

[54] PALLETIZED SHIPPING CONTAINERS

[75] Inventor: Herbert Richard Anderson, West Islip, N. Y.

[73] Assignee: Tri-Wall Containers, Inc., Plainview, N. Y.

[22] Filed: May 19, 1972

[21] Appl. No.: 255,078

[52] U.S. Cl. 229/23 C

[51] Int. Cl. B65d 13/00

[58] Field of Search 229/23 R, 23 C

[56]

References Cited

UNITED STATES PATENTS

2,778,523	1/1957	Dedmon.....	229/23 C X
2,797,800	7/1957	Sider.....	229/23 C X
2,822,971	2/1958	Elmendorf	229/23 C
2,947,414	8/1960	Johnson	229/23 C X
3,045,889	7/1962	Whiton	229/23 C X
3,237,839	3/1966	Wiley	229/23 C

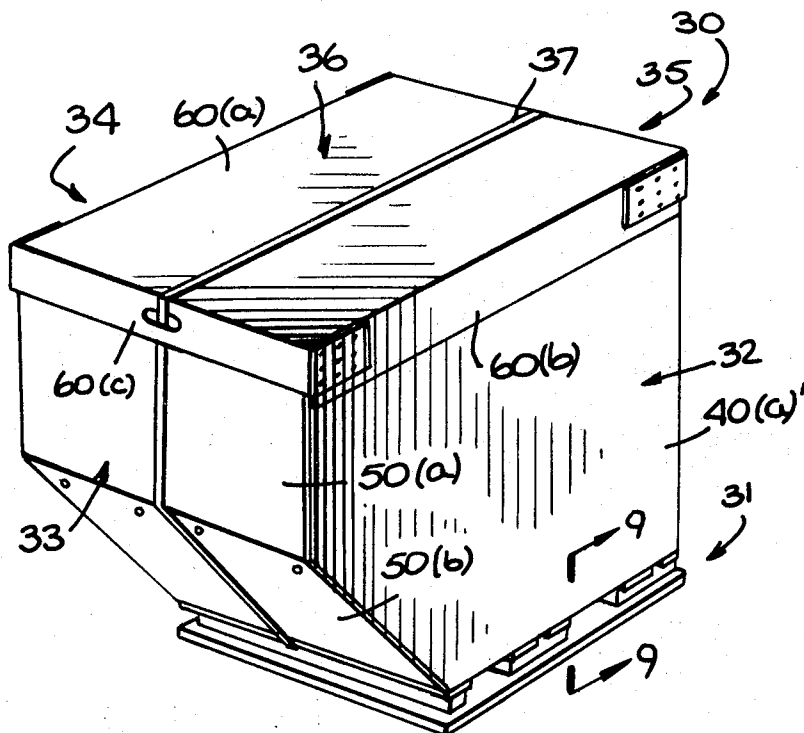
Primary Examiner—Davis T. Moorhead
Attorney—John Q. McQuillan et al.

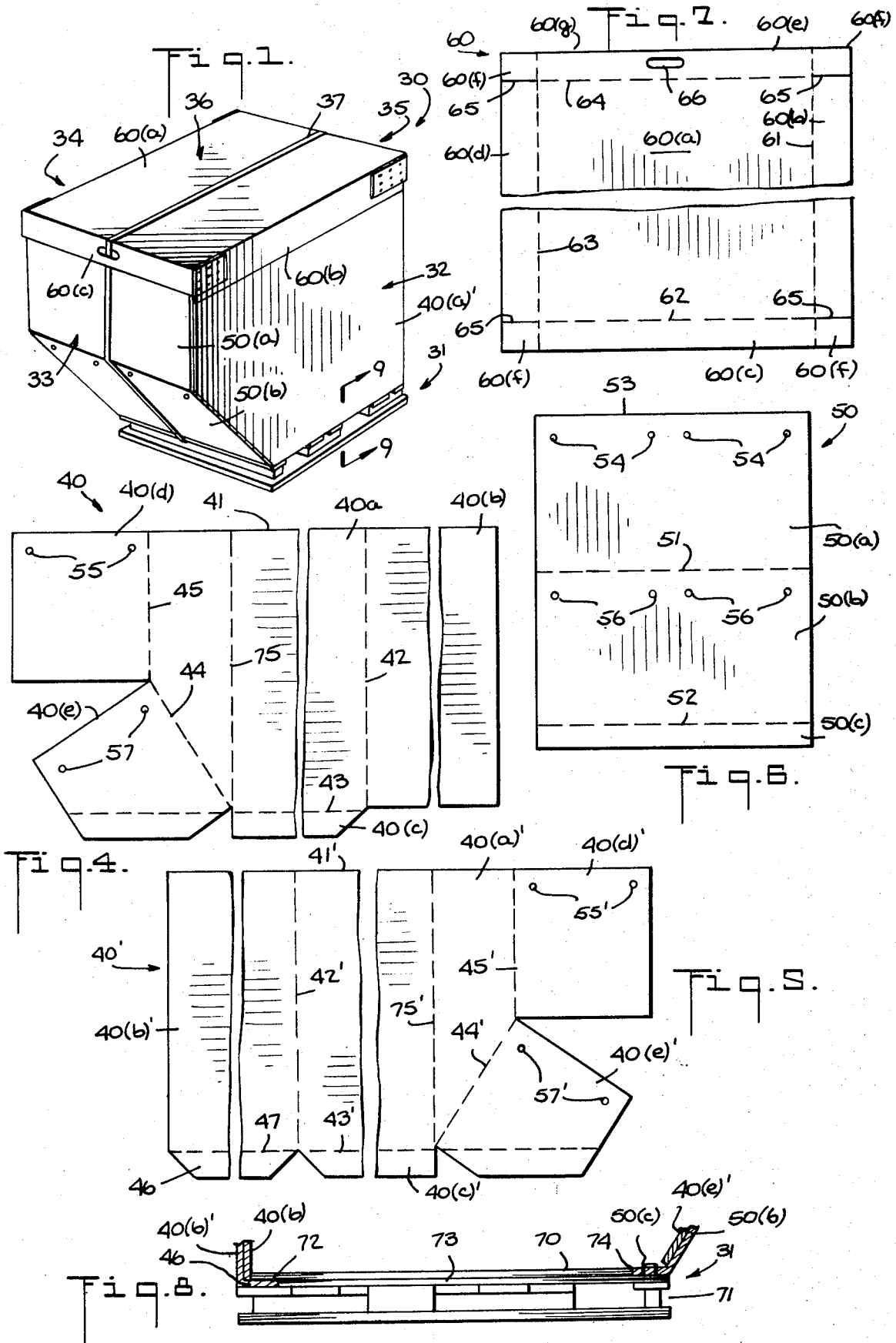
[57]

ABSTRACT

A palletized shipping container formed from corrugated paperboard comprising a rectangular pallet forming the base of the container, a vertically extending end wall panel and a pair of vertically extending sidewall panels. Each of the two sidewall panels has a closure panel attached thereto along a vertically extending fold line disposed along the edge portion of the sidewall panel opposite the end wall panel. The closure panels, which can be pivoted about the fold line, are adapted to overlie at least a portion of one another when they are each in a closed position with the bottom edge portions thereof disposed adjacent to the pallet. A cap member covers the opening in the top of the container and engages the upper portions of the outer surface thereof, thus locking the closure panels in the closed position and sealing the container.

17 Claims, 21 Drawing Figures





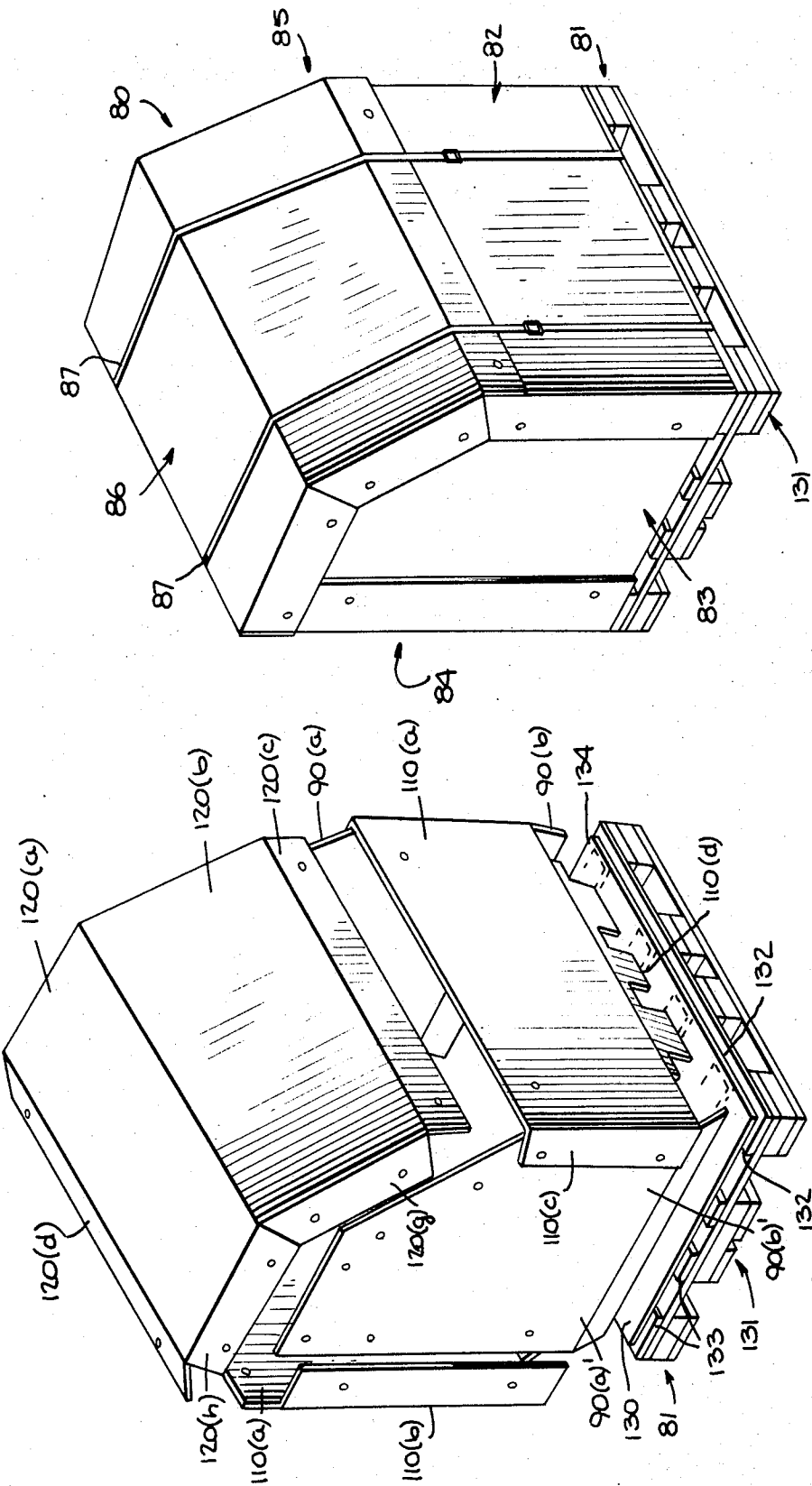
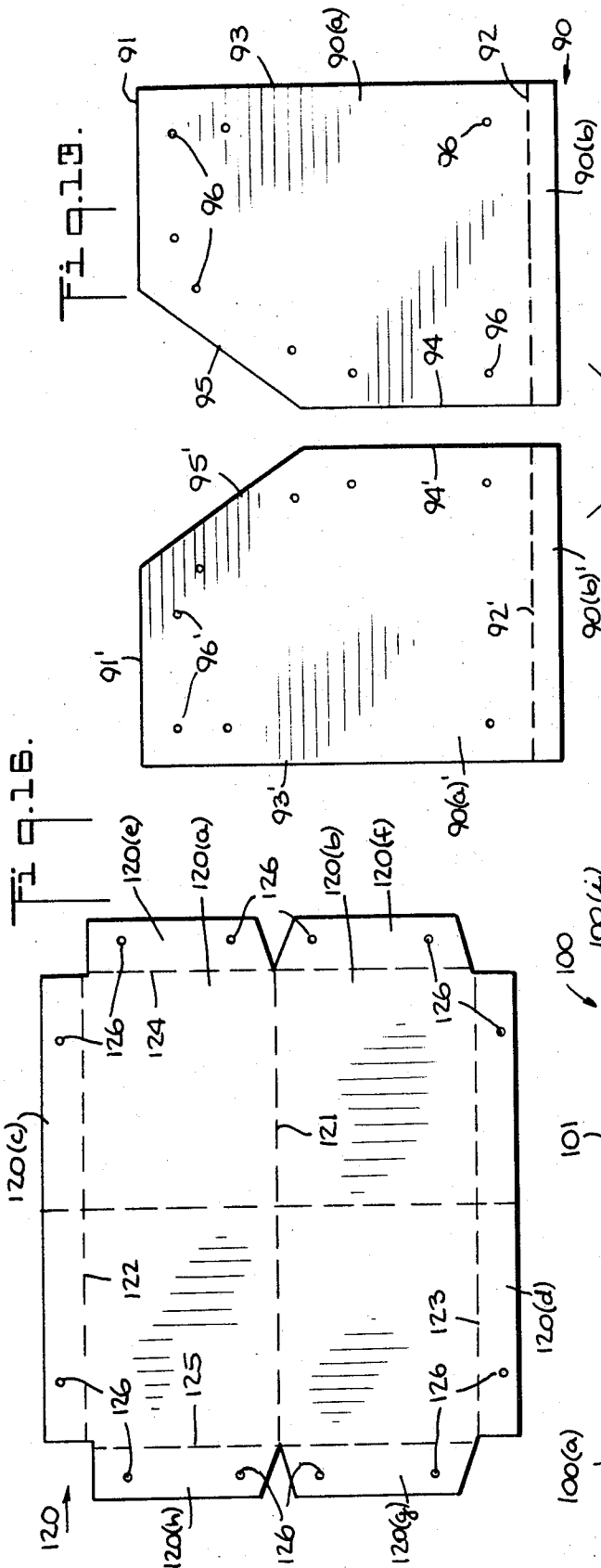


Fig. 11.

Fig. 12.



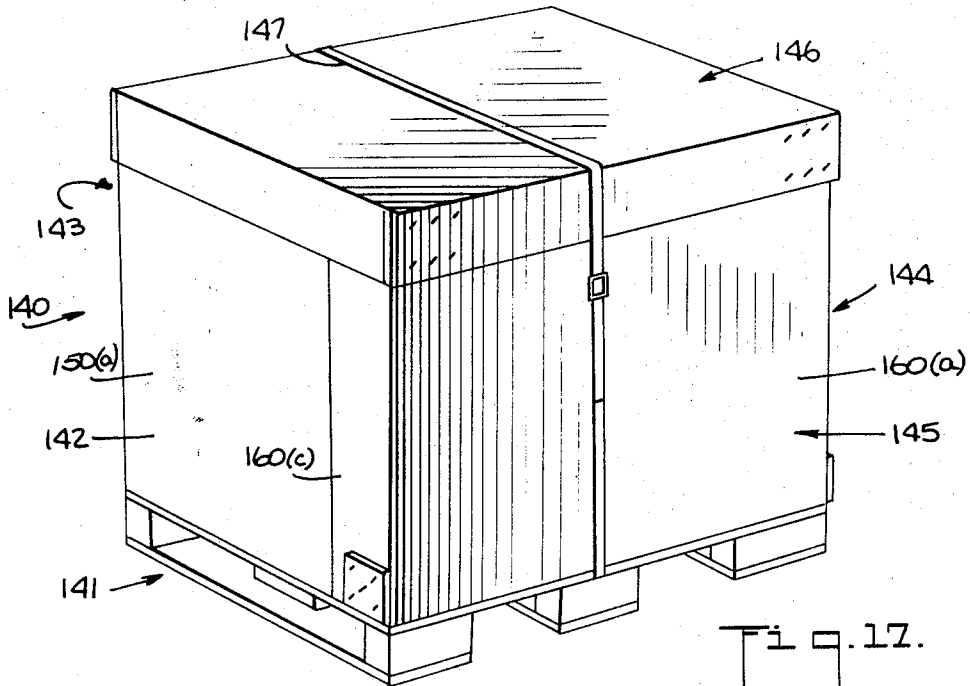


Fig. 17.

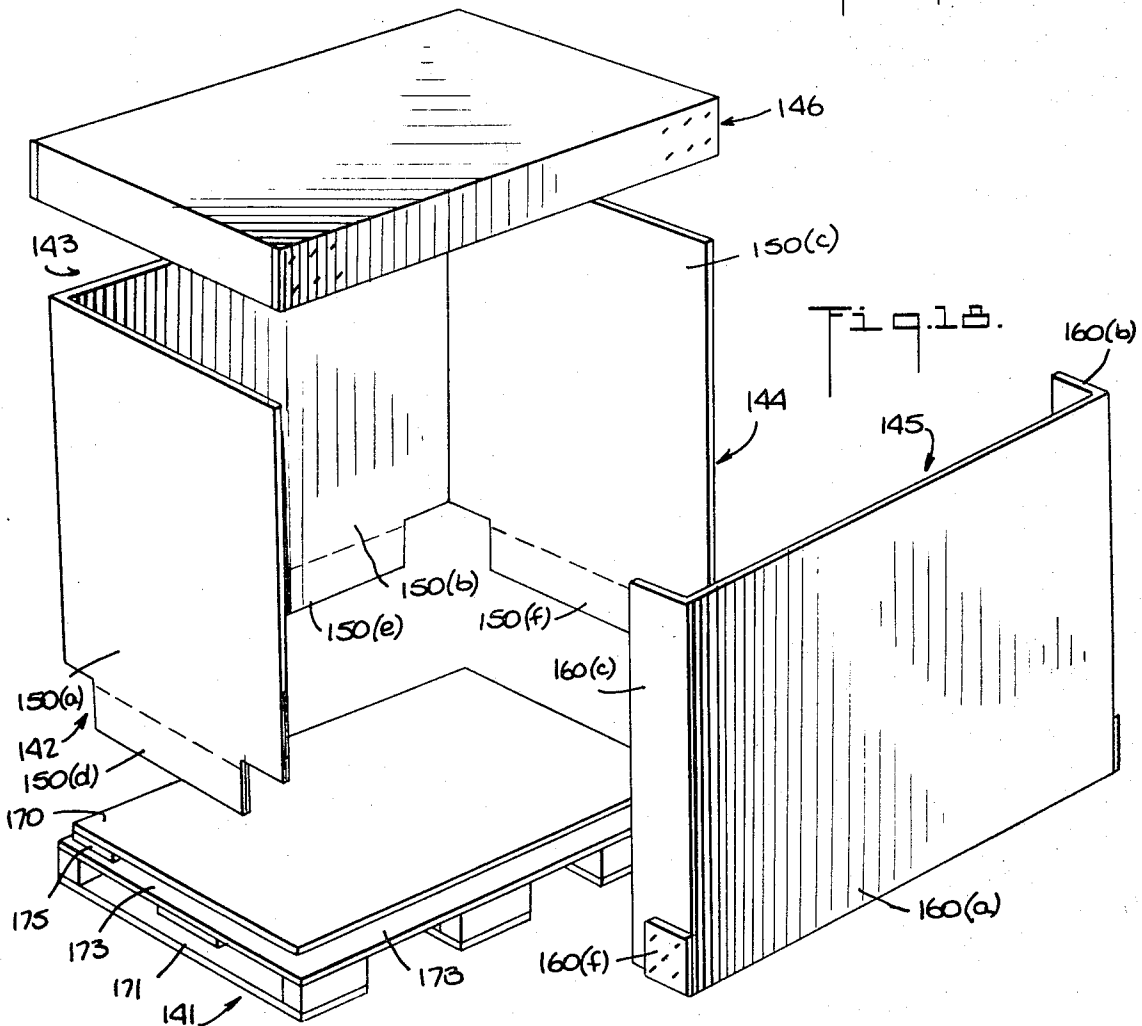


Fig. 18.

Fig. 18.

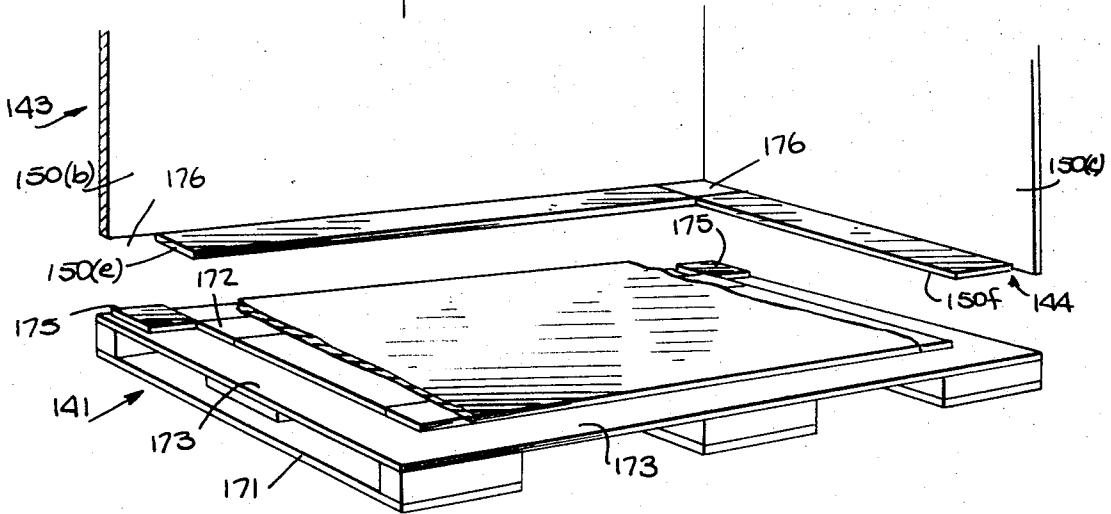


Fig. 20.

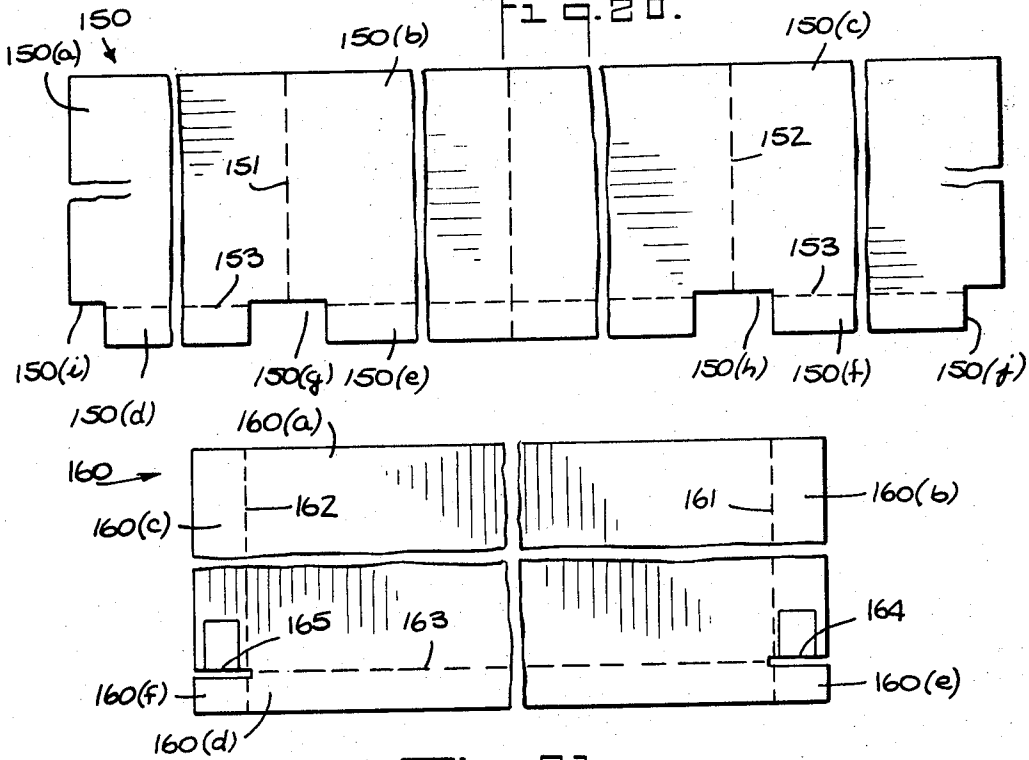
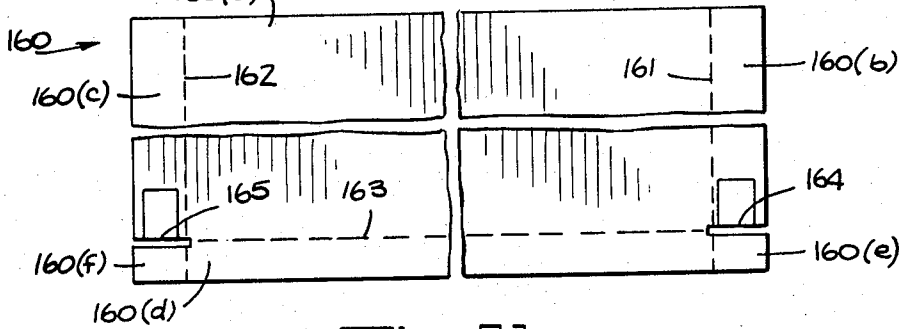


Fig. 21.



PALLETIZED SHIPPING CONTAINERS

BACKGROUND OF THE INVENTION

The present invention relates generally to palletized cargo containers constructed from corrugated paperboard and more particularly to palletized cargo containers to be transported by aircraft.

The advent of wide-bodied jets and larger freighter aircraft has greatly increased the capacity of cargo that can be transported through the air. Further, the use of air cargo containers by the airlines and the air cargo shippers has permitted a greater utilization of the available air cargo space since the air cargo container can be designed to nest in the cargo space of the aircraft. Another advantage of the air cargo container is that, once the goods are loaded into the container, they can be transported to their final destination without further handling of the contents of the container, thereby reducing the amount of time and labor required to load and unload the aircraft and to otherwise handle the air cargo.

One known type of air cargo container is constructed from a thin shell of aluminum and is sufficiently light weight and durable that its use has proved generally satisfactory; however, the aluminum air cargo containers have several disadvantages and drawbacks. In particular, the aluminum air cargo container is relatively expensive to manufacture, and they require special maintenance, for example, the removal of dents in the thin aluminum shell which readily occur during the handling thereof, which significantly increases the costs associated with transporting goods by this means. Another significant drawback to the aluminum cargo container is that it cannot be collapsed when it is empty. Thus, it occupies otherwise usable space when it is being stored, for example, after it has been unloaded, or when it is being returned empty from its destination.

One other type of lightweight cargo container that has been publicly used during the early 1960's is the rectangular composite container described and illustrated in the applicant's U.S. application Ser. No. 82,882, filed Jan. 16, 1961, now abandoned. Briefly, the composite container of the abandoned application included a rectangular pallet having a loading deck and a peripheral channel with a substantially rectangular cross-section extending below the upper surface of the deck along each of the sides of the pallet. Three upright sidewalls of the container were formed from a single blank of triple-wall corrugated paperboard and were attached to one another across vertical fold lines therein. Each of the sidewalls had a bottom flap that was inserted into one of the channels in the pallet when the container was being assembled. The fourth upright wall of the container was formed from a separate front panel which also had a bottom flap that was inserted into a channel of the pallet. The composite container was sealed by a tray-shaped cap that was secured to the rest of the container by at least one flexible band wrapped thereabout.

SUMMARY OF THE INVENTION

The palletized cargo containers of the present invention embody all of the advantages provided by the aluminum air cargo containers, and in addition, avoid several of the drawbacks and disadvantages inherent in the aluminum containers.

The palletized cargo containers of the present invention can be constructed from ordinary corrugated paperboard; however, it is preferable to construct the containers from triple-wall corrugated paperboard such as the paperboard sold under the trademark "TRI-WALL" and manufactured in accordance with the teachings of U.S. Pat. No. 2,725,529, issued Aug. 21, 1956, to Goldstein.

Palletized cargo containers constructed in accordance with the teachings of the present invention provide a lightweight and extremely durable container for shipping a wide variety of cargo. In particular, the palletized cargo containers of the present invention are particularly adaptable for use as air cargo containers. The palletized air cargo containers are inexpensive enough to permit them to be used for only a single shipment of goods, and they are sufficiently rugged and durable to permit them to be reused over and over again. In addition, the palletized air cargo containers are totally collapsible and can therefore be stored and transported with a significant savings of labor and expense. Further, when the containers are needed for an air cargo shipment, they can be easily assembled without the need for special tools or equipment, and because of the full-length door openings provided by this type of container, the air cargo can be easily loaded and unloaded from the container.

The advantages of the palletized air cargo containers of the present invention set out above permit the airlines and the air cargo shippers to realize a significant economic advantage over the use of aluminum air cargo containers. These advantages, as well as further objects and features of the present invention, will be better understood from the following detailed description which refers to the accompanying drawings, wherein:

FIG. 1 is a perspective view of one embodiment of the palletized air cargo container constructed in accordance with the present invention.

FIG. 2 is another perspective view of the container of FIG. 1.

FIG. 3 is a similar perspective view as the one of FIG. 2 showing the end closure panels of the container being opened to permit cargo to be loaded therein.

FIG. 4 through FIG. 7 are plan views of the open blanks for assembling the container of FIG. 1.

FIG. 8 is a cross-sectional view of the pallet of the container of FIG. 1 taken along line 8—8 in FIG. 2.

FIG. 9 is another cross-sectional view of the pallet of the container of FIG. 1 taken at a right angle to the cross-sectional view of FIG. 8 along line 9—9 in FIG. 1.

FIG. 10 is an exploded perspective view of the container of FIG. 1.

FIG. 11 is a perspective view of another embodiment of the palletized air cargo container of the present invention.

FIG. 12 is an exploded perspective view of the container of FIG. 11.

FIGS. 13 through 16 are plan views of the open blanks for assembling into the container of FIG. 11.

FIG. 17 is a perspective view of still another embodiment of the palletized cargo container of the present invention.

FIG. 18 is an exploded perspective view of the container of FIG. 17.

FIG. 19 is a perspective view of the pallet of the container of FIG. 17.

FIGS. 20 through 21 are plan views of the open blanks for assembling into the container of FIG. 17.

BRIEF DESCRIPTION OF THE INVENTION

Now referring to the drawings, one embodiment of the palletized air cargo container is illustrated in FIGS. 1-10. The assembled air cargo container 30 shown in FIGS. 1-3 includes a pallet 31 that forms the base of the container, four walls 32, 33, 34 and 35 which are preferably constructed from the triple-wall corrugated paperboard, and a cap 36, also preferably constructed from the corrugated fiberboard. The container 30 is preferably sealed by at least one flexible strap 37, as is well understood in the art.

The air cargo container 30 shown in FIGS. 1-3 can be assembled from four blanks, such as those illustrated in FIGS. 4-7, that are die cut to shape and scored for folding, as is well understood in the art. One of the sidewalls 32 or 34 of the container can be formed from the blank of triple-wall corrugated paperboard shown in FIG. 4. The blank 40 includes a sidewall panel 40(a) defined along one edge by a cut 41 that forms the upper edge of the upright sidewall and along the other edges by the score lines 42, 43, 44 and 45. The score line 43 extends approximately parallel to the cut 41 while the score lines 42 and 45 extend approximately perpendicular thereto. The score line 44 intersects each of the score lines 43 and 45 and forms an obtuse angle therewith. A rectangular front closure panel 40(b) and a bottom flap 40(c) are attached to the sidewall panel 40(a) across the score lines 42 and 43, respectively. A rectangular upper end flap 40(d) and a lower end flap 40(e) are also attached to the sidewall panel 40(a) across the score lines 45 and 44, respectively. Although the lower end flap 40(e) could have a rectangular shape, as will become more apparent hereinafter, a corner thereof is removed along a cut that is aligned with the lower edge of the bottom flap 40(c) to conserve the amount of the corrugated fiberboard required to form the blank.

The other sidewall of the container can be formed from a blank that is a mirror image of the blank 40. Such a blank is shown in FIG. 5, and the respective portions thereof are designated with the same numbers as the corresponding portion of the blank 40 followed by a prime. Thus, the blank 40' includes a front closure panel 40(b)', a bottom flap 40(c)', a lower end flap 40(e)' and an upper end flap 40(d)' attached to a sidewall panel 40(a)' across score lines 42', 43', 44' and 45', respectively. In addition, as shown in FIG. 5, a bottom flap 46 can be attached to the lower edge of the closure panel 40(b)' across a score line 47.

The back wall 33 of the container can be formed from a blank such as the blank 50 shown in FIG. 6 which includes a rectangular upper end panel 50(a), a rectangular lower end panel 50(b) and a bottom flap 50(c) connected to one another across score lines 51 and 52 which extend approximately parallel to the cut 53 which forms the upper edge of the back wall 35 of the container. As will become more apparent hereinafter, the distance between the cut 53 and the score line 51 approximately equals the length of the score lines 45 and 45' on the blanks 40 and 40'. Similarly, the distance between the score lines 51 and 52 approximately

equals the length of the score lines 44 and 44' of the blanks 40 and 40'.

The back wall 33 can be attached to the end flaps 40(d), 40(d)', 40(e) and 40(e)' of the sidewall panels 40 and 40' as the container is being assembled in one of several ways known in the art, for example, by staples. But, it is preferable to use fasteners that can be easily removed so that the container can be readily disassembled. Thus, the upper end panel 50(a) preferably has a series of openings 54 that will accept a removable fastener formed along the cut 53 which register with a corresponding series of openings 55 or 55' in the upper end flaps 40(d) and 40(d)' of the blanks 40 and 40', shown in FIGS. 4 and 5, as the back wall 33 and the sidewalls 32 and 34 are being assembled into the container 30. Similarly, the lower end panel 50(b) has a series of openings 56 adjacent the score line 51 which register with a corresponding series of openings 57 and 57' in the lower end flaps 40(e) and 40(e)' of the blanks 40 and 40'.

The cap 36 is generally of standard construction and can be formed from a rectangular blank 60 shown in FIG. 7. The blank 60 includes a rectangular top panel 60(a) and side panels 60(b), 60(c), 60(d) and 60(e) attached thereto across score lines 61, 62, 63 and 64, respectively. A flap 60(f) is formed at each corner of the blank 75 by a slot 65. The cap 36 is assembled by folding the side panels 60(b), 60(c), 60(d) and 60(e) perpendicular to the top panel 60(a) and by attaching each of the flaps 60(f) to one of the opposing side panels 60(b) or 60(d), for example, by stapling.

As will be explained more fully hereinafter, it is preferable that the side panel of the cap 36 that extends over the closure panels 40(b) and 40(b)' have a width somewhat less than the width of the other side panels. Further, it is also preferable to cut an opening, such as the elliptical opening 66 shown in FIG. 7, in the side panel 60(e). Thus, once the cargo container 30 has been loaded and the cap 36 placed on top of the container the flexible strap 37 can be fed through the opening 66 before it is tightened around the container, thereby retaining the strap 37 about the center of the container and securely locking the cap on the container to prevent unauthorized access thereto.

The pallet 31 can be formed by any one of several techniques known in the art and is preferably constructed from wooden members. Two cross-sectional views of the pallet 31 taken at right angles to one another are shown in FIGS. 9-10. The pallet 31 shown therein generally includes a rectangular plywood loading deck 70 which is supported above a two-way entry skid 71. In addition, according to the present invention a rectangular channel 72 is formed along three of the sides of the pallet 31 corresponding to the walls 32, 34 and 35 of the container 30. The channels are provided to receive the bottom flaps of the sidewall panels 40(a) and 40(a)' and the closure panel 40(b)' when the container is assembled. Thus, the thickness of each of the channels 72 is slightly greater than the thickness of the triple-wall corrugated fiberboard used to construct the container 30, and the depth of each of the channels is slightly greater than the width of the respective bottom flaps 40(c), 40(c)' or 46 to be inserted therein. The channels can be formed, for example, as shown in FIGS. 9 and 10, by providing spacer 73 between the loading deck 70 and the skid 71. Further, an additional channel can be formed along the side of the pallet 31

corresponding to the wall 33 of the container 30 to receive the bottom flap 50(c) or, as shown in FIG. 9, a slot 74 is preferably formed in the loading deck 70 which has dimensions approximately equal to the dimensions of the bottom flap 50(c) so that the flap will nest within the slot and be flush with the loading deck 70 of the pallet.

As noted above, one of the advantages of the palletized air cargo container of the present invention is that it can be shipped in a collapsed form so that a minimum of space will be required to transport the container. Thus, referring to FIG. 10, when the palletized air cargo container 30 is being prepared for transportation to the ultimate user, for example, a shipper or an air line, the bottom flap 50(c) of the end panel 50 is inserted into the slot 74 in the pallet 31 and is attached thereto, for example, by staples. The blank 50 is then placed upon the pallet 31 with the upper end panel 50(a) folded upon the lower end panel 50(b). The blanks 40 and 40' are also folded along several of the score lines thereon and are placed upon the blank 50. To facilitate collapsing the blanks 40 and 40' for shipment in the unassembled form, additional score lines 75 and 75' can also be formed as shown in FIGS. 4-5. These additional score lines permit the blanks to be folded upon themselves to such an extent that they will rest upon the pallet 31 without overhanging the edges thereof. The cap 36 which can be preassembled at the factory is then placed upon the folded blanks and bound to the pallet with straps, thus completing the unassembled container for shipment to the ultimate consumer.

When the palletized air cargo container 30 is to be used, it can be readily assembled by unfolding the respective blanks and placing them as shown in FIG. 10. Thus, the blanks 40 and 40' are placed on opposite sides of the pallet 31 with the end flaps thereof adjacent the end panels 50(a) and 50(b). The bottom flaps 40(c) and 40(c)' are then inserted into the channels 72 on the respective sides of the pallet 31; however, it is not necessary that they be attached therein. The sidewall panels 40(a) and 40(a)' are then placed in an upright position, and the upper end flaps 40(d) and 40(d)' and the lower end flaps 40(e) and 40(e)' are folded inwardly and at right angles to the respective sidewall panels. The end panels 50(a) and 50(b) are subsequently moved upwardly so that the lower end flaps 40(e) and 40(e)' overlie the lower end panel 50(b) and the upper end flaps 40(d) and 40(d)' overlie the upper end panel 50(a). The upper end flaps and the lower end flaps are then attached to the upper end panel and the lower end panel, respectively, for example, by inserting a fastener (not shown) through the corresponding pairs of openings 54 and 55, and 56 and 57. Once the upper and lower end flaps have been attached to the end panel, the bottom flaps 40(c) and 40(c)' of the sidewall panels 40(a) and 40(a)' will remain in the channels 72 since the side-wall panels are restrained from pivoting about any axis.

Referring again to FIG. 2, the closure panels 40(b) and 40(b)' can be swung open to permit easy access to the interior of the assembled palletized air cargo container 30. When the cargo container is to be loaded, it is preferable that the cap 36 be placed on the container before any of the load begins to bear on the sidewall panels thereby causing them to bulge slightly. Therefore, when the cap 36 is placed on the container 30

with the closure panels open, the side panel 60(e) of the cap 36 rests upon the upper edge of the closure panels 40(b) and 40(b)' while the side panel 60(c) of the cap 36 substantially overlies an upper portion of the upper end panel 50(a) and the opposing side panels 60(b) and 60(d) of the cap 36 increasingly overlie the sidewall panels 40(a)' and 40(a), respectively, in the direction of the end wall 33, thereby preventing the respective sidewall panels from bulging as the container is being loaded.

Once the palletized air cargo container 30 has been loaded, the closure panel 40(b) is swung into place across the open end of the container and the other closure panel 40(b)' is swung into an overlying relationship with the closure panel with the bottom flap 46 on the other closure panel 40(b)' being inserted into the channel 72 in the pallet 31. Once the closure panels have been closed, the side panel 60(e) of the cap 36 no longer rests on the upper edge of the closure panels, and the cap can be dropped over the top of the container so that it abuts the upper edge of the container around the periphery thereof. Although the side panel 60(e) is not as wide as the other side panels of the cap 37, it will overlie an upper portion of the closure panel 90(b)', thus preventing the closure panels from swinging open. In addition, once the strap 37 has been placed through the opening 66 in the cap and tightened about the container, the cap and the closure panels are prevented from opening and the container is thus securely closed.

It is apparent from the above description that, once the bottom flap 50(c) of the blank 50 has been attached to the pallet 31 and the cap 36 has been assembled from the blank 60 at the point of manufacture, the palletized air cargo container can be readily assembled as they are required without the need for special tools or equipment. Further, if the container has been assembled with fasteners rather than staples, it can be easily disassembled and stored for later use once the container has been unloaded.

It is further apparent from the above description that the obtuse angle between the score lines 44 and 44' and the respective score lines 43 and 45, and 43' and 45' of the blanks 40 and 40' can be varied, thus changing the angle between the lower end panel 50(b) and the loading deck 70. Therefore, the profile of the back wall 33 of the container can be selected to correspond to the contour of the interior wall of the cargo space in a particular aircraft so that they will more efficiently nest therein, thus permitting a maximum utilization of the cargo space available.

Another embodiment of the palletized air cargo container of the present invention is shown in FIGS. 11-16. The assembled palletized container pictured in FIG. 11 is also adapted to conform to the contour of the cargo space available in aircraft, particularly the upper sections thereof, by similarly selecting the profile of the front wall of the container. The assembled air cargo container 80 shown in FIG. 11 includes a pallet 81 that forms the base of the container, four upright walls 82, 83, 84 and 85 which are preferably constructed from the triple-wall corrugated paperboard, and a closure panel 86 also preferably constructed from the corrugated paperboard. Once the container 80 is loaded and is ready for shipping, it is preferably sealed by at least one flexible strap 87, as is well understood in the art.

The air cargo container can be formed from five blanks such as those illustrated in FIGS. 13-16 that are die cut to shape and score for folding, as is well understood in the art. Each of the side walls 83 and 85 can be formed from a different one of the blanks shown in FIG. 13. The blanks 90 and 90' are a mirror image of one another and the corresponding portions thereof will be designated by the same number, one being non-primed and the other being primed. The one blank 90 includes a side wall panel 90(a) defined along one edge by a cut 91 that forms the upper edge of the side wall and along the opposite edge by the score line 92 extending approximately parallel to the first cut 91. A bottom flap 90(b) is attached to the side wall panel along the score line 92. The side wall panel 15 is also defined by the opposing cuts 93 and 94 extending approximately perpendicular to the cut 91 and by a cut 95 intersecting each of the cuts 91 and 94 and forming an obtuse angle therebetween. The sidewall panel is also preferably provided with a series of openings 96 which are positioned to register with openings in the flaps of the other panels to permit a fastener to be inserted therethrough.

The back wall 84 of the container can be formed from the blank 100 shown in FIG. 14 which includes a back wall panel 100(a) defined by a cut 101 that forms that upper edge of the back wall 84 of the container, by a score line 102 which extends approximately parallel to the cut 101 and by score lines 103 and 104 which extend approximately perpendicular thereto. The back wall panel has two side flaps 100(b) and 100(c) attached thereto along the score lines 103 and 104, respectively, and two bottom flaps 100(d) and 100(e) attached thereto along the score line 102. As will become more apparent hereinafter, the bottom flaps 100(d) and 100(e) are formed by removing the rectangular cutouts 100(f), 100(g) and 100(h) which permit the flaps to be inserted into the channel to be formed in the back side of the pallet 81. Similarly, the square cutouts 100(i) and 100(j) formed at the upper end of the side flaps 100(b) and 100(c) are provided to allow the side flaps on the closure panel 86 to be nested therein. The upper edge of the back wall panel and each of the side flaps are also preferably provided with a pair of openings 105 which are positioned to register with openings formed in the other panels and flaps of the container.

The front wall 82 can be formed from a blank such as the one shown in FIG. 15 which includes a front wall panel 110(a) defined along one edge thereof by a cut 111 adapted to form the upper edge of the front wall 82 of the container. The front wall panel 110(a) is also defined by a score line 112 extending approximately parallel to the cut 111 and by a pair of score lines 113 and 114 extending approximately perpendicular thereto. A pair of side flaps 110(b) and 110(c) are attached to the front wall panel 110(a) along the score lines 113 and 114, respectively, and a bottom flap 110(d) is attached thereto along the score line 112. The side flaps 110(b) and 110(c) are chamfered along the upper edge thereof for abutting side flaps of the closure panel. As will be more apparent hereinafter, the bottom flap 110(d) is provided with rectangular cutouts 110(e) and 110(f) to permit the bottom flaps 90(b) and 90(b)' of the respective side wall panels 90(a) and 90(a)' to nest therein when the container is assembled and are further provided with rectangular

cutouts 110(g), 110(h), 110(i) and 110(j) to permit the bottom flap 110(d) of the front wall panel 110(a) to nest in a channel formed in the front side of the pallet. Openings 115 similar to those in the blank 100 are also provided in blank 110.

Finally, referring to FIG. 16, the closure panel 86 of the container 30 can be formed from the blank 120 which includes a rectangular top closure panel 120(a) and a rectangular side closure panel 120(b) attached to one another along a score line 121. A rear flap 120(c) and a front flap 120(d) are attached to the panels along the respective score lines 122 and 123 which extend approximately parallel to the score line 121. A side flap 120(e), 120(f), 120(g) or 120(h) is attached to a different one of the sides of the respective panels along one of the score lines 124 or 125 extending approximately perpendicular to the score lines 122 and 123. The side flaps are chamfered, as shown in FIG. 16, so that the flaps will not overlap one another or the side flaps of the front panel when the closure panel is positioned on the container. The flaps each have a pair of openings 125 therein which register with corresponding openings in the rear panel 100(a), the front wall panel 110(a) and the sidewall panels 90(a) and 90(a)' so that the flaps may be attached thereto.

The pallet 81 can also be formed by any one of several techniques known in the art and generally includes a loading deck 130 which is supported above a four-way entry skid 131 by a series of spacer members. In addition, a channel 132 is formed along each of the sides of the pallet 81 and disposed between the loading deck 130 and the skid 131. As shown in FIG. 12, the loading deck is spaced apart from the skid by one layer of slats 133 extending parallel to the front of the pallet and by another layer of slats 134 (shown in dashed lines) above the first layer extending perpendicular to the front of the pallet. The thickness of the slats 134 in the other layer is slightly greater than the thickness of the triple-wall corrugated fiber board used to construct the container for permitting the bottom flaps of the container panels to be inserted in the channels 132 formed between the one layer of slats 133 and the loading deck 130. The sidemost slats of the other layer of slats 134 are spaced in from the sides of the pallet so that the depth of the respective channels 132 is slightly greater than the width of the respective bottom flaps 90(b) and 90(b)' of the side panels 90(a) and 90(b) to be inserted therein. The ends of the loading deck 130 adjacent each of the sides of the pallet 131 are therefore cantilevered over one of the sidemost slats 134. Thus, when the bottom flap of each of the sidewalls are inserted into one of the channels 132 formed below the cantilevered portion of the loading deck 130 and the container 80 is loaded, the weight of the load tends to compress the cantilevered portion against the bottom flaps, thereby pinching the flaps and restraining them in the channel.

Since it is desirable to be able to remove either the front wall panel or the rear wall panel from an assembled container which is fully loaded, it is desirable that the loading deck not exert this pinching action on the bottom flaps 110(d) and 120(d) of the front wall panel 110(a) and the back wall panel 120(a). Thus, according to the present invention, the slats in the other series of slats 134 extend substantially from the front to the back of the pallet, thus providing direct support for the loading deck 130 across most of the depth of the pallet

131. Therefore, the channel 132 formed between the loading deck 130 and each of the frontmost and backmost slats of the one series of slats 133 has a varying depth because of the intrusion of the slats 134 of the other series therein. Accordingly, the rectangular cut-outs 110(g), 110(h) and 110(j) in the bottom flap 110(d) of the front wall panel 110(a) are provided to nest with the end of the slats in the other series of slats 134 adjacent the front of the pallet. Similarly, the rectangular cutouts, 100(f), 100(g) and 100(h) in the bottom flaps 110(d) and 110(e) of the rear wall panel 110(a) are provided so that the flaps nest between the ends of the slats of the other series of slats 139 adjacent the back side of the pallet.

The palletized air cargo container 80 can be readily assembled as shown in FIG. 12 without the need for special tools or equipment. For example, the container can be assembled by placing each of the bottom flaps 90(b) and 90(b)' on the side wall panels 90(a) and 90(a)' in a different one of the channels 132 on the opposite sides of the pallet 131, and the side wall panels are folded to an upright position. The bottom flaps 100(d) and 100(e) of the rear wall panel 100(a) are inserted into the channel 132 along the back of the pallet, and the rear wall panel is brought to an upright position and attached to the respective sidewall panels by folding each of the side flaps 110(b) and 110(c) against a different one of the sidewall panels and attaching it thereto, for example, by inserting fasteners through the registered openings therein. Similarly, after the container has been loaded through the large opening in the front thereof, the bottom flap 110(d) of the front wall panel 110(a) is inserted into the channel 132 extending along the front of the pallet. Once the front wall panel has been moved to an upright position, it can also be attached to the side wall panels 90(a) and 90(a)' by folding the side flaps 110(b) and 110(c) thereof against the respective sidewall panels and attaching them thereto. The closure panels 120(a) and 120(b) are subsequently folded along the score line 121 and placed over the opening in the top of the container with the front flap 120(d) thereof folded to overlie the front wall panel 110(a) and the rear flap 120(c) folded to overlie the rear wall panel 100(a). The closure panels are secured in place by attaching the respective flaps thereof to the respective sidewall, front wall and back wall panels of the container.

Still another embodiment of the palletized cargo container of the present invention is shown in FIGS. 17-21. The cargo container 140 shown in FIGS. 17 and 18 generally includes a pallet 141, three upright walls 142, 143 and 144 which are preferably constructed from the triple-wall corrugated paperboard, a front closure panel 145 and a cap 146 which are also preferably constructed from the corrugated paperboard. The container 140 is held together by a flexible strap 147 which encircles the container.

The cap 146 is of standard construction and can be formed from a blank, for example, such as the blank 60 for the container 30 which is shown in FIG. 7 but absent the rectangular cut-out 60(g).

The upright walls 142, 143 and 144 can be formed from a single blank 150 shown in FIG. 20 which includes a sidewall panel 150(a), a back wall panel 150(b) and another sidewall panel 150(c) attached to one another along the score lines 151 and 152. Each of the bottom flaps 150(d), 150(e) and 150(f) is attached

to a different one of the panels along the score line 153. The bottom flaps are provided for insertion into rectangular channels formed in the pallet 141, as described above. The front closure panel 145 can be formed from a blank 160 shown in FIG. 121 which includes a front wall panel 160(a), two side flaps 160(b) and 160(c) attached thereto along score lines 161 and 162, respectively, and a bottom flap 160(d) attached thereto along score line 163. Flaps 160(e) and 160(f), attached to each of the ends of the bottom flap 160(d) along the respective score lines 161 and 162, are formed by the respective cuts 164 and 165. The front closure panel 145 is assembled from the blank 160 by folding the flaps thereof at right angles to the front panel 160(a) and by attaching the flaps 160(e) and 160(f) to the respective side flaps 160(b) and 160(c).

As best seen in FIG. 19, the pallet 141, which can be formed by any one of several techniques known in the art, generally includes a loading deck 170 and a four-way entry skid 171. The loading deck is preferably slightly smaller than the skid so that the wall panels will bear directly on the top of the skid. The loading deck 170 is spaced above a two-way entry skid 171 by a spacer member 172, thus forming a rectangular channel 173 disposed between the loading deck 170 and the skid 171 along each side of the pallet 141. Each of the channels 173 is adapted to receive and engage one of the bottom flaps 150(d), 150(e), 150(f) and 160(d) of the respective wall panels. According to the present invention, a block 175 is disposed in the intersection of the channel 73 formed along the back side of the pallet and each of the channels 173 extending perpendicular thereto and is attached to the pallet. The edges of each of the blocks 175 are preferably spaced away from the side of the pallet approximately the thickness of the corrugated paperboard to provide a space for the portions of the vertically extending walls adjacent thereto to bear directly on the top of the skid 171.

The addition of the blocks 175 in the intersections of the channels 173 disposed along the sides and each of the pallet necessitates modifying the bottom flaps to be inserted therein. Therefore, referring again to FIG. 20, rectangular cut-outs 150(g) and 150(h) are provided between the bottom flap 150(e) and each of the bottom flaps 150(d) and 150(f). When the blank 150 is folded along the respective score lines thereof in preparation for being assembled into the three upright walls of the container, an opening 176 is defined between each pair of the adjacent bottom flaps, as shown in FIG. 19, that has dimensions which substantially equal the dimensions of the block 175. Therefore, when the bottom flaps 150(d), 150(e) and 150(f) are inserted into the channels 173 on the sides and back of the pallet, each of the blocks 175 will nest within the respective openings 176 between the flaps. The blocks 175 will thus abut the ends of the respective bottom flaps and will prevent movement of the flaps in the direction of the channel 173 in which they are inserted, thereby preventing similar movement of the wall panels to which the flaps are attached.

Rectangular cut-outs 150(i) and 150(j) are also provided in the blank 150 to permit the bottom flap 160(d) of the front wall panel 160(a), which extends completely across the front side of the container, to be inserted into the channel 173 along the front side of the pallet 171 without interference from the bottom flaps 150(d) and 150(f).

It is apparent from FIGS. 17 and 18 that, once the three upright walls 142, 143 and 144 have been assembled and the container has been loaded, the front closure panel 145 can be positioned over the opening in the front of the container with the bottom flap 160(d) thereof being inserted in the channel 173 along the front side of the pallet. Each of the side flaps 160(b) and 160(c) thereof will extend over a portion of the outer surface of one of the side wall panels 150(a) or 150(c) and into engagement therewith, thereby providing additional support for the side wall because of the special construction of the lower corners of the front closure panel 160(a) provided by the flaps 160(e) and 160(f). When the cap 146 has been placed on the container, it will engage a portion of the outer surface of the upper end of each of the side flaps (160(b) and 160(c), as well as a portion of the outer surface of the upper end of each of the wall panels. Therefore, once the flexible strap 147 has been tightened about the wall panels and the cap, they form an extremely rugged and durable palletized container. These features of the container are enhanced by the added advantage that the container can be easily assembled and disassembled with the need for special tools or equipment.

The particular embodiments of the palletized cargo container described above are intended to illustrate the broader aspect of the present invention and the advantages intended therein. Thus, modifications and variations of the particular embodiments of the invention will be apparent to those skilled in the art, and they may be made without departing from the spirit or scope of the present invention.

What is claimed is:

1. A palletized shipping container formed from corrugated paperboard comprising a rectangular pallet forming the base of the container, a vertically extending end wall panel of corrugated paperboard supported along one side of the pallet, a pair of vertically extending sidewall panels of corrugated paperboard spaced apart from one another in a facing relationship and supported by the two opposite sides of the pallet adjacent the one side thereof, each of the two sidewall panels being connected along a vertically extending edge portion thereof to a different vertically extending edge portion of the end wall, each of the two sidewall panels having a closure panel attached thereto along a vertically extending fold line disposed along the edge portion of the sidewall panel opposite the end wall panel, each of the closure panels being adapted for a swinging movement about the fold line, the closure panels being adapted to overlie at least a portion of one another when they are each in a closed position with the bottom edge portions thereof being disposed adjacent to the side of the pallet opposite to the one side thereof, and a cap member adapted to cover the opening formed in the upper portion of the container by the sidewall panels, the end wall panel, and the closure panels in the closed position and to extend into engagement with the upper portions of the outer surfaces thereof.

2. A palletized shipping container in accordance with claim 1 and further defined wherein the cap member includes a top panel adapted to cover the opening of the container and having the edge portions thereof extending adjacent to the upper portion of each of the sidewall panels, the end wall panel and the closure panels when they are in the closed position, and further includes a plurality of side flanges each attached to a dif-

ferent edge portion thereof and extending downwardly for engaging the upper portion of the outer surface of a different one of one of the sidewall panels, the end wall panel or one of the closure panels when they are in the closed position, the lower portion of at least one of the side flanges for engaging one of the closure panels and the end wall panel being disposed above the lower portions of the other side flanges, when the closure panels are in the closed position the cap member being adapted to be placed over the opening in the container with each of the side flanges engaging the upper portion of the outer surface of a different one of the sidewall panels, the end wall panel and one of the closure panels, and when the closure panels are moved from the closed position the cap member being adapted to be placed over the opening in the container with the lower portion of the one side flange of the cap member abutting the upper edge of each of the closure panels and with each of the other side flanges engaging the upper portion of the outer surface of a different one of the two sidewall panels and the end wall panel.

3. A palletized shipping container in accordance with claim 1 and further defined wherein the pallet has an upper surface forming the loading deck of the container, a channel extending along the length of each of the two opposite sides thereof, and a recess formed in the upper surface of the pallet and extending along the length of the one side of the pallet, the end wall panel has an upper panel, a lower panel connected to the bottom portion of the upper panel, and a bottom flap connected along a fold line to the lower panel opposite the upper panel, the bottom flap being disposed along its length in the recess and engaged thereto, the lower panel of the end wall panel extending upwardly and outwardly from the loading deck of the pallet and forming an obtuse angle therebetween, the upper panel of the end wall panel extending vertically, each of the sidewall panels has a bottom flap attached thereto along a fold line extending along the bottom edge portion thereof, the bottom flap of each of the two sidewall panels being disposed in a different one of the channels in the pallet, each of the sidewall panels has a lower flap attached thereto along a fold line disposed adjacent the lower panel of the end wall panel and extending at substantially the same obtuse angle with respect to the loading deck as the lower panel of the end wall panel extends thereto, each lower flap overlying a surface of at least a portion of the lower panel of the end wall panel and being attached thereto, and each of the sidewall panels has an upper flap attached thereto along a vertically extending fold line disposed adjacent the upper panel of the end wall panel, each upper flap overlying a surface of at least a portion of the upper panel of the end wall panel and being attached thereto.

4. A palletized shipping container in accordance with claim 3 and further defined wherein the pallet has another channel extending along the length of the side thereof opposite the end wall panel, and one of the closure panels has a bottom flap attached thereto along a horizontally extending fold line disposed along the bottom edge of the closure panel, the bottom flap of the closure panel being disposed in the other channel when the closure panels are in the closed position.

5. A palletized shipping container in accordance with claim 1 and further comprising a means for securing the cap member to the shipping container.

6. A palletized shipping container in accordance with claim 1 and further including a band extending around the perimeter of the container and across the outermost closure panel and the cap member for securing the cap member on the container and for retaining the closure panels in the closed position.

7. A palletized shipping container in accordance with claim 2 and further defined wherein at least one of the sides engaging one of the end wall panels and the closure panels has an opening formed therein and further includes a band extending around the perimeter of the container and across the outermost closure panel and the cap member, the band extending through the opening, the band for securing the cap member on the container and for retaining the closure panels in the closed position.

8. Corrugated paperboard blanks for assembling into a palletized shipping container, the shipping container including a rectangular pallet having an upper surface for forming the bottom loading deck of the container, a channel extending along the length of each of two opposite sides thereof, and a recess formed in the upper surface of the pallet and extending along the length of one of the sides thereof extending between the two opposite sides, the corrugated paperboard blanks comprising a first blank of corrugated paperboard including a sidewall panel for forming one of two opposite vertically extending sidewalls of the container, the sidewall panel having a bottom flap attached thereto along a score line disposed approximately parallel to the upper edge thereof, a closure panel attached thereto along a score line disposed approximately perpendicular to the upper edge of the sidewall panel, an upper flap attached thereto along a score line disposed approximately perpendicular to the upper edge of the sidewall panel and a lower flap attached thereto along a score line forming an obtuse angle with the score lines between the sidewall panel and each of the upper flap and the bottom flap, a second blank of corrugated paperboard including panels and flaps which correspond to the panels and flaps of the first blank and being a mirror image thereof, the sidewall panel of the second blank being adapted to form the other one of the opposite vertically extending sidewalls of the container, a third blank of corrugated paperboard including a rectangular upper panel, a rectangular lower panel attached to the bottom portion of the upper panel, and a bottom flap, the upper and lower panels being adapted to form the back wall of the container, the upper end panel being defined along one edge thereof by a cut adapted to form the upper edge of the back wall of the container, the upper panel being attached to the lower panel along a score line extending approximately parallel to the cut, the lower panel being attached to the bottom flap along a score line extending approximately parallel to the cut, and a fourth blank to be assembled into a cap member for the container, the corrugated paperboard blanks being adapted to be assembled into the container with the bottom flap of the lower panel being disposed along its length in the recess of the pallet and engaged thereto, the lower panel of the end wall panel extending upwardly and outwardly from the loading deck of the pallet and forming an obtuse angle therebetween, the upper panel of the end wall panel extending vertically, the bottom flap of each of the two sidewall panels of the first and second blanks being disposed in a different one of the channels in the

pallet, each lower flap thereof overlying a surface of at least a portion of the lower panel of the end wall panel and being attached thereto, each upper flap overlying a surface of at least a portion of the upper panel of the end wall panel and being attached thereto, the assembled cap member being adapted to cover the opening formed in the upper portion of the container and to extend into engagement with the upper portions of the outer surfaces thereof.

9. Corrugated paperboard blanks in accordance with claim 6 and further defined wherein the score line between the lower flap and the sidewall panel intersects each of the score lines between the side wall panel and the upper flap and between the sidewall panel and the bottom flap, the closure panel of each of the first and second blanks is defined along each of two opposite edges thereof by a cut aligned with a different one of the upper edge of the sidewall panel and the score line between the sidewall panel and the bottom flap, the upper flap is defined along the opposite edge thereof by a cut intersecting the intersection of the score lines between the sidewall panel and each of the upper flap and the lower flap, the lower flap is defined along each of two opposite edges by a cut intersecting a different one of the intersection of the score lines between the sidewall panel and each of the lower flap and the bottom flap, the upper panel and the lower panel of the third blank are defined along each of two opposite edges thereof by cuts extending approximately perpendicular to the upper edge of the back wall, the score lines on the third blank are spaced apart approximately the length of the score line between the sidewall panel and the lower flap, and the cut and the score line between the upper panel and the lower panel of the third blank are spaced apart approximately the length of the score line between the sidewall panel and the upper flap.

10. A palletized shipping container formed from corrugated paperboard comprising a rectangular pallet forming the base of the container, a pair of vertically extending sidewall panels of corrugated paperboard spaced apart from one another in a facing relationship and supported by two opposite sides of the pallet, a portion of the upper edge of each sidewall panel adjacent the back edge thereof extending approximately horizontally, the other portion of the upper edge of each sidewall panel extending downwardly from the portion of the upper edge to the front edge of the sidewall and forming an obtuse angle therebetween, a removable back closure panel being adapted to cover the back opening formed between the back edges of the opposite sidewall panels and the side of the pallet extending therebetween and to be attached to each of the sidewall panels, a removable front closure panel being adapted to cover the front opening formed between the front edge of each of the opposite sidewall panels and the side of the pallet extending therebetween and to be attached to each of the sidewall panels, and a removable top closure panel including a rectangular first panel, a rectangular second panel attached to the first panel along a first score line, the top closure panel being disposed across the opening formed in the upper portion of the container between the two opposite sidewall panels, the front closure panel and the back closure panel with the score line thereof extending between the intersection of the portion and the other portion of the upper edge of each of the sidewall panels and with the first panel abutting the portions of the

upper edge of each sidewall panel along the length thereof and the second panel abutting the other portion of the upper edge of each sidewall panel along the length thereof and being attached to at least each of the sidewall panels.

11. A palletized shipping container in accordance with claim 10 and further comprising a back flap being attached to the first panel of the top closure panel along a score line disposed approximately parallel to the first score line thereof, a front flap being attached to the second panel of the closure panel along a score line disposed approximately parallel the first score line thereof, a pair of opposite side flaps each being attached to each one of the first panel and the second panel along score lines disposed approximately perpendicular to the first score line thereof, each one of the back flap, the front flap and the pairs of side flaps of the closure panel overlying a surface of the upper portion of one of the two sidewall panels, the front closure panel and the back closure panel and being attached thereto.

12. Corrugated paperboard blanks for assembling into a palletized shipping container, the paperboard blanks being adapted to be assembled on a rectangular pallet having an upper surface for forming the bottom loading deck of the container, and a channel extending along the length of each of the sides thereof, the paperboard blanks comprising a first blank of corrugated paperboard including a sidewall panel having a bottom flap attached thereto along a score line extending approximately parallel to the upper edge of the sidewall, the sidewall panel being defined by a cut extending from the upper edge of the sidewall to front edge thereof and forming an obtuse angle therebetween, a second blank of corrugated paperboard including a panel and a flap which corresponds to the panel and flap of the first blank and being a mirror image thereof, a third blank of corrugated paperboard including a rectangular back panel having a bottom flap attached thereto along a score line extending approximately parallel to the upper edge of the back panel and having a pair of opposite side flaps each being attached thereto along a score line extending approximately perpendicular to the upper edge of the back panel, a fourth blank of corrugated paperboard including a rectangular front panel having a bottom flap attached thereto along a score line extending approximately parallel to the upper edge of the front panel and having a pair of opposite side flaps each being attached thereto along a score line extending approximately perpendicular to the upper edge of the front panel, and a fifth panel of corrugated paperboard including a rectangular first panel and a rectangular second panel attached thereto along a first score line, the first panel having a back flap attached thereto along a score line extending approximately parallel to the first score line, each of the first panel and the second panel having a pair of opposite side flaps attached thereto along score lines extending approximately perpendicular to the first score line, the corrugated paperboard blanks being adapted to be assembled into the container with the two panels, the front closure panel and the back closure panel forming the four vertically extending walls thereof and with the fifth blank being disposed across the opening formed in the upper portion of the container between the two opposite sidewall panels, the front closure panel and the back closure panel with the first score line thereof ex-

tending between the intersection of the cut and the upper edge of each of the sidewall panels and with the first panel abutting the upper edge of each sidewall panel along the length thereof and the second panel abutting the cut of each sidewall panel along the length thereof, the side flaps and the front and back flap of the fifth blank to be attached to one of the vertically extending walls of the container.

13. An improved palletized shipping container including a rectangular pallet forming the base of the container and having an upper surface forming the loading deck of the container and a channel extending along the length of each of at least two adjacent sides thereof, the channels intersecting one another at the corner of the pallet defined by the two adjacent sides, the container further including at least two vertically extending wall panels constructed from corrugated paperboard being disposed adjacent one another and being attached thereto, each of the wall panels having a bottom flap attached thereto along a fold line extending along the bottom edge portion thereof, the bottom flap of each of the two wall panels being disposed in a different one of the two channels in the pallet, the improvement comprising a block disposed in the intersection of the two channels in the two adjacent sides of the pallet and attached thereto, the bottom flap of each of the wall panels being relieved at the end thereof adjacent the other bottom flap to form an opening therebetween, the block disposed in the intersection of the two channels being adapted to nest within the opening, whereby the relieved end of each of the bottom flaps can abut the block for restraining lateral movement of the wall panel attached thereto.

14. An improved palletized shipping container including a rectangular pallet forming the base of the container and having an upper surface forming the loading deck of the container and a channel extending along the length of at least one side thereof, the container further including at least one vertically extending removable wall panel constructed of corrugated paperboard, the wall panel having a bottom flap attached thereto along a fold line extending along the bottom edge portion thereof, the bottom flap being disposed in the channel of the pallet, the improvement comprising at least one block being disposed within the channel at a preselected point along the length thereof and being attached thereto, and the bottom flap of the wall panel having an opening therein which registers with the block disposed in the channel for permitting the block to nest within the opening, the block for supporting the cantilevered portion of the loading deck disposed above the channel to permit the bottom flap of the wall panel to be inserted into and removed from the channel as the wall panel is assembled and unassembled when a load is bearing upon the cantilevered portion of the loading deck.

15. An improved palletized shipping container including a rectangular pallet forming the base of the container and having an upper surface forming the loading deck of the container, and a channel extending along the length of at least three sides thereof, the container further including a pair of vertically extending sidewall panels of corrugated paperboard spaced apart from one another in a facing relationship, each sidewall panel having a bottom flap attached thereto, the bottom flap of each of the sidewall panels being disposed in a different one of the channels on opposite sides of

the pallet, the container further including a closure panel being adapted to cover the opening formed between the two opposite sidewall panels and the side of the pallet extending therebetween and having the other channel formed therein, the closure panel including a bottom flap attached thereto across a fold line extending along the bottom edge thereof, the bottom flap of the closure panel being adapted to be disposed in the other channel, the improvement comprising the closure panel having a pair of opposite side flaps attached thereto along a different one of two fold lines extending approximately perpendicular to the bottom edge of the closure panel, each end of the bottom flap being attached to a different one of the side flaps, and each end of the bottom flaps of the sidewall panels adjacent the closure panel being relieved to form an opening therein, each of the openings being adapted to nest with the end of the bottom flap of the closure panel adjacent thereto when the bottom flap of the closure panel is disposed in the other panel of the pallet.

16. A rectangular pallet for forming the base of a palletized shipping container including at least two vertically extending wall panels constructed from corrugated paperboard being disposed adjacent one another and being attached thereto, each of the wall panels having a bottom flap attached thereto along a fold line extending along the bottom edge portion thereof, the pallet comprising an upper surface forming the loading deck of the container, a channel extending along the length of each of at least two adjacent sides thereof, the

channels intersecting one another at the corner of the pallet defined by the two adjacent sides, and a block disposed in the intersection of the two channels in the two adjacent sides of the pallet and attached thereto, the block being adapted to nest within an opening formed between the bottom flaps of the adjacent wall panels when the bottom flaps of the two wall panels are disposed in the two channels in the pallet, whereby each of the bottom flaps can abut the block for restraining lateral movement of the wall panel attached thereto.

17. A rectangular pallet for forming the base of a palletized shipping container including at least one vertically extending removable wall panel constructed of corrugated paperboard, the wall panel having a bottom flap attached thereto along a fold line extending along the bottom edge portion thereof, the pallet comprising an upper surface forming the loading deck of the container, a channel extending along the length of at least one side thereof, and at least one block being disposed within the channel at a preselected point along the length thereof and being attached thereto, the block for supporting the cantilevered portion of the loading deck disposed above the channel to permit the bottom flap of the wall panel having an opening therein which nests with the block to be inserted into and removed from the channel as the wall panel is assembled and unassembled when a load is bearing upon the cantilevered portion of the loading deck.

* * * * *

35

40

45

50

55

60

65