Dec. 6, 1966 L. C. DICK ET AL 3,289,828

UNITIZED CARTON LOADS

Filed May 5, 1964 3 Sheets-Sheet 1

Fig. 1.

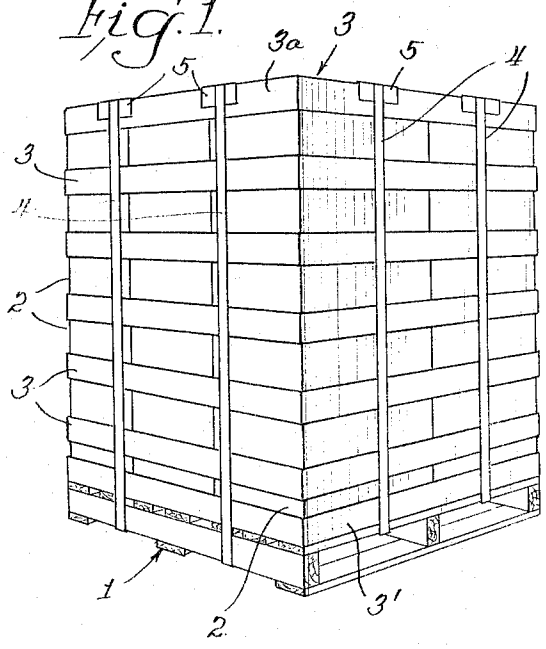


Fig. 2.

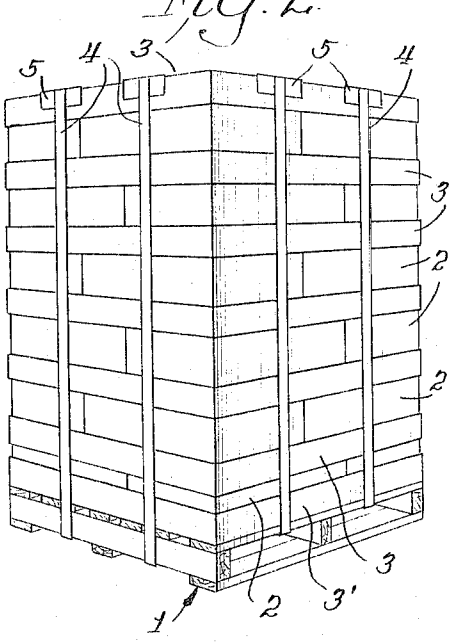
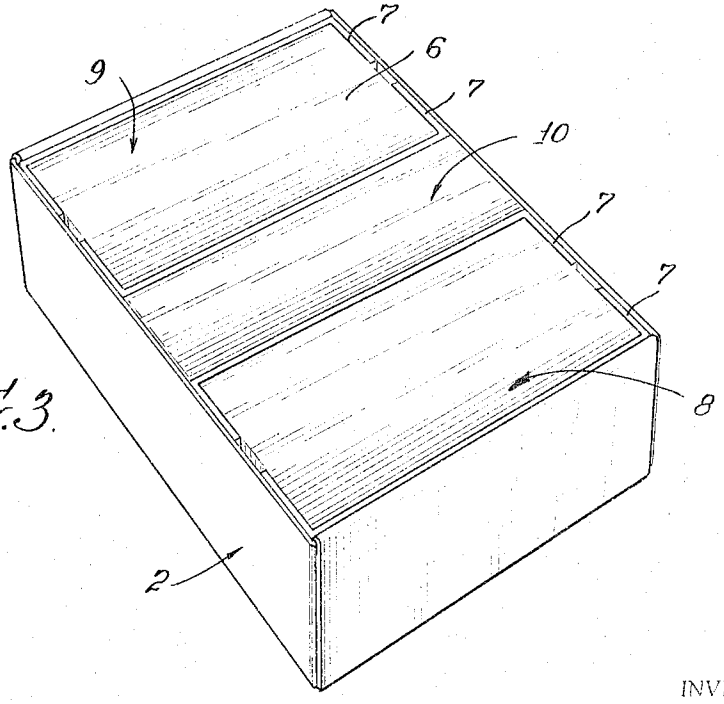


Fig. 3.



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UNITIZED CARTON LOADS

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Fig. 4

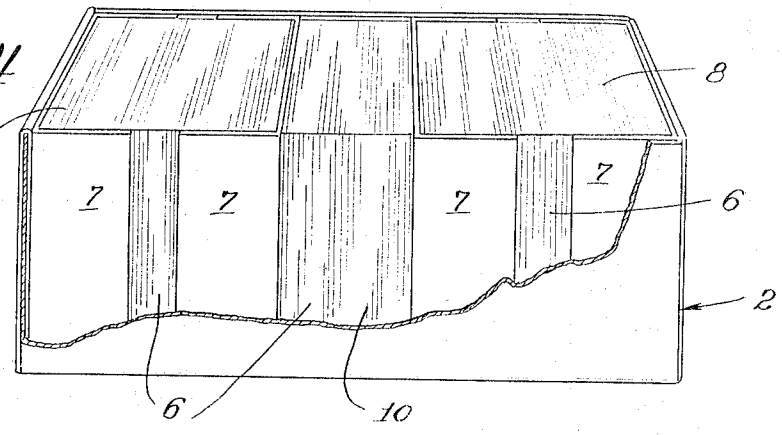
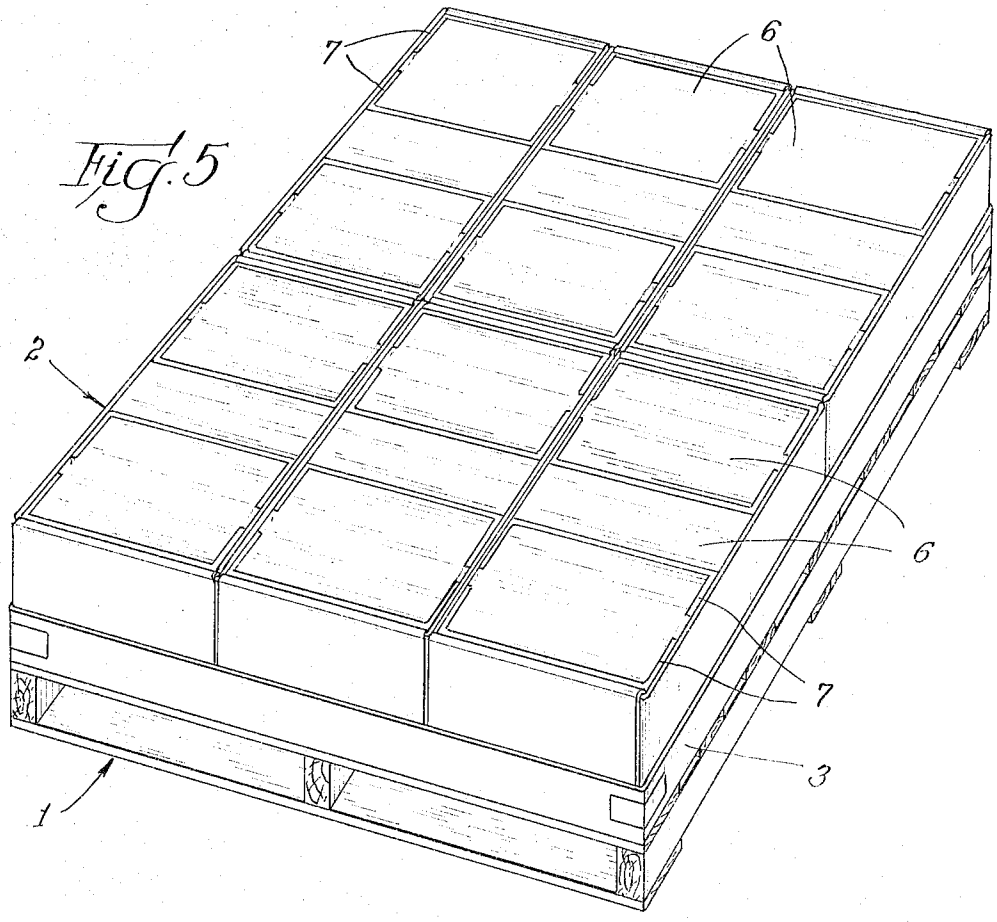


Fig. 5



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UNITIZED CARTON LOADS

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Fig. 6.

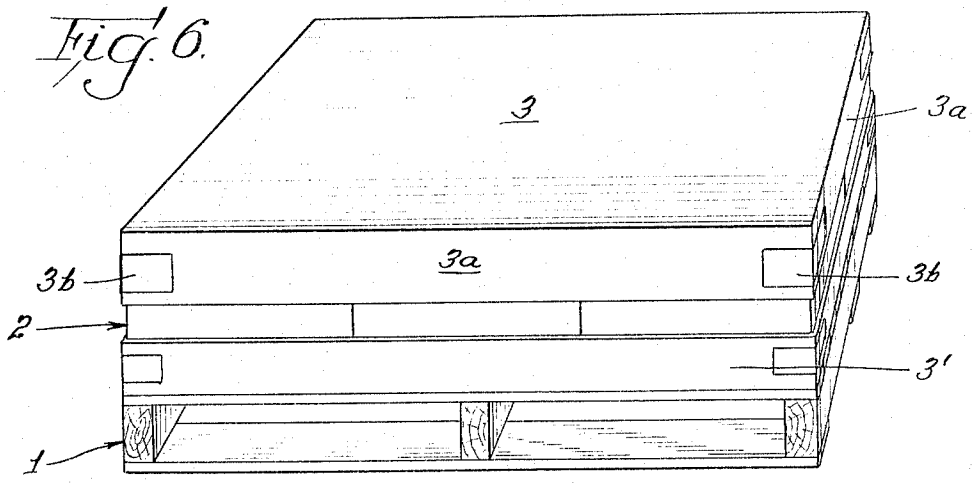


Fig. 7.

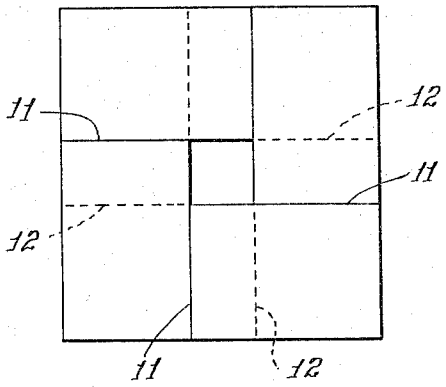


Fig. 8.

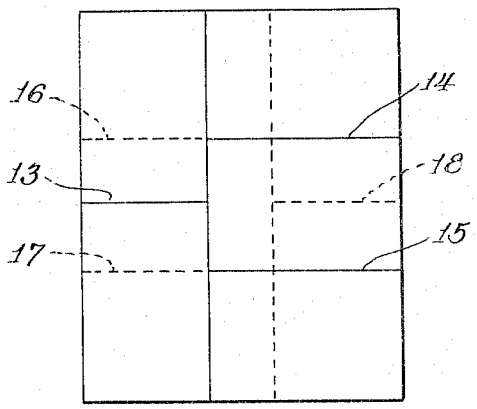
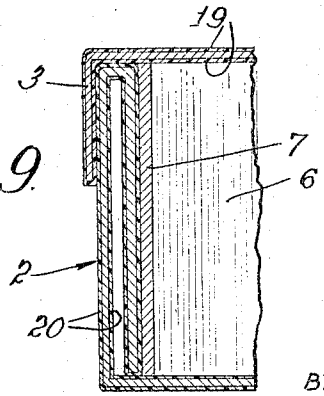


Fig. 9.



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3,289,828

UNITIZED CARTON LOADS

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Filed May 5, 1964, Ser. No. 365,054
13 Claims. (Cl. 206—65)

This invention relates to packaging, and is more particularly concerned with a method for packaging a plurality of folded and glued paperboard cartons into a unit load secured to a pallet base, and with the unit load provided thereby. As used 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 many such containers are piled to any great height. This is due largely to a tendency of the corrugated container to abosrb moisture during periods of high relative humidity. Excess moisture weakens the corrugated container, causing partial collapse of loads and spoilage of cartons contained therein. Damage to glued cartons in corrugated containers is also caused by uneven stacking of such containers so that the 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 this 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.

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.

It is an object of the present invention to provide a novel method for packaging materials such as folded and glued paperboard cartons in unitized loads. It is another object to provide such 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 a further object to provide unitized loads of the type described which are affixed to a pallet base for easy handling. It is an additional object to provide a 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 palletized unit load in another embodiment of the invention.

FIG. 3 is a perspective view of a single tray containing a load of knocked-down folding cartons.

FIG. 4 is a perspective view of the tray of FIG. 3 with one side panel partially broken away.

FIG. 5 is a perspective view showing a complete layer of trays arranged on a pallet base.

FIG. 6 is a perspective view of the layer of FIG. 5 after a cover has been placed thereover.

FIG. 7 is a top diagrammatic view showing an overlapping arrangement of two layers.

FIG. 8 is a top diagrammatic view showing a different arrangement of two overlapping layers; and

FIG. 9 is a fragmentary cross-sectional view through one end of a tray with cover in place.

According to the invention a palletized unit load is provided by placing a plurality of layers on a pallet and securing the layers to the pallet by strap means. The pallet may have a slatted top and bottom structure, or may be of solid construction. Each layer comprises 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, such as an expendable one 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 the trays and the cover are formed of a paperboard 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 secure the layers to the pallet. The resulting structure is strong, rigid, impact-resistant, and has high compressive strength.

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 FIGS. 1 and 2, completely assembled palletized unit loads are shown comprising a pallet **1**, which is commonly constructed 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** may be either of corrugated board or a cylinder type of paperboard. If an ordinary paperboard cover is used on each individual layer, an additional corrugated full layer cover is usually placed over the top layer before banding. As shown in FIGS. 1 and 2, an inverted cover **3'** 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 **4** commonly made of steel or plastic such as Dymax strapping. Corrugated edge protectors **5** are placed under the straps **4** at the edges of the top layer to prevent defacement or destruction of the cover when a substantial force is applied by the straps **4**. In FIG. 1 the trays in each layer are arranged in two rows, one row comprising three trays in side-to-side abutment 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. In FIG. 2 the arrangement of the trays of each succeeding layer is staggered 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 FIG. 3 a single tray **2** is shown containing a plurality of vertically arranged K.D. folding cartons **6**. The tray may be of the self-locking end type shown in FIGS.

3 and 9. In order to increase vertical compressive strength of the tray unit, a plurality of corrugated reinforcing pads 7 preferably having vertical corrugation are placed in the tray. The pads should have substantially the same height as the trays. As shown the pads are U-shaped. However, any form wherein the ends of the pads are substantially at right angles to the main portion of the pads is suitable, as for example L-shaped or modified Z-shaped. The preferred arrangement is shown in FIGS. 3 and 4 comprising two pads positioned in each half of the carton in facing relationship to form two end compartments **8** and **9** defining an intermediate compartment **10** therebetween. In the embodiment shown, the end compartments are designed to contain approximately 100 cartons and the intermediate compartment to contain approxiately 50 cartons.

In FIG. 5 a plurality of trays containing cartons and vertical supports are shown positioned on a pallet **1**. Various other arrangements may of course be used. However, it is desirable that the overall dimensions of each layer conform substantially to the dimensions of the pallet.

In FIG. 6 the first layer has been completed by placing a cover **3** thereover. The cover may be formed of paperboard or similar material, and has depending flanges **3***a*. Corner reinforcements **3***b* formed of a material such as tape or reinforced tape, e.g., gummed kraft, are applied to secure the flanges **3***a* and to strengthen the structure. Subsequent layers are positioned in similar manner.

In a preferred embodiment, a corrugated board cover is placed over the top layer to provide additional support and to withstand the stress applied by the subsequent banding. Additionally, an inverted corrugated cover **3'** may be placed on the bottom of the first layer to provide support against lateral displacement. The entire unit may then be banded with steel or plastic straps to form a palletized unit load as shown in FIGS. 1 and 2.

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 overlapping in order to stabilize the load against lateral movement. Two arrangements are shown in FIGS. 1 and 2 and have been described previously. In another arrangement, shown in FIG. 7, the trays in each layer may be arranged in a pinwheel pattern. An upper layer is shown by the solid lines having surfaces of abutment **11**. The trays of the layer immediately below are staggered with respect to the top layer and form surfaces of abutment shown by the broken lines **12**. FIG. 3 shows still another arrangement. Here one layer is composed of two trays having an end-to-end surface of abutment **13** and an adjacent row of three trays having side-to-side surfaces of abutment **14** and **15**. The layer below, shown by broken lines, comprises five trays in mirrored-image arrangement with respect to the top layer having side-to-side surfaces of abutment **16** and **17**, and an end-to-end surface of abutment **18**. Succeeding layers alternate in similar manner. This arrangement has 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 paperboard material which has been coated with a plastic material highly impermeable to moisture, such as polyethylene, polypropylene, silicone resin, wax, or the like. This expediency 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. In the fragmentary view of FIG. 9, the cover **3** is shown having a coating **19** applied to both surfaces thereof, while the tray **2** has a coating **20** applied to both surfaces thereof. However, satisfactory results are obtained if a coating is present on only one surface of the cover and/or tray. As shown in FIG. 9, the tray is of the locking end type of structure.

The following examples are given by way of illustration only and are not to be construed as limiting.

Example 1

A unitary load was prepared and placed on a 46¼ inch by 44¼ inch pallet, utilizing six layers of six trays per layer, making a total of 36 trays per pallet load, and containing 9,000 K.D. (knocked-down) folding paperboard cartons per pallet load. Each succeeding layer was stacked with the individual trays superimposed directly over corresponding trays of the preceding layer, as in FIG. 1. Each tray was filled with vertically positioned folded ice-cream cartons. Four corrugated U-shaped reinforcing pads having vertical corrugations were inserted, one at each end of the tray, and, additionally, one spaced 100 cartons inward from each end, as shown in FIGS. 3–5, to add compressive strength and stability not only to the tray container, but also to the entire unit load.

An inverted cover was first placed on the pallet and the first layer of trays inserted therein, in a pattern comprising two rows of three layers each. Successive layers each comprising two rows of three layers each were stacked in the pattern shown in FIG. 1.

Each layer was stacked in a stacking pattern comprising two rows of three trays each, as shown in FIG. 1. A corrugated board full layer cover was placed over each layer. The entire pallet load of six layers was secured with four plastic straps (#504 Signode Dymax straps)-two length and two girth. The load was vibrated on a Gaynes vibrator, and the test was conducted with one gate positioned on the vibrator. The end and side of the pallet load were blocked with two inch by four inch pieces secured to the vibrator floor to prevent the pallet load from moving off the vibrator car during testing. The pallet load was subjected to vibration for one hour at 125 r.p.m. The load stood up satisfactorily throughout the test. The load was then subjected to a static load test by placing a 1600 pound stacking weight on the pallet load for 20 hours. No damage to the cartons resulted. The load also successfully withstood an 11 mile per hour impact test. The load also withstood subsequent warehouse tests and truck shipments.

Example 2

A pallet load was prepared utilizing five trays per layer, with the trays arranged in a row of three trays and an adjacent row of two trays. Each tray was filled with K.D. folding ice-cream cartons. Corrugated U-shaped reinforcing pads were inserted at each end of the tray and also at 100 cartons in from each end. The two center pads were turned with the flange pointing toward the end of the trays. Instead of a full layer corrugated cover, as in Example 1, a full layer cover comprised of a polyethylene-coated paperboard was utilized. The paperboard material was the same as that employed for the individual tray containers. Spot glue areas were used between the full layer cover and the bottom of the tray containers of the next layer placed thereover to help lock the load in place. A corrugated full layer cover was utilized in conjunction with the paperboard full layer cover on the top layer to provide strength for the strapping and possible double tiering on the top layer. The entire pallet load of six layers was secured with four #504 Signode Dymax straps (two length and two girth). The load was vibrated for one hour and subsequently impacted. Although, during vibration, the load was not quite as stable as that described in Example 1 utilizing corrugated full layer covers over each layer, the slight movement of the load was not serious. After vibrating and impacting, the load was dismantled and examined and evidenced no damage to the folding ice cream cartons.

Example 3

A pallet load was prepared utilizing four trays per layer in a pinwheel arranged stacking pattern, as shown in FIG. 7. Three #504 Signode Dymax straps (two length and one girth) were employed to secure the unit. The load successfully passed the vibration and impact tests.

The method and palletized unit load of the present invention represent 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.

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.

We claim:

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 paperboard trays arranged in a substantially rectangular pattern, each of said trays containing a plurality of knocked-down folding paperboard cartons arranged in a vertical plane and a vertical reinforcing member formed of corrugated board and 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 paperboard cover having a peripheral depending flange disposed over and encircling the trays of said entire layer.

2. A palletized load according to claim 1 wherein an inverted unitary corrugated board cover is mounted on said pallet and the first layer of trays is contained within said cover.

3. A palletized load according to claim 1 wherein the corrugations of the vertical reinforcing member are vertical.

4. A palletized load according to claim 1 wherein the bottom of each tray is adhesively affixed to the cover immediately below.

5. A palletized load according to claim 1 wherein the paperboard of which said trays and said cover are formed is coated with a plastic material.

6. A palletized load according to claim 5 wherein said plastic material is polyethylene.

7. A palletized load according to claim 1 wherein the top layer has a cover thereover comprised of corrugated board.

8. A palletized load according to claim 1 wherein each layer has a corrugated board cover.

9. A palletized load according to claim 1 wherein the height of said reinforcing member is substantially the same as that of said tray.

10. A palletized load according to claim 1 wherein each tray contains two pairs of U-shaped reinforcing members, each pair being arranged in facing relationship and positioned at an end of said tray, whereby three compartments are defined.

11. A palletized load according to claim 10 wherein trays of adjacent layers are arranged in staggered relationship with respect to each other.

12. 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 polyethylene-coated paperboard trays arranged in a substantially rectangular pattern, each of said trays containing a plurality of knocked-down folding paperboard cartons vertically arranged and a plurality of U-shaped vertical reinforcing members formed of corrugated board, and a polyethylene-coated unitary paperboard cover having a peripheral depending flange disposed over and encircling the trays of said entire layer, the top layer being covered with an additional corrugated board cover, said reinforcing members and trays having substantially the same height.

13. A palletized load according to claim 12, wherein trays of adjacent layers are arranged in staggered relationship with respect to each other.

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LOUIS G. MANCENE, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,289,828 December 6, 1966

Lloyd C. Dick et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, lines 4 to 6, for "assignors to KVP Sutherland Paper Company, Kalamazoo, Mich., a corporation of Delaware" read -- assignors, by mesne assignments, to Brown Company, a corporation of Delaware --; column 3, line 48, for "FIGURE 3" read -- FIGURE 8 --.

Signed and sealed this 19th day of September 1967.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents