

A REINFORCED PALLET

FIELD OF INVENTION

- 5 The present invention relates to a pallet with enhanced structural integrity to support high unit loads disposed on its work surface.

BACKGROUND OF THE INVENTION

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Pallet provides a structural foundation for unit loads to be handled and transported in the logistic supply chain. With lifting equipment such as forklifts, jack devices, front loader or conveyors, the pallet provides protection for the goods that are securely stacked on top of it to be kept in storage or carried in transportation.

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Various pallets have been designed and introduced to the public. An example of a pallet with its features disclosed in the public domain is a lightweight corrugated pallet under the patent number of US3861326. The pallet comprises at least one corrugated upper deck member being filled by rigid plastic foam filler at the flutes of the top side corrugations to provide added strength and rigidity to the upper deck. The upper deck member is supported by multiple spaced rigid plastic support members that are adhesively fastened to the underside corrugations of the upper deck. The spacing of the plastic support members allows entry of prongs of a forklift truck. The downside of this pallet is that the corrugated feature does not provide a flat working surface for the pallet and hence affects the stability of loads placed on top of the pallet.

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Another prior art, US4690360 describes a cargo pallet having a rectangular shaped core that comprises a grid of a plurality of stringers and struts that forms a cross-hatch assembly with the stringers extending from one edge of the core to the other edge of

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the core and the struts being cross members between the stringers. The stringers and the struts have at least one cross-sectional portion substantially in a C-shape for a flat surface to be presented on either side of the cross-sectional portion. Two aluminium sheets are attached by rivets to the flat surfaces to cover the core. This pallet, however, lacks rigidity as the cross-hatch assembly with aluminium sheets attached on its surface does not provide sufficient strength to support large load and would fail easily. The lack of base members to support the base of the pallet also attributes to the weak structural integrity of the pallet.

From the abovementioned examples of pallets, it could be concluded that the rigidity and stability of a pallet are crucial to support heavy loads. It is therefore important to introduce a reinforced pallet with enhanced structural integrity to address the drawbacks of existing pallets.

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SUMMARY OF INVENTION

The main aspect of the present invention is to provide a pallet for handling or storing goods.

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Another aspect of the present invention is to provide a pallet with enhanced structural integrity such that it is capable of remaining stable under a heavy load.

Still another aspect of the present invention is to provide a two-way or a four-way pallet.

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Yet another aspect of the present invention is to provide a pallet with reinforced base members to support the work surface and load.

Also another aspect of the present invention is to provide a pallet with a large work

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surface.

At least one of the preceding aspects is met, in whole or in part, by the present invention, in which the embodiment of the present invention describes a pallet comprising a plurality of elongate base members (102) being spaced apart from one another at its long edges with a plurality of block structures (108) arranged one by one within and along the long edges of each base member (102) that the base member (102) carries a plurality of paired slits (106) and each slit (106) cuts into every block structure (108) at a predetermined length; and a plurality elongate deck units (101) perpendicularly disposed on top of the base members that each deck unit is defined by a first construct (103), with an n-shaped cross-sectional profile, sandwiched in between a pair of second constructs (104), with an inverted L-shaped cross-sectional profile, and each deck unit (101) has a conjoined horizontal flat surface and a pair of downwardly extending portions (105) formed by the contiguous first (103) and second constructs (104); wherein the paired vertical extending portions (105) of each deck unit (101) are slotted into the aligned paired slits (106) of each block structure (108) to link all the base members (102) with the deck units (101) together while the horizontal flat surface serves as a work surface.

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BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram showing the perspective view of a two-way pallet with base members extending along the length of all deck units.

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Figure 2 is a diagram showing the perspective view of a four-way pallet with base members having deck units disposed on top of the top partial portions of the base members.

30 Figure 3 is a diagram showing the perspective view of a base member with a casing

formed by a pair of U-shaped channels.

Figure 4 is a diagram showing the perspective view of a base member with a casing formed by a C-shaped channel.

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Figure 5 is a diagram showing the perspective view of a base member with a casing formed by a pair of C-shaped channels.

Figure 6 is a diagram showing the perspective view of a base member with its casing being reinforced by a pair of L-shaped columns that are not overlapped at the bottom of the base member.

Figure 7 is a diagram showing the perspective view of a base member with its casing being reinforced by a pair of L-shaped columns with one of the columns overlapping the other.

Figure 8 is a diagram showing the perspective view of a pallet having a plurality of reinforcing pieces attached perpendicularly to the bottom of the base members.

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DETAILED DESCRIPTION OF THE INVENTION

The present invention discloses a pallet comprising a plurality of elongate base members (102) being spaced apart from one another at its long edges with a plurality of block structures (108) arranged one by one within and along the long edges of each base member (102) that the base member (102) carries a plurality of paired slits (106) and each slit (106) cuts into every block structure (108) at a predetermined length; and a plurality elongate deck units (101) perpendicularly disposed on top of the base members that each deck unit is defined by a first construct (103), with an n-shaped cross-sectional profile, sandwiched in between a pair of second constructs (104), with

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an inverted L-shaped cross-sectional profile, and each deck unit (101) has a conjoined horizontal flat surface and a pair of downwardly extending portions (105) formed by the contiguous first (103) and second constructs (104); wherein the paired vertical extending portions (105) of each deck unit (101) are slotted into the aligned paired
5 slits (106) of each block structure (108) to link all the base members (102) with the deck units (101) together while the horizontal flat surface serves as a work surface.

With reference to Figure 1, the first construct (103) with the n-shaped cross-sectional profile has a horizontal flat surface and two downwardly extending protrusions
10 whereas the second constructs (104a, 104b) with the L-shaped cross-sectional profiles each have a horizontal flat surface and a downwardly extending protrusion. By joining the three constructs (103, 104) together with the first construct (103) positioned in the middle of the second constructs (104a, 104b), the horizontal flat surfaces of the constructs (103, 104) are combined together to form a stable work
15 surface with a large area for loads to sit on the work surface. Each of the downwardly extending protrusion of the first construct (103) is joined with the downwardly extending protrusions of the second constructs (104a, 104b) to form the pair of downwardly extending portions (105) for each deck unit (101).

20 Figure 1 shows a preferred embodiment of the pallet having base members (102) that extend along the length of all the deck units (101). The base member has a substantially uniform height. Such embodiment provides more stability to the base members (102) that are used to support the deck units (102). The embodiment shown in Figure 1 is a two-way pallet that is designed to be entered and lifted by forklift
25 from the front or rear of the pallet through the gaps between two individual base members (102). On the other hand, the embodiment depicted in Figure 2 is a four-way pallet which allows forklift to enter from the front/rear as well as the sides of the pallet. The versatility of the present invention allows the production of two-way and four-way pallets. At least one bottom partial portion of each base member can be
30 removed to form a gap for allowing forklift entry from the sides of the pallet. It is

however preferred to have two bottom partial portions removed for each base member (102) as shown in Figure 2 to form the four-way pallet. With the bottom partial portion being eliminated, the block structure (108) within the top partial portion (120) has a height smaller than the block structures (108) that are positioned inside the complete portions of the base members (102). Deck units (101) could be perpendicularly disposed on top of the top partial portion (120) of the base members for providing more work surface. The deck units (101) could have the same configuration as the two-way pallet shown in Figure 1, whereby each deck unit is formed by a first construct (103) being sandwiched in between two second constructs (104). The top partial portions have slits (106) to receive the extending portions (105) of the constructs (103, 104).

Each base member (102) is formed by a plurality of block structures (108) that are housed within a casing. The block structures (108) are preferred to be in the shape of a cube or cuboid and are aligned one by one along the casing with or without being spaced apart from one another. The base member (102) carries a plurality of paired slits (106) and each slit (106) cuts into every block structure (108) at a predetermined length from the top surface of the base member (102) including the top surface of the casing. Hence, each block structure (108) has two slits (106) for receiving the two downwardly extending portions (105) of each deck unit (101). The position, alignment and shape of the slits (106) should correspond to the pair of downwardly extending portions of each deck unit (101) such that the portions (105) could be fitted snugly into the slits (106) to form effective joints between the deck units (101) and the base members (102). Also, it is required that the block structures (108) have a height which corresponds to the height of the base member (102) so that the downwardly extending portions (105) of the deck units (101) could reach the slits (106) on the base members (102).

Preferably, the casing which accommodates the block structures could be formed by one or a pair of U-shaped (107a, 107b) or C-shaped channels (107c, 107d). In the

embodiment shown in Figure 3, the casing that is formed by a pair of U-shaped channels (107a, 107b) comprise a bottom U-shaped channel (107a) and a top U-shaped channel (107b). The U-shaped channel (107a, 107b) has a horizontal part and two vertical parts extending towards the same direction at the sides of the horizontal part. The bottom U-shaped channel (107a) is disposed at the bottom of the base member (102) for the block structures (108) that are arranged one by one along the long edge of the U-shaped channels (107a, 10b) to sit on it. The block structures (108) fit snugly into the bottom U-shaped channel (107a), with the horizontal part and the two upwardly extending vertical parts extending upwards for embracing the bottom portion of the block structures (108). On the other hand, the top U-shaped channel (107b) is inversely positioned at the top of the base member (102), such that the vertical parts extend downwards. The top U-shaped channel (107b) sits on the block structures (108) and embraces the top portion of the block structures (108).

Another embodiment of the casing is illustrated in Figure 4, in which the casing is formed by a single C-shaped channel (107c). The C-shaped channel (107c) has a vertical part with two horizontal parts extending from the top and bottom of the vertical part at the same direction embracing the top, bottom and one of the side surfaces of the block structures (108). The block structures (108) are fitted within the C-shaped channel (107c) one by one along the long edge of the C-shaped channel (107c).

A pair of C-shaped channels (107c, 107d) shown in Figure 5 provide protection and enhance the rigidity of the base members (102) as compared to the embodiment of the pallet base member (102) in Figure 4. The pair of C-shaped channels (107c, 107d) comprises a first C-shaped channel (107c) and a second C-shaped channel (107d). The first C-shaped channel (107c) has a smaller dimension than the second C-shaped channel (107d) and is disposed at one side of the base member (102) with the block structures (108) fitted within the C-shaped channels (107c, 107d) one by one along the long edges of the C-shaped channels (107c, 107d). The first C-shaped channel

(107c) embraces the top, bottom and one side surfaces of the block structures (108) just like the embodiment in Figure 4. On the other hand, the second C-shaped channel (107d) is inversely positioned to have its horizontal parts extending towards a direction opposite to the direction of the horizontal parts of the first C-shaped channel (107c). The second C-shaped channel (107d) embraces the block structures (108) and the first C-shaped channel (107d) from another side surface of the block structures (108), enclosing the top and the bottom surfaces of the first C-shaped channel (107c) at the same time. The first C-shaped channel (107c) and the block structures (108) have dimensions that enable them to be fit snugly within the second C-shaped member (107d).

To enhance the structural integrity of the base members (102) such that the pallet could sustain high load, a pair of L-shaped columns (109a, 109b) are utilized to surround each long edge of the casing of each base member (102). The L-shaped column (109) has a vertical part and a horizontal part that are joined perpendicularly to each other. One of the L-shaped columns (109a) surrounds one side surface and the bottom surface of the base member (102) fully or partially whereas the other L-shaped column (109b) surrounds the opposite side surface and the bottom surface of the base member (102) fully or partially. If the L-shaped columns (109) cover the bottom surface of the base member (102) partially as depicted in Figure 6, there is no overlapping of the horizontal parts to prevent the bottom surface for the base member (102) that is reinforced by the L-shaped columns (109) to be uneven. Conversely, if the L-shaped columns (109) cover the bottom surface fully as shown in Figure 7, there is overlapping of the horizontal parts in a condition that each horizontal part has a surface area that is substantially similar to the bottom surface of the base member (102). One of the L-shaped columns (109b) should have larger dimensions in its height for its vertical surface and width for its horizontal surface as compared to the other L-shaped column (109a), such that the L-shaped column (109a) with smaller dimensions embraces one of the side surfaces and the bottom surface of the block structure (102) fully and the L-shaped column (109b) with larger dimensions

embraces the smaller L-shaped column (109a) and the block structures (108) for forming an even bottom surface for the base member (102).

- Referring to Figure 8, a plurality of elongate reinforcing pieces (110) could be added to the pallet to provide additional stability and protection to the base members (102). The pieces (110) are being spaced apart and attached perpendicularly along the bottom of the base members (102), spanning from the first base member (102) at one edge of the pallet to the last base member (102) at the opposite edge of the pallet.
- As the material used to produce the pallet also plays an important role in determining the structural integrity of the pallet, a material with high strength and load resistance are suitable to be applied. Examples of the preferred materials are the high density fiberboard and medium density fiberboard. Other types of fiberboard or materials such as plywood, plastic, metal, laminated sheet papers, coreboard and paperboard including kraftliner or testliner could also be employed to produce the

Although the description above contains many specifications, it is understood that the embodiments of the preferred form are not to be regarded as a departure from the invention and it may be modified within the scope of the appended claims.

CLAIMS

1. A pallet comprising
a plurality of elongate base members (102) being spaced apart from one
5 another at its long edges with a plurality of block structures (108) arranged
one by one within and along the long edges of each base member (102) that
the base member (102) carries a plurality of paired slits (106) and each slit
(106) cuts into every block structure (108) at a predetermined length; and
a plurality elongate deck units (101) perpendicularly disposed on top of the
10 base members that each deck unit is defined by a first construct (103), with an
n-shaped cross-sectional profile, sandwiched in between a pair of second
constructs (104), with an inverted L-shaped cross-sectional profile, and each
deck unit (101) has a conjoined horizontal flat surface and a pair of
downwardly extending portions (105) formed by the contiguous first (103)
15 and second constructs (104);
wherein the paired vertical extending portions (105) of each deck unit (101)
are slotted into the aligned paired slits (106) of each block structure (108) to
link all the base members (102) with the deck units (101) together while the
horizontal flat surface serves as a work surface.
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2. A pallet according to claim 1, wherein the base member (102) has a
substantially uniform height or has at least one bottom partial portion removed
to form a gap in between two top partial portions (120) of the base member
(102).
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3. A pallet according to claim 1, wherein the base member (102) has a casing
formed from one or a pair of U-shaped (107a, 107b) or C-shaped (107c, 107d)
channels.

4. A pallet according to claim 3, wherein the casing formed by a pair of U-shaped channels comprises a bottom U-shaped channel (107a) and a top U-shaped channel (107b), the bottom U-shaped channel (107a) being disposed at the bottom of the base member (102) for the block structures (108) that are arranged one by one along the long edges of the U-shaped channels (107a, 107b) to sit thereon; and the top U-shaped channel (107b) being inversely positioned at the top of the base member (102) to sit on the block structures (108).
5. A pallet according to claim 3, wherein the casing formed by the C-shaped channel (107c) is disposed at one side of the base member with the block structures (108) fitted within the C-shaped channel (107c) one by one along the long edge of the C-shaped channel (107c).
6. A pallet according to claim 3, wherein the casing formed by a pair of C-shaped channels (107c, 107d) comprising a first C-shaped channel (107c) and a second C-shaped channel (107d), the first C-shaped channel (107c) having a smaller dimension than the second C-shaped channel (107d) and being disposed at one side of the base member (102) with the block structures (108) fitted within the first C-shaped channel (107c) one by one along the long edges of the C-shaped channels (107c, 107d); and the second C-shaped channel (107d) embracing the block structures (108) and the first C-shaped channel (107c) from another side of the base member (102).
7. A pallet according to claim 1, further comprising a pair of L-shaped columns (109a, 109b) embracing every long edge of the casing of each base member (102).
8. A pallet according to claim 1, further comprising a plurality of elongate reinforcing pieces (110) being spaced apart and attached perpendicularly along the bottom of the base members (102).

9. A pallet according to claim 1, wherein the block structures (108) have a height that corresponds to the height of the base member (102).
- 5 10. A pallet according to claim 1, wherein the pallet is made of any one or combination of a high density fiberboard, medium density fiberboard, plywood, plastic, metal, laminated sheet papers, coreboard and paperboard.