). It will be appreciated that in order to minimise freight costs, it is desirable that the system be light in weight as possible without compromising on strength. Advantageously, the lid, base and side panel components all have holes 130 (as shown in figures 1 to 10 and 13) which not only provide ventilation, but also reduce the weight of the system. The ventilation holes also serve as a grip means, allowing easier handling of the components during assembly/disassembly and easier lifting and removal of the lid.

During loading, unloading and transport of RPC's, the possibility of damage occurring to the RPC is quite high. As the packaging system of the present invention comprises several releasably interlocking components, if damage occurs to one component, the whole system does not have to be replaced, but instead, only the damaged component will need to be replaced thereby reducing cost and the need to replace an entire unit.

As previously mentioned, the system of the invention is easy to assemble and collapse by means of releasably interlocking side panels 1151, 1201, lid 105 and base 110 having male/female connecting portions 118, 122 and locking portions 1181, 1221 that are injection moulded as part of side panels 1151, 1201 (which are more clearly depicted in figures 6, 7, 8 and 9). As a means of further increasing the strength of the packaging system, particularly for systems in which high loads are to be carried and transported, reinforcing ribs 150, as shown in figure 13, are injection moulded into the system components at positions experiencing high regions of stress upon loading and transport of the packaging system such as the regions surrounding the male/female connecting portions 118, 122 and the male/female locking portions 1181, 1221. Further strength and stability is imparted to the assembled system by the use of plugs 170 (as shown in figure 11) which are slotted into cavities 1182 (see figure 13) located on the male locking portions 1181 as previously described.

Referring to figure 10, this shows the system of the embodiment depicted in figures 1 through to 10 in a collapsed and packed state ready for transport. In the collapsed and packed configuration, the base 110 supports the other components (lid 105 and side panels 1151, 1201) wherein the lid 110 and side panels 1151, 1201 are packed on top of the base 110 and each other in a substantially flat orientation. Although not shown in figure 10, the collapsed and packed system may be secured by

means of a longitudinal member passed through the underside of the base. In a preferred embodiment, four longitudinal members are passed through the corner projections (feet) 140 located on the base 110 wherein each corner projection 140 has an aperture 160 (see figure 4a). Corresponding apertures 160 are located on each of the lid 105 (see figure 5) and side panels (see figures 6 to 9) through which the longitudinal member may be passed.

In a particularly preferred embodiment, the longitudinal member is a bolt wherein four bolts pass through feet 140 located on the underside of the base 110 through apertures 160. Each of the four bolts are also passed through the lid 105 and side panel components 1151, 1201 by virtue of specially moulded apertures 160 located on these components. Preferably each of the four bolts are bolted on the exit side to secure the collapsed and packed system. It will be appreciated that such an arrangement may be used to secure one or more collapsed and packed systems. It will also be appreciated that any number of longitudinal members may be used to secure a collapsed and packed system, for instance a wire, a rod or such like member.

In a preferred embodiment, the packaging system of the invention is used to transport fruit, more particularly, bananas. The system preferably comprises a top portion (lid) having dimensions of about 1170mm x 1170mm; a bottom portion (base) having dimensions of about 1170mm x 1170mm; and four side (two opposite sides comprising male panels and the other two opposite sides comprising female panels) with each male or female panel having dimensions of about 385mm x 1170mm. Preferably also, the projections (feet) on the base are at least 43 mm in length to provide enough clearance between the base underside and the ground to accommodate the tynes of a forklift. When used to transport about 1000 kg of bananas per packaging system, the packaging system preferably comprises four or five panels per side and weighs, respectively, about 60 or 70 kg when in the unloaded state (including lid, base and all side panels).

It will be appreciated that any number of side panels are able to be adopted depending on the article to be packed, load restrictions and required capacity of the system. Typically, factors which will determine the number of side panels adopted (and therefore the height of the packaging system) will be restrictions on load capacity, carrier (eg. truck, train or ship) dimensions and also the type of article to be transported. Although preferred dimensions of the assembly are provided above, it will be appreciated that the dimensions of the components may be altered to suit a specific purpose and also to meet any existing or imposed restrictions on load capacity and system size. It will also be appreciated that whilst in the embodiment depicted in

figures 1 to 10 all the side panels are of equal dimensions, the height of the side panels may be varied as required and panels of different heights may be used within the same packaging system. Side panels having equal dimensions are especially preferred however. It will also be appreciated that whilst the embodiment shown in figures 1 to 5 10 have a base and lid of square configuration, a rectangular configuration is also possible.

All components (lid, base, and side panels) of the system are preferably fabricated so that one side of the component has a substantially smooth, flat surface, devoid of projections. Preferably, the smooth flat sides of each component is faced 10 inward once packaging system is assembled. This is particularly advantageous when damage-prone articles such as fruit are to be packed into the system wherein the smooth surface of the interior minimises potential damage to the fruit during packing and transport.

In alternative embodiments of the invention, the projections (feet) on the system 15 base may be desirably configured so as to be able to be locked into position in a corresponding recess on the system lid to thereby enable two or more packaging systems to be stacked in a stable configuration.

In yet another embodiment of the invention, the top and bottom portions may be identical such that the base is able to also serve as a lid. Given that the top and bottom 20 portions are identical in this embodiment, this advantageously results in the requirement for only one mould to form both the top and bottom portions of the system. Desirably, the packaging system having identical top and bottom portions will be configured so as to be able stack one assembled packaging system on top of another in a secure and stable fashion.

25 In an alternative embodiment of the invention, the side panels may be configured to accommodate shelves between the layers of side panels at a position where one side panel is positioned on top of another panel to thereby separate the packaging system into two or more compartments. The use of shelves is particularly advantageous when high loads or damage-prone articles such as fruit are to be 30 transported, whereby the articles in the bottom of the system do not have to carry the entire weight of the load, but rather, part of the load is distributed throughout the shelving and thereby supported by the system.

Although particularly suitable for use in the fruit and produce industries, the packaging system of the present invention will be easily accepted in various industries, 35 including but not limited to, food industries, clothing and shoe industries, auto part

industries, or any other industry requiring shipping of articles from one locale to another.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific
5 embodiments without departing from the scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

CLAIMS:

1. A collapsible packaging system comprising:
a lid;
a base; and
5 four sides each comprising one or more male or female side panels; wherein
the male or female side panels are releasably interlocked using male and female
connecting portions located on the side panels, to form an assembled packaging system;
and wherein
10 the packaging system may be collapsed from an assembled state to a collapsed
state into individual components which are stackable in a substantially flat
configuration.
2. The collapsible packaging system according to claim 1 wherein the male or
female side panels further comprise one or more male or female locking portions
15 located on a top or bottom edge of the male or female side panel.
3. The collapsible packaging system according to claim 1 or claim 2 wherein each
side of the packaging system comprises a plurality of side panels.
- 20 4. The collapsible packaging system according to any one of the preceding claims
wherein each of the male locking portions located on an edge of a male or female side
panel further comprise a cavity adapted to receive a plug to thereby allow a side panel
to be interlocked with another side panel, the lid or the base.
- 25 5. The collapsible packaging system according to claim 4 wherein the side panels
further comprise storage recessed portions in which the plugs are able to be stored
when the packaging system is in the collapsed state.
6. The collapsible packaging system according to any one of the preceding claims
30 wherein the base comprises a topside and an underside and wherein one or more
projections are located on the underside.
7. The collapsible packaging system according to claim 6 wherein the projections
are each at least about 40 mm in length.

8. The collapsible packaging system according to claim 6 wherein the projections are each about 40 mm to about 45 mm in length.
9. The collapsible packaging system according to claim 6 wherein the projections
5 are each about 43 mm in length.
10. The collapsible packaging system according to any one of the preceding claims wherein the base comprises at least two recessed portions on its underside wherein each of the recessed portions are adapted to accommodate a forklift tyne.
10
11. The collapsible packaging system according to any one of the preceding claims wherein the base comprises male or female locking portions located on its topside, the male or female locking portions adapted to receive, or be received by, respective male or female locking portions located on a bottom edge of the side panels.
15
12. The collapsible packaging system according to any one of the preceding claims wherein the lid, having a topside and an underside, has located on its underside male or female locking portions adapted to receive, or be received by, respective male or female locking portions located on a top edge of the side panels.
20
13. The collapsible packaging system according to any one of the preceding claims wherein the lid further comprises one or more clips located on its underside that are received by corresponding clip receiving portions located on an edge of the side panels to thereby secure the lid to the side panels when the packaging system is in an
25 assembled state.
14. The collapsible packaging system according to any one of the preceding claims wherein all of the side panels have substantially identical dimensions of height, length and width.
30
15. The collapsible packaging system according to any one of the preceding claims wherein the base is reinforced with a lightweight steel frame.
16. The collapsible packaging system according to any one of the preceding claims
35 wherein one or more of the base, lid, and side panels comprise one or more holes.

17. The collapsible packaging system according to any one of the preceding claims wherein one or more reinforcing ribs are moulded into any one of the lid, base or side panels of the packaging system.
- 5 18. The collapsible packaging system according to any one of the preceding claims wherein the base is adapted to support the lid and side panels in a stacked arrangement when the packaging system is in the collapsed state, wherein the lid and side panels are secured to the base in a substantially flat configuration by means of at least one longitudinal member passing through aligned apertures located on each of the base,
10 side panels and lid.
19. The collapsible packaging system according to claim 18 wherein four longitudinal members are each passed through an aperture located on each corner projection on the underside of the base and through corresponding and aligned apertures
15 located on each of the lid and side panels to thereby secure the lid and side panels to the base in a substantially flat configuration when the packaging system is in the collapsed state.
20. The collapsible packaging system according to claim 18 or claim 19 wherein the
20 longitudinal member is in the form of a bolt, a wire or a rod.
21. The collapsible packaging system according to any one of the preceding claims wherein the lid, base and side panels are formed by injection moulding from a plastic selected from any one of high density polyethylene (HDPE), PE8008 + 5000S (40%),
25 PE80064, Enforcing Polypropylene (PP) or PP340.
22. The collapsible packaging system according to any one of the preceding claims wherein the plastic is HDPE.
- 30 23. The collapsible packaging system according to any one of the preceding claims wherein the packaging system has the following dimensions:
a lid having dimensions of about 1170mm x 1170mm;
a base having dimensions of about 1170mm x 1170mm;
and four sides comprising one or more side panels each having dimensions of
35 about 385mm x 1170mm.

24. The collapsible packaging system according to any one of the preceding claims wherein the lid, base, and side panel components are fabricated so that at least one side of each component has a substantially smooth, flat surface, wherein the flat surface is faced inward when the packaging system is in an assembled state.

5

25. A base or pallet comprising:
a topside and an underside; wherein
the base is moulded from a lightweight plastic material and is further reinforced with a lightweight steel frame, and wherein

10 the base further comprises a plurality of projections extending from the underside of the base.

26. The base or pallet according to claim 25 wherein the projections are at least about 40 mm in length.

15

27. The base or pallet according to claim 25 wherein the projections are about 40 mm to about 45 mm in length..

28. The base or pallet according to claim 25 wherein the projections are about 43
20 mm in length.

29. The base or pallet according to any one of claims 25 to 28 further comprising at least two recessed portions on its underside wherein each recessed portions are adapted to accommodate a forklift tyne.

25

30. A method of packaging and transporting articles comprising the use of a packaging system according to any one of the preceding claims.

30

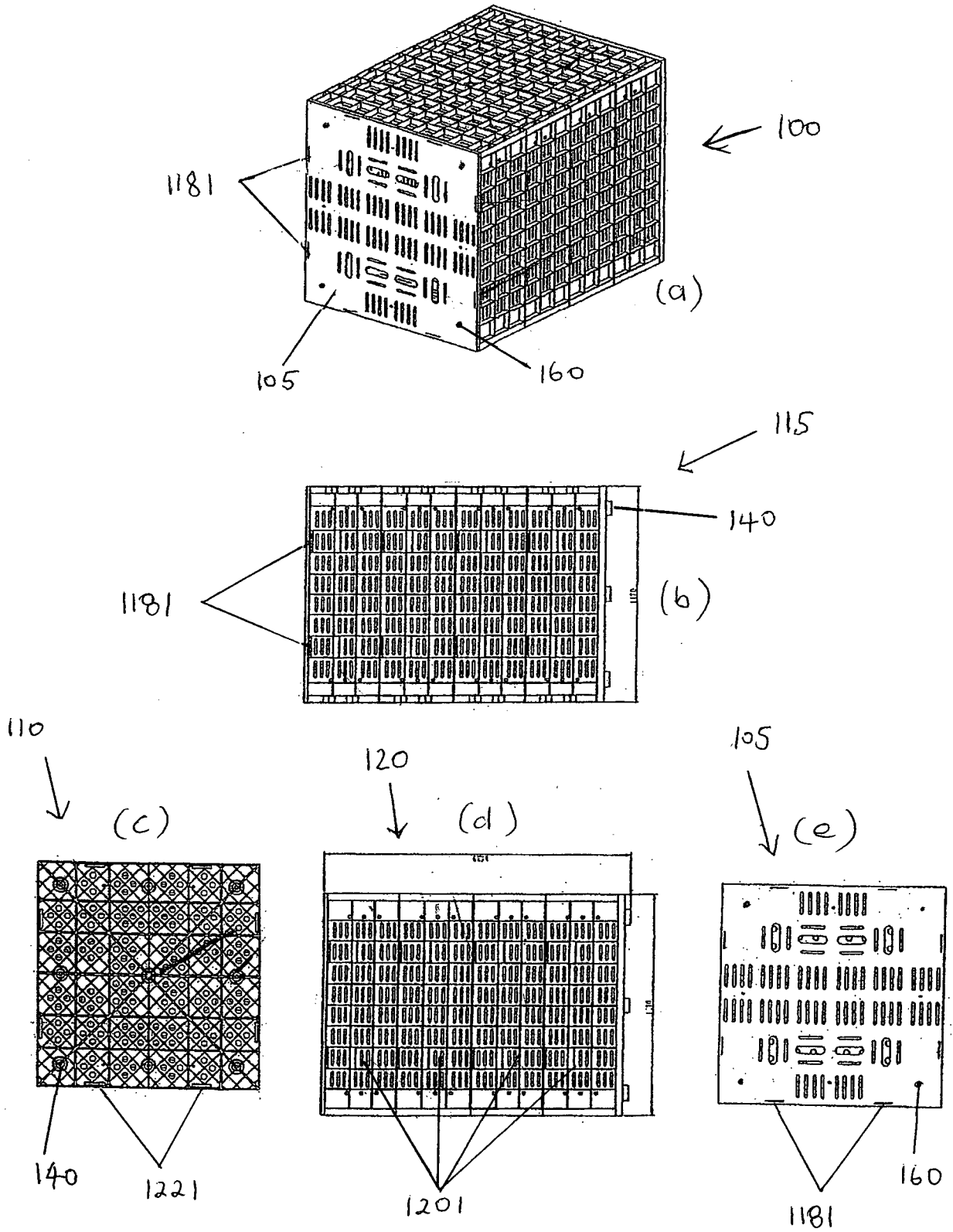


Figure 1

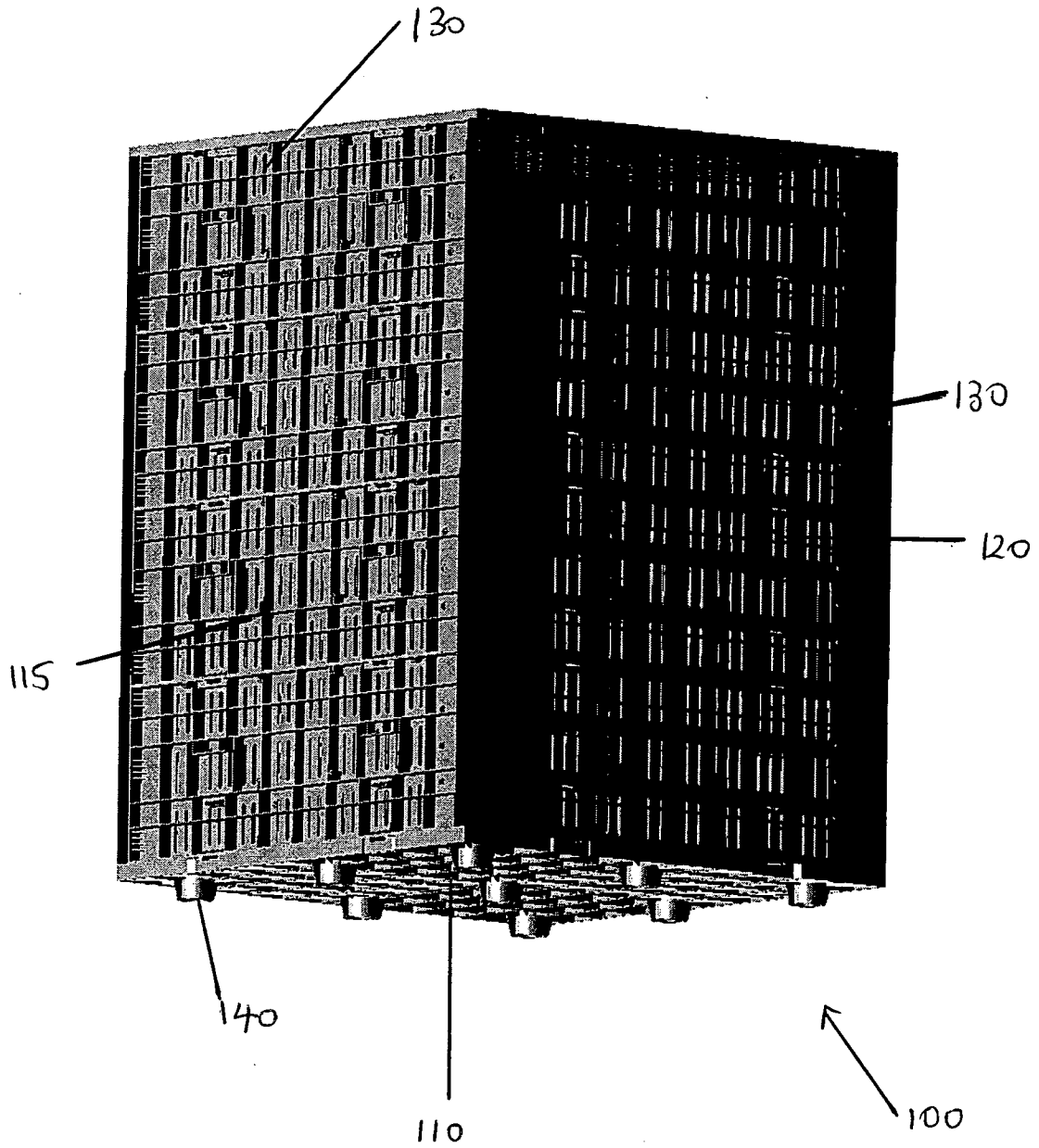


Figure 2

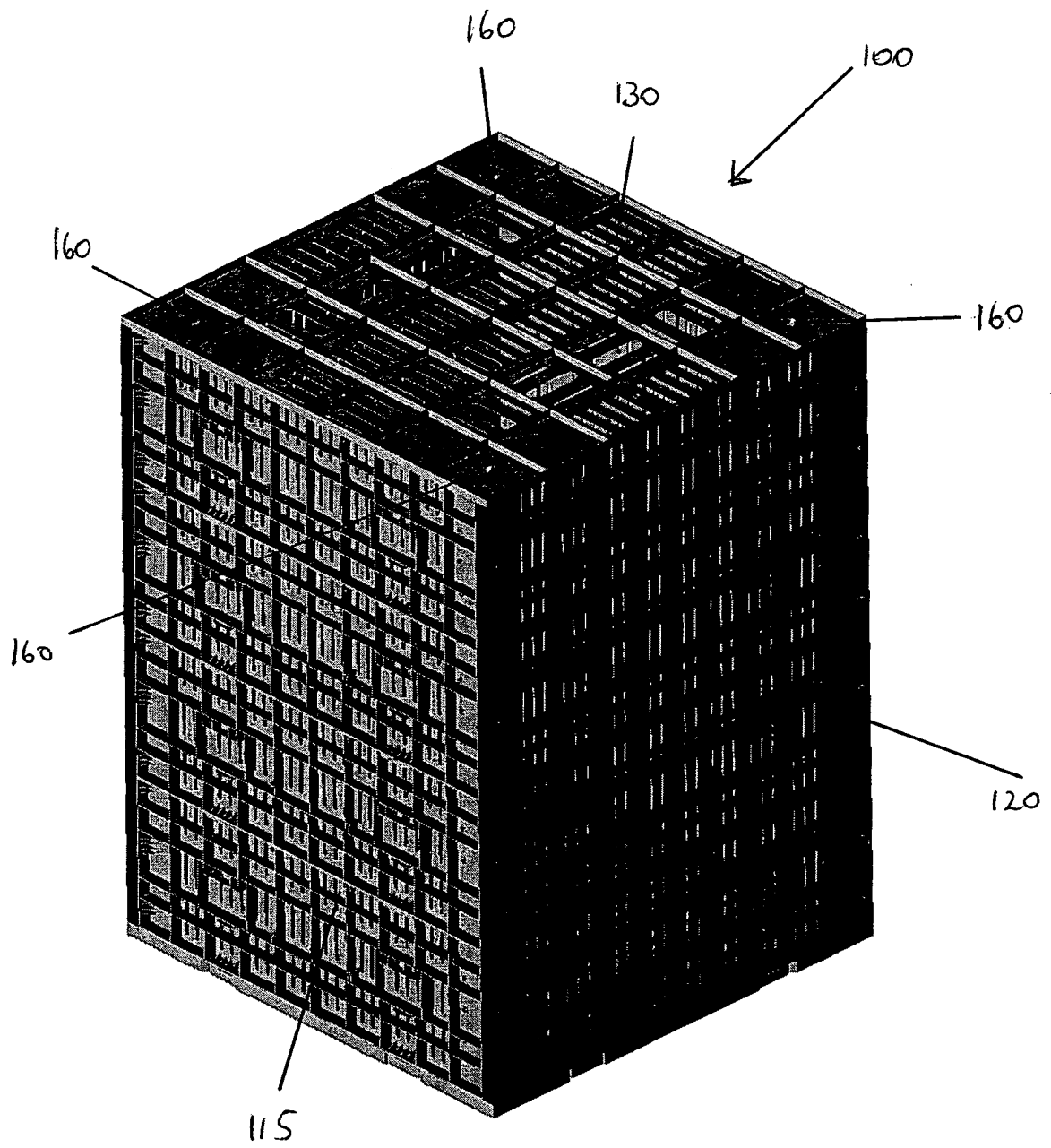


Figure 3

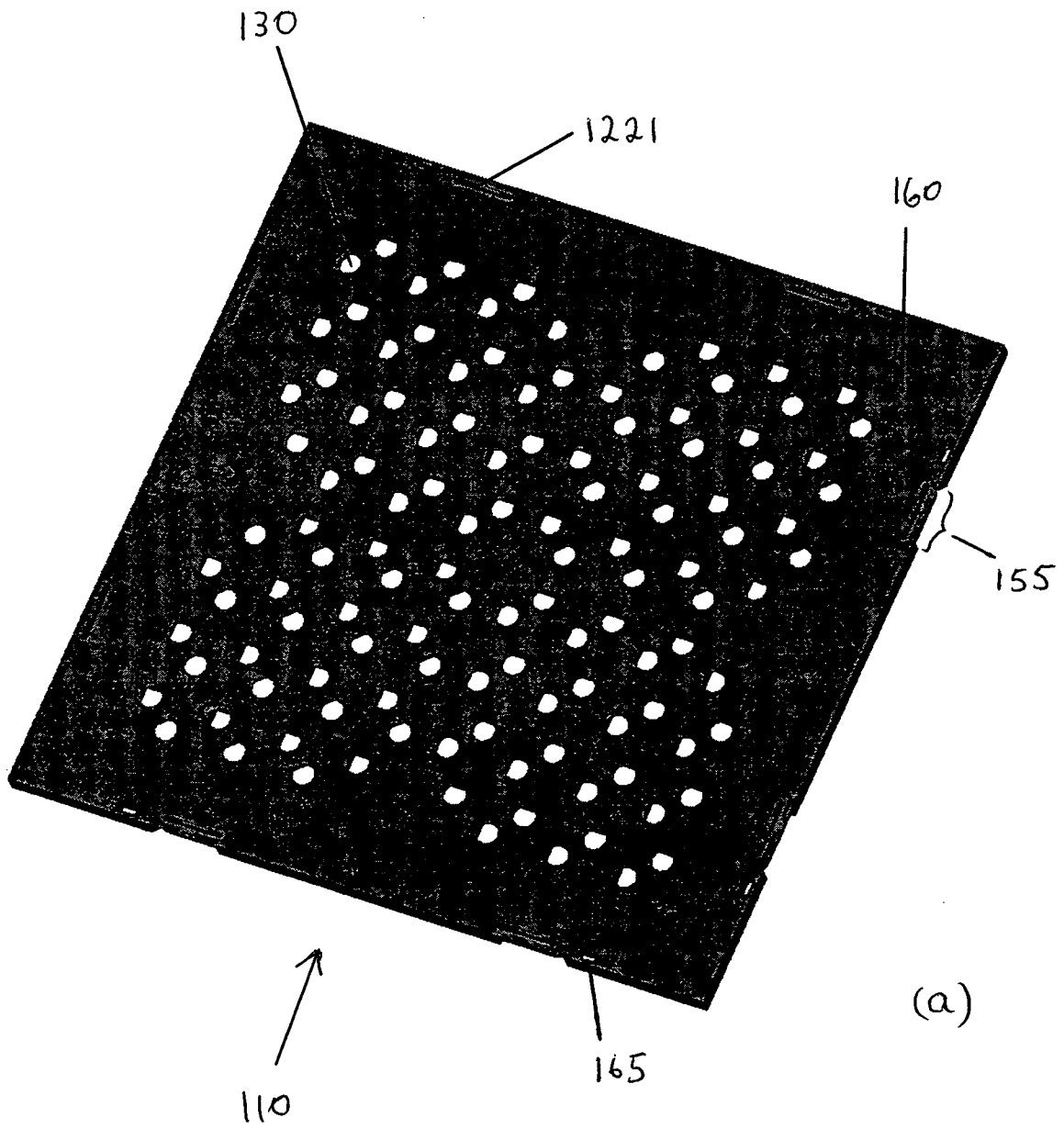


Figure 4

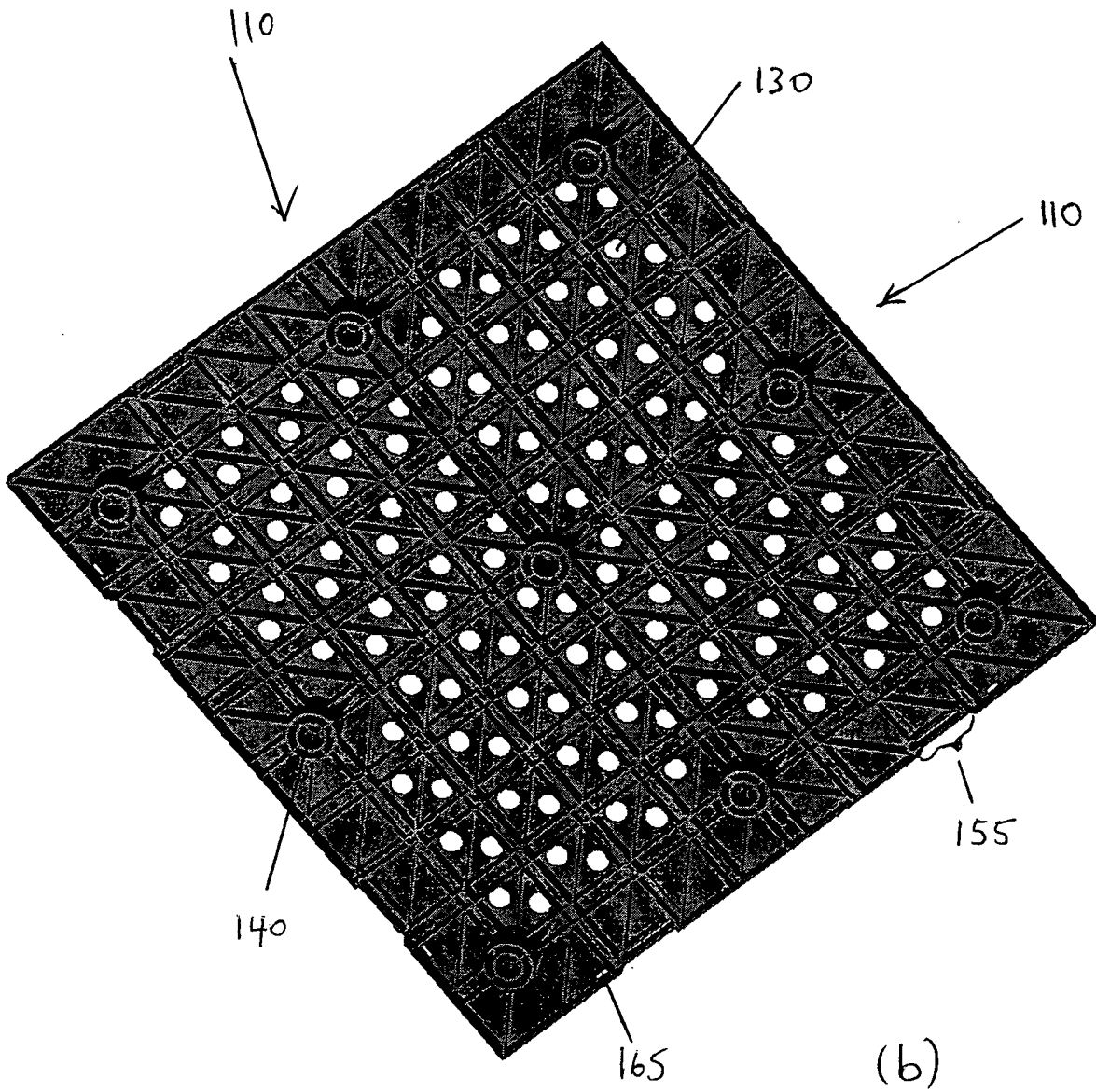


Figure 4 (cont.)

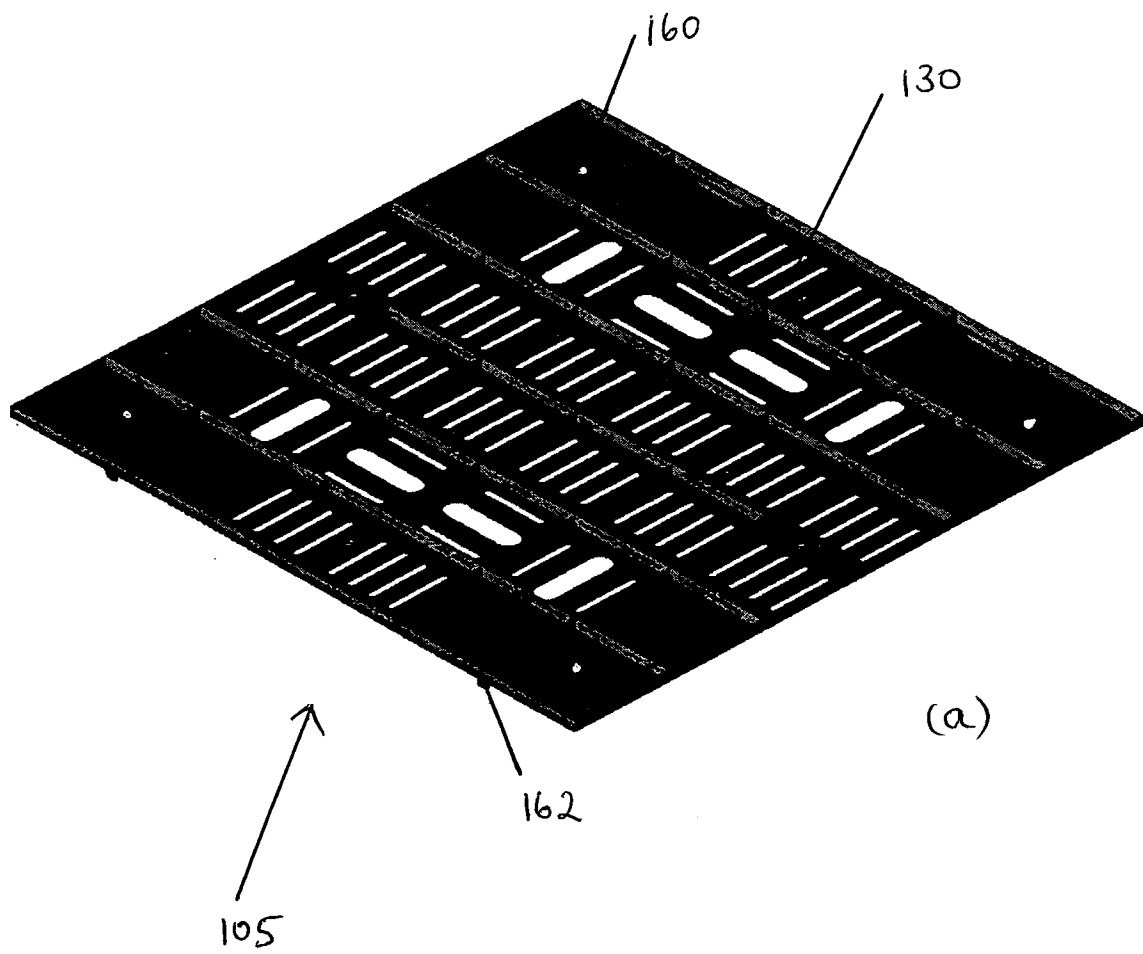


Figure 5

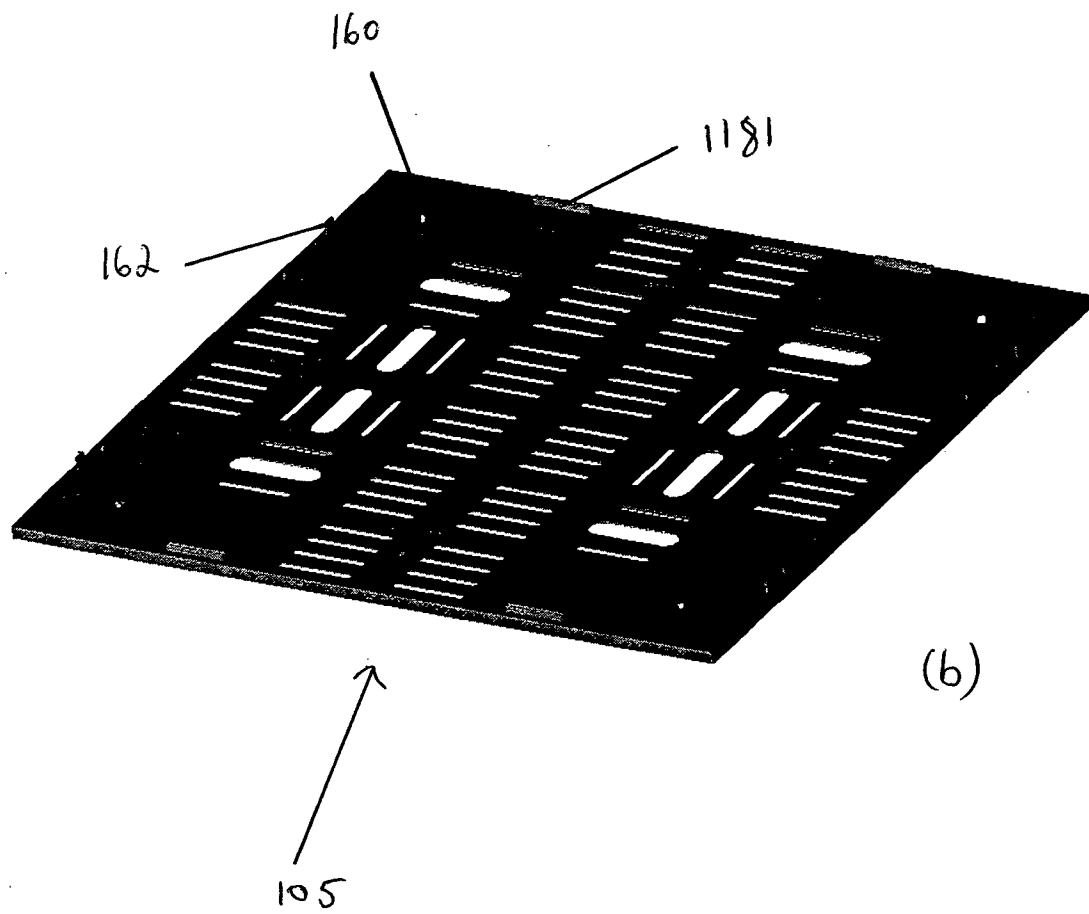


Figure 5 (cont.)

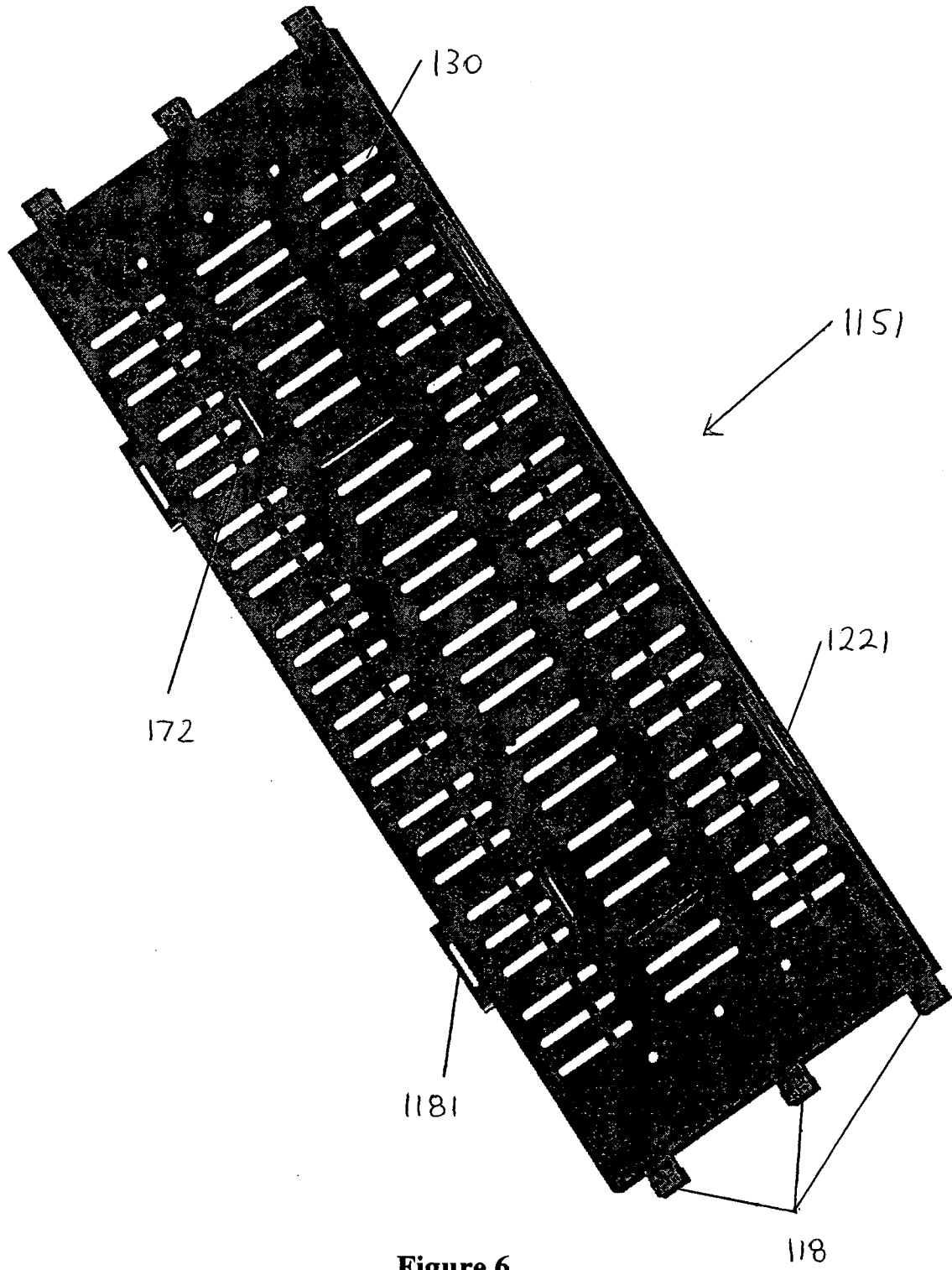


Figure 6

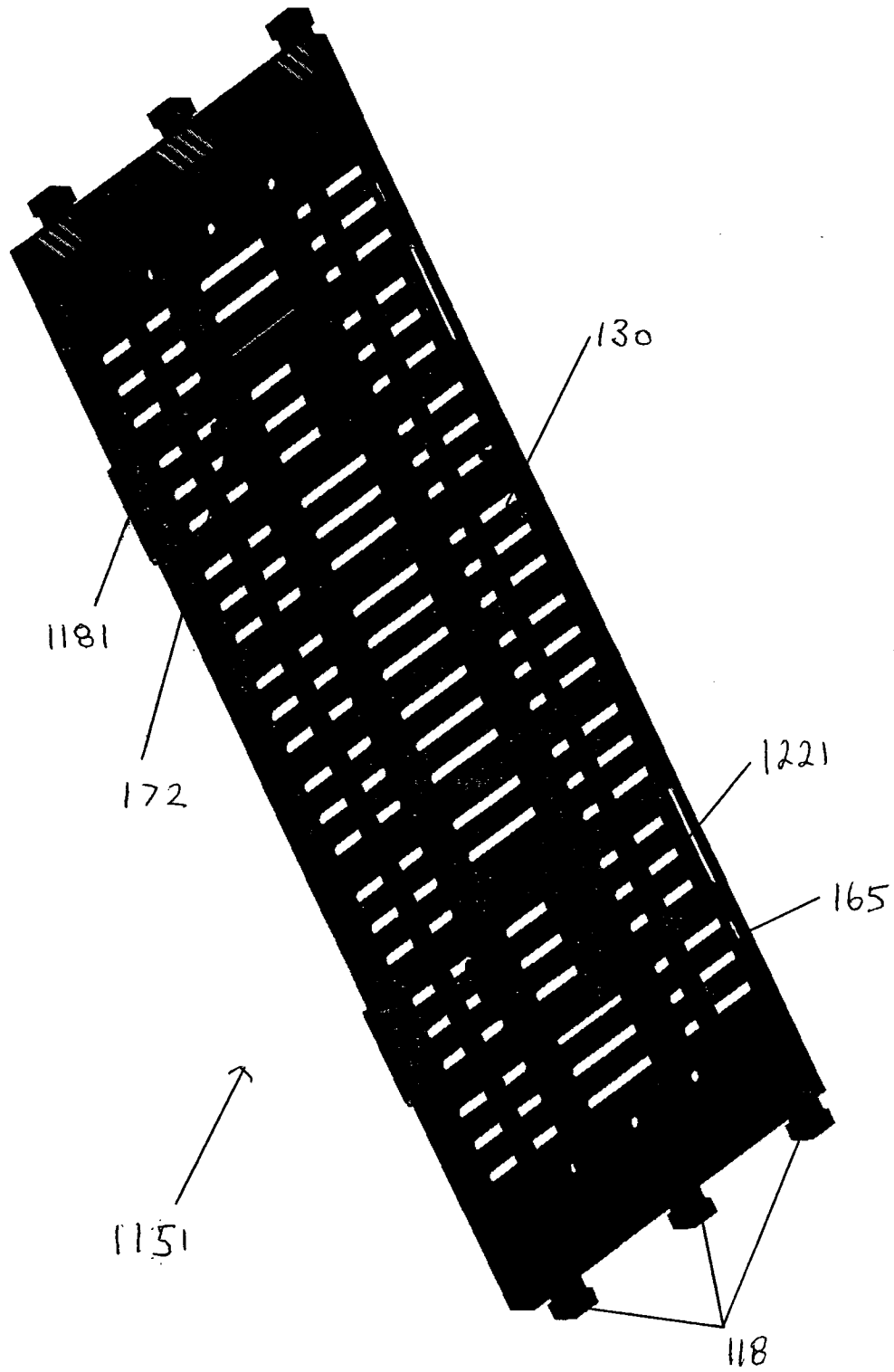


Figure 7

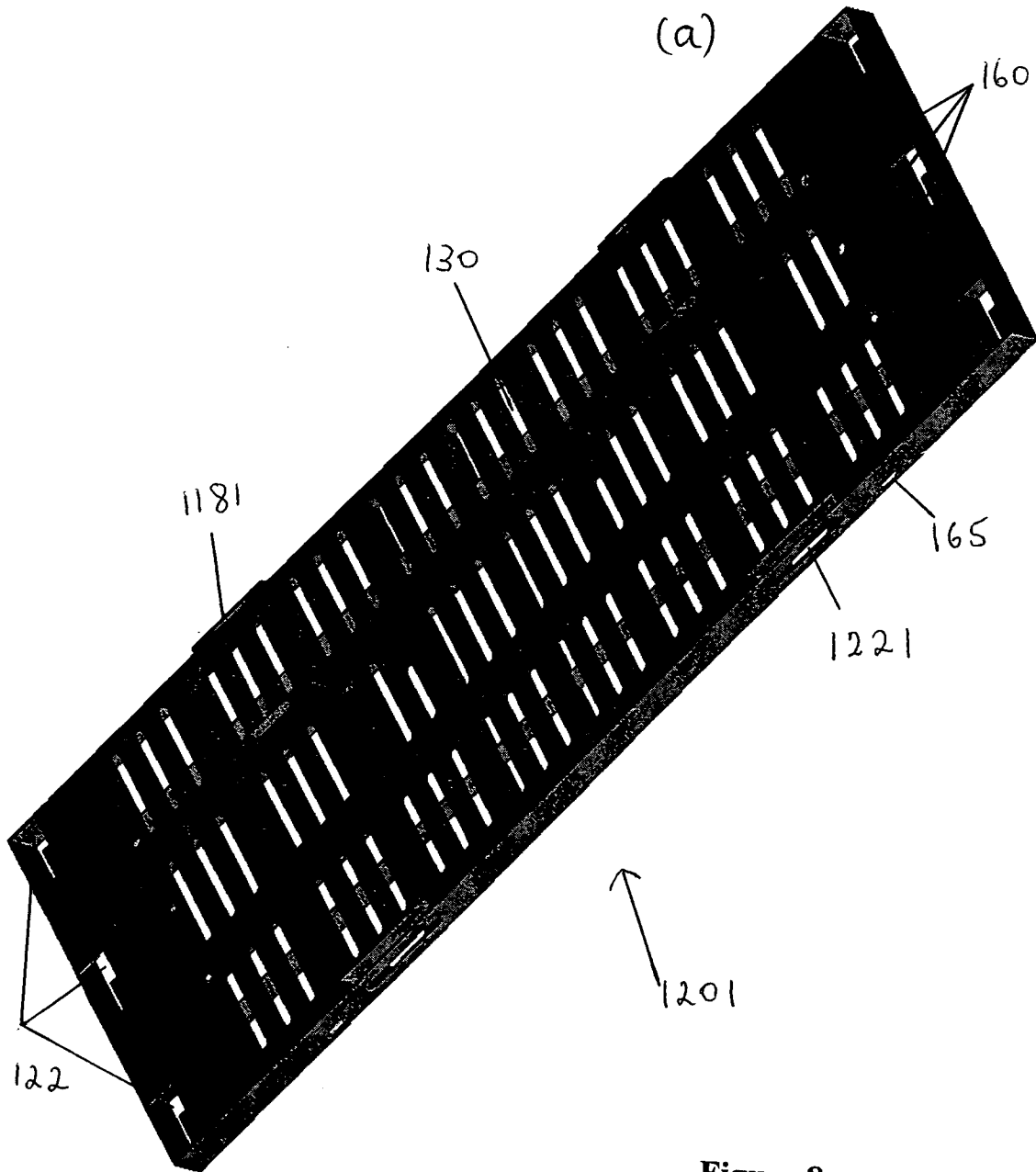


Figure 8

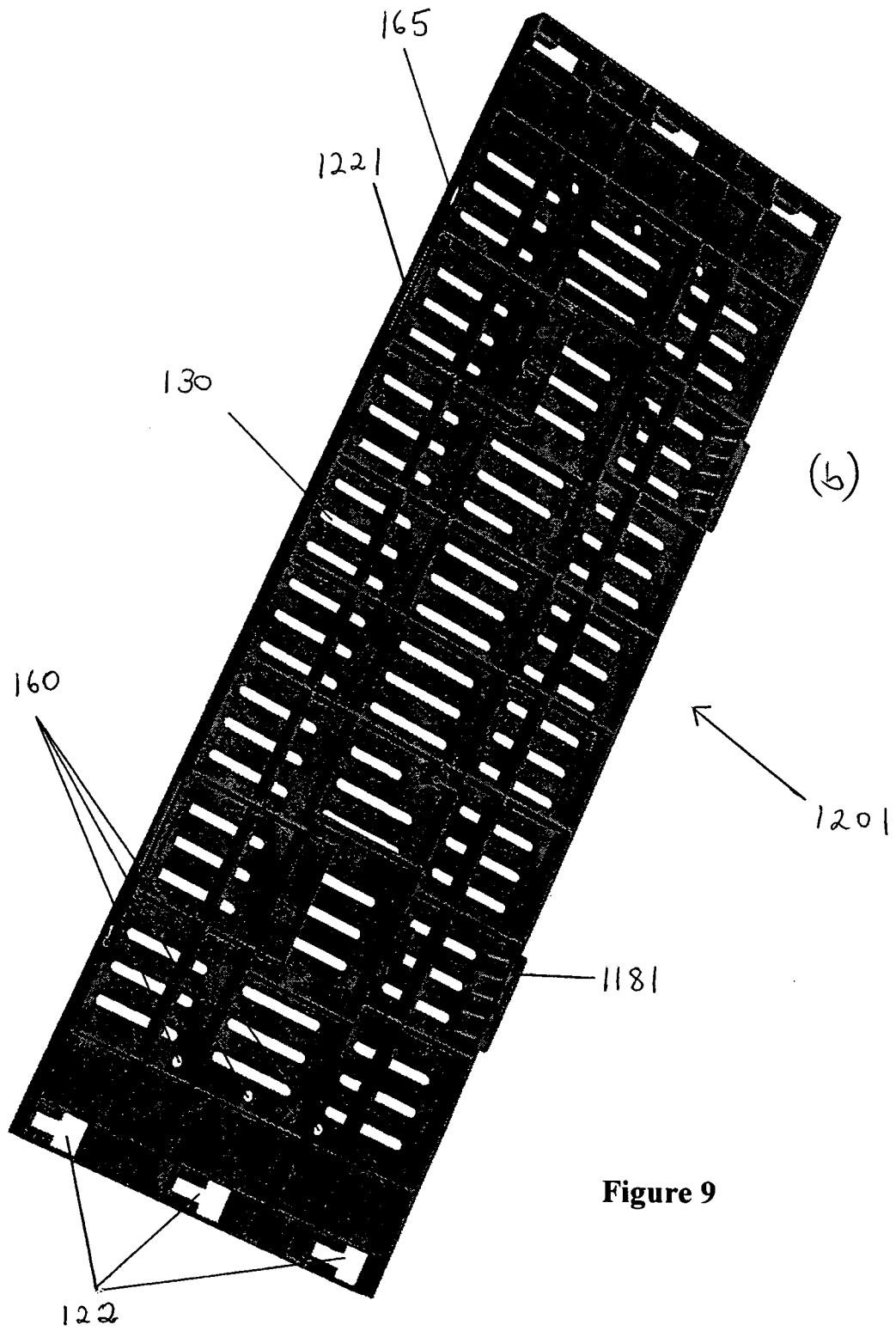


Figure 9

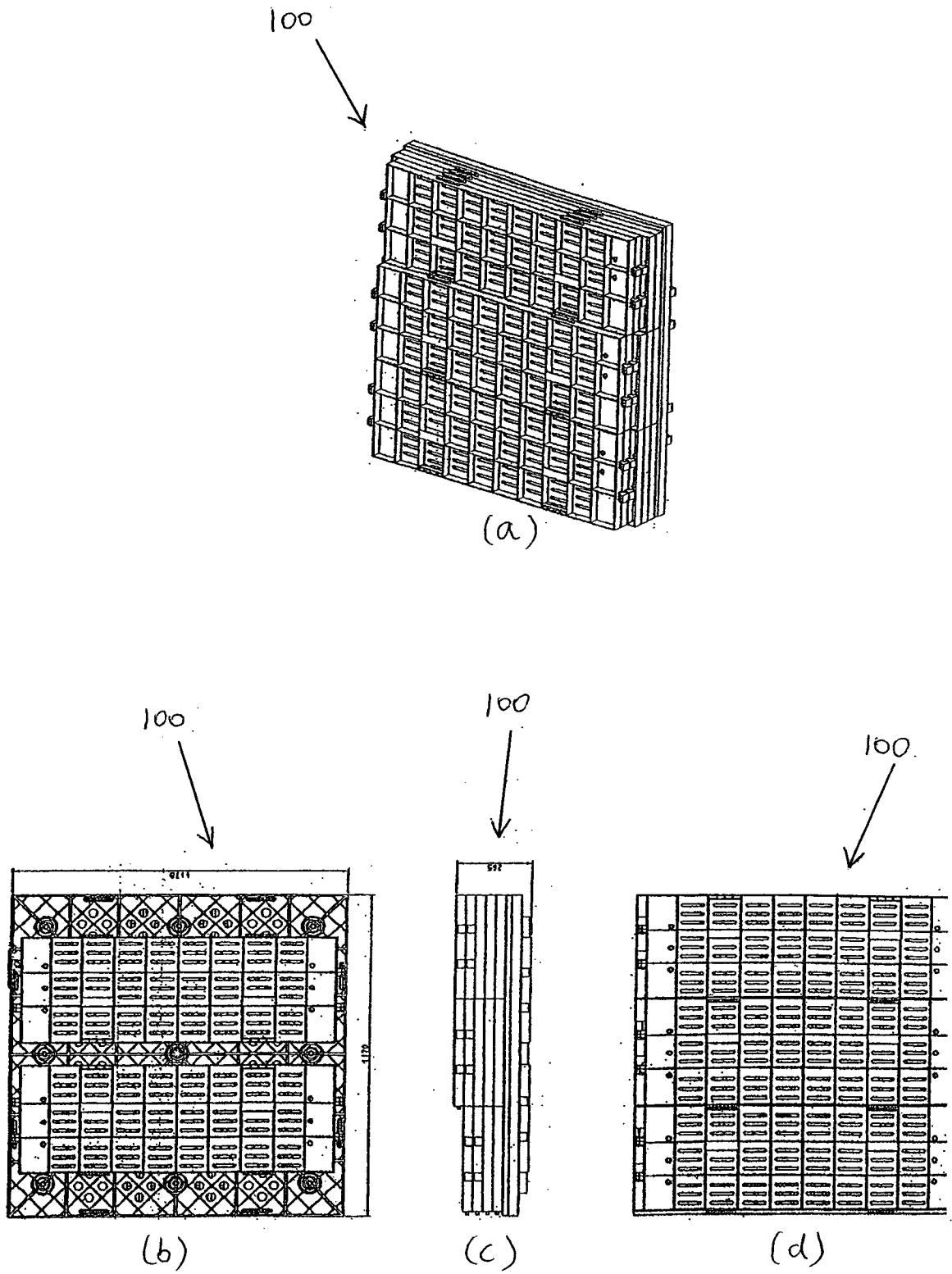


Figure 10

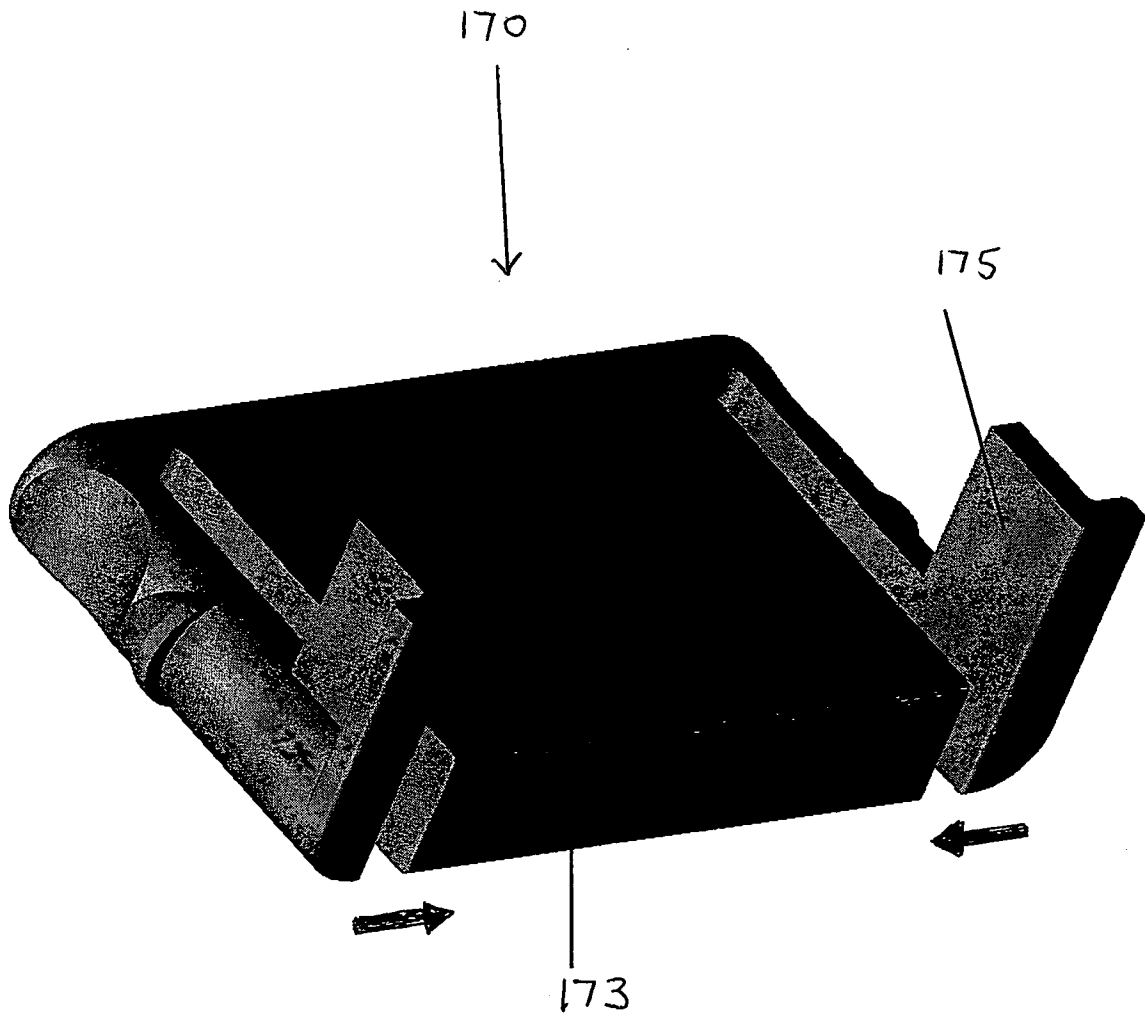


Figure 11

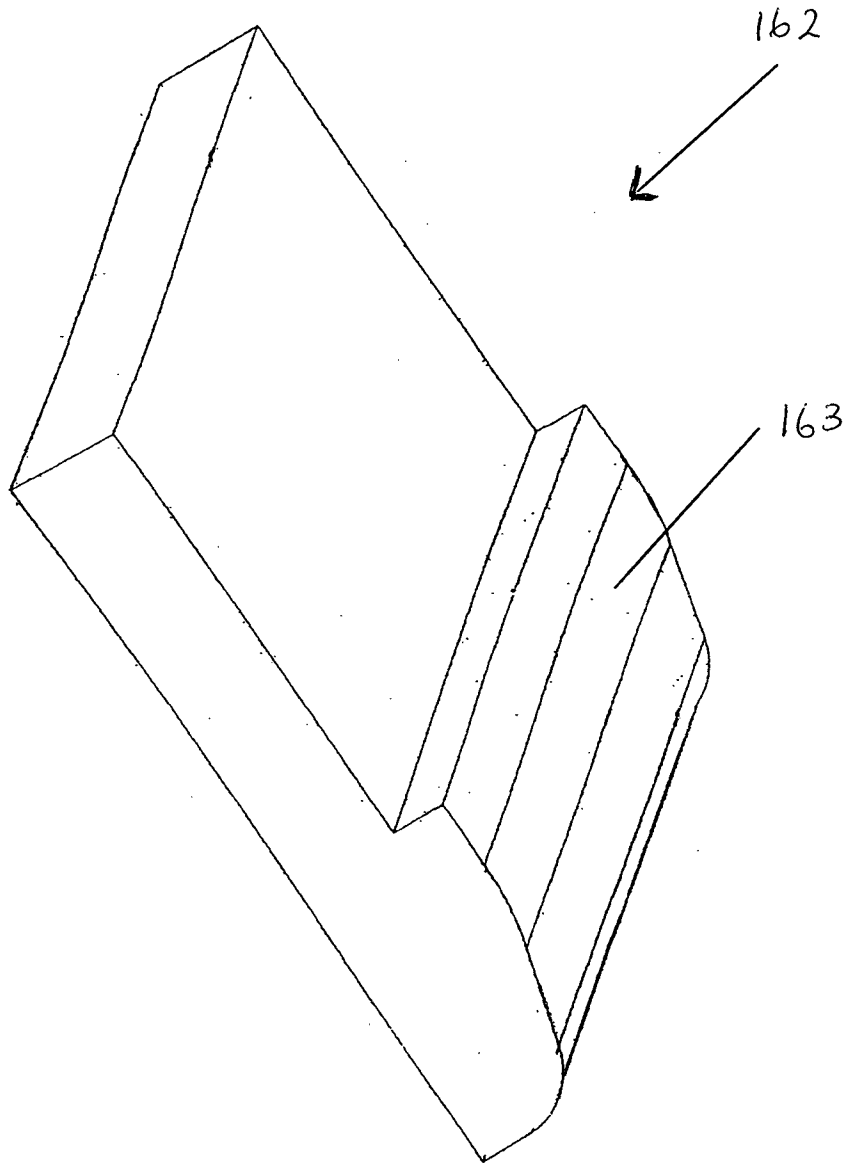


Figure 12

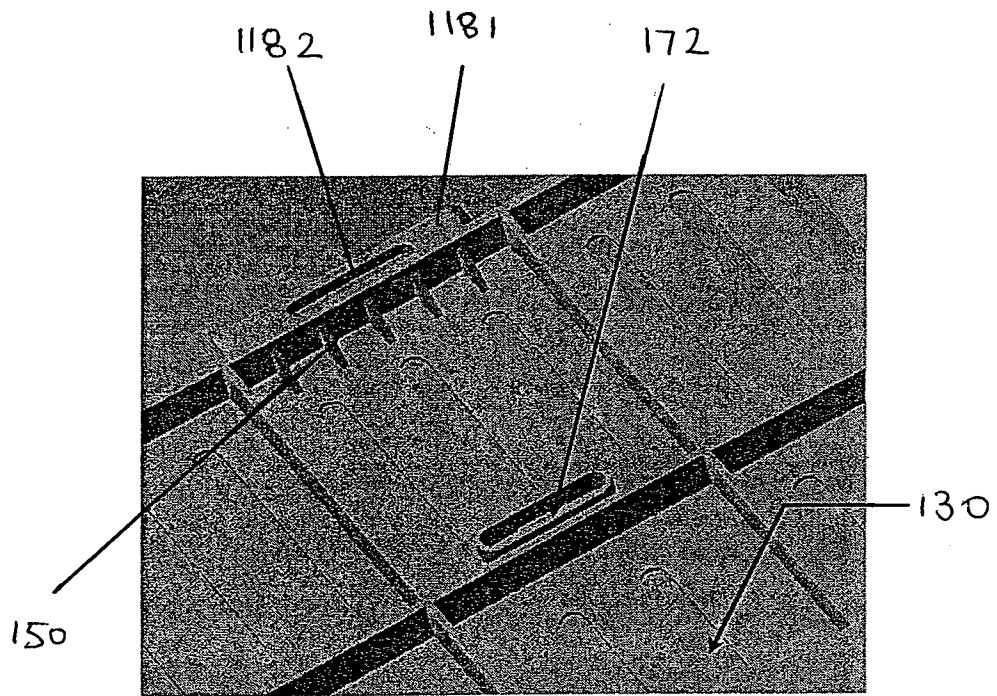
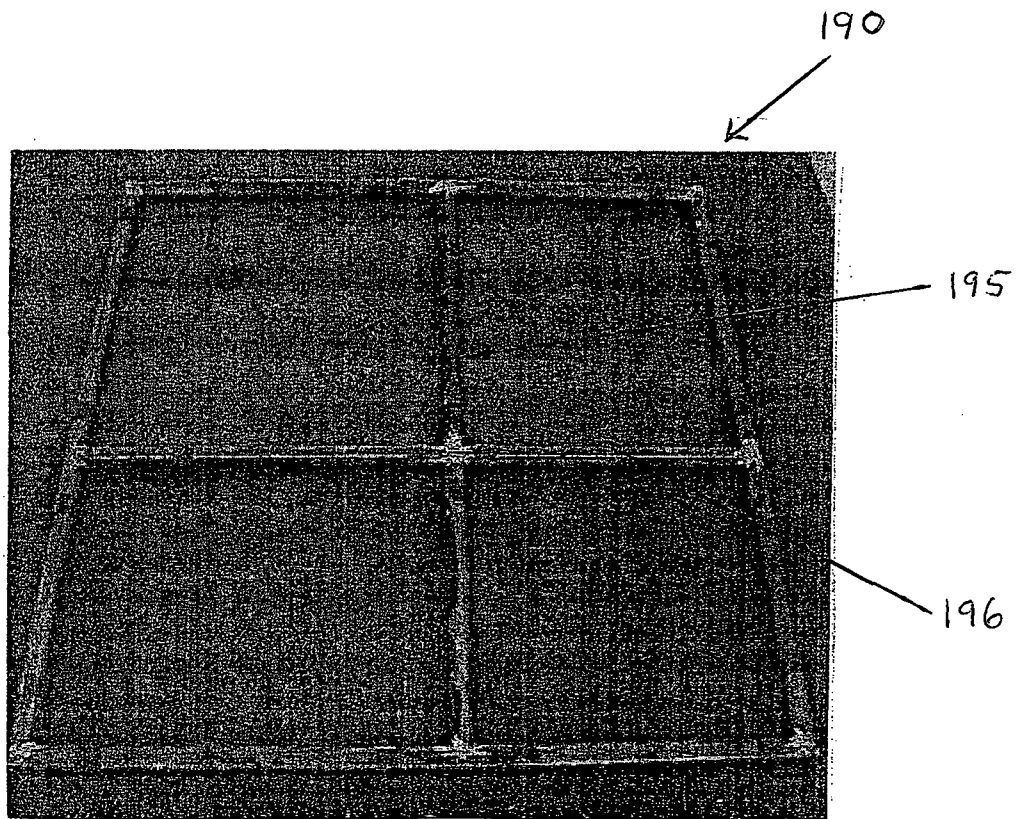
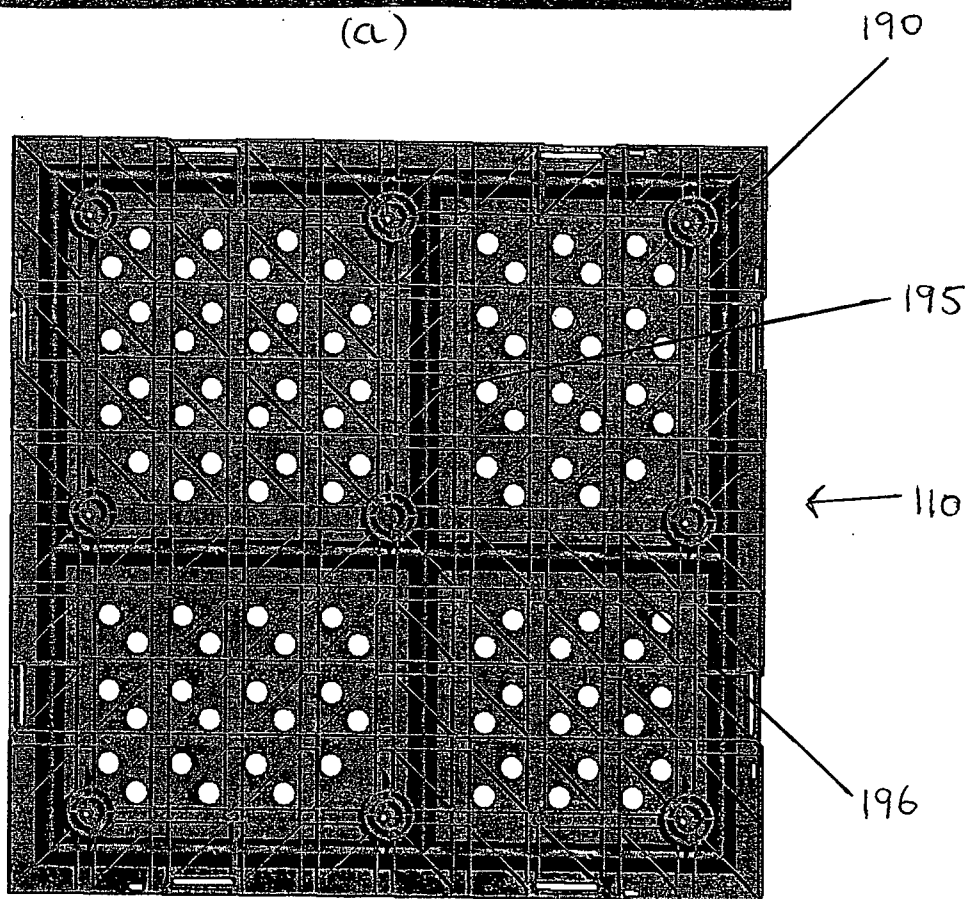


Figure 13



(a)



(b)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2008/001793

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

<i>B65D 6/10</i> (2006.01)	<i>B65D 6/34</i> (2006.01)	<i>B65D 21/032</i> (2006.01)
<i>B32B 3/00</i> (2006.01)	<i>B65D 19/18</i> (2006.01)	<i>B65D 85/34</i> (2006.01)
<i>B65D 6/24</i> (2006.01)	<i>B65D 21/028</i> (2006.01)	<i>F16B 12/00</i> (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)
 EPOQUE & WPI: Marks (B65D6/IC/EC, B65D19/IC/EC, B65D21/IC/EC, B65D85/34/IC/EC, B32B3/IC/EC, F16B12/IC/EC) &
 Keywords (collapsible, modular, foldable, demountable, container, box, trunk, plural, numerous, many, panel, side, wall, interlock, link, join, fasten, lock, secure, stack, arrange, vertical, rod, bolt, post, align and related 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 4782972 A (WENKMAN ET AL.) 08 November 1988 Entire Document, particularly Abstract; Figs. 2, 6, 7, 9, 10	1, 2, 4, 11, 14, 16, 17, 21-23, 30
Y	Entire Document	24
Y	WO 2004/087513 A1 (KIDSON ET AL.) 14 October 2004 Entire Document, particularly Abstract; claim 7	24
X	US 2003/0222080 A1 (FULTON ET AL.) 04 December 2003 Entire Document, particularly Abstract, Figs. 12a, paragraph [0055]	1, 2, 4, 11-14, 16, 17, 21-23, 30
Y	Entire Document	24

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

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"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	
"E" earlier application or patent but published on or after the international filing date	"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	
"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)	"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	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"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
06 March 2009

Date of mailing of the international search report **15 MAR 2009**

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2008/001793

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 Sheet 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.: 1-5, 11-14, 16-24, 30

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/AU2008/001793

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2002/092443 A2 (COTSWOLD DESIGN AND CONSULTANCY LIMITED) 21 November 2002 Entire Document, particularly Figs. 1, 3a, 3b	1-3, 11, 12, 14, 16, 21-23, 30
Y	Entire Document	24
<p>Note: For the "Y" indications, document two can be combined with documents one or three or four with relevance to claim 24.</p>		

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2008/001793

Supplemental Sheet 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:

- Claim 1 is directed to a collapsible packaging system with claimed features defining its collapsibility. The only feature(s) that may distinguish the claimed invention over the prior art are those relating to its collapsibility.
- Claim 25 is directed to a base or pallet where the base is of reinforced plastic material and having projections. The base or pallet is not collapsible. The only features that may distinguish the claimed invention over the prior art relate to the structure of the base.

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.

Each of the abovementioned groups of claims has a different distinguishing feature and they do not share any feature which could satisfy the requirement for being a special technical feature. Because there is no common special technical feature, the claims do not satisfy the requirements of unity of invention *a priori*. The inventions of claims 1 and 25 do both include a 'base' and a 'topside' which quite plainly cannot constitute special technical features within the meaning of PCT Rule 13.2, second sentence which defines a special technical feature as a feature which makes a contribution over the prior art.

Where appendant claims introduce features of one of the claimed inventions and yet are appendant to claims directed to the other of the claimed inventions, such claims will only be searched and reported on to the extent that additional search fees have been paid for both inventions. Since claims 6-10, 15 and 25-29 define features which are common to both the first and second inventions, they were not searched because the additional fees for the second invention have not been paid.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2008/001793

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 4782972	NONE
WO 2004087513	AU 2004226000 NZ 542387
US 20030222080	NONE
WO 02092443	GB 2375525

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX