

March 25, 1969

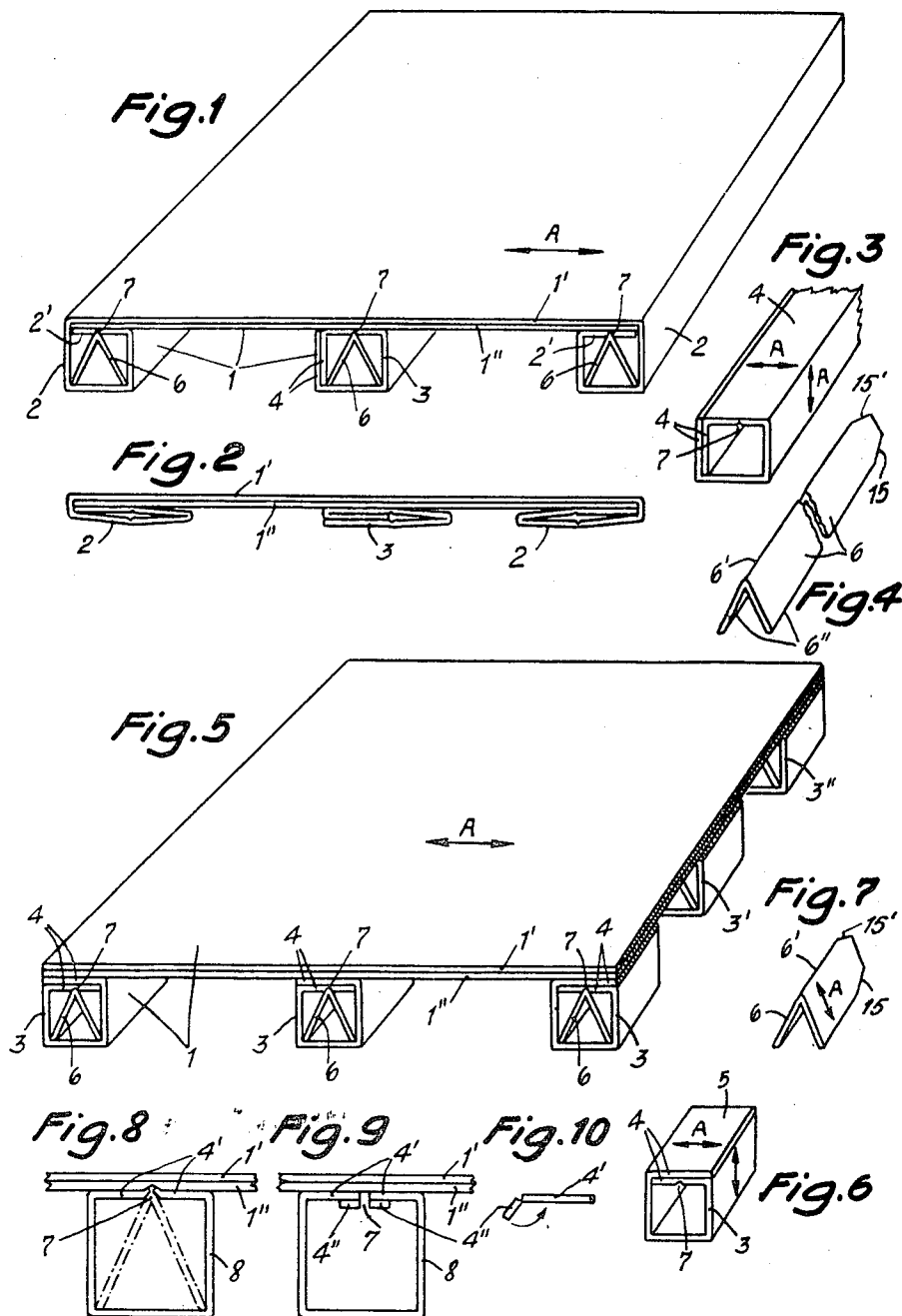
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3,434,435

PROPPING MEANS FOR PACKING AND TRANSPORTING REQUISITES

Filed June 26, 1967

Sheet 1 of 3



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Fig. 11

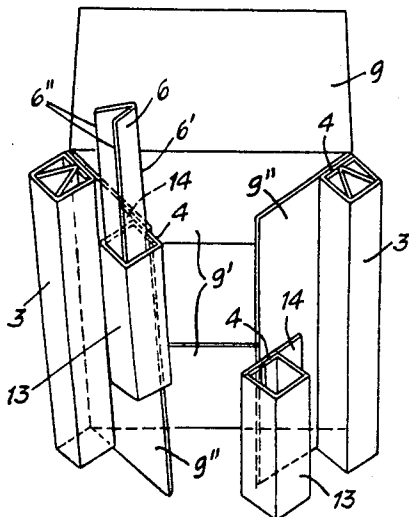


Fig. 13

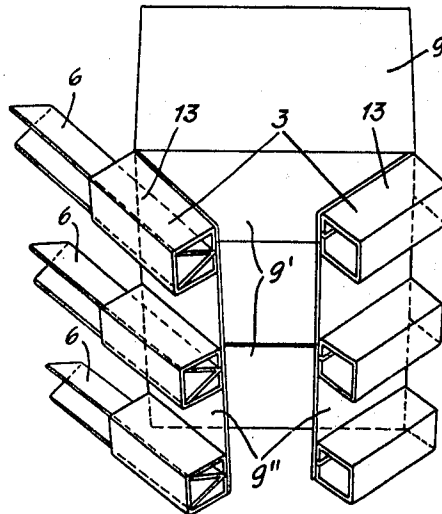


Fig. 12

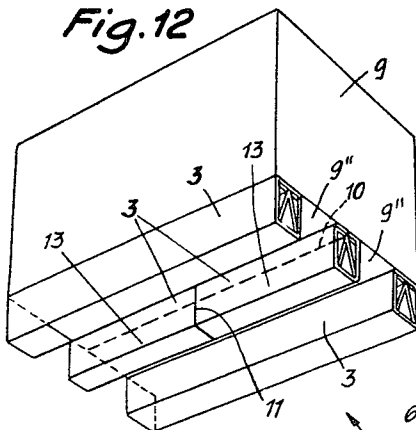


Fig. 14

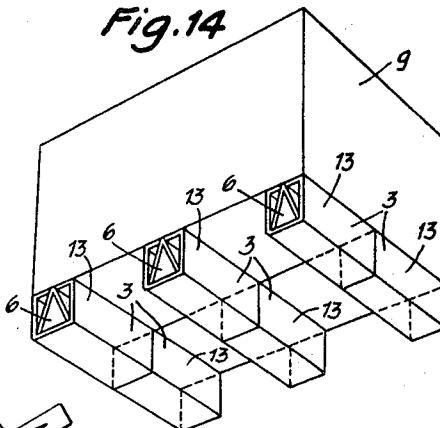


Fig. 16

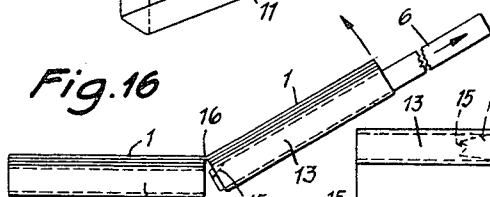


Fig. 17

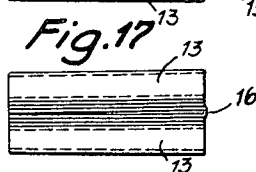
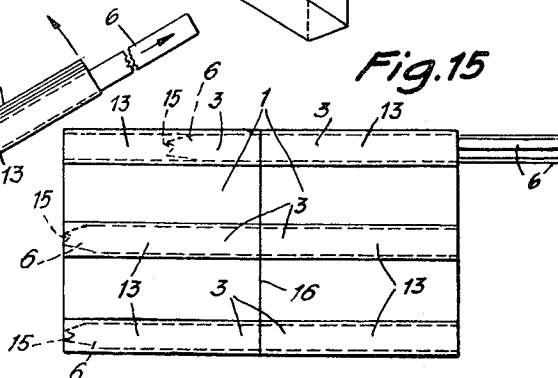


Fig. 15



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Fig. 18

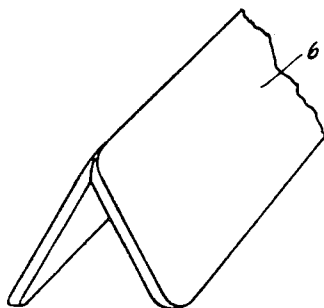


Fig. 19

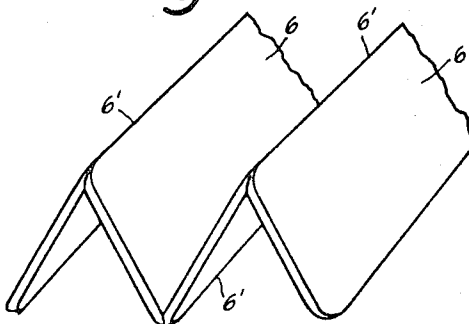


Fig. 20

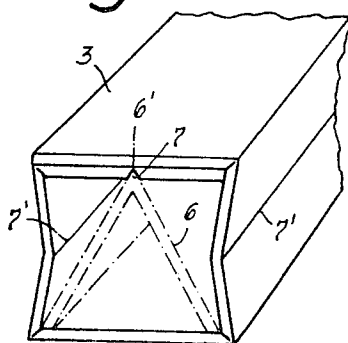


Fig. 21

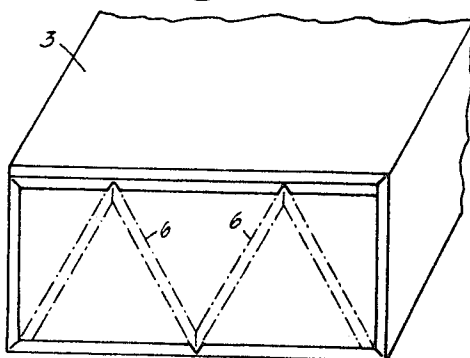


Fig. 22

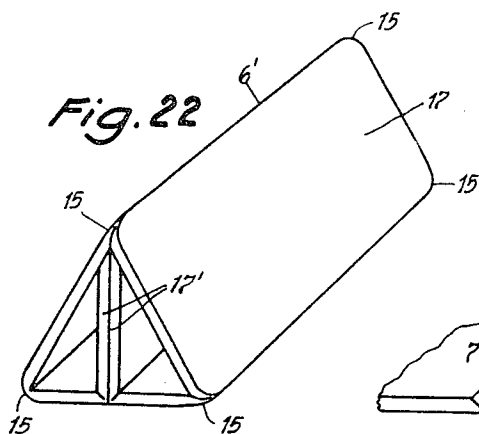
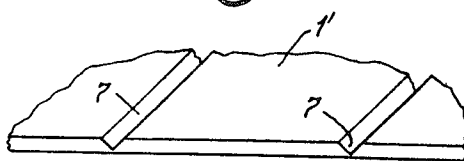


Fig. 23



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## PROPPING MEANS FOR PACKING AND TRANSPORTING REQUISITES

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9,676/66

Int. Cl. B65d 19/12, 19/16

U.S. Cl. 108—56

16 Claims

### ABSTRACT OF THE DISCLOSURE

This invention provides a material handling assembly for use in packing, storing and transporting materials. The assembly includes a materials contacting member and means connecting at least one hollow, foldable joist member to the bottom of the said materials contacting member. A foldable, stiffener member is removably disposed within each said hollow joist member. The stiffener member has at least one V-shaped section having a pointed ridge formed by two legs of the V-shaped section. The ridge is pointed upwardly in a direction normal to the horizontal. A retaining means is located at the top of the said joist member to receive the pointed ridge of the stiffener member.

### BACKGROUND OF THE INVENTION

Transport and packing requisites such as palettes, containers, boxes and the like made of wood, cardboard or corrugated board, are known per se, and the bottom thereof or supporting ledges provided thereon form therewith a rigid whole. For storing, the support at a distance of said requisites from the floor or ground is important, and for stacking storage the maintenance of a suitable distance from each other is important, so that said requisites may be readily seized by the fork of a lift truck for moving.

### SUMMARY OF THE INVENTION

The present invention relates to propping means for packing and transporting requisites such as palettes, containers, boxes and the like. According to the invention, said means are distinguished in that supporting joists are provided at the bottom which are formed as foldable hollow profiles, foldable stiffening elements being removably disposed in said profiles to act as cross and longitudinal braces.

### BRIEF DESCRIPTION OF DRAWINGS

Various forms of the invention are shown in the drawings, in which:

FIG. 1 is a perspective view of a palette of a first example,

FIG. 2 is a side view with folded supporting joist,

FIG. 3 is a partial view of a supporting joist,

FIG. 4 is a partial view of a stiffening element,

FIG. 5 shows in perspective a palette of a second form of the invention,

FIG. 6 is a partial view of an appurtenant supporting joist,

FIG. 7 is a similar view of the stiffening element,

FIGS. 8 and 9 show further variants of the supporting joist,

FIG. 10 is a detail of FIG. 9,

FIG. 11 shows in perspective a third example in the form of a container with partly opened bottom and provided with supporting joists,

FIG. 12 is a view similar to FIG. 11 but with closed bottom,

FIG. 13 is a view similar to FIG. 11 of a fourth example,

FIG. 14 is a view similar to FIG. 13 but with closed bottom,

FIG. 15 seen from below, shows a foldable palette, FIG. 16 shows the two half portions of the palette of FIG. 15, partly folded,

FIG. 17 shows the palette of FIGS. 15, 16 in the folded state,

FIG. 18 depicts a V-shaped stiffening element,

FIG. 19 illustrates a stiffening element formed by two adjacent V-profiles,

FIG. 20 shows a supporting joist destined to take up a V-shaped stiffener,

FIG. 21 depicts a supporting joist including a stiffening element formed of two continuous V-profiles,

FIG. 22 illustrates a stiffening element formed of a triangular profile, and

FIG. 23 shows a portion of a prefolded corrugated cardboard for a stiffener or a supporting joist.

### DESCRIPTION OF SPECIFIC EMBODIMENTS

In FIGS. 1 to 4, 1 designates the palette formed of a corrugated cardboard sheet 1' and a double sheet 1'' of corrugated cardboard adjacent to the underside of sheet 1', and of three supporting or propping joists 2 and 3. Said palette is of rectangular base form and on its two longitudinal sides comprises propping joists 2 folded down from sheet 1' and integral therewith. The joists 2, 3 are square hollow profiles of corrugated cardboard or other stiff material. The palette is engageable from the bottom by the fork of a lift-truck from two opposite sides by introduction between the joints. V-shaped stiffeners 6 of corrugated cardboard or other suitable material are removably inserted in the joists and serve as cross and longitudinal braces. The two exterior joists 2 with their legs 2' which are adjacent to the double sheet 1'', are pasted or glued to the latter. Joist 2 with its overlapping glued legs 4 forms a square hollow profile of which the leg that is at right angles to the legs 4 is glued to the double sheet 1''. Each stiffener 6 with its ridges 6' is engaged in a longitudinal groove 7 on the inside of the joists 2 and 3, while the free leg edges 6'' of the stiffeners are supported on the edge angles of the joists 2, 3 which face the bottom. In this way the supporting joists are very effectively braced and have a high bending strength.

The cardboard corrugations run from the palette bottom 1', 1'' at right angles to the joists 2 and 3, i.e. in the direction of the arrows A. At the joists 2, 3 and the stiffeners 6 the corrugations also run in the direction of the arrows A indicated in FIGS. 1 and 4.

When not used and shipped empty, the joists 2, 3 are collapsed and folded flat (FIG. 2), after having withdrawn the stiffeners 6, so that the joists require only little space.

The palette 1 according to FIG. 5 may be seized below by a fork from four sides. The bottom also comprises corrugated cardboard leaves 1', 1'' which are glued to each other. On the underside of the bottom leaf 1'' are fixedly located by gluing three joists 2 formed by spaced portions 3, 3' and 3''. In the hollow spaces thereof are withdrawably inserted the V-shaped stiffeners 6. The spaces between the joists 3 on one hand and between the joist portions 3, 3' and 3', 3'' on the other hand serve for the introduction of a fork (not shown) of a lift truck. In this example also the run of the cardboard corrugations is indicated by the arrows in FIGS. 5 to 7. The joists 3, 3', 3'' are formed similar and disposed at the palette bottom as in the first example and may be collapsed or folded down as shown in FIG. 2 after having removed the stiffeners 6.

In FIGS. 8 and 9 are shown joists 8 which close the hollow space with shortened end-legs 4' while forming a longitudinal groove 7. These shortened legs 4' with their outsides which are provided with adhesive, are glued to the bottom members 1', 1'' of the palette or to the bottom of a container or box. In FIG. 9 the longitudinal groove 7 is given a greater depth by beading or crimping inwardly the shortened legs 4'.

The sides of the joists 2, 3 that have to be glued to the bottom of a palette or a box or container, are provided with permanent adhesive faves 5. The latter before being stuck on are protected, as known, by readily detachable cover foils.

FIGS. 11 and 12 show a container or box 9 of which the bottom is formed by two inner and two outer opposite bottom parts 9', 9'' that are disposed as flaps. The bottom parts 9'' carry the joists 3, namely two exterior joists and a two-part intermediate joist. The exterior joists 3 are glued to the exterior longitudinal edges of the container. The intermediate joist 3 is formed of two parts 13 of equal length which in the position of closure of the bottom parts 9' are coaxially joined to each other and cover the joint 10 between the two bottom parts 9''. One joist part 13 is glued to the facing left-hand bottom part 9'' and the other joist part is glued to the facing right-hand bottom part 9''. The joist parts 13 comprise on their exterior legs 4 an extension 14 which serve as adhesive flange and aim to give a better support on the bottom part. In each joist 3 is again inserted a stiffener 6 which interconnects the two parts 13 of the intermediate joist 3 so that the bottom parts 9'' of which each carries a joist part 13, are locked in their closed position. The topside of the container is conventionally closable. Obviously the additional support is more suited for containers and the like of great volume and weight, which are transported by lift trucks. When withdrawing the appurtenant stiffener from joist 3 up to joint 11 or by total withdrawal, the connection between the joist parts 13 is canceled so that the bottom parts 9'' of which each carries a joist part 13, may be swung to their open position. After removing the stiffeners 6, the joists 3 may be folded flat. To facilitate insertion of the stiffeners 6, the latter on one endside, the longitudinal sides 6'' and on the apex are beveled at 15 and 15' (FIGS. 4 and 7).

The container 9 in FIGS. 13 and 14 is provided with three supporting joists 3 of which each comprises two separate joist parts 13 which are glued to the exterior bottom parts 9'' athwart to the hinges thereof. Each bottom part 9'' carries, as shown in FIG. 14, three joist parts 13 which in the closed position of the bottom parts 9'' are united to a single joist 3 by the insertion of stiffeners 6, and these joists are as long as a complete joist 3 and are rigidly interconnected in the position of use.

FIGS. 15 to 17 show a palette 1 that is foldable in two half portions, and the joists 3 thereof extend athwart of the fold 16 and are subdivided in half their length. One joist part 13 is connected to one palette half-portion, and the other part 13 to the other half-portion. The palette 1 is made up to a rigid structure by insertion of the stiffeners 6 to connect the two-part joists 3. Folded palettes when not in use, may be stacked on top of each other to save storage space. When folding the palettes, as shown in FIGS. 16 and 17, the joists also are folded flat of course.

The additional support described for transport and packing requisites is particularly distinguished by a surprisingly high strength against tensile stresses, vertical and lateral pressure, bending and torsion. Its price is relatively cheap and permits to discard a transport requisite after short use. The additional support and the appurtenant transport or packing requisite may be impregnated so that they may be exposed to the weather. The foldable or collapsible joists also may be marketed single, as they are readily attachable to transport requisites such as palettes, boxes, containers and the like by gluing.

A V-profile as shown in FIG. 18 or an element made-up of two V-profiles as shown in FIG. 19 may serve as stiffener for insertion in a supporting joist 3 and 4 formed as square hollow profile. To produce clean folding edges, in particular ridges 6' of the V-profiles 6, folding grooves 7 (FIG. 23) for a stiffener 6 or a joist 3 are provided on the face of blank 1' that serves as interior side of the hollow profile, which grooves close themselves about the folding groove 7 when bending the cardboard. For the engagement of the ridges 6' of a V-profile stiffener 6 in FIGS. 18 and 19, grooves 7 also are cut and pressed on the hollow-profile inside of joist 3 at the respective points. These guiding grooves 7 facilitate insertion of the stiffener 6, firmly locate same in joist 3 and stiffen, on the other hand, the cross sectional shape of the joist. By providing buckling folds 7' on the vertical sidewalls of joist 3 (FIG. 20) it is assured that in the case of high loading the sidewalls will bend inwards and not outwards and thus hold the stiffener in place still better. The load pressure on joist 3 is taken-up in each case by stiffener 6 alone, which fact calls for the use of high-grade corrugated cardboard such as "corrugated fiberboard" therefor, known to those skilled in the art. Thanks to the accommodation of the entire load by the stiffeners, the wall thickness of the joists 3 may be made relatively very thin. For this reason, a cardboard with close corrugations may be used, but it has to be of good quality since it will be subjected in use both mechanically and to tension on the bottom face of the joist. Faultless folding of the joists can only be obtained by the use of single-corrugation thin kinds of cardboard.

Instead of a V-profile also may be used a triangular profile 17 (FIG. 22) as stiffener, in which the ridge 6' is propped by vertical braces 17'. The profile 17 is bent from one piece by bending together the corrugated-cardboard blank 1', which forms six partial strips through five folding grooves 7, over three angles of 60° each and then over two angles of 90° each so that the two terminal strips 17' form a vertical brace for the isosceles triangular structure.

To facilitate insertion of stiffener 6 into joist 3, the edges on at least one front may be eliminated by a rounding-off 15 (FIG. 22). These rounded corners 15 also may be applied, of course, to the V-profiles according to FIGS. 18 and 19.

Easy foldability of the joists, after having withdrawn the stiffeners therefrom, is favored by using a cardboard that has fine corrugations and suitably may be impregnated waterproof on both sides or be plastic-coated or laminated.

The hollow square joist and the diagonal stiffener suitably are provided with edges that are free of outside folds and bent over inside folds.

The supporting structure formed by joists and stiffeners inserted therein is particularly suited for palettes, containers and palette boxes to which they are applicable thanks to their shape formed as square hollow profile at any desired point on the bottom of a transport requisite and, further, is given a high load capacity, thanks to the diagonal stiffener.

Joists and stiffeners preferably may be made of waterproof material such as corrugated cardboard impregnated or plastic coated on both sides, but also of plastic, wood or sheet iron.

The diagonal bracing of the joist profile by the stiffener is ensured by the engagement of the longitudinal edges of the latter in grooves provided on the joist inside. These grooves fix the stiffener in its most effective position. The guide groove assumes the function of the pressure or thrust axis which renders possible the self-bracing action of the stiffener with increasing load. Thanks to the guide groove, the stiffener is readily and positively insertable into the joist.

The stiffener may be formed by a V-profile or a triangular profile which comprises two legs standing at an

angle to each other. It also may be made up of a plurality of adjacent or continuous triangular profiles.

A V-stiffener comprising a plural-layer corrugated cardboard is distinguished by high loadability, is twist-proof, of lightweight and is much cheaper than a conventional stiffener made of corrugated cardboard layers stacked on top of each other. The stiffener disclosed by the present invention saves room when not used, i.e. when not inserted yet.

Since, above all, the containers possess the best static properties in the range of their exterior walls, and the intermediate spaces between the joists in the case of small containers would be too narrow for easy handling with lift trucks, the hollow joists according to the invention were brought to an annular assembly, either as a prefabricated closed unit or with an intermediate space that forms the guide groove, in order to provide the statically and functionally most favorable position for the attachment of the joists.

As the greatest enemy of corrugated cardboard has been found to be moisture, it has been provided that the joists as well as their stiffeners be protected by appropriate means and measures such as impregnation, plastic coating on both sides, waterproof lining with conventional packing machines and packing systems such as electrostatic welding in waterproof foils, shrinkfoils and the like, or by providing special protective devices and means.

Particularly for repeated use of the transport requisites reinforced by the stiffeners disclosed, it appears suitable to also use other materials in place of corrugated cardboard, which on account of their particular properties and possibilities of manufacture are suited for the production of the propping means, such as impregnated stiff pasteboard, plastic, wood, sheet iron as well as proper combinations thereof.

In the case of two-part joints provided on bottom flaps, a double function is attained by the insertion of the stiffeners, namely the positive longitudinal and crosswise bracing as well as a strong and quick-action bottom closure.

Two and more transport requisites provided with supporting joists, such as containers and boxes, may be effectively coupled to a detachable unit by the insertion of long and continuous stiffeners. It is desirable for transport to combine several small bundles and trusses to form a transport unit so as to save handling and manipulation in loading and shipping.

What we claim is:

1. A materials handling assembly for use in packing, storing and transporting comprising, in combination:

- (a) a materials contacting member,
- (b) means connecting at least one hollow, foldable joist member to the bottom of the materials contacting member,
- (c) a foldable stiffener member removably disposed within each said hollow joist member,
- (d) said stiffener member having at least one V-shaped section having a pointed ridge formed by two legs of the V-shaped section,
- (e) said ridge being pointed upwardly in a direction normal to the horizontal, and
- (f) retaining means located at the top of the said joist member to receive the pointed ridge of the stiffener member.

2. A materials handling assembly as defined in claim 1 wherein:

said connecting means include an adhesive material along an outer top side of said joist member to attach said joist member to said materials contacting member.

3. A materials handling assembly as defined in claim 1 wherein:

said materials contacting member has at least one leaf

member that rotates around the axis of a hinge portion,

said leaf member carrying at least one hollow joist member fixedly attached thereto.

4. A materials handling assembly as defined in claim 3 wherein:

said materials contacting member has a hinge portion connecting two bottom leaf members, each said leaf member carries at least one hollow joist member fixedly attached thereto,

the longitudinal edges of the said joist members being disposed in a direction normal to the axis of the hinge portion and being coextensive with each other when said leaf members are located in a common plane to provide a continuous, sectional hollow joist member substantially across the bottom of the material contacting member.

5. A materials handling assembly as defined in claim 3 wherein:

there are two leaf members and each rotates about the axis of a corresponding hinge portion,

said hinge portions being laterally displaced from each other,

said leaf members being rotatable into a horizontal position wherein the leaf member edges opposite the hinge portions are juxtaposed therebetween, the longitudinal edges of the said joist members being disposed in a direction limited to the choice of one being parallel to the axis of the hinge portions and one being normal to the axes of the hinge portions.

6. A materials handling assembly as defined in claim 5 wherein:

the longitudinal edges of the said joist members are disposed in a direction normal to the axes of the hinge portions and are coextensive with each other when said leaf members are in said horizontal position to provide a continuous, sectional hollow joist member substantially across the bottom of the material contacting member.

7. A materials handling assembly as defined in claim 5 wherein:

at least one joist member having a length shorter than said leaf members is located on each of the said leaf members at the said juxtaposed edges,

the longitudinal edges of said joist members being disposed in a direction parallel to the axes of said hinge portions and being coextensive with each other when said leaf members are in said horizontal position to provide a continuous, sectional hollow joist member substantially across the bottom of the material handling member.

8. A materials handling assembly as defined in claim 1 wherein:

said materials contacting member is a continuous planar structure, and hollow, foldable joist members are mounted along three separate parallel positions on the bottom of said planar structure.

9. A materials handling assembly as defined in claim 8 wherein:

said planar structure includes foldable bottom portions along two opposite edges to form two integral joist members at two of the parallel positions, and a third separately formed joist member is mounted on the bottom of the planar structure between the two integrally formed joist members.

10. A materials handling assembly as defined in claim 9 wherein:

said third joist member includes an overlapping side having inner and outer portions to form a closed hollow section, and

said pointed ridge retaining means includes a longitudinal groove located inside said hollow joist member on a side other than said overlapping side.

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11. A materials handling assembly as defined in claim 8 wherein:

each said joist member includes overlapping sides having an inner and outer portion,  
said pointed ridge retaining means includes a longitudinal groove located inside said hollow joist member on said overlapping inner portion, and  
said joist connecting means includes an adhesive material located between said outer overlapping portion and bottom of said planar structure.

12. A materials handling assembly as defined in claim 11 wherein:

said joist members include spaced portions having co-extensive longitudinal edges.

13. A materials handling assembly as defined in claim 1 wherein:

said joist member has a square cross section, and  
said pointed ridge retaining means includes a longitudinal groove between two shortened wall portion edges juxtaposed along the top of said joist member.

14. A materials handling assembly as defined in claim 1 wherein:

said retaining means includes a reinforcing strip contiguous to said shortened wall portions along both sides of said longitudinal groove.

15. A materials handling assembly as defined in claim 1 wherein:

said stiffener member has two V-shaped sections, and

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said pointed ridge retaining means includes two longitudinal grooves located on the inside of said hollow joist member to receive a corresponding pointed ridge.

16. A materials handling assembly as defined in claim 1 wherein:

said V-shaped stiffener member includes a wall portion joining the ends of said legs to form a triangular cross section, and

a vertical bracing support positioned normal to said joining wall and extending to the inside of said pointed ridge.

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