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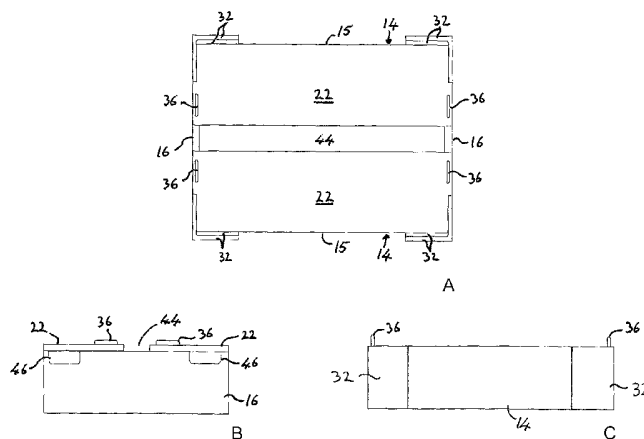
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(54) Title: TRAY OR BOX FOR TRANSPORT OF GOODS



(57) Abstract: A stackable box having an interior cavity for containing perishable articles in a controlled temperature environment. The stackable box has a rectangular base (12), a pair of side walls (14) and a pair of end walls (16). Spacers are arranged on the outside of the side walls (14), each spacer (32) formed at least in part by one or more extensions (32) from the end walls (16). When a pair of said stackable boxes are arranged side by side the respective spacers of the pair of stackable boxes abut with each other so that a vertically extending gap (42) is defined between the side walls (14) of the pair of boxes. The box may include a lid (22) movable so as to close and open the box and the end walls (16) may be of double thickness. The stackable box may be formed from a blank. A blank (10) for forming a stackable box is also described and claimed.

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Tray or box for transport of goods

Field of Invention

This invention relates to a stackable tray or box of the type used to transport fruit, vegetables and other perishable items in a controlled temperature environment. The invention will be particularly described with reference to a cardboard box or tray used to transport fruit and other horticultural produce, but it is to be understood that the invention can have other applications.

Background to the invention

Cardboard boxes and trays used for transporting perishable and bruisable fruit and vegetables from the facility where they are packaged to their point of sale need to be able to perform a variety of different functions. Firstly, the boxes need to be able to contain the items in a manner in which individual items are not subjected to physical damage. The boxes need to be stackable, since typically they would be stacked, one on top of the other, to a height of 2 meters or more, and the lowermost boxes need to be able to support the weight of the boxes and their contents above. The boxes also need to be able to withstand a certain degree of moisture absorption, since the environment in which the boxes are transported is typically relatively humid, and the items in the boxes typically have a high moisture content.

Patent publication number GB 2 173 480 A describes a stackable tray. The tray is made from a cardboard blank and has a base portion and peripheral edge portions folded to define side walls, one pair of a single layer of cardboard, the other pair of double form. The outermost parts of the end walls have folded extensions at the corners of the tray, which define upstanding projections and recesses.

Patent publication number GB 1540389 A describes a tray made from a folded blank. The tray has a rectangular base panel and two pairs of opposing side walls, one of which has a centre section having hinged to it at each of its opposing ends a wing section. The wing sections sandwich between them adjacent end portions of the side walls of the other pair of opposing side walls.

United States patent number 4,883,221 describes a carton tray apparatus. The apparatus includes a bottom wall, and side, end and top walls. Flaps emanate from the side, end or top wall to align and lock to one another, remaining ones of the side, end or top walls-to maintain the

apparatus in its articulated configuration, through locking means operably positioned within the flaps. These locking means engage and cooperate with elements in the adjacent side, end or top wall. Support columns extend between the top walls and bottom wall to further resist collapse of the apparatus during stacking. The top walls extend above and parallel to the bottom wall and partially cover the article containment region defined by the side walls, end walls and bottom wall.

United States patent number 6,286,753 describes a displayable produce container. The container is an open-top container comprising a bottom wall, two side walls, and two end walls. The concave ledges of the side walls contain curved scores. Each side wall contains two panels, each of which contains a mirrored curved score and two minor flaps. The curved scores cause the side walls to go into tension and create stacking shoulders for other containers. The minor flaps of the side walls surround the end walls to increase structural rigidity.

United States patent number 5,853,120 describes a tray apparatus with a reinforced corner structure. The tray has internal minor flaps which have been split to create inner and outer flaps which can be folded and aligned on the inside and the outside of the corner areas of the tray to provide vertically extending corner support structures in addition to the corners formed by the end and side walls of the container tray. In one embodiment the tray includes top wall portions and the corner support members emanate from opposite edges of the top wall members.

The trays described in the aforementioned patent publications may suffer from the problem that they are open top trays that are not closable and/or the internal space within the tray is reduced by internal extensions.

Since the boxes for transporting perishables are transported in a controlled temperature environment, there needs to be a fair degree of thermal transfer between the interior of the individual boxes, and the environment in which they are being transported. This invention is particularly concerned with this requirement. The trays described in the aforementioned patent publications may also or instead suffer from the problem of a limited ability to transfer heat from and to the interior of the boxes.

Transportation of fruit and vegetables is often performed over extremely long distances, often between different countries and continents. For example, fruit is often transported between the southern and northern hemispheres so that markets can take advantage of different summer and winter production seasons in the different hemispheres. Produce is often picked slightly

under-ripe, and then allowed to ripen en-route, so that on arrival at its point of sale the produce is at or near to its ideal state of ripeness for consumption, thereby ensuring high value at the point of sale.

In order to be able to achieve this state of readiness for consumption, produce will typically be transported in refrigerated containers set at a temperature which is at or close to the temperature where minimal ripening will take place, that is, the natural ripening process will be substantially stopped but not so low that the produce will be damaged. This temperature will differ from one type of fruit or vegetable to another. For example, mangos need to be transported at about 13°C, avocados at 7°C, kiwifruit at -0.5°C and so on. The refrigerated containers are designed to transport the produce contained therein at exactly the preferred temperature and humidity, irrespective of the outside conditions.

The environmental conditions within modern containers is able to be varied. That is, as the container nears its final destination it is possible to change the conditions within the container by, for example, increasing the temperature within. This then allows the produce to ripen rapidly (as the rate of ripening increases with increased temperature) so that at the point of sale it is at or near its ideal condition for consumption. This changing of the interior condition can be done manually or remotely.

In an attempt to ensure that all boxes of produce within the transport container are firstly kept at the correct temperature, and secondly are subjected to any change in conditions at or about the same time, transport containers have a special air circulation arrangement for circulating cooling air within the container. This arrangement in at least some containers comprises a fluted floor of the container defining a series of longitudinally extending air passages that run the length of the container. Refrigeration equipment is provided at one end of the container and is arranged to pump air at the optimal temperature and humidity down the air passages. This cooled air filters up past the stacked, produce filled boxes, and spent air is then extracted from the top of the container by the refrigeration equipment for re-cooling and re-circulation.

A problem with this arrangement is that the boxes are typically stacked within the container on pallets in an array of ten or so boxes per layer on each pallet. The boxes might be stacked two meters or more high, and the pallets are placed as close as possible together, thereby ensuring the maximum packaging efficiency within the container. This close packing

arrangement results in the produce towards the centre of each stack not being subjected to the same temperature control conditions as those boxes towards the outside of the stack.

This can result in a range of problems, such as produce towards the centre of the stack not being cooled adequately, ripening too early, and subsequently deteriorating. Produce will often itself generate heat, and if this is not carried away by the refrigerated air flow, uneven ripening and deterioration can occur. Also, where it is desired to change the ambient conditions in order to affect the ripening action, the produce towards the centre of each stack will, due to uneven air flow, have a delayed change of condition, again resulting in uneven ripening, and ultimately, less than optimum produce and hence reduced value of such produce.

It is therefore an object of the present invention to provide a box that meets the requirements for transporting fruit, vegetables and other perishable items in a controlled temperature environment, overcomes at least one of the problems of known boxes and/or provides the public with a useful alternative.

Any reference in this specification to the prior art does not constitute, nor should it be considered, an admission that such prior art was widely known or forms part of the common general knowledge in Australia, or in any other jurisdiction, before the priority date of any of the appended claims.

Summary of the Invention

The present invention relates to a box that integrates a vertical air flow channelling arrangement into the sides of the boxes. Providing a vertical air flow passage between adjacent boxes allows air to move through the palletised product without contact with the product in the boxes. This enhances heat removal from individual boxes. This heat removal can be achieved without product water loss which would otherwise compromise the product. Heat transfer from the product to the vertical air flow channel is via natural convection and conduction through packaging materials but is more effective than without channelling as the surface area for heat transfer from each individual box in the stack in such a system is both greater and more evenly dispersed.

According to a first aspect of the present invention, there is provided a stackable box having an interior cavity for containing perishable articles in a controlled temperature environment, the stackable box comprising a generally rectangular base, a pair of side walls extending upwards away from opposite sides of the base, a pair of end walls extending upwards

from opposite ends of the base, a lid formed from one or more lid parts that each extend from the upper edge of one of the side walls, the lid movable so as to close and open the box; and spacers arranged on the outside of the side walls, each said spacer formed at least in part by one or more extensions from the end walls, such that when a pair of said stackable boxes are arranged side by side the respective spacers of the pair of stackable boxes abut with each other so that a vertically extending gap is defined between the side walls of the pair of boxes.

Preferably, the spacers are connected to the end walls through a fold line or other hinge type connection.

Preferably, the stackable box is formed from a cardboard material, wherein the spacer is defined by at least two layers of said cardboard material.

Preferably, the stackable is formed from a single blank of corrugated and laminated cardboard material erectable to form the stackable box, wherein each spacer comprises two layers of the cardboard material, both layers consisting of an extension of one of the end walls. The end walls may be formed by the cardboard folded back on itself along a fold line and wherein the extension of the end walls consists of a first and second extension portion, one located on each side of the fold line, the first extension portion secured to the side wall and the second extension portion secured outside of the first extension portion. The first and second extension portions may be distinct extension portions.

Preferably, the side walls have a first length and the end walls have a second length, shorter than the first length.

Preferably, the end walls include at least one aperture to allow air flow between an interior and exterior of the stackable box.

Preferably, each spacer is secured to the side wall so as to provide structural support to the stackable box, assisting to support a load applied to the stackable box by like stackable boxes stacked on top of the stackable box.

Preferably, the stackable box may be formed from a blank, wherein the stackable box is maintained in a constructed form without any interior extensions so that the interior portion of the box is defined solely by the base, the pair of side walls, the pair of end walls and the lid.

Preferably, the end walls each further comprise at least one projection and the base further comprises at least one receptacle complimentary to the projection so that when like stackable

boxes are stacked on top of each other the at least one projection is received by the at least one receptacle so as to tend to maintain the boxes in a stacked configuration. Each said lid may have at least one second receptacle complementary to the at least one projection, the at least one second receptacle positioned to receive the projection when the lids are in a position so as to close the stackable box. The at least one second receptacle may comprise an aperture and the at least one projection extends through said aperture past the at least one lid so as to be receivable by the at least one receptacle in the base of a like stackable box.

Preferably, the box is erected from a blank of cardboard material having corrugations and the corrugations are aligned in an orientation such that with the box in its erected condition the corrugations in the spacer extend vertically. The corrugations may be aligned in an orientation such that with the box in its erected condition the corrugations in the end walls extend vertically.

According to a second aspect of the present invention, there is provided a blank comprising multiple portions suitable for forming a stackable box by folding the blank along fold lines at the intersection of the portions, the blank comprising a rectangular base portion having side edges and end edges that are shorter than the side edges, two end portions, one extending from each of the end edges, the end portions both extending away from the end edges of the base by a first distance and having a fold line at a mid point along said first distance to enable each end portion to be folded back on itself, two side portions, one extending from each of the side edges, the side portions both extending away from the side edges by a distance substantially equal to the distance between each end edge of the base and the fold line at a mid point of the respective end portion of the end edge, and end portion extensions connected to the end portions, the end portion extensions able to be located outside of and adjacent to the side walls when both the side walls and the end walls are substantially perpendicular to the base, the end portion extensions together partially covering the side walls when located outside of and adjacent to the side walls.

Preferably, each said end portion extension consists of two parts, one part located to each side of the fold line at said mid point of the end portions. Each of said two parts may have different dimensions so that when the extensions are oriented and located outside of and adjacent to the side walls both said parts extend along the side wall to substantially an equal extent.

Preferably, the end portion extensions together cover less than half of the side walls when located outside of and adjacent to the side walls.

Preferably, the blank further comprises a lid portion extending from one of the side portions, the lid portion operable to open and close the box when constructed. The blank may further comprise two lid portions, one extending from each of the side portions away from the base the lid portions operable to together open and close the box when constructed. Each said lid portion may include at least one receptacle and wherein the end portions include at least one protrusion complimentary to the at least one receptacle so as to be receivable by the at least one receptacle, the at least one protrusion extending from its end portion substantially parallel to the end portion when the end portion is folded back on itself along the fold line at said mid point of the end portions. The at least one receptacle and the at least one protrusion may be dimensioned so as to create an interference fit with each other. The base may have at least one further receptacle located to receive the at least one protrusion of a box made from a like blank when the blank is in a constructed form.

According to a third aspect of the present invention, there is provided a stackable box for containing perishable articles in a controlled temperature environment, the box having been formed from a blank and comprising a rectangular base, a pair of side walls comprising a single layer of blank material extending upwards from opposite sides of the base, a pair of end walls comprising a double layer of blank material extending upwards from opposite ends of the base, spacers arranged on the outside the pair of side walls, each said spacer comprising two layers of blank material and located to abut against a spacer of an adjacent like stackable box to said stackable box so as to define a vertically extending gap between the side walls of said boxes for the passage there through of ventilation air.

Preferably, each of the said two layers of blank material that comprise the spacers extend from one layer of the double layer of blank material of one of the pair of end walls, the two layers of blank material both extending around a corner of the box defined by the intersection of a said side wall with a said end wall and being secured to said side wall.

Preferably, the stackable box further comprises a lid extending from an upper edge of one of the side walls, the lid comprising a planar material and not having any fold lines other than a fold line at the intersection with said one of the side walls. The stackable box may further comprise a further lid, the further lid extending from an upper edge of the other of the side walls. Each lid may include apertures there through and the end walls each have protrusions extending there from, each said protrusion adapted to extend through one of said receptacles and engage with a

like stackable box located on top of the stackable box. The protrusions may extend through said receptacles so as to form an interference fit.

These and further features of the invention will be made apparent from the description of preferred embodiments of the invention given below by way of example. In the description reference is made to the accompanying drawings, but the specific features shown in the drawings should not be construed as limiting on the invention.

Brief description of the drawings

Figure 1 shows a plan view of a cardboard blank for use in erecting a stackable box according to the invention;

Figures 2a-c show plan, end and side views respectively of the erected box formed from the blank shown in figure 1;

Figure 3 shows a plan view of a cardboard blank for erecting a second embodiment of a stackable box according to the invention;

Figures 4a-c show plan, side and end views respectively of an erected box formed from a blank of a type shown in figure 3;

Figure 5 shows a plan view of a pair of boxes of the type shown in figure 1 or figure 3 located side by side with each other, the reference numerals used being consistent with figure 1.

Detailed description of the embodiments

Referring initially to figures 1 and 2, figure 1 shows a blank 10 and figure 2 shows a box formed from the blank 10. More particularly, figure 2a shows a plan view, figure 2b an end view and figure 2c a side view of the box.

The blank 10 for forming a box according to the invention is cut from a single sheet of cardboard using known cutting techniques. The cardboard might conveniently comprise a 3113C type cardboard or other suitable type of cardboard material. It should be understood that in the specification the term "cardboard" can mean any suitable cardboard or paperboard which will have sufficient strength and rigidity for the purpose intended. A dual arch (2 x 160 gm per m²); pulp-paper corrugated board with outside lines of 290 gm per m² kraft board, for example, will perform equally well. Clearly, depending on the application for which the box is intended,

different boards having different coatings can be used which will withstand the riggers of stacking, transportation and storage conditions.

It should also be appreciated that the term "box" used herein is intended to be broadly interpreted, that is, to include within its scope open and closed boxes, trays and like stackable containers for use in the transportation of perishable goods.

The blank 10, as shown, includes a base 12 having a pair of side walls 14 and end walls 16, which are defined by inner flaps 18 and outer flaps 20 that are connected by fold lines 19. Preferably, the fold lines 19 are each located along a centre line of the end walls 16 so that the inner flaps 18 and outer flaps 20 have the same dimensions. However, alternatively the fold lines 19 may be located at another mid-point of the end walls 16 so that the inner flaps 18 and outer flaps 20 have different dimensions. The side walls 14 each have a cover or lid flap 22 connected to the sidewalls 14 along a fold line 24. Optionally, each lid flap 22 may be formed in multiple parts, for example two parts each so as to create quadrants of the box, each quadrant accessible by opening a different part of one of the lid flaps 22. The side walls 14 are each connected to the base 12 along a fold line 26 and the end walls 16 are each connected to the ends of the base 12 along a fold line 28. The base 12 has four openings 30 cut therein for receiving projections of a box located there below, in the manner as described hereinafter.

Each end of both the inner flaps 18 and the outer flaps 20 of the end walls 16 has an extension 32 formed thereon. Each extension 32 is connected to the end walls 16 along fold lines 34. The extensions 32 are arranged to fold around the outside of the side walls 14 when the box is in its erected condition and be adhered or otherwise secured to the outside of the side walls 14, thereby holding the box in its erected condition and furthermore serving as compressive supports to strengthen the box in a vertical direction. Alternative ways of securing the extensions 32 to the side walls 14 include using staples, tape and/or rivets. Further alternatives may be apparent to a person skilled in the relevant arts.

The extensions 32, furthermore, serve as spacers or outwardly directed projections so that when the box is placed side by side with either another box, or a flat surface, the central portion 15 of the outside of the side walls 14 will be spaced away from the adjacent box or flat surface, thereby defining a vertically extending gap in the central region of the sidewall 14. This is described in more detail herein below.

Figure 1 shows the preferred embodiment of the present invention of a blank 10 having four extensions 32 for each end wall 16. In an alternative embodiment, the side-by side extensions 32 may be combined into a single extension and the fold line 19 continued into the extensions. The fold line 19 may be replaced by a double fold line if required so that each fold line of the double fold line is folded by 90 degrees instead of having a single fold line requiring folding by 180 degrees (see herein below).

Each end wall 16 of the box includes a pair of projections 36, which extend upwardly and out and are adapted to locate in the openings 30 of the box above when like boxes are stacked together. The projections 36 are formed in the blank 10 by scoring or severing the blank about the periphery of the projections 36 on one side of the fold lines 19 and are dimensioned to extend into the openings 30, which may have a width W of approximately three layers of blank material, particularly where the blank 10 is made from cardboard or a similar material where the projections 36 may deform slightly. In alternative embodiments using a cardboard blank, the width W may be reduced to approximately at least two layers of blank material if a reduced clearance is acceptable. The interaction between the projections 36 in the openings 30 serve to lock boxes together in their stacked configuration, preventing misalignment of the stack and ensuring the stack of boxes are stable. The end walls 16 may both include two recesses 48 aligned with the projections 36 and openings 30, the recesses 48 preventing the outer flaps 20 interfering with the projections 36 from another box.

In addition, the projections 36 project through openings 40 located in the lids 22. The openings 40 may have at least one like dimension as the projections 36, preferably the same longitudinal length so as to result in an interference fit between the openings 40 and the projections 36. Thus, the interaction of the projections 36 in the openings 40 serve to hold the lids 22 closed, but a provide relatively simple mechanism for opening the box when required.

Therefore, to construct the box shown in figure 2 from the blank shown in figure 1, the outer flaps 20 are folded along fold line 19 inwards to overlay the inner flaps 18 and the end walls 16 and the sidewalls 14 are folded along fold lines 28 and 26 respectively so as to be perpendicular to the base 12. The projections 36 then extend from the end walls 16 perpendicular to the base or may be make to extend at a slightly inward taper by reducing the dimensions of the inner flaps 18. The extensions 32 are then folded along fold lines 34 and adhered to the sidewalls

14. The lids 22 can then, when required, be folded along fold lines 24 over on top of the end walls 16 so that the openings 40 receive the projections 36.

The extensions 32 of the inner flap 18 may be slightly longer than those of the outer flap 20, for example to allow the extensions 32 to terminate at the same location as shown in Figure 2a. In an alternative embodiment, the outer flaps 20 are folded along fold line 19 outwards, in which case the extensions 32 of the outer flaps 20 may be longer. Also, in this alternative embodiment the projections 36 may be longer and project into the interior of the box if required, for example, to provide a more stable stack of boxes.

With particular reference to figure 5 of the drawings, the manner in which the extensions 32 define the spacer means and similarly hold the box in its erected condition, is shown in more detail. The extensions 32, when adhered to the sidewall 14 stand proud of the sidewall 14, thus defining a vertically extending gap 42 adjacent the central portion 15 on either side of the box. The gap 42 is defined by two layers of the cardboard from which the box is formed. When two like boxes are placed side by side, as indicated in figure 5 of the drawings the gap 42 becomes four layers of cardboard wide. It will also be appreciated that the central part 15 of the sidewall 14, intermediate the folded over extensions 32, has a thickness of a single layer of cardboard.

In alternative embodiments of the present invention, the two lids 22 may be omitted or shortened to form an open or substantially open top box. Also, one of the two lids 22 may be omitted or shortened and the other lengthened, optionally to such an extent so as to cover substantially the entire top surface of the box. Repositioning of the openings 30 and projections 36 may be appropriate in these alternative embodiments.

It is envisaged that with the boxes stacked side by side in normal stack configuration, the gap 42 will extended vertically the entire height of the stack of boxes, that is from the bottom box all the way to the top box in the stack. This gap 42 will thus define a vertically extending air channel for air conditioned air passing upwards from the floor of the container in which the stack boxes are located to the top of the container. Since the air is passing up past a single cardboard thickness wall, heat transfer between the gap 42 and the interior of the box will be relatively rapid, thus ensuring that where it is desired to extract heat from the interior of the box to the outside, this will occur relatively rapidly, and likewise where it is desired to increase the heat of the interior of the box by passing warmer air up the gap 42, this will also occur relatively rapidly. In other words, the central boxes in the stack will not be insulated against the effect of cooling or

heating airflow by the boxes surrounding the central boxes in the stack. The central boxes in the stack will themselves be subjected to the flow of air conditioned air passing up through the gap 42. As shown in Figure 5, the extensions 32 cover less than half the side walls 14 and are as small as possible while retaining a required structural strength in order to maximise the ability to transfer heat into and out of the box through the sidewalls 14.

An advantage of providing a gap 42 on the sidewalls 14 instead of on the end walls 16 occurs when the sidewalls 14 are longer than the end walls 16. This provides an increased area available for heat transfer with the flow of air conditioned air passing up through the gap 42 in comparison to if the gap 42 was provided on the end walls 16. Also, as the end walls 16 are formed from a double layer of cardboard, the extensions 32 can also be provided on both sides of the fold line 19, allowing the extensions 32 to form a double layer of cardboard to space the box from an adjacent box.

As is well known, corrugated or fluted cardboard, of the type described herein, is able to carry a far greater load when a load is applied in an axial direction, parallel to the axis of the flutes or corrugations. It is desired that the extensions 32 are able to carry the vertical load of the stack boxes. For this reason it is desired that the cardboard is aligned so that the flutings are parallel to the sides of the box, and perpendicular to the ends of the box. This will ensure that when the box is in its erected condition, the axis of the corrugations in the cardboard in the extensions 32 extend vertically, thus ensuring that all four corners of the box have the double thickness extensions with the flutings extending vertically. This will ensure the box as a whole is able to withstand high vertical load, and all four corners of the box can equally well carry that load. In addition, it will be appreciated that the load carrying components of the box, that is the extensions 32, are located on the outside of the box thereby ensuring that the usable space within the box is not in any way compromised by load carrying components. Locating the extensions 32 on the outside of the box also avoids an irregular shaped interior, which may maximise the usable interior space of the container.

It will be noted that a gap 44 is defined between the lids 22 and that apertures 46 are formed in the end walls 16. This provides ventilation for the interior of the box, further assisting with heat transfer into or out of the box, as required. Clearly it will be possible to provide ventilation openings in the side walls 14 of the box to further improve ventilation into and from the interior of the box, should this be required.

Figures 3 and 4 depict similar illustrations to those of figures 1 and 2 but for a slightly larger box, made from a blank 100 (Figure 3). For example, the box shown in figures 1 and 2 may be adapted to carry a load of approximately 5.5 kg, the box defining a footprint of 440 mm by 340 mm. The height of the box is approximately 100 mm. The box shown in figures 3 and 4 have a similar footprint but the height of the box is approximately 190 mm, and the box is adapted to carry a load of approximately 11.3 kg.

The box shown in figures 3 and 4 need not be described in detail, since the features of the box are substantially the same as those of the smaller box shown in figures 1 and 2. The figure 3 and 4 illustrations have been numbered with the same numerals as the figure 1 and 2 illustrations but within the sequence 100 to 150. In the interests of clarity, reference numerals for the fold lines have been omitted from figure 3, the box folding in the same manner as the box shown in figures 1 and 2. The main structural difference in the box shown in figures 3 and 4 is that the aperture 136 is formed in two parts, one in the inner flap 118 and one in the outer flap 120 of the side walls 116, whereas the box shown in figures 1 and 2 had a single aperture 36 across the fold line 19.

The spacers, defined by extensions 32 in this embodiment, need not take the form described herein. Indeed, in some applications it might be preferable for the spacers to be located outside of the end walls 16 of the container, rather than, or in addition to outside the sidewalls 14 of the container. In addition, the spacers need not be defined by extensions to the side or end walls or need not be defined solely by extensions to the side walls. An alternative approach would be for one or more spacers to simply be adhered onto the side or end walls if this proves to be a more convenient manufacturing technique, or for additional spacers to be adhered to the outside of the existing extensions 32. For example, in an alternative embodiment, the extensions 32 of the side wall 16 may be secured to the side wall 14 when the box is constructed and an additional spacer adhered to the extension 32 on the outside of the box. Another example would be to provide the entire outer flap 20 separately and adhere or otherwise secure the outer flap 20 to the box. The advantage, however, of having solely integral spacers is that the boxes can be erected using conventional manufacturing techniques. The integral spacers may also assist to increase the load bearing capacity of the box. Clearly, other forms of spacers are possible, and specifically envisaged are spacers made from different materials, spacers defined by pressing projections into the cardboard material, and other forms of folded or overlapping board members are also envisaged.

In less preferred embodiments of the invention only one of the side walls may be provided with a spacer. In this embodiment alternative methods of maintaining the box in its assembled position may be used at least for corners not having a spacer.

It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings. All of these different combinations constitute various alternative aspects of the invention.

The foregoing describes embodiments of the present invention and modifications, obvious to those skilled in the art can be made thereto, without departing from the scope of the present invention as defined in the appended claims.

Claims:

1. A stackable box having an interior cavity for containing perishable articles in a controlled temperature environment, the stackable box comprising:
 - a generally rectangular base;
 - a pair of side walls extending upwards away from opposite sides of the base;
 - a pair of end walls extending upwards from opposite ends of the base;
 - a lid formed from one or more lid parts that each extend from the upper edge of one of the side walls, the lid movable so as to close and open the box; and
 - spacers arranged on the outside of the side walls, each said spacer formed at least in part by one or more extensions from the end walls, such that when a pair of said stackable boxes are arranged side by side the respective spacers of the pair of stackable boxes abut with each other so that a vertically extending gap is defined between the side walls of the pair of boxes.
2. The stackable box of claim 1, wherein said spacers are connected to the end walls through a fold line or other hinge type connection.
3. The stackable box of claim 1 or claim 2 when formed from a cardboard material, wherein the spacer is defined by at least two layers of said cardboard material.
4. The stackable box of any one of claims 1 to 3, when formed from a single blank of corrugated and laminated cardboard material erectable to form the stackable box, wherein each spacer comprises two layers of the cardboard material, both layers consisting of an extension of one of the end walls.
5. The stackable box of claim 4, wherein the end walls are formed by the cardboard folded back on itself along a fold line and wherein the extension of the end walls consists of a first and second extension portion, one located on each side of the fold line, the first extension portion secured to the side wall and the second extension portion secured outside of the first extension portion.
6. The stackable box of claim 5, wherein the first and second extension portions are distinct extension portions.
7. The stackable box of any one of claims 1 to 6, wherein the side walls have a first length and the end walls have a second length, shorter than the first length.

8. The stackable box of any one of claims 1 to 7, wherein the end walls include at least one aperture to allow air flow between an interior and exterior of the stackable box.
9. The stackable box of any one of claims 1 to 9, wherein each spacer is secured to the side wall so as to provide structural support to the stackable box, assisting to support a load applied to the stackable box by like stackable boxes stacked on top of the stackable box.
10. The stackable box of any one of claims 1 to 9 when formed from a blank, wherein the stackable box is maintained in a constructed form without any interior extensions so that the interior portion of the box is defined solely by the base, the pair of side walls, the pair of end walls and the lid.
11. The stackable box of any one of claims 1 to 10, wherein the end walls each further comprise at least one projection and the base further comprises at least one receptacle complimentary to the projection so that when like stackable boxes are stacked on top of each other the at least one projection is received by the at least one receptacle so as to tend to maintain the boxes in a stacked configuration.
12. The stackable box of claim 11, wherein each said lid has at least one second receptacle complementary to the at least one projection, the at least one second receptacle positioned to receive the projection when the lids are in a position so as to close the stackable box.
13. The stackable box of claim 12, wherein the at least one second receptacle comprises an aperture and the at least one projection extends through said aperture past the at least one lid so as to be receivable by the at least one receptacle in the base of a like stackable box.
14. The stackable box of any one of claims 1 to 13, wherein the box is erected from a blank of cardboard material having corrugations and the corrugations are aligned in an orientation such that with the box in its erected condition the corrugations in the spacer extend vertically.
15. The stackable box of claim 14, wherein the corrugations are aligned in an orientation such that with the box in its erected condition the corrugations in the end walls extend vertically.
16. A blank comprising multiple portions suitable for forming a stackable box by folding the blank along fold lines at the intersection of the portions, the blank comprising:
 - a) a rectangular base portion having side edges and end edges that are shorter than the side edges;
 - b) two end portions, one extending from each of the end edges, the end portions both extending

away from the end edges of the base by a first distance and having a fold line at a mid point along said first distance to enable each end portion to be folded back on itself;

c) two side portions, one extending from each of the side edges, the side portions both extending away from the side edges by a distance substantially equal to the distance between each end edge of the base and the fold line at a mid point of the respective end portion of the end edge;

d) end portion extensions connected to the end portions, the end portion extensions able to be located outside of and adjacent to the side walls when both the side walls and the end walls are substantially perpendicular to the base, the end portion extensions together partially covering the side walls when located outside of and adjacent to the side walls.

17. The blank of claim 16, wherein each said end portion extension consists of two parts, one part located to each side of the fold line at said mid point of the end portions.

18. The blank of claim 17, wherein each of said two parts has different dimensions so that when the extensions are oriented and located outside of and adjacent to the side walls both said parts extend along the side wall to substantially an equal extent.

19. The blank of any one of claims 16 to 18, wherein the end portion extensions together cover less than half of the side walls when located outside of and adjacent to the side walls.

20. The blank of any one of claims 16 to 19 further comprising:

e) a lid portion extending from one of the side portions, the lid portion operable to open and close the box when constructed.

21. The blank of any one of claims 16 to 19 further comprising:

e) two lid portions, one extending from each of the side portions away from the base the lid portions operable to together open and close the box when constructed.

22. The blank of claim 20 or claim 21, wherein each said lid portion includes at least one receptacle and wherein the end portions include at least one protrusion complimentary to the at least one receptacle so as to be receivable by the at least one receptacle, the at least one protrusion extending from its end portion substantially parallel to the end portion when the end portion is folded back on itself along the fold line at said mid point of the end portions.

23. The blank of claim 22, wherein the at least one receptacle and the at least one protrusion are dimensioned so as to create an interference fit with each other.

24. The blank of either claim 22 or claim 23, wherein the base has at least one further receptacle located to receive the at least one protrusion of a box made from a like blank when the blank is in a constructed form.

25. A stackable box for containing perishable articles in a controlled temperature environment, the box having been formed from a blank and comprising:

a rectangular base;

a pair of side walls comprising a single layer of blank material extending upwards from opposite sides of the base;

a pair of end walls comprising a double layer of blank material extending upwards from opposite ends of the base;

spacers arranged on the outside the pair of side walls, each said spacer comprising two layers of blank material and located to abut against a spacer of an adjacent like stackable box to said stackable box so as to define a vertically extending gap between the side walls of said boxes for the passage there through of ventilation air.

26. The stackable box of claim 25, wherein each of the said two layers of blank material that comprise the spacers extend from one layer of the double layer of blank material of one of the pair of end walls, the two layers of blank material both extending around a corner of the box defined by the intersection of a said side wall with a said end wall and being secured to said side wall.

28. The stackable box of any one of claims 25 to 27, further comprising a lid extending from an upper edge of one of the side walls, the lid comprising a planar material and not having any fold lines other than a fold line at the intersection with said one of the side walls.

29. The stackable box of claim 28, further comprising a further lid, the further lid extending from an upper edge of the other of the side walls.

30. The stackable box of claim 28 or claim 29, wherein each said lid includes apertures there through and the end walls each have protrusions extending there from, each said protrusion adapted to extend through one of said receptacles and engage with a like stackable box located on top of the stackable box.

31. The stackable box of claim 30, wherein said protrusions extend through said receptacles so as to form an interference fit.

32. A stackable box substantially according to any one of the embodiments as herein described with reference to the accompanying drawings.
33. A blank for forming a stackable box and substantially according to any one of the embodiments as herein described with reference to the accompanying drawings.

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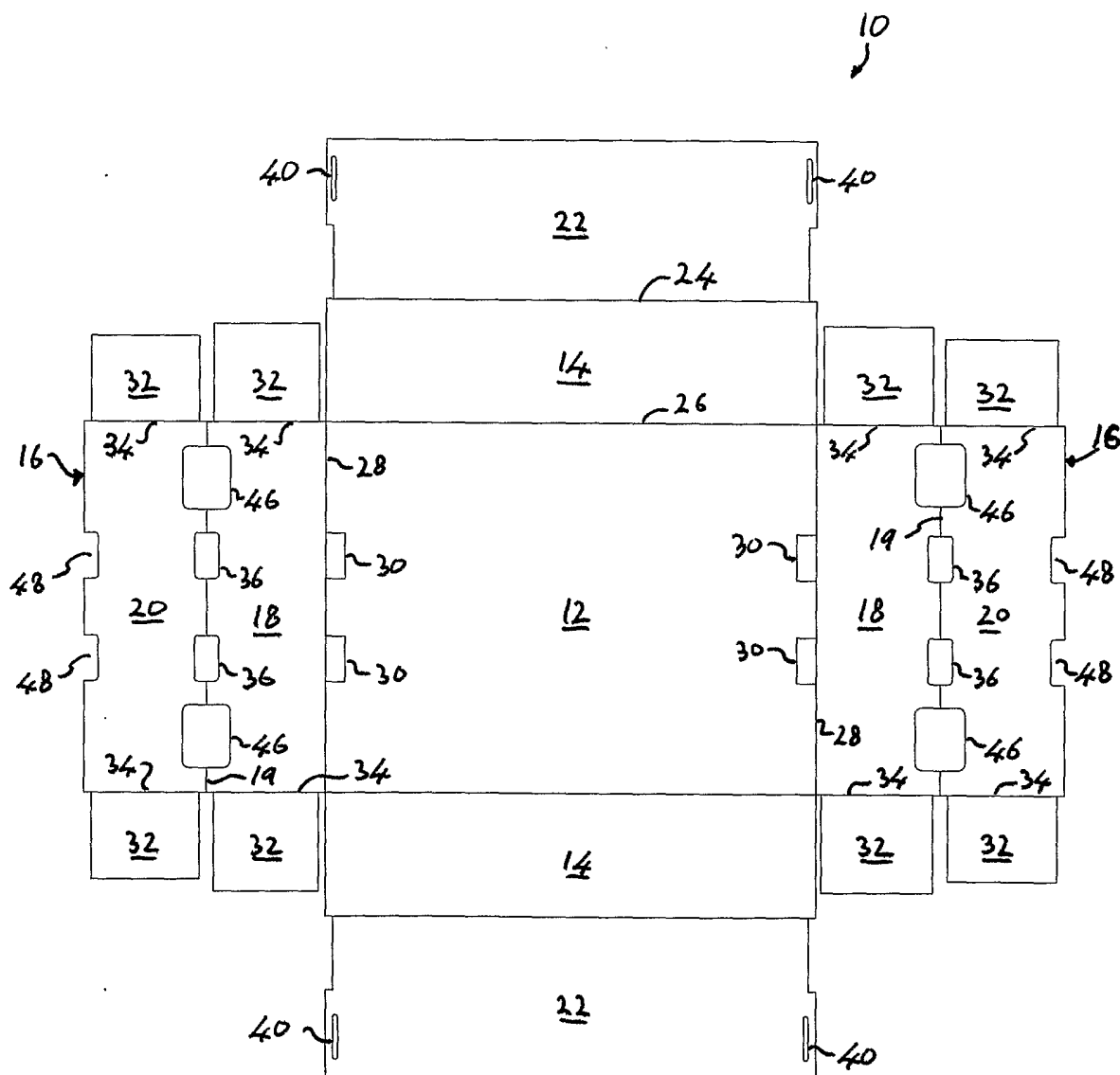


Figure 1

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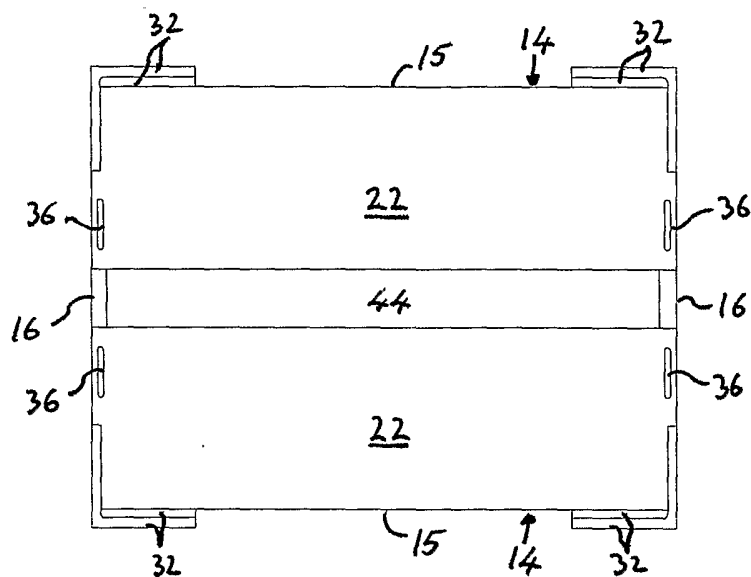


Figure 2a

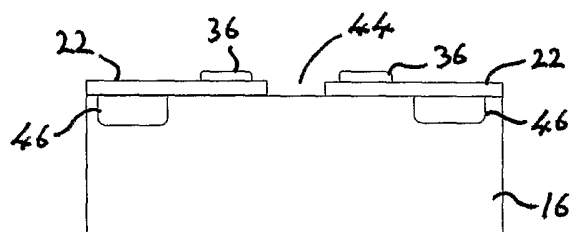


Figure 2b

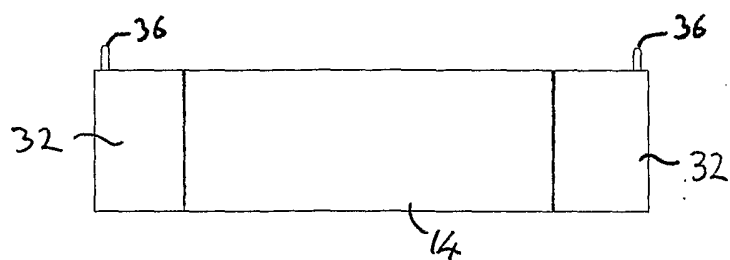


Figure 2c

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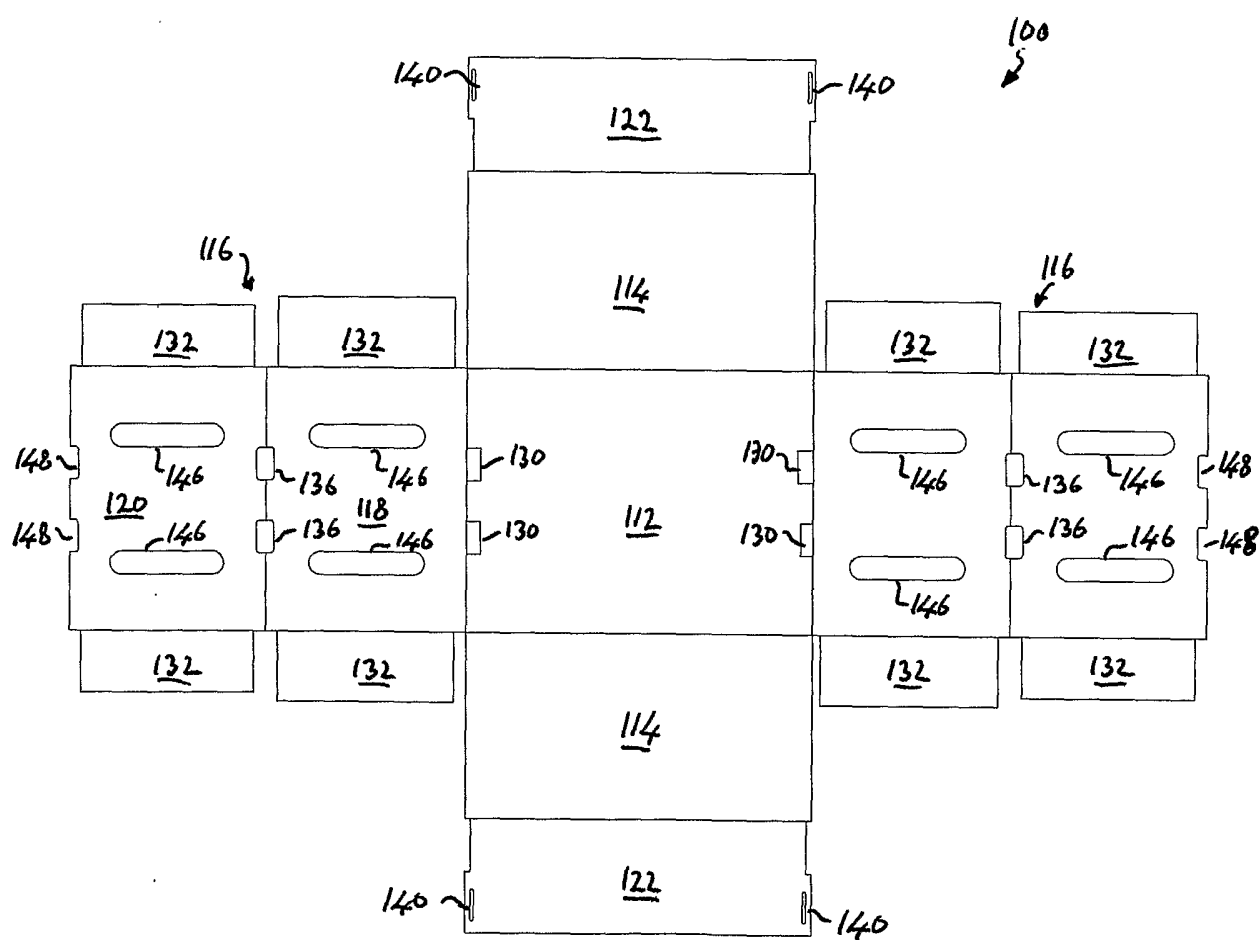


Figure 3

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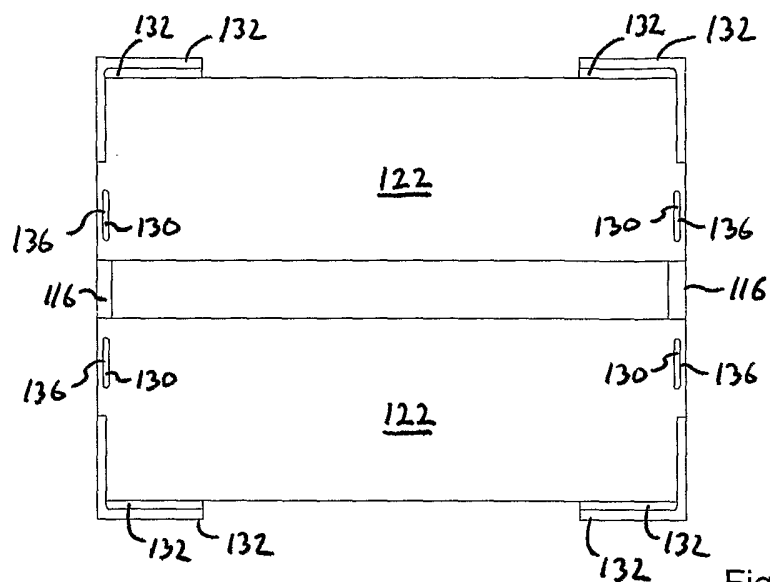


Figure 4a

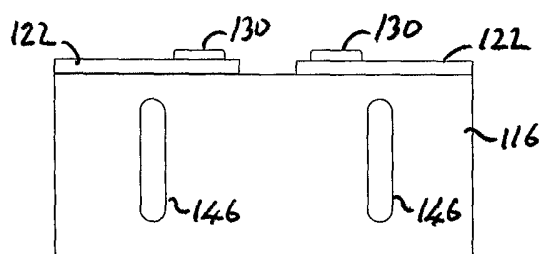


Figure 4b

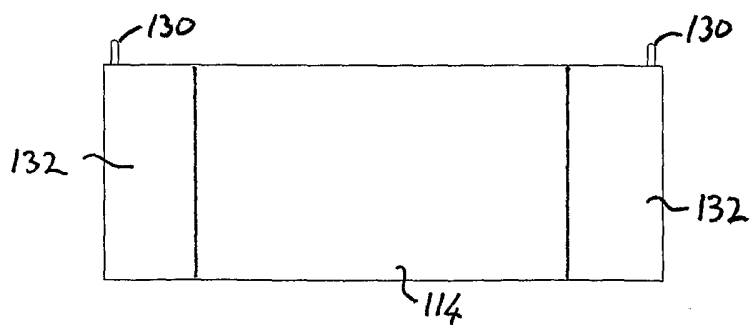


Figure 4c

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2006/000144

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. **B65D 5/28** (2006.01)
B65D 21/032 (2006.01)

B65D 81/18 (2006.01)
B65D 85/34 (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)

DWPI, USPTO, ESP@CENET and keywords: box, container, flap, side, panel, double, dual, exterior, outside, stackable, superpose, ventilation, temperature, refrigeration and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	GB 1540389 A (ASHTON CONTAINERS LIMITED) 14 February 1979 Figs. 1-3 and accompanying description the whole document	1, 2, 16, 19 1, 2, 7-9, 11-15, 20-24
X Y	US 6581772 B2 (NOLAND) 24 June 2003 Figs. 1-2 and accompanying description See columns 3, 4	1, 2, 16 1, 2, 7-9, 11-15, 20-24
Y	US 5002224 A (MUISE) 26 March 1991 the whole document	1, 2, 7-9, 11-15, 20-24
Y	US 5649663 A (PESTOW, Jr.) 22 July 1997 the whole document	1, 2, 7-9, 11-15, 20-24



Further documents are listed in the continuation of Box C



See patent family annex

* "A"	Special categories of cited documents: 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
01 March 2006

Date of mailing of the international search report **17 MAR 2006**

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2006/000144

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 6286753 B1 (JACKSON et al.) 11 September 2001 Figs. 1-2 and accompanying description See columns 3 - 5	1,2, 16, 19 1, 2, 7-9, 11-15, 20-24
A	US 4883221 A (BRUNDAGE) 28 November 1989 the whole document	
Note: For the Y indications, US 5002224 can be combined with any one of GB 1540389 or US 6286753, and US 6581772 can be combined with any one of US 5002224 or US 5649663 with relevance to the same claims.		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2006/000144

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	
GB	1540389	NONE	
US	6581772	US	2002179481
US	5002224	NONE	
US	5649663	NONE	
US	6286753	US	6375068
		US	2001042783
US	4883221	NONE	
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.			
END OF ANNEX			