UNITIZED CARTON LOADS
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ABSTRACT OF THE DISCLOSURE
A pallet load is provided comprising a plurality of layers, each layer comprising a plurality of trays into which contents are placed. A single cover is placed over each layer of trays. Each tray is provided with compartments which are biased against the cover thereby excluding foreign matter. Each tray is provided with a plurality of columns wherein the end walls are folded over and engage side wall flaps. A horizontal severance line is provided in an end wall. When the severance line is separated, the end wall is either removed or released, permitting contents of each tray to be unloaded through the open end wall.

This invention relates to packaging, and is more particularly concerned with a method for packaging a plurality of folded and glued cardboard cartons, as well as many other products which might otherwise be damaged by stacking weight, excessive handling, humidity conditions and/or contaminations, into a unit load secured to a pallet base, and with the unit load provided thereby. As herein, the terms "board" and "paperboard" are synonymous.

Folded and glued cartons and similar items have commonly been shipped by packaging them in small corrugated board containers. However, individual corrugated containers are difficult to handle in bulk, and are subject to damage and deterioration if such containers are piled to any great height. This is due largely to a tendency of the corrugated container to support the contents on the inside of the container, to absorb moisture during periods of high relative humidity. Excess moisture weakens the corrugated container, causing partial collapse of loads and spoilage of cartons or other products contained therein. When unit loads of this type are double tiered, the bottommost containers may collapse due to weakening as a result of moisture absorption, giving rise to a safety hazard. Damage to glued cartons in corrugated containers is also caused by uneven stacking of such containers so that corner strength in the corrugated container is not properly utilized, in which case pressure points develop at points on the corrugated container not designed to withstand such stacking weight. This also results in damage to contents of the container. Since the corrugated containers must be handled individually into and out of a freight car or truck, considerable damage to the containers and contents often occurs during such transfers. It is not unusual for the individual corrugated containers to be handled as many as ten times before they reach the customer's filling machine. Moreover, as the weight and size of these containers increase, there is a natural tendency for material handlers to drop or throw the container, further increasing the possibility of damage to its contents.

Recently the packaging industry has become interested in unitized loads in which a plurality of small paperboard cartons are placed into one large container. In order to render the unit load sufficiently strong to withstand the rigors of transportation, it has been necessary to utilize heavy corrugated board as the outer container for the unitized load. This method of packaging has found favor with the industry, but is relatively expensive in practice because of the high cost of such large corrugated containers. However, previously proposed alternative solutions to the problem have suffered from one or more serious disadvantages such as lack of stability, rigidity, or resistance to moisture. Customers of the folding carton industry, as well as the industry itself, have also become interested in unitizing these small containers in order to reduce labor costs for materials handling and loading of freight cars and truck-trailers. Such attempts to reduce labor costs have resulted in greater material costs since an expendable type pallet must be procured for each unit load. Additional warehousing space is also required. Moreover, this alternate method has suffered from one or more serious disadvantages such as lack of stability, rigidity, resistance to moisture vapor and resistance to contamination by insects, dirt, dust and other foreign materials, the latter aspect being of particular importance when the carton is to be used for packaging of a food or food related product.

In our copending application Serial No. 365,054, filed May 5, 1964 and now Patent No. 3,289,629 a palletized unit load is disclosed and claimed which is provided by placing a plurality of layers on a pallet and securing the layers to the pallet by strap means. Each tray or a plurality of trays each containing a plurality of K.D. (Knocked-down), folded and glued paperboard cartons vertically arranged. A plurality of corrugated reinforcing pads are placed in each tray, at least one at each end of the tray, to increase the load supporting properties of the individual tray unit. A group of trays is placed in a layer on a pallet, and a unitary cover formed of paperboard and having depending flanges is placed over the entire group of trays of the layer. In a preferred embodiment, both the trays and the cover are formed of a cylinder board material which has been coated with a moisture-resistant plastic material such as polyethylene. Additional layers are added in a similar manner, and strap means utilized to bind the layers to the pallet. Although the resulting structure has been found to be generally satisfactory from the standpoint of strength, rigidity, impact resistance, and compressive strength, it is still lacking in several important properties. First, the pallet load is not completely protective against the entry of insects and other contaminants such as dirt and dust. Further, although the application of a polyethylene inner layer contributes a great deal to the exclusion of moisture, when the pallet load is subjected to humid atmospheres an undesirable large amount of moisture still enters the load through the various openings present and may result in warping and general weakening of the structure.

It is an object of the present invention to provide an improved and novel method for packaging materials such as folded and glued paperboard cartons in unitized loads. It is another object to provide such improved unitized loads which are highly resistant to moisture, impact, and vibration, and which will withstand the effects of heavy loads placed thereon, and which can moreover be carried or conveyed by normal means and in normal manner without danger of collapsing.

It is another object to provide a pallet load wherein means are provided for excluding insects and substantially reducing the amount of moisture which may enter the load. It is a further object to provide a novel tray for use in forming a pallet load according to the invention having a readily openable end for dispensing K.D. cardboard cartons contained in the tray without the necessity for lifting the cartons out of the open top of the tray. It is an additional object to provide a tray of the type described which is so dimensioned that it provides greater protection for the cartons contained therein against crushing and other forces encountered during shipping than prior.
structures. It is still a further object to provide a palletized load having means provided to prevent lateral displacement of the trays contained in the palletized unit load, and yet which permits the trays to be readily removed from the load by the operator of the set-up and filling equipment on which the contained cartons are utilized. It is a further object to provide a package which is highly resistant to vermin, dirt, dust or other foreign material which might otherwise contaminate the product. It is another object to provide a novel container which may be easily opened at one end or from either end to permit rapid removal of the cartons directly into the customer’s filling machine. It is a further object to provide improved palletized loads of the type described which are affixed to a pallet base for easy handling. It is an additional object to provide an improved palletized unit load which is relatively inexpensive in practice. The accomplishment of the foregoing and additional objects will become more fully apparent hereinafter.

The invention in its preferred embodiment is illustrated by the accompanying drawings in which:

FIG. 1 is a perspective view of a palletized unit load according to the invention.

FIG. 2 is a perspective view of a single tray containing a load of knocked-down folding cartons.

FIG. 3 is a perspective view of the tray of FIG. 2 with one side panel partially broken away.

FIG. 4 is a perspective view showing a complete layer of trays arranged on a pallet base.

FIG. 5 is a perspective view of a layer of FIG. 4 with a cover shown in place.

FIG. 6 is a cross-section taken at the line 6—6 of FIG. 4.

FIG. 7 is a perspective view of a filled tray with one end opened, showing a removed panel and supporting member.

FIG. 8 is a fragmentary cross-section of the tray and cover stock.

FIG. 9 is a perspective view of a tray comprising another embodiment of the invention; and

FIG. 10 is a perspective view of the tray of FIG. 9 with one end open.

According to the invention, a palletized unit load is provided by placing a plurality of layers on a pallet, each layer comprising for example a plurality of trays containing K.D. (knocked-down), folded and glued paperboard cartons vertically arranged. Alternatively, the cartons may be horizontally arranged. A plurality of vertically arranged reinforcing members or pads, preferably U-shaped, are placed in each tray, at least at each end of the tray, to increase the load supporting properties of the individual tray unit. Each side wall of each tray is provided with a barrier flap resiliently biased upwardly. A group of filled trays is placed on a pallet and a unitary cover placed over the entire layer. The barrier flaps engage the cover with a resiliently biased force cooperating with the cover to form a barrier against the entrance or intrusion of insects, dust or dirt. As a further improvement, the height of the supporting members is designed to be greater than that of the K.D. cartons contained within the tray. As a result, the supporting members provide a primary support for any load which may be placed on top of the tray, thus protecting the cartons from being crushed. In an improved embodiment the tray structure is comprised of fold-over end panels, at least one of which is provided with a substantially integral severance line. When the severance line is broken, the end of the tray may be readily opened or removed to permit the cartons contained therein to be removed through the open end, as for feeding into an automatic set-up machine.

A group of trays is placed in a layer on a pallet, such as a standard pallet made of wood, and arranged in rectangular form, preferably in an arrangement whereby the shape of the layer corresponds to the shape of the pallet. A unitary cover formed of paperboard and having depending flanges is placed over the entire group of trays of the layer. Additionally, an inverted unitary tray may be placed under the first layer to prevent lateral shifting. In a preferred embodiment both trays and the cover are formed of a paperboard material such as cylinder board which provides a lightweight, stackable, moisture-resistant plastic material such as polyethylene. Such cylinder board trays and covers or caps are preferably die cut to maintain exact relative dimensions which are important features in obtaining a rigid load and proper weight distribution when loads are stored in storage. Either a load-locking or a non-load-lock type glue is provided between the pallet and the bottom inverted corrugated cover or cap, between the bottom layer of trays and the inverted cover, and between bottoms of trays and the cover on which the trays rest. Such glue arrangement is preferably provided for each layer of trays on the unit load. Additional layers are added in a similar manner, and strap means utilized to secure the layers to the pallet. The resulting structure is strong, rigid, impact-resistant, has high compressive strength, and offers high resistance to the entrance of insects, vermin, moisture and foreign material.

Reference is now made to the accompanying drawings for a better understanding of the invention, wherein all the parts are numbered and wherein the same numbers are used to refer to corresponding parts throughout.

Referring to FIG. 1, a completely assembled palletized unit load is shown comprising a pallet 1, which is composed of wood, and a plurality of trays 2 arranged in layers, each layer having a full layer unitary cover 3 covering the entire layer and serving to hold the trays of each layer together as a unit. The cover 3 is preferably made of a cylinder type of paperboard. An additional corrugated full layer cover 3s is usually placed over the cylinder board cover of the top layer before bonding. Alternatively a wood cover may be placed over the top layer. As shown in FIG. 1, an inverted cover 4 may be placed under the first layer of trays. A plurality of layers are assembled on each pallet and secured thereto by means of straps 5 commonly made of steel or plastic such as Dymax strapping. The trays are glued to the underlying cover as already described. Corrugated or fiberboard edge protectors 6 are placed under the straps 5 at the edges of the top layer to prevent defacement or destruction of the cover when a substantial force is applied by the straps 5. As shown in detail in FIG. 4, the trays in each layer may be arranged in two rows, one row comprising three trays sliding side-to-side against each other and the other row comprising two trays in end-to-end abutment. The trays of succeeding layers are superimposed over the respective trays of the preceding layer. The arrangement of the trays of each succeeding layer may be staggered, as shown in FIG. 1, so that each tray overlies an abutment surface between trays of the preceding layer. This arrangement serves to stabilize the unit load and prevent lateral shifting of the trays.

In a preferred embodiment, a corrugated board or wood cover is placed over the cylinder board cover of the top layer to provide additional support and to withstand the stress applied by the subsequent bonding. The entire unit may then be banded with steel or plastic straps to form a palletized unit load as shown in FIG. 1.

The placement of the trays within each layer may take various forms. Moreover, the trays of succeeding layers may be placed in different or staggered positions to provide over-lapping layers in order to stabilize the load against lateral movement. A staggered arrangement is shown in FIG. 1 and was described previously. In another arrangement, the trays in each layer may be arranged in a pinwheel pattern, with trays of each layer staggered with respect to adjacent layers, as disclosed in the copending application referred to above. Alternatively, one layer may be composed of two trays having an end-to-end surface of abutment and an adjacent row of three trays hav-
ing side-to-side surfaces of abutment. Each layer comprises five trays in mirrored-image arrangement with respect to adjacent layers. Succeeding layers alternate in similar manner. Such arrangements, as previously stated, have been found to increase resistance to lateral displacement materially. In a preferred embodiment of the invention, both the tray and the cover are formed of cylinder board material, as shown in FIG. 8, which has been coated with a plastic material highly impermeable to moisture, such as polyethylene, polypropylene, silicone resin, wax, or the like. This expedient enables the palletized unit loads to be stored over a long period of time and even under relatively humid conditions without deterioration or loss of structural strength and rigidity. Although a coating may be applied to both surfaces of each tray and each cover, satisfactory results may be obtained if a coating is present on only one surface of the cover and/or tray. As shown in FIG. 8, the cylinder board comprises a top liner 26, a filler 27, and back liner 28. A plastic coating 29 is applied to the back liner 28 and, if desired, a second plastic coating may be applied to the top liner 26.

FIG. 2 illustrates a single tray 2 containing a plurality of vertically arranged K.D. folding carts 7. The tray should preferably be designed so that the sides thereof are higher than the top edge of the folding carton, in order to provide side protection from crushing. The tray is preferably of the self-locking end type shown in FIGS. 2 and 3. In order to increase vertical compressive strength of the tray unit, a plurality of corrugated reinforcing members or pads, as for example U-pads 6, preferably having vertical corrugations, are placed in the tray. Alternatively, the reinforcing members or pads may be prepared from heavy cylinder board, and preferably two or more thicknesses glued together. In order to provide for shaping the pads into U-form, the individual layers are preferably properly scored prior to gluing the layers together. As shown in the drawings, and particularly in FIGS. 2, 3, 4, 6, and 7, each tray 2 in its preferred form is comprised of a bottom 9 and side panels 10 hingedly connected thereto. Inner end wall flaps 11 are hingedly connected to the ends of the side panels 10, and outer end wall panels 12 are hingedly connected to the ends of the bottom 9. Fold-over flaps 13 are hingedly connected to the upper edges of the outer end wall panels 12, and are folded over and engage the inner end wall flaps 11. Barrier flaps, i.e., dust flaps, 14 are hingedly connected to the upper edges of the side walls 10 and are preferably resiliently biased upwardly. One of the outer end wall panels 12 is provided with a horizontal reinforcing line 15 provided as by perforating or scoring to facilitate opening the end of the carton. If desired, severance lines may be provided in both outer end wall panels. However, in particular applications it may be preferred to utilize a severance line only at one end, so that the K.D. cartons within the tray may be inserted in a predetermined position, and the preference of the severance line serves as an index for insuring that the proper end is opened in order that the cartons will be properly presented to the automatic set-up machinery.

In order to provide the greatest compression strength and protection for the contained K.D. cartons, the tray and U-pads are so proportioned that the upper edges of the pads or supporting members are approximately 1/16" above the height of the knocked-down cartons. The height of the side panels (inside dimension, from bottom of tray to center of the score where barrier flaps begin) should preferably be the same height as the corrugated U-pads. The upper edges of the outer end wall panels of the tray should be approximately 1/16" below the corrugated U-pad height.

As shown in their preferred form in the drawings, the supporting members or pads are U-shaped to provide the greatest support and to prevent crushing of the cartons contained within the tray. However, any form wherein the ends of the pads are substantially at right angles to the main portion is suitable, for example L-shaped or modified Z-shaped. In the preferred arrangement as shown in FIGS. 2, 3, 4, and 7, two U-pads are positioned in each half of the carton in facing relationship to form two end compartments 16 and 17 defining an intermediate compartment 18 therebetweeen. In the embodiment shown, the end compartments are designed to contain approximately 100 cartons and the intermediate compartment to contain approximately 50 cartons.

A pallet load according to the invention is constructed by first providing a suitable pallet 1 of a material such as wood, as shown in FIG. 4. An inverted cover 4 of approximately the same size as the pallet is placed thereon and may be adhesively affixed thereto. Alternatively, a skid-proof coating may be applied to either the pallet or inverted cover surface to prevent lateral sliding movement between the cover and the pallet. A plurality of trays loaded with K.D. cartons and having corrugated reinforcing pads 8, as shown in FIG. 4 and described above, are placed within the inverted cover 4. As shown in FIG. 5, a unitary cover or cap 3 is then placed over the entire layer of trays. The cover may be formed of cylinder board or similar material and comprises a top 19 having depending flanges 20. Corner reinforcements 21 formed of extruded material such as tape, or reinforced corrugated cardboard, or preferably a fiberglass filament tape, are applied to secure the flanges at their ends and to the strength of the structure. Subsequent layers are positioned in a similar manner.

In order to permit the flanges 20 of the cover or cap 3 to bond readily and prevent the sides of the flange from bowing outwardly, the flanges are preferably defined by means of a score line 22 commonly known as a "skip score." Such a score line may be provided by alternate scores 23 and cuts 24, the cuts being applied only partially through the thickness of the paperboard material, preferably applied at the outer surface thereof. A suitable configuration comprises alternating one inch scores with one inch cuts. The novel scoring of the cylinder board layer caps or unitary covers reduces the tendency for side and end flaps of the cover to "fear out" when they are positioned over layers of trays after the corners have been taped. Relatively short cuts are made in the die cutting operation, replacing equal lengths of scoring rule on both sides and ends of the covers. The depth of the cuts is controlled so that no actual openings are made in the caps at these points. Alternating the cuts and scores in this manner enables the flaps to lie flat against the sides of the load. This reduces the possibility of subsequent tearing or other damage to the layer caps. In order to prevent the entrance of moisture into the covers, either one or both sides of the covers may be coated with polyethylene by any suitable means to reduce further the possibility of distortion of the flaps by controlling loss or gain of moisture in the cap itself.

According to a preferred embodiment of the invention, the barrier flaps 14 are so biased upwardly that they engage the cover with a substantial resilient force when the cover is in place, cooperating therewith to form a barrier. Further, the edges of the supporting members or pads which extend above the upper edges of the outer end wall panels of the tray also engage the cover and support the cover in a position elevated above the cartons contained within the tray. As a result of the cooperation of the barrier flaps and the supporting members with the cover, an excellent barrier seal is provided, preventing entry of insects and foreign matter. Moreover, the tight seal formed prevents moisture from entering the carton, which moisture would ordinarily contribute to the weakening of the corrugated reinforcement or supporting pads 8, as well as other structure within the tray.

It is possible to provide lateral stability, a coating of an adhesive to provide adhesion between the bottom of the trays and the cover on which they rest. In another embodiment either the bottom of the trays or the top of the cover, or both,
may be coated with a non-skid composition. This prevents lateral sliding of the trays, while at the same time it permits the trays to be readily lifted by a single operator from the cover on which they rest without requiring the breaking of an adhesive seal. When the second layer of filled trays has been placed in position, a cover or cap is placed thereover, enabling another layer of trays to be placed thereon, and so on in succession. After the last layer of trays has been placed in position, a cover prepared from a heavier material such as corrugated board is placed over the top, in order to provide additional strength. If desired a cylinder board cover, preferably having an inner plastic coating, may be placed over the top row of trays, followed by a corrugated cover placed thereover. This assures both good moisture-proofness and mechanical strength. The pallet load is then completed by securing the layers to the pallet by means of metal or plastic straps, such as Dymax straps.

After the pallet load has been prepared in the form described, it may be stored or shipped without danger of crushing or distortion, while preventing the entrance of insects, vermin, and dust or other undesirable contaminants.

The completed pallet load may be disassembled by first cutting the securing straps. The individual trays may then be lifted or slid off the top of the load.

According to a further improved embodiment of the individual tray or carton aspect of the invention, a severance line 15 is provided which may be separated by suitable means. This permits the top of the outer end wall above the severance line together with the fold-over flap to be lifted out of the carton, allowing the remaining portion of the outer end wall to fold down and the inner end wall flaps to be folded outward. This results in an open end through which the K.D. cartons may be removed or fed into an automatic set-up machine. Such structure is shown in FIG. 7 and a preferred structure is shown in FIG. 10.

In the preferred embodiment, shown in FIG. 10, the severance line, as for example a perforation line, may be positioned at or near the bottom of one or both outer end panels. As a result, when the severance line is broken, the entire end panel of the carton separates and may be removed. The entire tray of cartons may then be placed into a properly designed machine feed section to accomplish a "magazine type" feed of the tray contents. After the U-pads are removed, a backward pull on the cylinder board tray pallets easy removal of the tray from the feed section, leaving a single row of cartons in the proper relative position for uninterrupted feeding of the machine.

This method, made possible by the novel end structure of the tray, greatly reduces the workload of feeding the machine.

Although any type of pallet known in the art may be utilized in preparing the unit load of the invention, a preferred structure is shown in the drawings, especially FIG. 1 thereof. In preparing the wood pallet in its preferred embodiment, the upper portion is formed by nailing six boards 30, the dimensions of which are ½" x 4" x 37", and one board 31, the dimensions of which are ½" x 6" x 37", to three strings 32. The six inch board is utilized to obtain a 40 inch dimension at this point so that, after unloading the trays from the pallet, the customer may make one cut across the 37-inch width of the pallet in order to obtain a standard 40-inch pallet width that will fit within their own products. The bottom of the pallet is prepared by nailing four boards 33, the dimensions of which are 16½" x 3½" x 37", at the end of the pallet, and one board 34, the dimensions of which are ½" x 4½" x 37", at the center of the pallet, to the strings 32. A space of 1½" is provided between each pair of boards to provide the placement of the 1½-inch wide strap therebetween. The dimensions of the strings are 1½" x 5" x 44½", each of which is provided with a 3" x 9½" cutout to permit the entrance of either a manually or electrically operated pallet transporter, as well as conventional forklift trucks.

Viewed from the end of the pallet, the two end strings are inset one inch each to obtain a thirty-six inch dimension. The most conventional fork length of a forklift truck is thirty-six inches. Inserting the strings in this manner ensures that the forks will be completely through all three strings when the unit load is lifted from the side. Where this is not provided for, only two of the three strings may rest on the truck, resulting in an unstable condition with regard to lifting and moving the unit load.

The method and palletized unit load of the present invention represents a significant improvement in the art.

The invention enables palletized loads to be readily prepared which may be conveniently handled for shipment, and which successfully withstand vibration, impact and crushing, to which forces such loads are normally subjected in transit. Moreover, because the use of an expensive complete corrugated outer container is avoided, a substantial reduction in material cost is achieved. Further, by using cylinder board, a polyethylene type coating can be readily applied to serve as improved protection against moisture vapor which would otherwise weaken the package and cause damage to the product. Subsequent die cutting of the cardboard components assures accurate relative dimensions of tray to cap, thus insuring stability of the load and minimizing the development of undesirable pressure points. The tray is constructed to permit unloading from either end directly into a carton filling machine, resulting in substantial labor savings for the user. Its side flaps, when used in conjunction with the layer cap cover, form a superior protection against vermin, dirt, or other foreign materials. This feature is a significant factor insofar as food or food related cartons are concerned.

It is to be understood that the invention is not limited to the exact details of construction, operation, or exact materials or embodiments shown and described, as obvious modifications and equivalents will be apparent to one skilled in the art, and the invention is therefore to be limited only by the scope of the appended claims.

What is claimed is:

1. A palletized load comprising a pallet base and a plurality of layers secured thereto by strap means, each of said layers comprising a plurality of cardboard trays arranged in a substantially rectangular pattern, each of said trays comprising a bottom panel having side wall panels and end wall panels connected thereto and containing a plurality of articles therein, a vertical reinforcing member positioned in each tray comprising a body member having at least a portion extending along the width dimension of said tray and at least one end member disposed at right angles thereto, and a unitary cardboard cover having a peripheral depending flange disposed over and encircling the trays of said entire layer, the improvement wherein the sidewalls of each of said trays are each provided with a protective flange connected to the upper edge thereof resiliently biased against said unitary cover and cooperating with said cover to provide a barrier against the intrusion of foreign matter into said layer and containing a plurality of knocked-down folding cardboard cartons vertically arranged and a plurality of U-shaped vertical reinforcing members formed of corrugated board, and a unitary cardboard cover having a peripheral depending flange disposed over and encircling the trays of said entire layer, the improvement wherein each side wall of each of said trays is provided at its upper edge with a protective flange resiliently biased against said unitary cover.

2. In a palletized load comprising a pallet base and a plurality of layers secured thereto by strap means, each of said layers comprising a plurality of cardboard trays arranged in a substantially rectangular pattern, each of said trays comprising a bottom panel having side wall panels and end wall panels connected thereto and containing a plurality of knocked-down folding cardboard cartons vertically arranged and a plurality of U-shaped vertical reinforcing members formed of corrugated board, and a unitary cardboard cover having a peripheral depending flange disposed over and encircling the trays of said entire layer, the improvement wherein the sidewalls of each of said trays are each provided with a protective flange resiliently biased against said unitary cover.
and cooperating with said cover to provide a barrier against the intrusion of foreign matter into said tray.

3. In a palletized load according to claim 2, the improvement wherein each tray contains two pairs of U-shaped reinforcing members, each pair being arranged in facing relation and positioned at an end of said tray, whereby three compartments are defined.

4. In a palletized load according to claim 3, the improvement wherein the upper edges of said end wall panels are higher than the upper edges of said cartons, but lower than the upper edges of said reinforcing members.

5. In a palletized load comprising a pallet base and a plurality of layers secured thereon by strap means, each of said layers comprising a plurality of cardboard trays arranged in a substantially rectangular pattern, each of said trays containing a plurality of knock-down folding cardboard cartons vertically arranged and a plurality of U-shaped vertical reinforcing members formed of corrugated board, and a unitary cardboard cover having a peripheral depending flange disposed over and encircling the trays of said entire layer, the improvement wherein each of said trays comprises a bottom panel, a pair of side panels hingedly connected thereto, each side panel having a pair of end flaps, and a pair of end panels each hingedly connected at one end to said bottom panel and having a fold-over flap at the other end folded over and engaging a pair of end flaps of said side panels, at least one of said end wall panels being provided with a severance line connecting the two vertical edges thereof, whereby an end of said tray may be removed by tearing said end wall panel at said severance line and removing said fold-over flap and the portion of said side wall panel attached thereto.

6. In a palletized load according to claim 5, the improvement wherein said severance line is substantially horizontally positioned in the upper portion of said end wall panel.

7. In a palletized load according to claim 5, the improvement wherein said severance line is horizontally positioned substantially at the bottom of said end wall panel.

8. In a palletized load comprising a pallet base and a plurality of layers secured thereon by strap means, each of said layers comprising a plurality of cardboard trays arranged in a substantially rectangular pattern, each of said trays containing a plurality of knock-down folding cardboard cartons vertically arranged and a plurality of U-shaped vertical reinforcing members formed of corrugated board, and a unitary cardboard cover having a peripheral depending flange disposed over and encircling the trays of said entire layer, the improvement wherein each of said trays comprises a bottom panel, a pair of side panels hingedly connected thereto, each side panel having a pair of end flaps, and a pair of end wall panels each hingedly connected at one end to said bottom panel and having a fold-over flap at the other end folded over and engaging a pair of end flaps of said side panels, the side walls of each of said trays each being provided at their upper edge with a protective flap resiliently biased upwardly for providing contact against a cover, at least one of said end wall panels being provided with a severance line connecting the two vertical edges thereof, whereby an end of said tray may be removed by tearing said end wall panel at said severance line and removing said fold-over flap and the portion of said end wall panel attached thereto.

9. In a palletized load according to claim 8, the improvement wherein said severance line is substantially horizontally positioned in the upper portion of said end wall panel.

10. In a palletized load according to claim 8, the improvement wherein said severance line is horizontally positioned substantially at the bottom of said end wall panel.

11. In a palletized load according to claim 8, the improvement wherein the upper edges of said end wall panels are higher than the upper edges of said cartons, but lower than the upper edges of said reinforcing members.

12. An end-opening paperboard tray comprising a bottom panel, a pair of side panels hingedly connected thereto, each side panel having a pair of end flaps, and a pair of end wall panels each hingedly connected at one end to said bottom panel and having a fold-over flap at the other end folded over and engaging a pair of end flaps of said side panels, the side walls of each of said trays each being provided at their upper edge with a protective flap resiliently biased upwardly for providing contact against a cover, at least one of said end wall panels being provided with a severance line connecting the two vertical edges thereof, whereby an end of said tray may be removed by tearing said end wall panel at said severance line and removing said fold-over flap and the portion of said end wall panel attached thereto.

13. The tray of claim 12, wherein said severance line is located substantially at the bottom of said end panel.

14. An end-opening paperboard tray comprising a bottom panel, a pair of side panels hingedly connected thereto, each side panel having a pair of end flaps, and a pair of end wall panels each hingedly connected at one end to said bottom panel and having a fold-over flap at the other end folded over and engaging a pair of end flaps of said side panels, at least one of said end wall panels being provided with a severance line connecting the two vertical edges thereof, whereby an end of said tray may be removed by tearing said end wall panel at said severance line and removing said fold-over flap and the portion of said end wall panel attached thereto.

15. An end-opening paperboard tray comprising a bottom panel, a pair of side panels hingedly connected thereto, each side panel having a pair of end flaps, and a pair of end wall panels each hingedly connected at one end to said bottom panel and having a fold-over flap at the other end folded over and engaging a pair of end flaps of said side panels, the side walls of each of said trays each being provided at their upper edge with a protective flap resiliently biased upwardly for providing contact against a cover and for cooperating with said cover to provide a barrier against the intrusion of foreign matter into said tray, said tray containing a plurality of knock-down folding cardboard cartons, and a plurality of U-shaped vertical reinforcing members formed of corrugated board, at least one of said end wall panels being provided with a severance line connecting the two vertical edges thereof, whereby an end of said tray may be removed by tearing said end wall panel at said severance line and removing said fold-over flap and the portion of said end wall panel attached thereto to provide a convenient exit for removal of said cartons contained therein.

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