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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : **B65D 19/40**	**A1**	**(11) International Publication Number:** **WO 96/16873** **(43) International Publication Date:** 6 June 1996 (06.06.96)

(21) International Application Number: PCT/US95/15308

(22) International Filing Date: 28 November 1995 (28.11.95)

(30) Priority Data:
08/345,838 28 November 1994 (28.11.94) US

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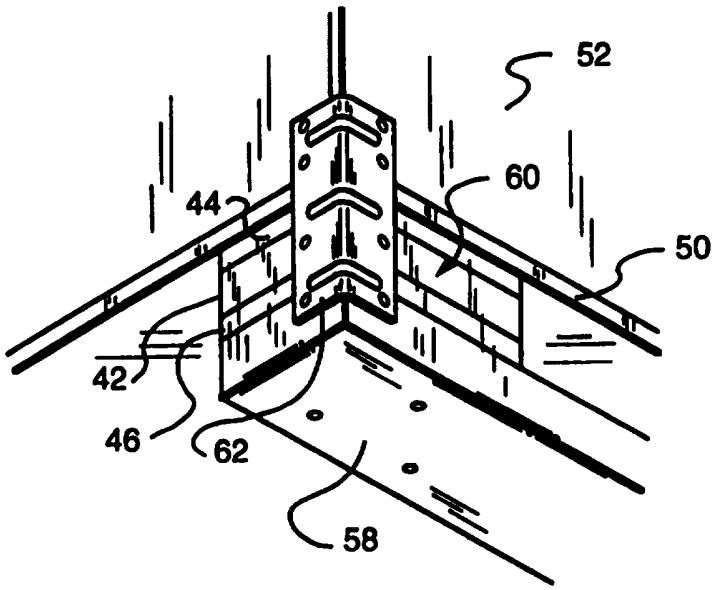
(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: WOODEN CONSTRUCTION ELEMENT, CONSTRUCTION FORM AND PALLET OR BIN MADE THEREWITH



(57) Abstract

A wooden pallet or bin in which a top load-bearing deck (50) and a bottom deck (58) are spaced from one another by wooden spacer blocks (60). The wooden spacer blocks (60) which are preformed blocks made up of a solid wood core member (42) sandwiched between layers (44, 46) of plywood which are adhesively laminated to the core member, are far more resistant to splitting than are unitary blocks, which are conventionally used in constructing pallets or bins. A construction form (82) including stiffening members comprising preformed members made of a wooden core (84) sandwiched between plywood layers (86, 88) is also described, as well as a construction element consisting of a wooden core member (42) sandwiched between plywood layers (44, 46).

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WOODEN CONSTRUCTION ELEMENT, CONSTRUCTION FORM AND PALLET OR BIN MADE THEREWITH

This invention relates to new and improved wooden structures. The invention has particular utility in connection with wooden pallets and bins and will be described in connection with such utility, although other utilities are contemplated.

A pallet is a horizontal portable platform device used as a base for assembling, storage, handling and transporting in a unit load. Pallet structures must be made of hard durable materials constructed to bear high compressive loads over long periods of time, repeated rough usage and high intensity impacts during handling.

Referring to Fig. 1, a typical prior art wooden pallet comprises a top deck assembly consisting of a plurality of longitudinally extending spaced wooden top deck boards 10 fastened to a plurality of wooden stringer boards 12, 14, 16 which extend parallel to one another, and perpendicular to the top deck boards 10. The stringer boards 12, 14, 16 in turn are affixed to the top surfaces of wooden spacer blocks 18 which separate the top deck assembly from the bottom deck boards 20. This construction permits four-way access by forklift tongs which may be inserted between the top and bottom decks.

The pallet is in the form of a truss, and therefore the loads are distributed through the various components in such a way that any defects, weaknesses or damage in individual components typically will not materially adversely affect the total performance of the pallet. In order to permit repair, a pallet typically is assembled using mechanical fasteners such as nails 22 and/or staples which permits replacement of individual damaged components. Particularly susceptible to damage are the spacer blocks 18 which typically comprise 2 1/2 inch by 3 1/2 inch by 4 to 8 inch wooden blocks. The spacer blocks are prone to splitting due to rough handling of the pallets and/or from impact from the tongs of a forklift.

Also, the spacer blocks are weakened by nailing, and may often split when one or more of the top or bottom deck boards are replaced. Accordingly, care must be taken to employ only the highest quality, knot-free, old-growth lumber to form the spacer blocks. Such lumber is expensive. Moreover, notwithstanding the use of such select lumber, spacer block splitting remains a significant problem and is a significant part of the cost of maintaining wooden pallets in usable condition. In order to overcome the aforesaid problem of spacer block splitting, it has been proposed to build up spacer blocks by laminating plywood pieces together. However, such laminated plywood blocks are virtually impossible to drive nails through the flat sides of the boards and thus are not susceptible to mass production using automatic nailers. Moreover, laminated plywood blocks have virtually no holding power for nails driven into the edges.

A bin is essentially a horizontal portable platform device similar to a pallet, but having a solid top deck assembly typically comprising a sheet of plywood, and four upstanding walls which, together with the plywood deck form an open bin.

It is therefore an object of the present invention to provide a new and improved wood construction for wooden pallets or bins which overcomes the aforesaid and other disadvantages of the prior art. Another more specific object of the present invention is to provide an improved wooden pallet or bin construction having desired characteristics of toughness, rigidity, hardness, high impact, high compressive strength, and durability in rough handling.

A yet further object of the invention is to provide a wooden pallet or bin assembly having the aforesaid desired characteristics, and in which the spacer blocks can be formed from commonly available low-cost wood products rather than scarce, expensive, old-growth lumber.

In order to accomplish the aforesaid and other results, the present invention provides a new and improved wooden pallet or bin construction in which the spacer blocks comprise preformed blocks consisting of a solid wood core member sandwiched between top and bottom layers of plywood which are adhesively laminated to the top and bottom surfaces to the core member to form a sturdy block assembly. The resulting laminated block assembly has improved rigidity and strength and resistance to splitting as compared to unitary blocks formed of even select old-growth lumber.

Other objects and advantages of the present invention will be apparent from the following detailed description of the invention, taken in connection with the accompanying drawings wherein like numerals depict like parts and wherein:

Fig. 1 is a perspective view from below of a conventional prior art wooden pallet construction;

Fig. 2 is a view, similar to Fig. 1, and showing a wooden pallet made in accordance with a preferred embodiment of the present invention;

Fig. 3 is a perspective view showing details of a wooden spacer block made in accordance with the present invention;

Fig. 4 is an exploded view of the spacer block of Fig. 3;

Fig. 5 is a perspective view from below of a wooden bin assembly made in accordance with the present invention;

Fig. 6 is a view similar to Fig. 5, and showing details of a portion of the bin construction of Fig. 5;

Fig. 7 is a view similar to Fig. 5, and showing another form of wooden bin assembly made in accordance with the present invention;

Fig. 8 is a view similar to Fig. 3, and showing details of the runner construction employed in the Fig. 7

wooden bin assembly made in accordance with the present invention; and

Fig. 9 is a perspective view of a construction form made in accordance with the present invention.

In the embodiment of the present invention illustrated in Figs. 2-4, there is shown a wooden pallet made in accordance with the present invention, including the top deck sub-assembly of conventional construction, comprising a plurality of elongate top deck boards 30 which are affixed using conventional mechanical fasteners such as staples or nails, to a plurality of wooden stringers 32, 34, 36. The top deck board/stringer sub-assembly in turn is affixed to the top surface of spacer blocks 38 made in accordance with the present invention, as will be described in detail below. Typically the top deck is first formed as a sub-assembly by nailing or stapling the top deck boards to the stringers, and the top deck sub-assembly is then fastened to the spacer blocks 38 by nailing through the top deck boards 30, the respective underlying stringers 32, 34, 36 and well into the spacer blocks 38. Typically three or more 2 1/2 or 3 inch screw or ring shank nails are used to fasten the top deck sub-assembly to each underlying support block 38. Spacer blocks 38 are positioned at the corners of the pallet, intermediately of both the sides and ends of the pallet, and one spacer block is positioned directly in the center of the pallet.

Completing the pallet are bottom deck boards 40 which are attached to the bottom surface of and bridge the spacer blocks 38. As seen in Fig. 2, each bottom deck board 40 bridges and is attached to three spacer blocks. Bottom deck boards 40 are affixed to their respective spacer blocks by means of nails 41. As before, at least three nails sufficiently long to be driven well into each block are used. The construction provides four-way access for the tines of a forklift truck.

A feature and advantage of the present invention is the provision of unique spacer blocks which resist splitting. Referring in particular to Figs. 3 and 4, the spacer blocks 38 in accordance with the present invention comprise a wooden core member 42, typically 1 1/2 inches by 3 1/2 inches by 4 to 8 inches which is sandwiched between plywood members 44, 46, which are adhesively laminated affixed to the top and bottom surfaces of the wooden core blocks 42. Typically, the plywood comprises half-inch plywood so that the resulting spacer blocks are 2 1/2 inches by 3 1/2 inches wide by 4 to 8 inches, i.e. are of a dimension comparable to unitary spacer blocks conventionally employed in the prior art. However, unlike conventionally employed spacer blocks which demand select, old-growth, knot-free lumber, the spacer blocks made in accordance with the present invention may be formed of conventional construction grade 2 by 4 inch studs (nominally 1 1/2 by 3 1/2 inch) for the core member, and conventional CDX exterior plywood for the plywood members, and an exterior, water-resistant adhesive as the laminating adhesive. The resulting spacer blocks constructed in accordance with the present invention are less expensive to manufacture, they are far more durable and far less prone to splitting from impact and/or nailing, as compared to prior art spacer blocks made of select, old-growth, knot-free lumber.

Turning to Figs. 5 and 6, there is shown a bin made in accordance with the present invention, and comprising a bin bottom 50 typically formed of a solid sheet of plywood, and four upstanding walls 52 (only two of which are visible in Fig. 5), which together with base 50 and corner posts (not shown) form an open bin 54 of conventional construction. The bin bottom 50 includes a pair of skid assemblies 56 each comprising skid boards 58 and spacer block assemblies 60. As in the case of conventional pallet assemblies, conventional bins employ

solid blocks made of select, old-growth, knot-free lumber to form the spacer blocks for the skid assemblies. As distinguished therefrom, in accordance with the present invention, the spacer blocks 60 comprise laminated spacer blocks which are identical to the laminated spacer blocks described in detail in connection with the Fig. 2 embodiment of the invention, and shown in Figs. 3 and 4. As seen in Fig. 5, each skid assembly 56 comprises three spacer blocks, one mounted at each end of the skid assembly, and one mounted at the mid-point of the skid assembly. The spacer blocks 60 are affixed to the bin bottom 50 by nailing through from the inside of the bin, while the skid boards 58 are attached to the opposite surface of the spacer blocks by nailing through the skid boards 58. As before, the construction permits four-way access to the tines of a forklift truck.

Referring also to Fig. 6, preferably, but not necessarily, the corners of the bin are reinforced by steel corner brackets or so-called "corner irons" 62 which bridge and are fastened, by nailing, to the lower skid boards 58, the core member 42 of the spacer block 38 and the walls 52 of the bin.

Referring to Figs. 7 and 8 there is shown yet another embodiment of the invention, and comprising a bin including a bin bottom 50, and having elongated solid stringers or runners 63 which are similar in construction to the spacer blocks 38 of the present invention. That is to say, elongate stringers 63 each comprise an elongate core member 64, typically a 2 by 4 inch or 2 by 6 inch construction grade stud, sandwiched between elongate strips of plywood 68, 70, which are adhesively laminated to the core member. As before, the skids are attached to the bin bottom 50 adjacent opposite edges of the bin bottom by nailing through the bin bottom 50. If desired, a third skid 63', similar to skids 63, may be employed, for supporting the center of the bin. Also, if desired,

metal corner brackets or corner irons 72, similar to corner brackets 62 (see Fig. 6) may be employed for reinforcing the corners, and a flat bracket or "iron" 74 may be employed for stabilizing the center skid. The resulting construction provides two-way access for the tines of a forklift truck. Alternatively, if desired, the skids may be notched as shown in phantom at 75, for providing four-way access for the tines of a forklift truck.

The present invention is susceptible to modification. For example, the laminated block concept of the present invention advantageously may be used in constructing stiffening elements for construction forms or the like, for example, concrete forms and/or temporary retaining walls. One such construction is shown in Fig. 9. Referring to Fig. 9, the construction form comprises a plywood sheet 80, on which are mounted a plurality of stiffening elements 82. Stiffening elements 82 are similar to the runners 63 of the Fig. 7 embodiment, and comprise a wooden core member 84 formed, for example, of 2 by 4 inch or 2 by 6 inch construction grade stud lumber sandwiched between elongate strips of construction grade exterior plywood members 86,86 which are adhesively laminated to the core lumber member 84. As before, the reinforcing studs are affixed to the panel 80 by nailing from the outside of the panel through the panel and into the laminated reinforcing members. The invention also advantageously may be used for forming construction timbers, for example, for use as floor joists, roof rafters, and the like. In such case, a construction grade stud such as a 2 by 6, 2 by 8, 2 by 10 or the like is sandwiched between elongated strips of construction grade exterior plywood members which are adhesively laminated to the core lumber member as before. Alternatively, two 2 by 4's or the like construction grade studs may be laid edge-to-edge, and adhesively laminated between elongate

exterior plywood members to form a construction timber of desired size. The resulting construction timbers made in accordance with the present invention have improved resistance to twisting and bending as compared to conventional wooden timbers of comparable size, and generally are less expensive than conventional wooden timbers since lower quality wood may be employed to form the core member in accordance with the present invention.

Spacer blocks made in accordance with the present invention were tested for resistance to splitting by nailing. Twenty-four 3 inch screw nails were driven, twelve nails to a side, into a 2 1/2 by 3 1/2 by 5 inch laminated block made in accordance with the present invention. No splitting was observed.

Various changes may be made in accordance with the foregoing invention without departing from the spirit and scope, which is defined and limited only by the following claims, wherein:

CLAIMS

I claim:

1. In a pallet comprising a top load-bearing deck and a bottom deck spaced from one another by wooden spacer blocks, the improvement wherein said wooden spacer blocks comprise preformed blocks (38) consisting of a solid wooden core member (42) sandwiched between layers (44,46) of plywood which are adhesively laminated to the core member, and said preformed blocks are fastened to said top and bottom decks (30,40) by mechanical fastening means.

2. In a pallet according to claim 1, and further comprising an integral bin (54), and, if desired, further comprising metal reinforcing brackets (62) bridging the bin and the spacer blocks (60).

3. In a pallet comprising a deck having a top load-bearing surface and a bottom surface, and a plurality of skid members affixed to the bottom surface, the improvement wherein the skid members (63) comprise preformed members consisting of a wooden core member (64) sandwiched between plywood layers (68, 70) which are adhesively laminated to opposite surfaces of the core, and said preformed members are fastened to said deck (50) by mechanical fastening means.

4. In a pallet according to claim 3, and further comprising an integral bin, and, if desired, further comprising metal reinforcing brackets (62) bridging the bin and the skid members (63).

5. In a bin comprising a top load-bearing deck and a bottom deck spaced from one another by wooden spacer blocks, the improvement wherein said wooden spacer blocks comprise preformed blocks consisting of a solid wooden core member (60) sandwiched between layers of plywood which are adhesively laminated to the core member, and said preformed blocks are fastened to said top and bottom decks (50, 58) by mechanical fastening means.

6. In a bin according to claim 5, and further comprising metal reinforcing brackets (62) bridging the bin and the spacer blocks.

7. In a bin comprising a deck having a top load-bearing surface and a bottom surface, and a plurality of skid members affixed to the bottom surface, the improvement wherein the skid members comprise preformed members each consisting of a wooden core (42) sandwiched between plywood layers (44, 46) which are adhesively laminated to opposite surfaces of the core, and said preformed members are fastened to said deck by mechanical fastening means.

8. In a bin according to claim 7, and further comprising metal reinforcing brackets (62) bridging the bin and the skid members.

9. In a construction form comprising a deck having a top surface and a bottom surface, and a plurality of stiffening members affixed to the bottom surface, the improvement wherein the stiffening members (82) comprise preformed members each consisting of a wooden core (84) sandwiched between plywood layers (86, 88) which are adhesively laminated to opposite surfaces of the core, and said preformed members are fastened to said deck (80) by mechanical fastening means.

10. A construction form according to claim 9, wherein the wooden core (84) comprises at least two elongate wooden studs.

11. A construction element comprising a solid wooden core member (42) sandwiched between plywood layers (44, 46) which are adhesively laminated to opposite walls of the core member.

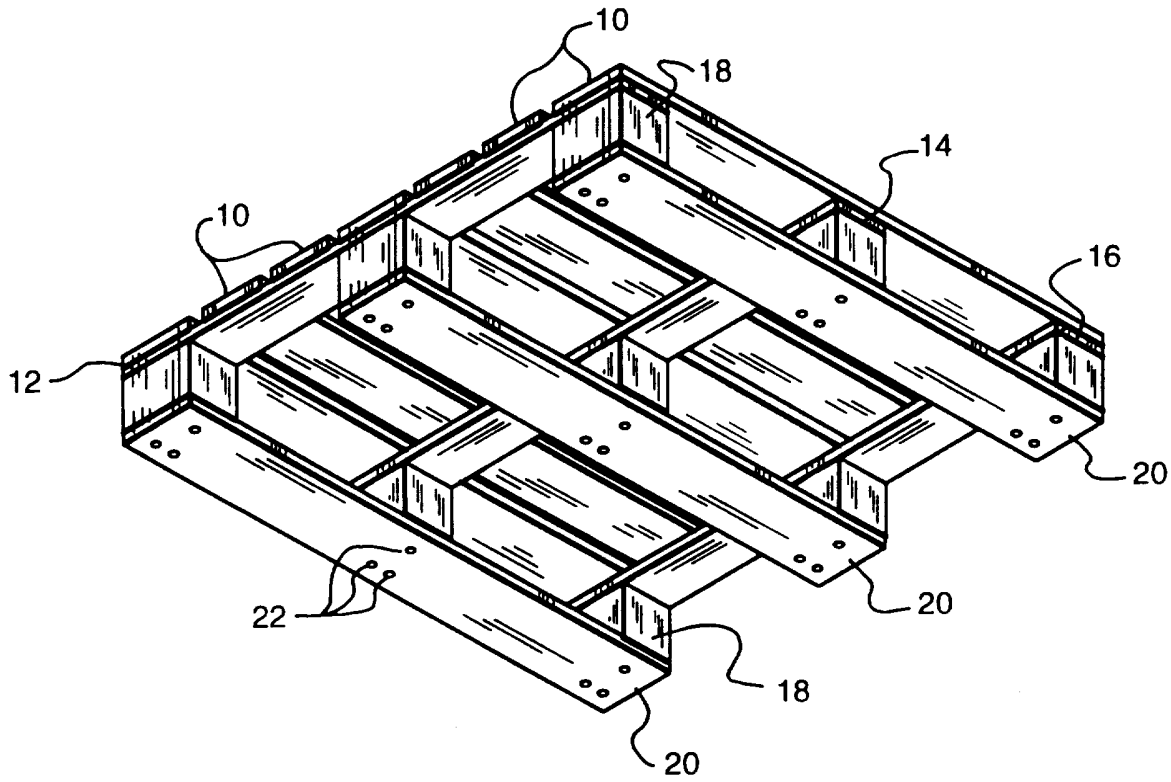

FIG. 1
(PRIOR ART)

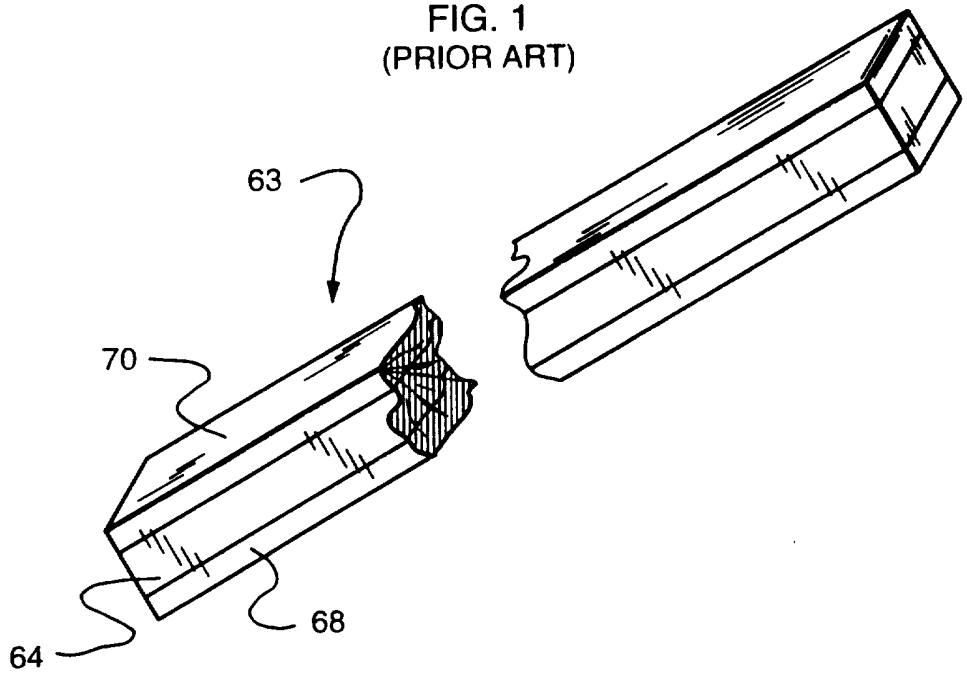

FIG. 8

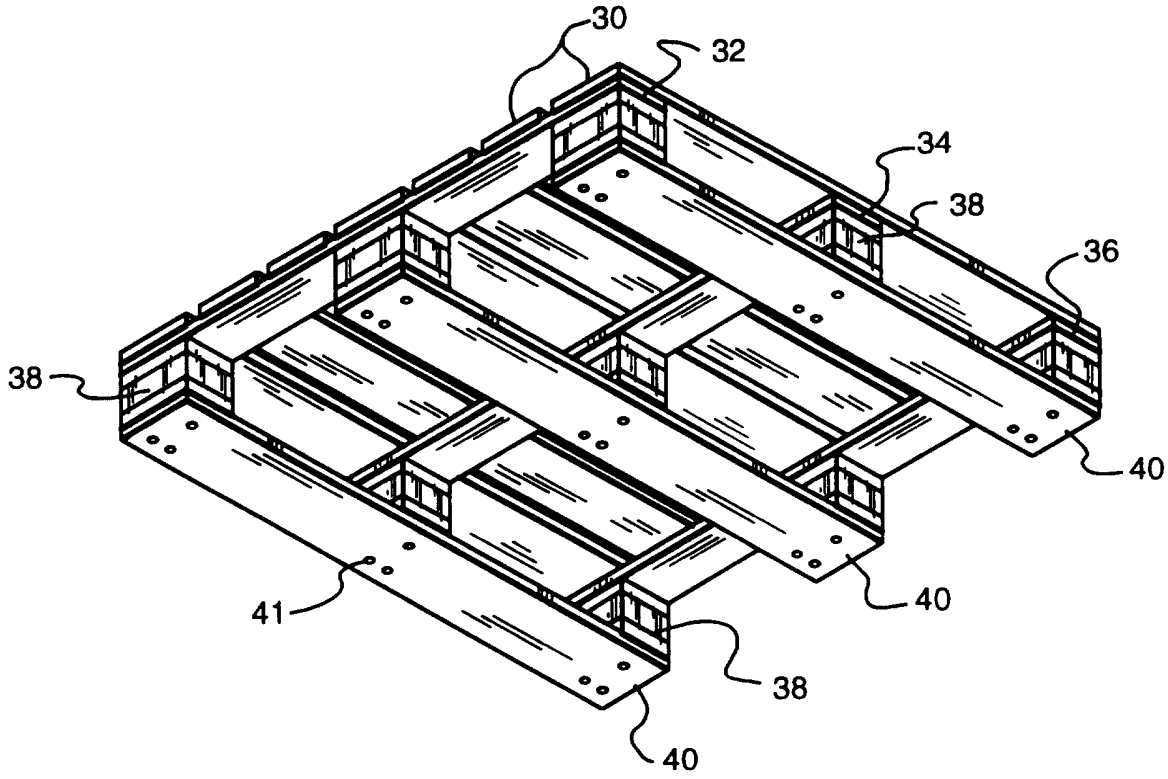

FIG. 2

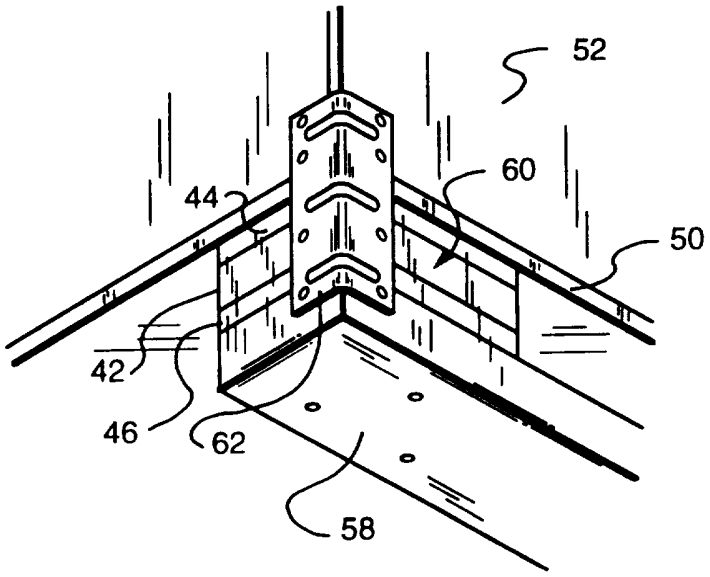

FIG. 6

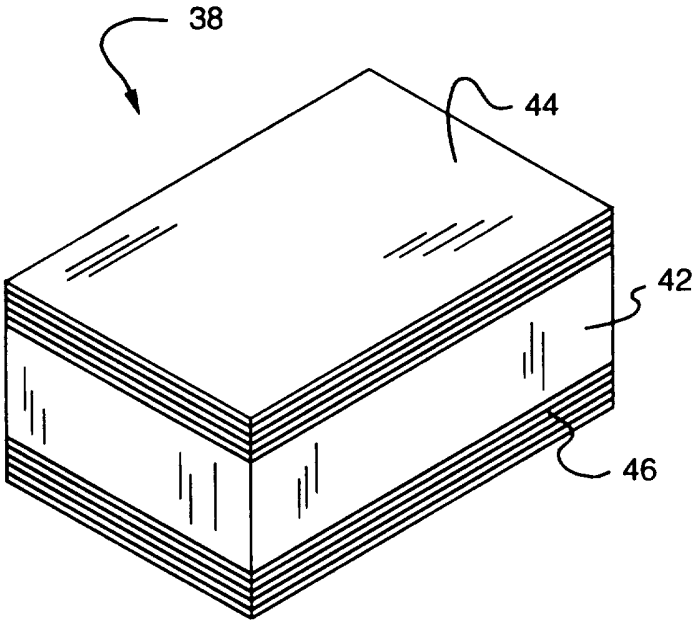

FIG. 3

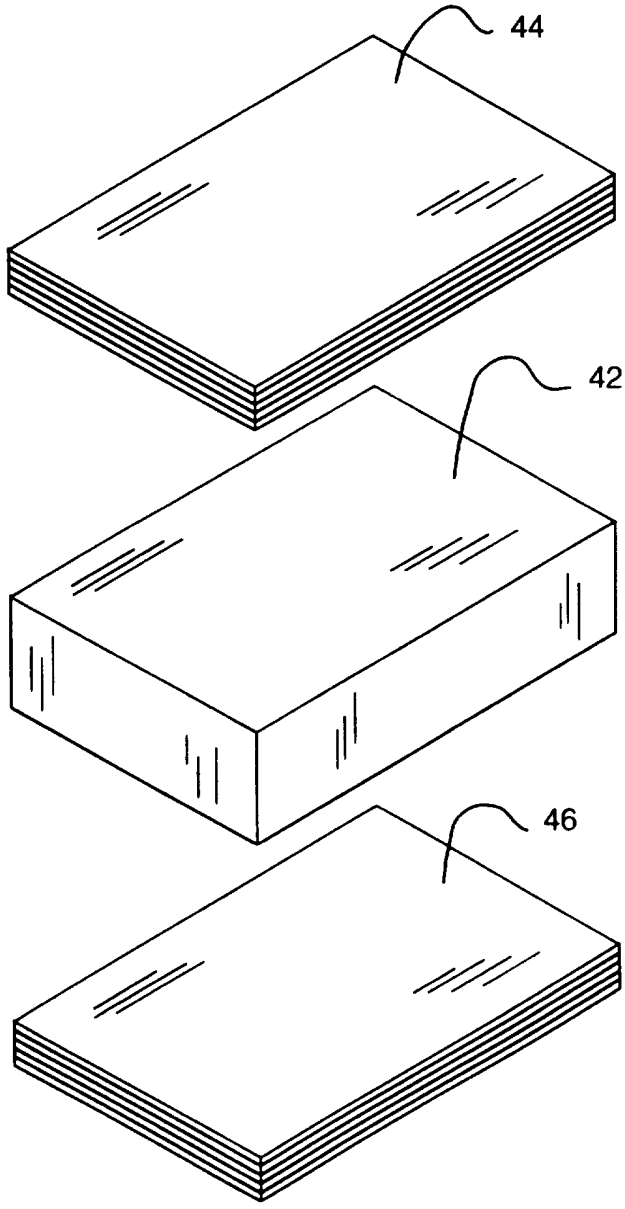

FIG. 4

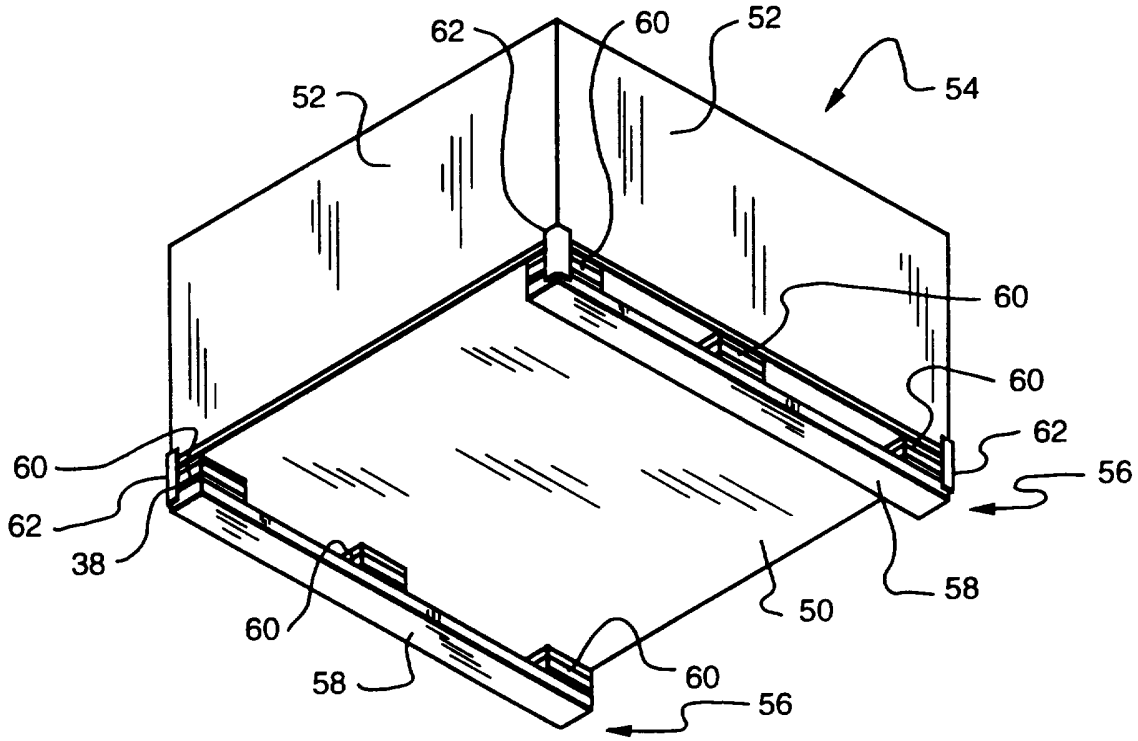
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FIG. 5

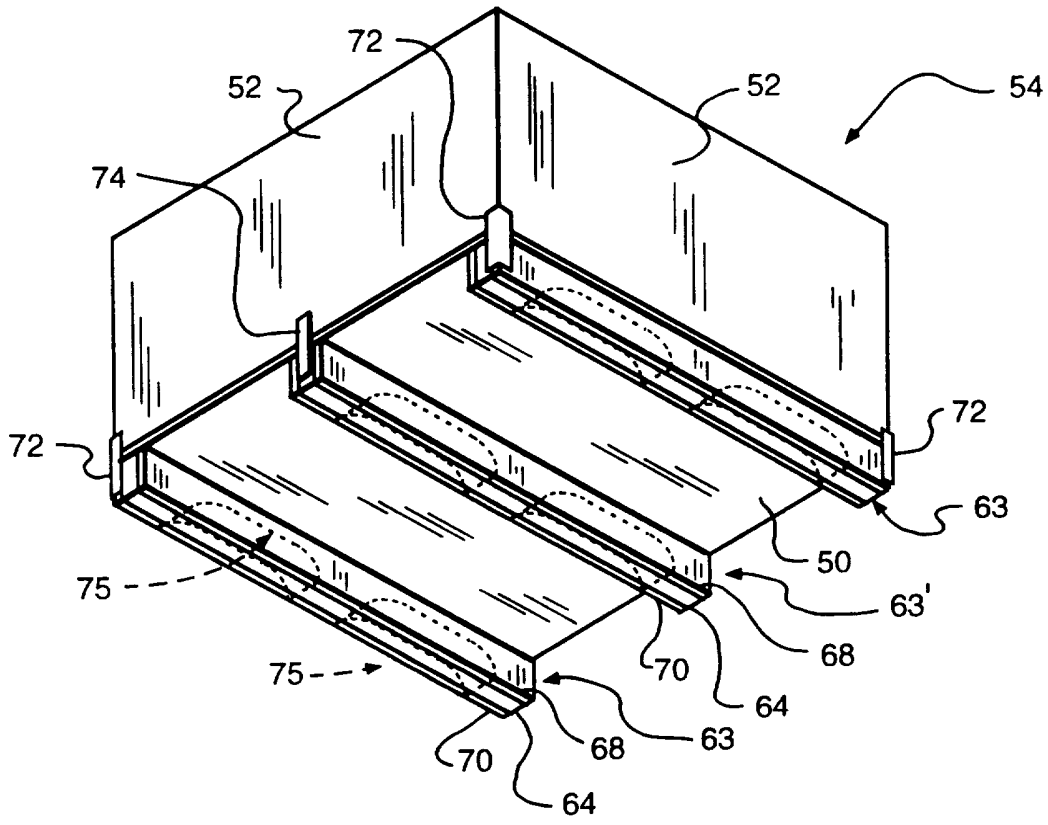
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FIG 7

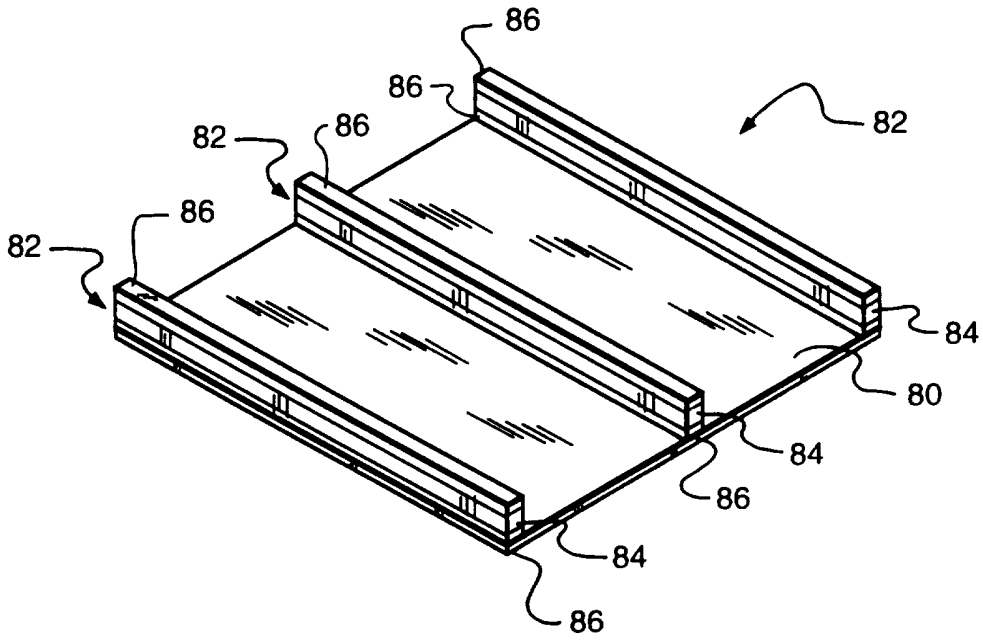

FIG. 9

INTERNATIONAL SEARCH REPORT

Inter ial Application No
PCT/US 95/15308

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D19/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D E04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	CH,A,323 848 (PORTASILO) 15 October 1957 see page 1, line 37 - line 47; figure 1	11 9
A	US,A,2 503 022 (BENOIST ET AL.) 4 April 1950 see column 2, line 38 - column 3, line 11; figures 2,3	1,3,5,7
A	US,A,2 524 599 (PHILP) 3 October 1950 see column 5, line 8 - line 12; figure 4	1,3,5,7
A	SCHNIEWIND: "CONCISE ENCYCLOPEDIA OF WOOD & WOOD-BASED MATERIALS" 1989 , PERGAMON PRESS , OXFORD, GB XP002000293 see page 35, paragraph 2.8	9,10

☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search
3 April 1996

Date of mailing of the international search report
15.04.96

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CH-A-323848		NONE	
US-A-2503022	04-04-50	NONE	
US-A-2524599	03-10-50	NONE	