

[54] **PALLET CONSTRUCTIONS**

[72] Inventor: **Harvey G. Skinner**, Ligonier, Pa.

[73] Assignee: **Vulcan, Inc.**, Latrobe, Pa.

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[52] U.S. Cl. .... **108/51, 108/56**

[51] Int. Cl. .... **B65d 19/18**

[58] Field of Search ..... **108/51-58**

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*Primary Examiner*—James T. McCall

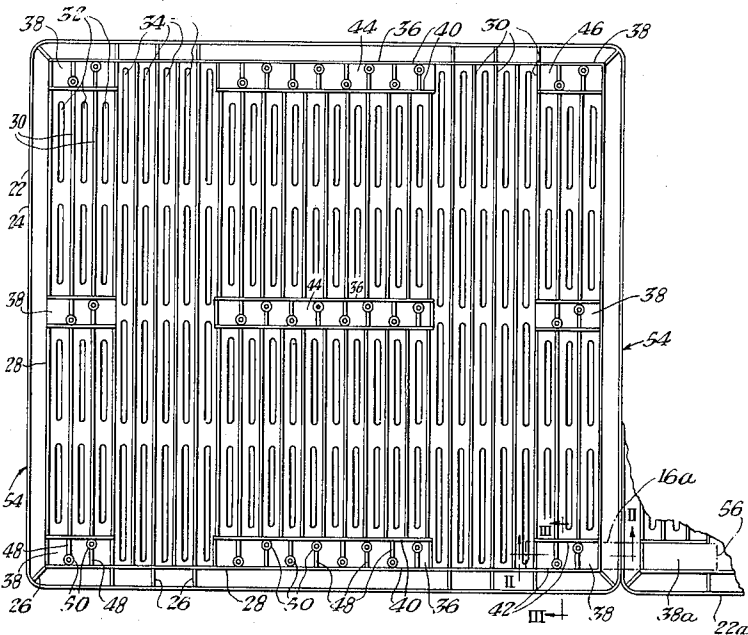
*Assistant Examiner*—Glenn O. Finch

*Attorney*—Buell, Blenko & Ziesenheim

[57] **ABSTRACT**

A pallet construction comprising a prefabricated pallet component having transverse stiffening means, a plurality of longitudinally extending support member engagement means formed on said pallet component, each of said engagement means including a pair of spaced extensions disposed for substantially flush engagement with an associated support member, support members inserted between each pair of said extensions, and fastening means for securing said pallet component to each of said support members at said engagement means.

**15 Claims, 17 Drawing Figures**



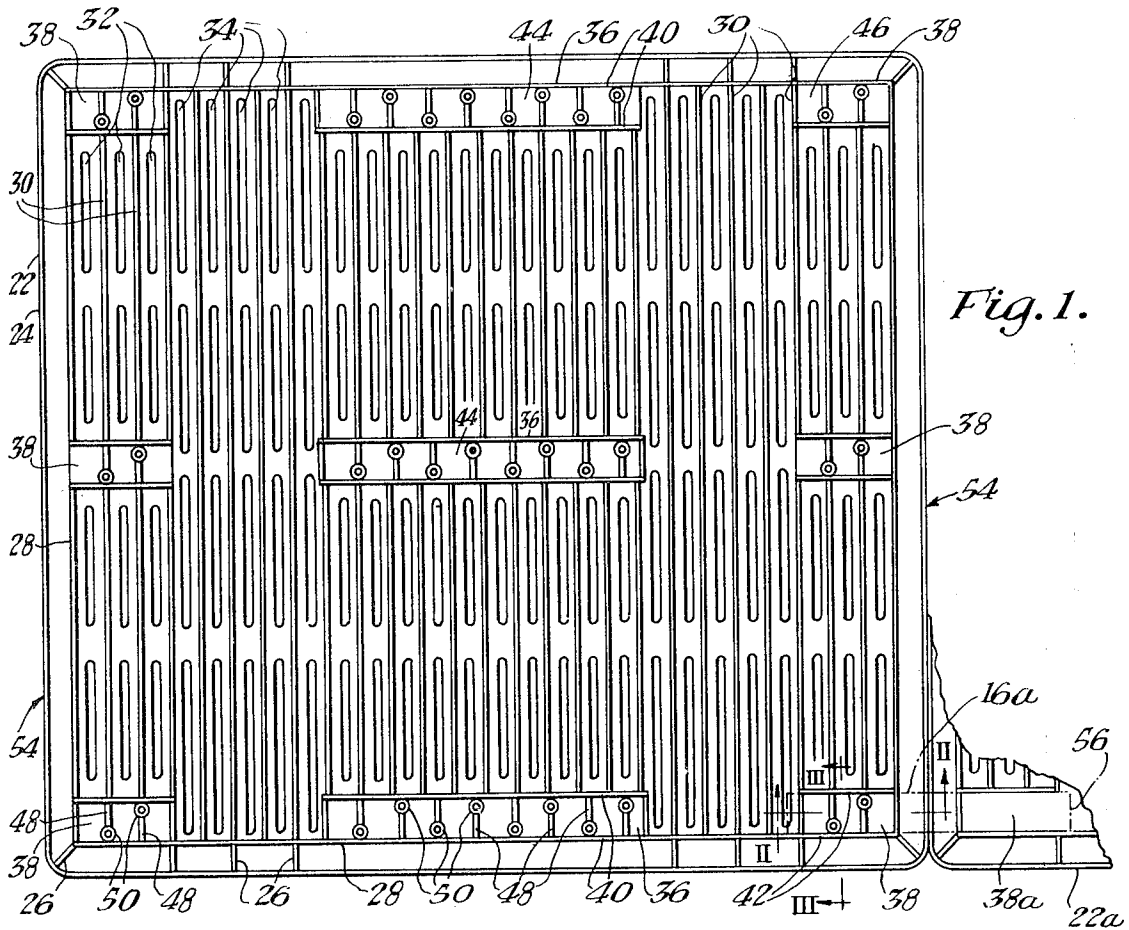


Fig. 1.

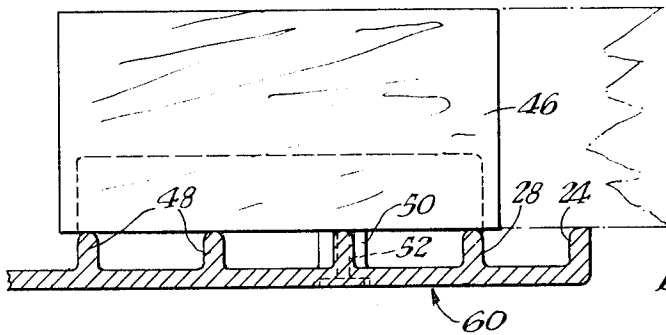


Fig. 2.

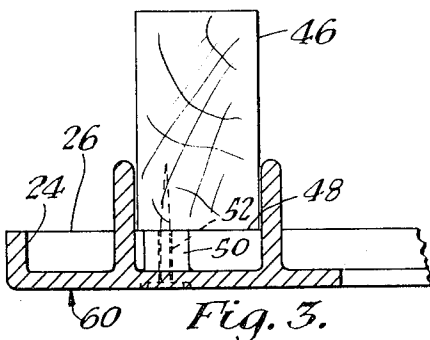
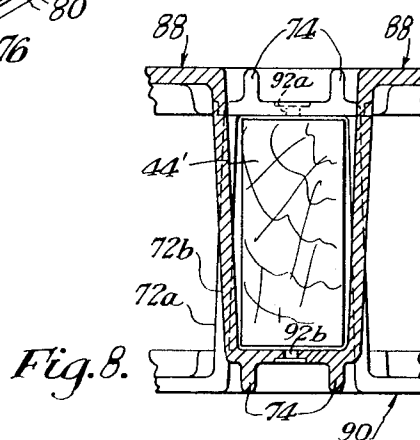
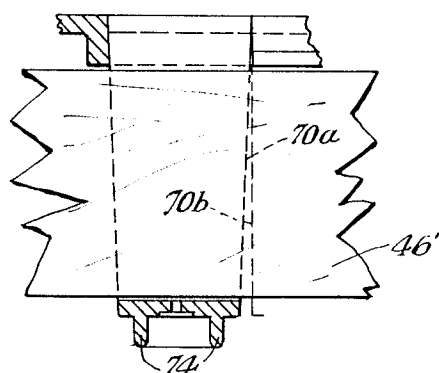
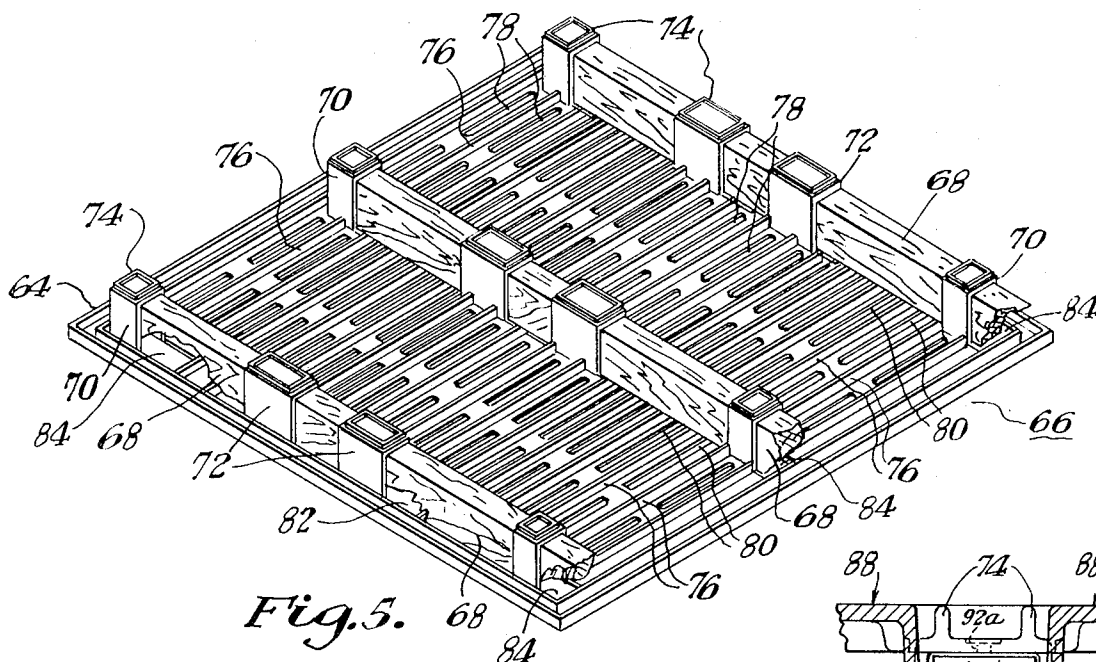
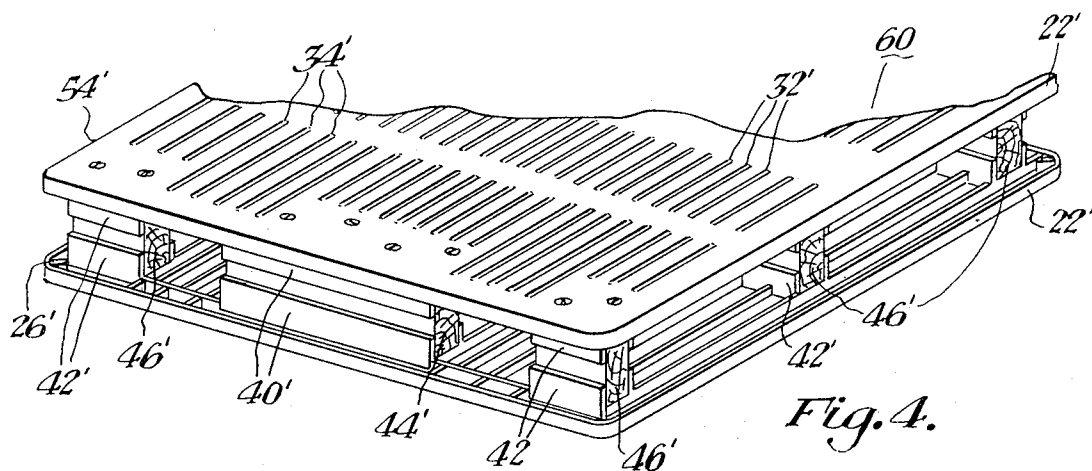


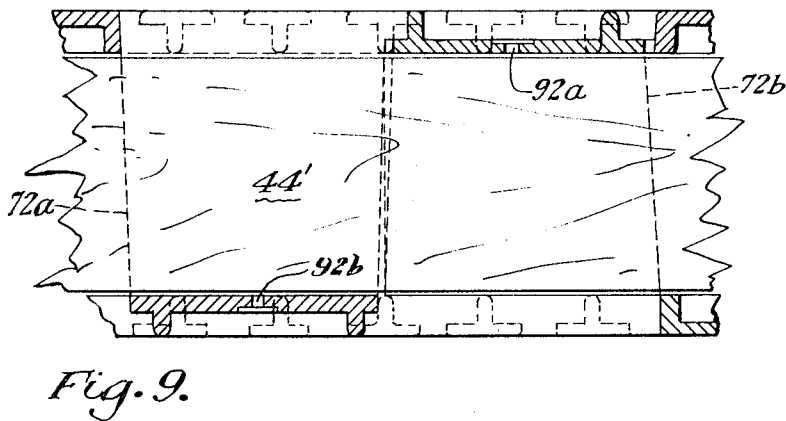
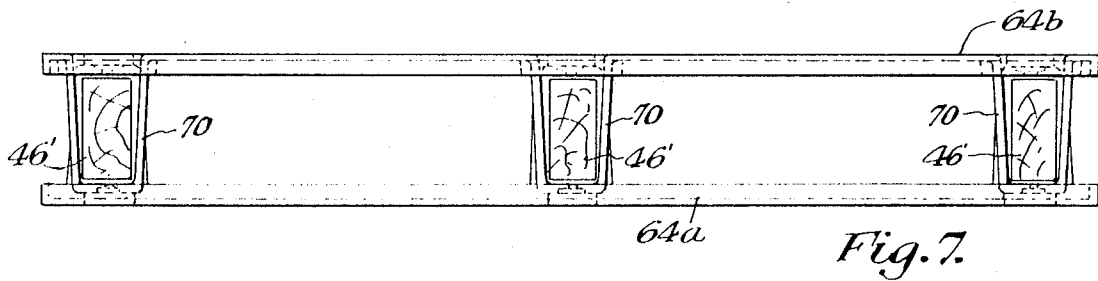
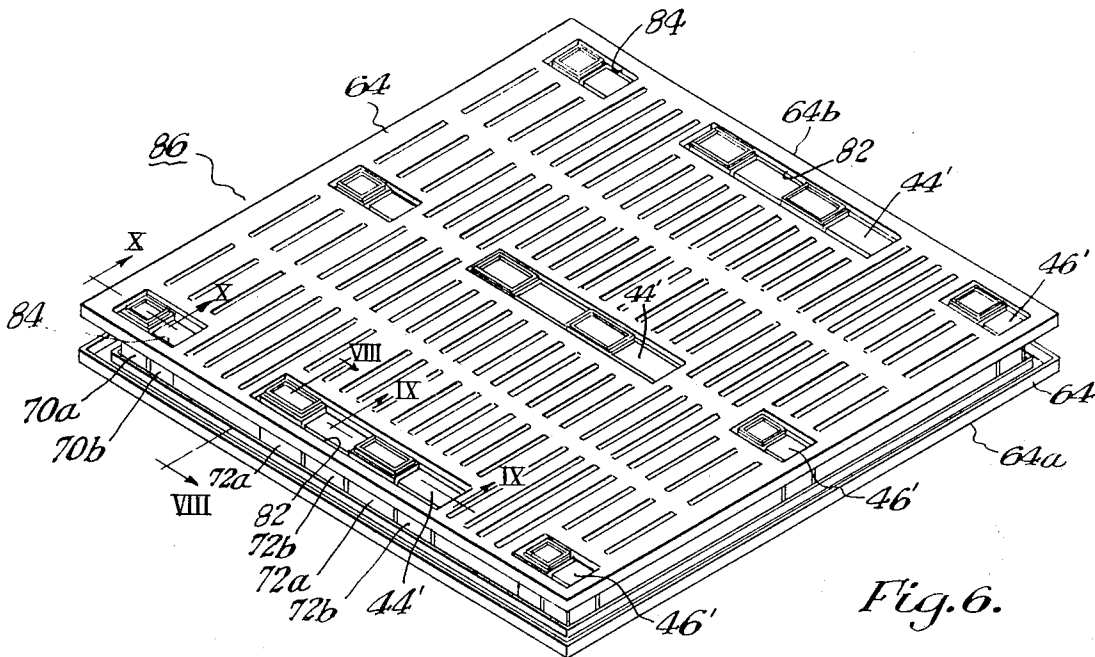
Fig. 3.

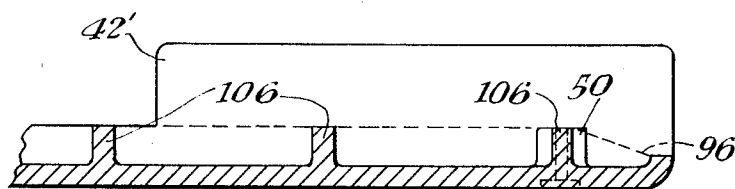
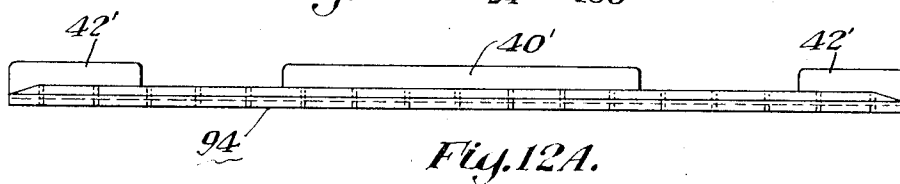
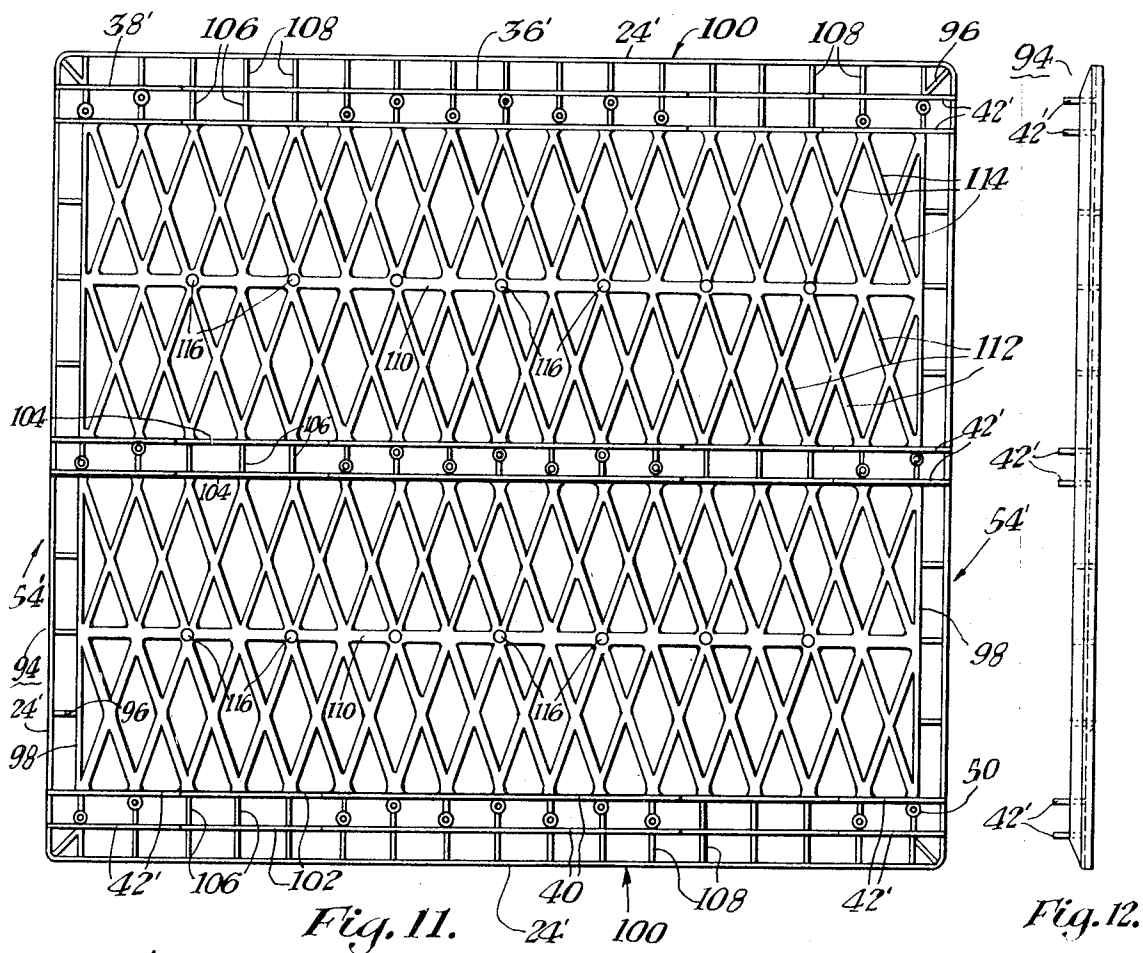
INVENTOR  
 Harvey G. Skinner  
 BY  
 [Signature]  
 HIS ATTORNEYS



INVENTOR  
Harvey G. Skinner

BY  
Bull, Shuck & Tessen Inc.  
HIS ATTORNEYS





INVENTOR  
Harvey G. Skinner  
BY  
2nd Clk, Blanko & Linsen Meier  
HIS ATTORNEYS

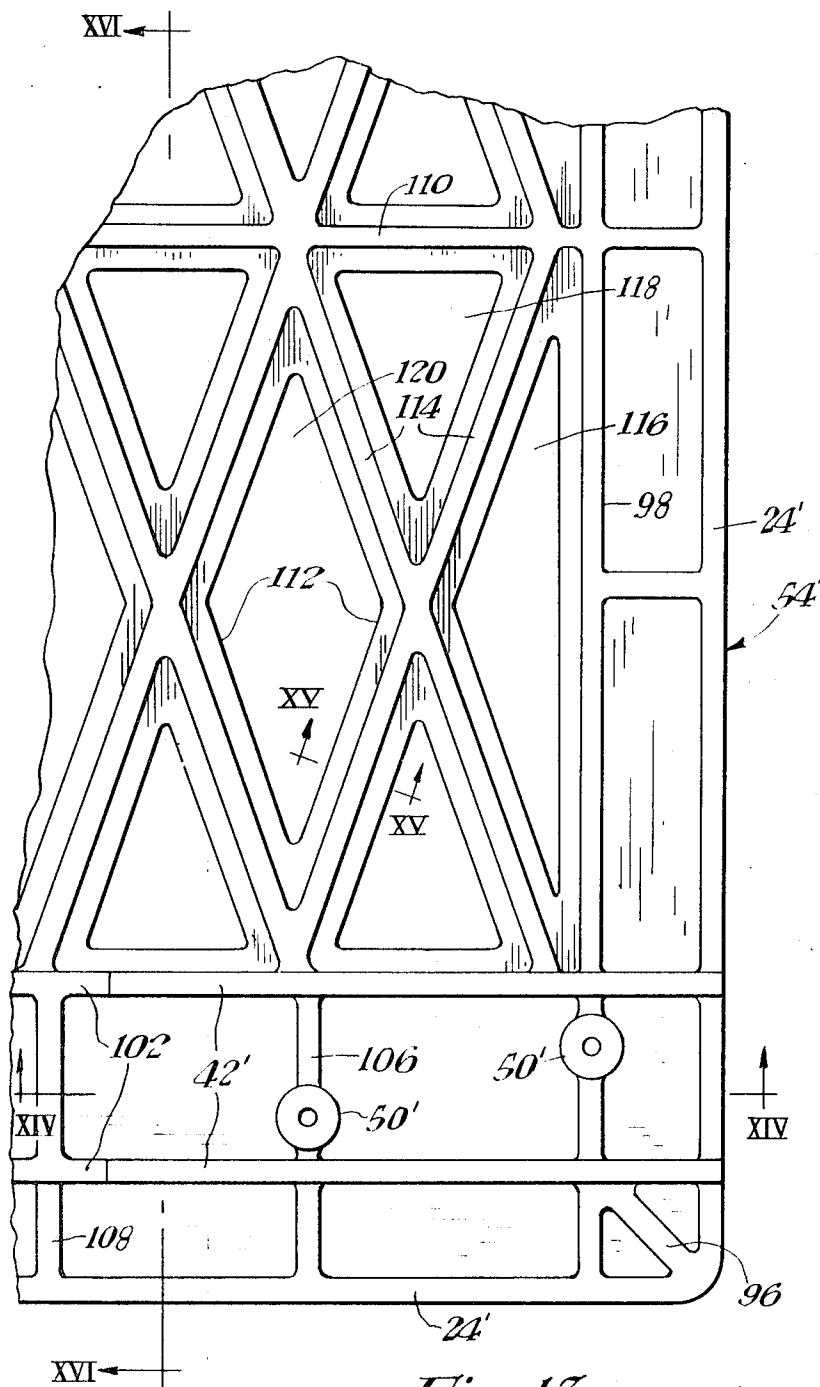


Fig. 13.

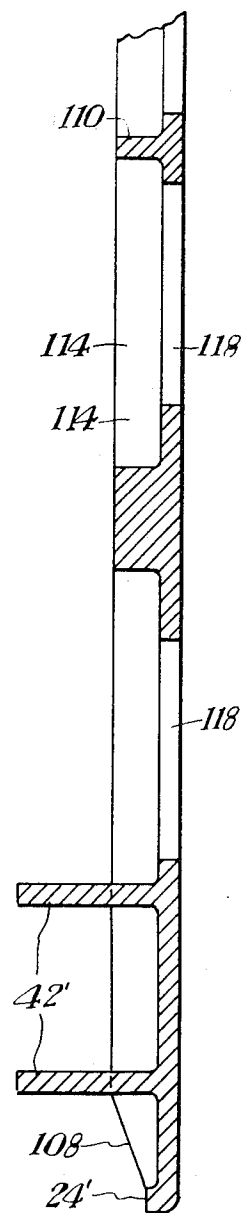


Fig. 16.

INVENTOR  
Harvey G. Skinner.

BY

*Swell, Hentz & Liebenheim*

HIS ATTORNEYS

## PALLET CONSTRUCTIONS

The present invention relates to a pallet of unique but non-complex construction, and more particularly to a shipping pallet including components which can be readily assembled for either a single- or doubled-deck assembly. My invention is especially concerned with a pallet construction which is assembled from one or more substantially identically molded members, which are assembled with common structural members such as wooden  $2 \times 4$ 's or the like into either a single- or double-deck arrangement.

Use of a pallet structure which is capable of single and double deck arrangements without substantial modification has many advantages. For example, the single-deck structure can be used for supporting finished articles on a rough surface, while a double-deck pallet construction is useful for insertion between groups of finished articles in protection of their juxtaposed surfaces. Where the connecting and/or supporting members of the pallet construction are commonly available materials such as lengths of wood, shipping of the empty pallets is greatly facilitated, as the supporting and/or connecting members for each pallet member, or for the pallet halves in the case of double-deck construction, can be obtained locally. Moreover, the use of locally available materials for joining or assembling the pallet construction components provides a ready supply of joining members of different lengths as desired, with the result that molded or otherwise preformed sections of the pallet construction can be joined edgewise or laterally, if desired, as modules in a larger area pallet construction.

There is a definite need, then for a pallet construction utilizing not only a minimum of component parts, but also locally available components of various sizes to minimize shipping volume of empty pallets and to provide a desired versatility in structural arrangement of the pallet for a variety of applications. Such use of local materials, particularly in the case of the single deck pallet construction, permits ready replacement of those components which are most apt to become worn during repeated use of the pallet construction. In certain arrangements of my pallet construction, for double-deck application, the upper and lower deck components can be made identical to facilitate manufacture, storage, shipping, and inventory of the pallet constructions.

A pallet construction, which can be assembled with a minimum of fastening hardware is also desirable. A need of such pallet construction exists, particularly where the pallet construction is reused repeatedly, or must be converted from single-deck to double-deck construction or vice versa. In certain arrangements of my pallet construction, I provide unique engagement means whereby the aforementioned supporting and/or connecting members can be quick-attached to either a single pallet deck or to a pair of opposed pallet decks as desired. It is important, however, that such engagement means be arranged so that the load-bearing surfaces of the pallet members are juxtaposed thereto. Load therefore is transferred directly from the pallet members to the interposed supporting or connecting members without concern for intervening clearances and possible breakage of the engagement means.

I am aware, of course, of a number of previous pallet constructions in this general area, typified for example by the U.S. Pat. No. to Cushman No. 2,699,912; Cauffiel No. 2,792,164; Trapp No. 2,942,825; and Brown No. 2,973,931. The Brown, Cushman and Cauffiel patents disclose various types of pallet constructions and other structural units, the components of which are joined directly by integrally formed projections or protrusions in the respective components. Consequently a number of undesirable, relatively deep recesses are formed in the load-bearing surfaces of these prior constructions. Moreover, locally available connecting or supporting materials cannot be used. This particular disadvantage is partially overcome by certain of the pallet constructions of Brown wherein elongated joining members are passed through mated straps extended alternately from the pallet components. The strap recesses of Brown, on the other hand, are only partially filled by the elongated joining members and any applicable

loading is transmitted entirely through the integral straps rather than through the joining members. Accordingly, the load capability of this known pallet construction is limited by the strength of the straps rather than by the strength of the joining members. Further, with the straps of the Brown pallet construction (FIGS. 14-17) terminating at the inside surfaces of the opposed pallet component, the outer surface of one pallet component must transfer loading to the straps of another component, which is undesirable in many applications.

The Trapp pallet construction is not adaptable for use with pre-molded pallet components in contrast to my present invention. Difficulties of handling, storing and shipping wooden pallets are, of course, well-known. Further, known pallet constructions, other than entirely wooden pallets, frequently have required specialized hardware for joining the molded pallet components, for example as illustrated in the Cushman patent.

Many known pallet constructions, for example as typified by the Cushman patent, are formed of preformed pallet components which are resiliently joined and, therefore, capable of relative lateral displacement. Such displacement is undesirable in many applications for obvious reasons.

I overcome these disadvantages of the prior art by providing a pallet construction comprising a prefabricated pallet component having transverse stiffening means, a plurality of longitudinally extending support member engagement means formed on said pallet component, each of said engagement means including a pair of spaced extensions disposed for substantially flush engagement with an associated support member, support members inserted between each pair of said extensions, and fastening means for securing said pallet component to each of said support members at said engagement means.

I also desirably provide a similar pallet construction including said transverse stiffening means being a plurality of spaced ridge members, and said support members being mounted on said ridge members, said support members and said extensions extending transversely of said ridge members.

I also desirably provide similar pallet constructions including each associated pair of said extensions being secured to a bight portion in strap formation, each of said straps being shaped to closely receive the associated one of said support members, including a number of load-bearing projections formed respectively on said bight portions, including fastening means for securing said bight portions to said supporting members, said fastening means being recessed within said load-bearing projections.

I also desirably provide a similar pallet construction including a second similar pallet component, said pallet components being assembled in apposed double-deck arrangement with juxtaposed engagement extensions thereof respectively engaging the same one of said supporting members, and additional fastening means for securing said second pallet component to said supporting members.

I also desirably provide a similar pallet construction wherein each associated pair of said extensions is adjoined with a bight section in strap formation, and each of said bight sections of each of said pallet components extend through openings therefor in the other of said pallet components.

I also desirably provide a similar pallet construction wherein fastening means are provided on each of said bight sections for access thereto at each of said openings.

I also desirably provide a similar pallet construction including said engagement means being disposed into a number of longitudinally extending rows on said pallet component, said transverse stiffening means including arrays of angularly disposed ridge members intersecting said rows at other than right angles.

During the foregoing discussion, various objects, features and advantages of the invention have been set forth. These and other objects, features and advantages of the invention together with structural details thereof will be elaborated upon during the forthcoming description of certain presently preferred embodiments of the invention and presently preferred methods of practicing the same.

In the accompanying drawings I have shown certain presently preferred embodiments of the invention and have illustrated certain presently preferred methods of practicing the same, wherein:

FIG. 1 is a bottom plan view of a single deck pallet construction arranged in accordance with my invention and illustrating also means for joining the principal pallet component laterally or edgewise to similar pallet components;

FIG. 2 is a partial longitudinal sectional view of the pallet construction of FIG. 1 and taken along reference line II—II thereof;

FIG. 3 is a cross-sectional view of the pallet construction of FIG. 1 and taken along reference line III—III thereof;

FIG. 4 is a reduced isometric view of a double-deck pallet construction utilizing an apposed pair of pallet components each of which is similar to that shown in FIG. 1;

FIG. 5 is a bottom isometric view of a modified form of my single deck pallet construction;

FIG. 6 is a top-isometric view of a double deck pallet construction, otherwise similar to that shown in FIG. 5;

FIG. 7 is a right-end elevational view of the pallet construction shown in FIG. 6;

FIG. 8 is a partial enlarged cross-sectional view of a pallet construction of FIG. 6 and taken along reference line VIII—VIII thereof;

FIG. 9 is an enlarged partial longitudinally cross-sectioned view of the pallet construction of FIG. 6 and taken along reference line IX—IX thereof;

FIG. 10 is a similar view of the pallet construction of FIG. 6 and taken along reference line X—X thereof;

FIG. 11 is a bottom plan view of still another modification of my novel pallet component, which can be assembled in single or double deck construction after the manner of FIGS. 1-4;

FIG. 12 is an edge-elevational view of the pallet component of FIG. 11;

FIG. 12A is a frontal edge elevational view of the pallet component of FIG. 11;

FIG. 13 is a partial enlarged top plan view of the pallet component of FIG. 11;

FIG. 14 is a longitudinally sectioned view of the pallet component as shown in FIG. 13 and taken along reference line XIV—XIV thereof;

FIG. 15 is a partial sectional view of the pallet component of FIG. 13 and taken along reference line XV—XV thereof; and

FIG. 16 is a cross-sectional view of the pallet component as shown in FIG. 13 and taken along reference line XVI—XVI thereof.

With reference now to FIGS. 1-4 of the drawings, the exemplary pallet construction 20 shown therein comprises a pre-molded or otherwise prefabricated pallet component 22 of generally rectangular configuration. The pallet component 22 can be molded from a suitable structural plastic such as polyethylene. For requisite structural strength, the pallet component 22 can be provided with a peripheral and depending lip 24 with suitable transverse supporting ribs 26 positioned as desired, at the longitudinal edges 27 of the pallet. Similar rib sections (not shown) can be used at the transverse edges 54 of the pallet. The rib sections 26 can be extensions of the transverse ridges or ribs 30 described below. The main body of the pallet component 22 is further delineated by a peripherally extending reinforcing ridge 28 extending generally parallel to the peripheral lip 24 and engaging the aforementioned rib sections. Further strengthening of the pallet component 22 is accomplished by a number of transversely extending rib structures 30 as better shown in FIGS. 1 and 2. The ribs or ridges 30 extend in so far as practical between the longitudinal section of the peripheral reinforcing ridge 28. To reduce the weight of the pallet component 22 and to conserve fabrication material, a number of transverse slots 32, 34 can be molded into the pallet component 22. The slots alternate with the transverse ribs 30, which are at least partially delineated thereby.

As illustrated, the slots 32, 34 terminate short of support engagement means 36, 38 of the pallet component 22. Each of the support engagements 36 or 38 includes a pair of depending flanges or extensions 40 or 42 which are spaced to closely receive external supports 44 or 46 respectively therebetween. The supports 44, 46 provide longitudinal reinforcement of the pallet 20, particularly at the corners and longitudinal edges 27 of the pallet component 22, in contrast to the transverse reinforcing action of the transverse ribs 30.

The supports 44 and 46 can be fabricated from locally available materials such as wooden 2 × 4's, wooden firing strips, scrap metal or other readily available materials. In the illustrated arrangement, the depending pallet flanges 40, 42 are spaced to receive the shorter lateral dimension of conventional wooden 2 × 4's therebetween, although some other spacing for differently sized supports obviously can be utilized. Wooden 2 × 4's are readily available from local suppliers virtually regardless of location. Moreover, they are of standard dimensions and can be readily sawed to required lengths. Various types of wood can be used for this purpose, all of which are readily available and commonly cut into 2 × 4's or other standardized dimensions. For example, for moderate load-carrying capability, the wooden supports can be cut from spruce or the like. For more severe loading, white pine or Douglas fir supports can be utilized, the latter of which is rated at nearly twice the load-carrying capability of spruce.

The depending flanges 40 or 42 of the support engagements 36, or 38 can be transversely reinforced by a number of relatively short strengthening rib sections 48 extended respectively therebetween as best seen from FIG. 1. The rib sections 48 can be effective extensions or continuations of the primary transverse ribs 30, if desired. A number of the rib sections 48 can be provided with integrally molded eyelet members 50, which define suitable openings 52 for passage of wood screws or other appropriate fastening means for securance of the pallet component 22 to the support members 44, 46. As evident from FIGS. 2 and 3 these longitudinally extending support members rest upon the eyelet members 50 and upon the transverse stiffening means of the pallet component 22, including the reinforcing rib sections 48 at the support engagement means 36, 38.

If desired, the shorter support members 46 at either transverse edge 54 of the pallet component 22 can be replaced by longer support members 56 as denoted by the chain outlines thereof in FIGS. 1 and 2. The longer supports 56 are then secured to the support engagements 38 and extend to similar support engagements 38a, of an adjacent pallet component 22a. The pallet components 22, 22a in effect, then, form modules of a corresponding larger pallet construction.

As a further alternative, the support members 44 and 46 of a single row can be replaced with a single, longer length (not shown) of supporting material shaped to fit in the central engagement 36 and the corresponding end engagements 38 of such row.

With the support members 44 or 46 secured as aforesaid to their respective engagements 36, 38 of the pallet component 22, a relatively rigid pallet construction is created. There is no lateral play in the various components of the single deck pallet construction 20 and the exposed lateral edge 58 of the supports 44, 46 can engage extremely rough surfaces without damage to the reusable pallet component 22. Moreover, the supports 44, 46 can be readily replaced from locally available material, without the necessity of discarding the entire pallet construction 20. Where the upper surface 60 i.e., the bottom surfaces of the pallet construction 20 as illustrated in the drawings) engage finished surfaces of the load, the screw-heads or the like inserted through the apertures 52 can be recessed. It will be appreciated, of course, that, depending upon the application of the pallet construction 20, that a different number of screws and screw openings 52 can be provided.

For shipping and storage, the supports 44, 46 can be removed to reduce lading and inventory space. Moreover a



pair of the pallet components 22 can be nested in a low profile arrangement, to conserve storage space, by offsetting their respective flanges or extensions 40, 42 slightly. With this arrangement, it becomes economical and highly desirable to return the pallet components to their point or points of origin after detaching the locally provided support components 44, 46 or 56. In the past, particularly in the case of wooden pallets, the pallets were merely destroyed rather than returned to the point of origin, because of their considerably larger bulk.

In FIG. 4 of the drawings, a double deck pallet construction 60 is illustrated which is readily assembled after the manner of the preceding figures. In the FIG. 4 arrangement, identical pallet components 22' are assembled in apposed spaced relation by means of the support members 44', 46'. Each of the support members is similarly inserted between opposed pairs of flanges 40' or 42', which depend respectively from the apposed pallet components 22'. Each support member 44' or 46' is then secured to each pallet component 22' by the aforementioned wood screws, in the case of wooden support members or by other suitable fasteners in the event that support members fabricated from a different material are substituted.

As shown in chain outline in FIG. 4, the pallet construction 60 can be joined laterally with a similar pallet construction 62 by use of correspondingly longer support members 56'.

In FIG. 5 a modified form 64 of my pallet component is illustrated in a single deck pallet construction 66. For initial retention of the support members 68 a number of straps or loops 70, 72 are molded integrally with the pallet component 64. The straps in effect are formulated by adding bight portions 73a or 73b to the engagement extensions described above. In the single deck pallet construction 66 a single support member 68 can be inserted longitudinally through each row of loops 70, 72. As described and illustrated in greater detail below, each of the straps 70, 71 is provided with an integrally molded or otherwise formed bearing surface or projection 74 whereby the pallet construction 66, when inverted from the position shown in FIG. 5, can engage a relatively rough floor or other supporting surface.

The support 68 can be fabricated from wood or other locally available material as noted above, and in this example, the straps 70, 72 are sized to receive closely suitable lengths of wooden 2 x 4's. The three supports 68 in addition provide longitudinal stiffening of the pallet component 64, while transverse stiffening is provided by a number of transverse and in this example integrally molded ribs 76. A number of weight reducing and material saving slots 78, 80 can be provided in the pallet component 64.

For the purposes enumerated below, a number of strap receiving openings 82, 84 are formed in the pallet component 64 at positions respectively adjacent the straps 70, 72 thereof. Such openings can be omitted from those pallet components 64 intended only for single deck useage, but are desirably included for manufacturing uniformity.

In FIGS. 6-10 of the drawings, a double deck pallet construction 86 is illustrated, which employs an apposed pair of the pallet components 64 illustrated in FIG. 5 and described above. When thus apposed, it will be seen that the straps 70, 72 of the lower pallet component 64a are juxtaposed to the pallet opening 82, 84 of the upper pallet component 64b and vice versa. As better shown in FIGS. 8 and 10 of the drawings, the loadbearing projections 74 of the straps 70, 72 of each pallet component 64 project through the corresponding openings 82, 84 of the other pallet component to a position at least flush with the adjacent surfaces 88 of such other pallet component. With this arrangement, virtually all of the loading imposed upon a given side of the pallet construction 86 is transferred through the associated projections 74 directly to the supports 44', 46' to the strap load bearing surfaces 74 at the other side of the pallet construction 86 and which are in turn at least flush with the outer pallet component surfaces 90 thereof. Thus, severe loadings can not be imposed upon those surfaces 88, 90 of the pallet construction 86 which are remote from the strap load bearing projections 74.

Although three rows of straps 70, 72 are illustrated (FIGS. 6 and 7) it will be appreciated that a different number can be substituted. In the pallet construction 86 of FIG. 6, relatively longer and shorter support and connecting members 44' and 46' are inserted respectively through the juxtaposed straps 70 (FIG. 10) and 72 (FIGS. 8 and 9) to join the pallet components 64a, 64b together. It will be understood, of course, that the connecting and support members 44', 46' for each row of straps 70, 72 can be replaced with a single connecting member, such as one of the connecting members 68 shown in FIG. 5. In many situations, however, shorter or scrap lengths of 2 x 4's or the like are more likely to be available from which the support members 44', 46' can be cut.

Each of the straps 70a, 72a of the lower pallet component 64a is provided with a fastening aperture 92a through which a suitable fastener such as a wood screw is passed to secure the lower pallet component 64a to the support members 44', 46'. Similarly, fastening apertures 92b are provided in the straps 70b, 72b of the upper pallet component 64b. Desirably, the fastener apertures 92a, 92b are formed centrally of the load bearing ridges 74 of the respective straps 70a, 72a and 70b, 72b. The heads of the wood screws or the like (not shown) need not be recessed or countersunk owing to the presence of the surrounding load bearing projections 74.

In FIGS. 11-16 of the drawings a pallet component 94 is arranged after the manner of FIGS. 1-4 with supporting member engagements 36', 38' for supportive securance to appropriately shaped supporting members (not shown in FIGS. 11-16) similar to the supporting members of the preceding figures. The support engagements 38', however, are extended flushly to the transverse edges 54' of the pallet component 94 for added strength and for a stronger junction with a laterally adjacent pallet component (not shown). As evident from FIGS. 11 and 12 three rows of the support engagements 36', 38' are utilized in this example, although a different number of rows can be employed. Although three such engagements 36', 38' are used in each row of the engagement, as seen from FIG. 12a, here again a different number can be employed in each row, depending upon the size, shape, and application of the pallet component.

The pallet component 94 likewise is provided with a depending peripheral lip 24' which is reinforced at the transverse edges 54' of the pallet component 94 by longitudinal rib section 96 and by a parallel transversely extending ridge 98. At the longitudinal edges 100 of the pallet component 94, the depending lip 24' is reinforced by a spaced pair of longitudinally extending reinforcing ribs 102, from which the support engaging flanges or extensions 40', 42' of the outer rows of support engagements are depended. The flanges of the central row of support engagements are similarly depended from a pair of longitudinally extending reinforcing ribs or ridges 104. The aforementioned pairs of longitudinal ridges 102, 104 are reinforced by transverse rib or ridge sections 106. The longitudinal edges 100, including the depending lip 24', of the pallet component 94, are further reinforced by transverse ridge sections 108 extended between the juxtaposed portions of the peripheral lip 24' and the adjacent longitudinal ridges 102. The pallet component 94 can be further strengthened in the longitudinal direction by additional longitudinal ridges such as the ridges 110 described below.

In the areas defined by the spaced pairs of longitudinal ridges 102, 104, the pallet component 94 is transversely strengthened by an open meshwork of angularly disposed and crossed ribs or stringers 112, 114, with each of the rib structures 112, 114 having the cross-sectional configuration shown in FIG. 15 or equivalent. By extending the ridges 112, 114, at other than right angles to the longitudinal ridges 102, 104 a greater structural rigidity of the molded pallet component 94 is attained.

Further, the use of the angularly disposed ribbing 112, 114 together with the longitudinally extending reinforcing ridges 110 facilitates the flow of injected material during the molding operation. Such material, for example, can be injected at cer-

tain of the junctions of the ribbing 112, 114 with the longitudinally extending ridges 110 as denoted by gates 116.

The various intersecting arrangements of the diagonal ridges 112, 114 with the longitudinal ridges 102, 110 and the support engaging extensions such as the flanges 42', are further detailed in FIGS. 13, 14 and 16 of the drawings. The lip reinforcing ridge sections 96, 108 can be tapered as shown in FIGS. 14 and 16 respectively, in conformance with beam lading requirements, along with use of a correspondingly narrower lip 24'. Various appropriately sized openings 116, 118, 120 (FIG. 13) can be left between the ridges or diagonal ribs 112, 114 to conserve material and to facilitate molding.

From the foregoing it will be apparent that novel and efficient forms of PALLET CONSTRUCTIONS have been described herein. While I have shown and described certain presently preferred embodiments of the invention and have illustrated presently preferred methods of practicing the same, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the spirit and scope of the invention.

I claim:

1. A pallet construction comprising a single generally planar prefabricated pallet component having transverse stiffening means on one side thereof, a plurality of longitudinally extending support member engagement means formed on said pallet component on said one side, each of said engagement means including a pair of spaced extensions disposed for substantially flush engagement with an associated support member, support members inserted between each pair of said extensions, and fastening means for securing said pallet component to each of said support members at said engagement means.

2. The combination according to claim 1 including said transverse stiffening means being a plurality of spaced ridge members, and said support members being mounted on said ridge members, said support members and said extensions extending transversely of said ridge members.

3. The combination according to claim 1 including a pair of longitudinally extending ridge members forming part of each said support engagement means, the associated extensions being depended respectively from said longitudinal ridge members.

4. The combination according to claim 1 including a peripheral and depending lip formed on said pallet component, a perimetric ridge member formed on said pallet component and spaced inwardly of said lip, said perimetric ridge extending substantially parallel with said lip, and a number of reinforcing ridge members formed on said pallet component and extending between said peripheral lip and said perimetric ridge.

5. The combination according to claim 1 including each associated pair of said extensions being secured to a bight portion in strap formation, each of said straps being shaped to closely receive the associated one of said support members.

6. The combination according to claim 5 including a number of load bearing projections formed respectively on said bight portions.

7. The combination according to claim 6 including fastening means for securing said bight portions to said supporting members, said fastening means being recessed within said load bearing projections.

8. The combination according to claim 1 including a second similar pallet component, said pallet components being assembled in apposed double deck arrangement with juxtaposed engagement extensions thereof respectively engaging the same one of said supporting members, and additional fastening means for securing said second pallet component to said supporting members.

9. The combination according to claim 1 including a number of eyelet members integrally formed on said pallet component at said engagement means to receive said fastening means.

10. The combination according to claim 8 wherein each associated pair of said extensions is adjoined with a bight section in strap formation, and each of said bight sections of each of said pallet components extend through openings therefor in the other of said pallet components.

11. The combination according to claim 4 wherein the ridge sections along the transverse edges of said pallet component are continuations of those extensions forming part of the adjacent support member engagement means.

12. The combination according to claim 10 wherein load bearing projections are formed on each of said bight sections for extension through said openings.

13. The combination according to claim 10 wherein fastening means are provided on each of said bight sections for access thereto at each of said openings.

14. The combination according to claim 1 including said engagement means being disposed into a number of longitudinally extending rows on said pallet component, said transverse stiffening means including arrays of angularly disposed ridge members intersecting said rows at other than right angles.

15. The combination according to claim 14 including at least one longitudinally extending ridge member intersecting said angularly disposed transverse ridge member at points of their mutual intersection, said longitudinal ridge member being disposed about midway between said rows of engagement means.

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