United States Patent

Ball

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[54] **PALLETS**

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

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

[58] **Field of Search** 108/51–58; 94/13; 182/41; 52/108, 660, 666, 167; 46/26

[56] **References Cited**

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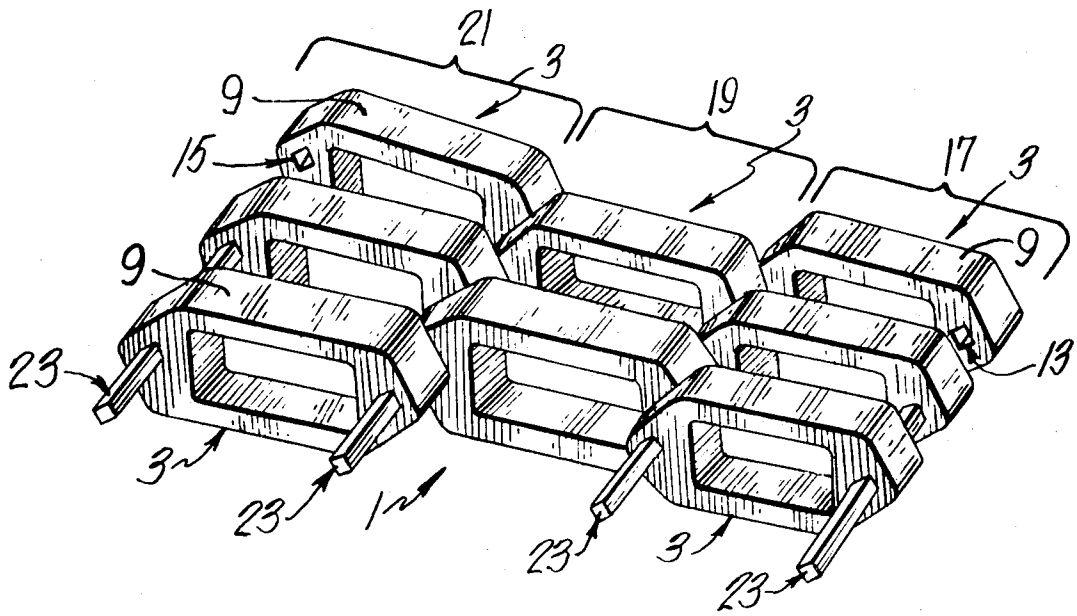
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[57] **ABSTRACT**

A pallet constructed from a plurality of block units non-rotatably connected together to form a rigid pallet platform surface.

7 Claims, 12 Drawing Figures



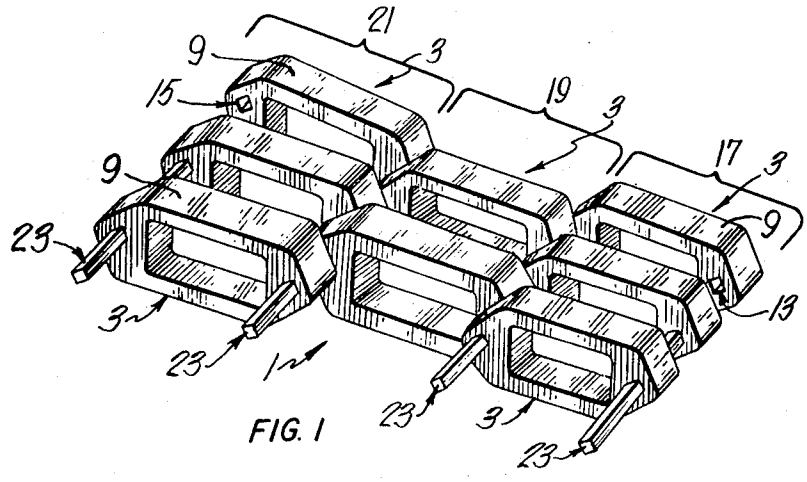


FIG. 1

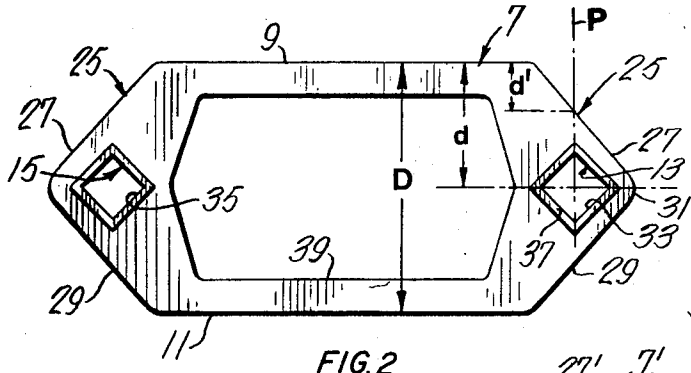


FIG. 2

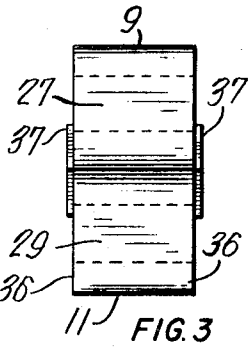


FIG. 3

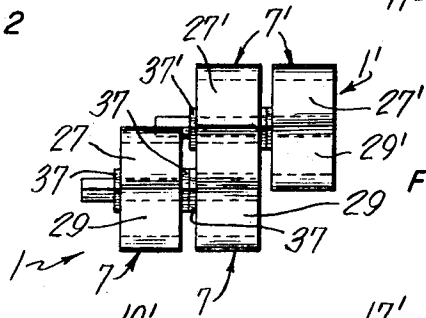
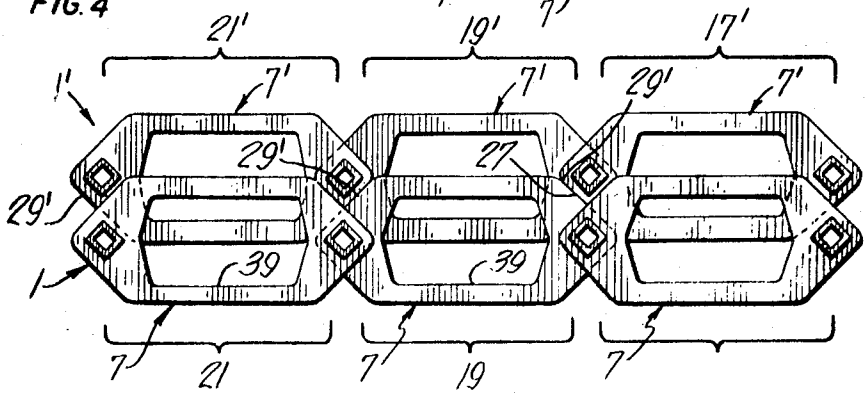


FIG. 5

FIG. 4



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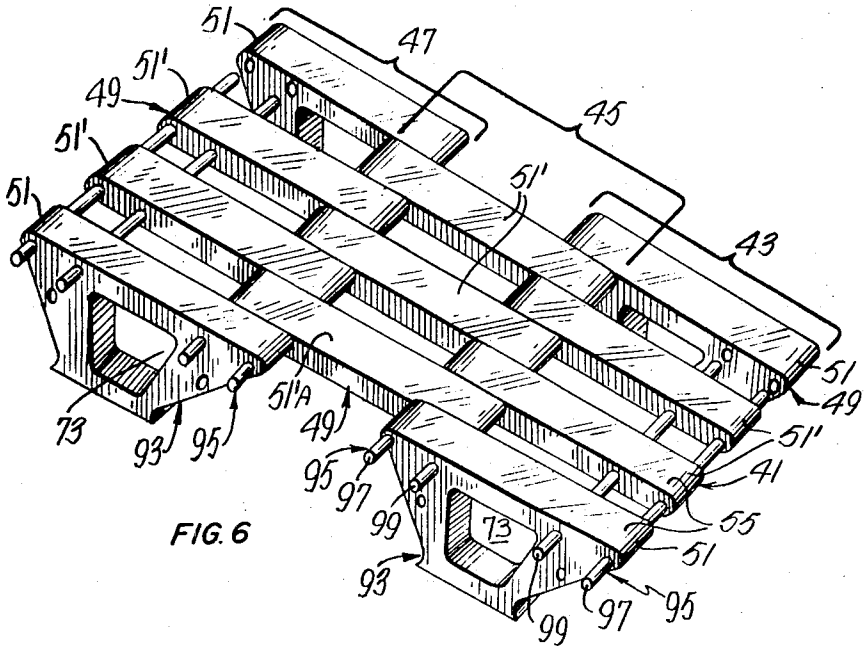


FIG. 6

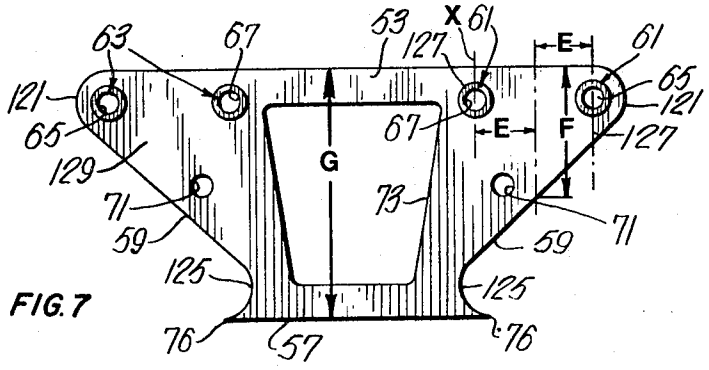


FIG. 7

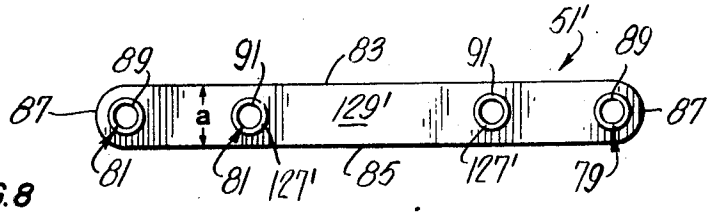


FIG. 8

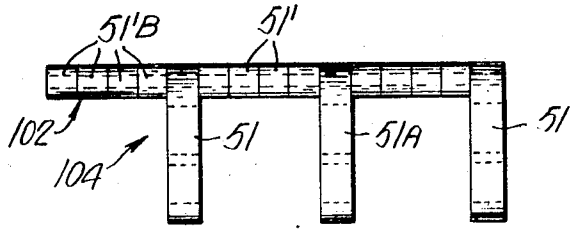


FIG. 9

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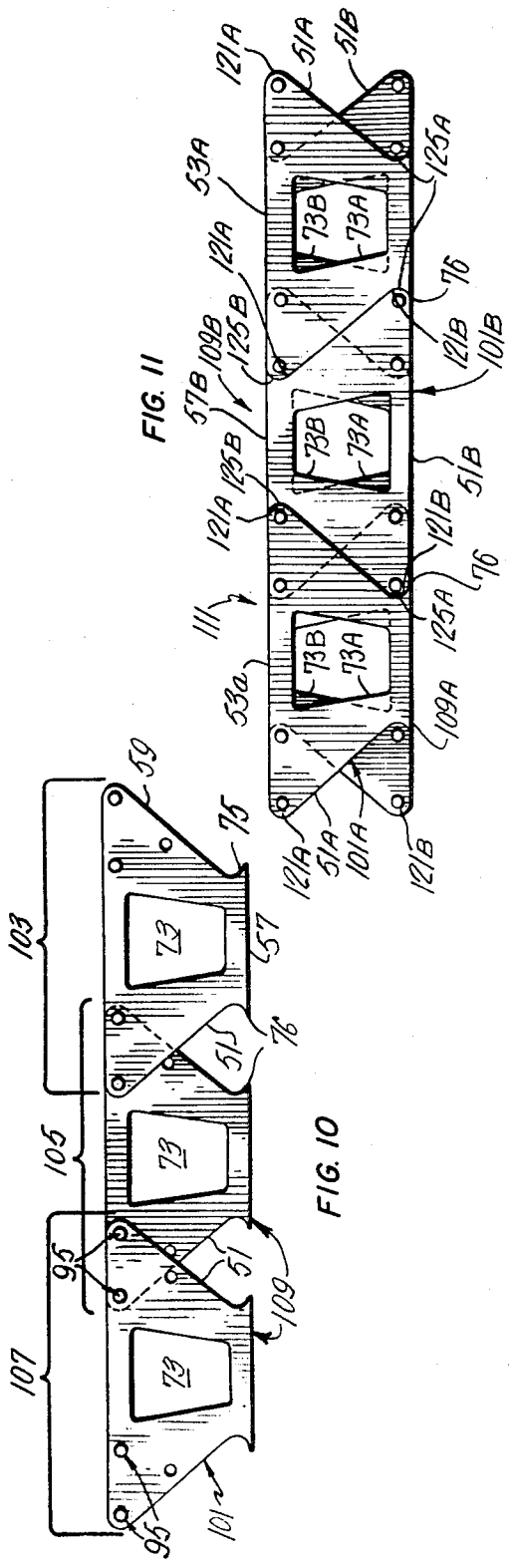


FIG. 11

FIG. 10

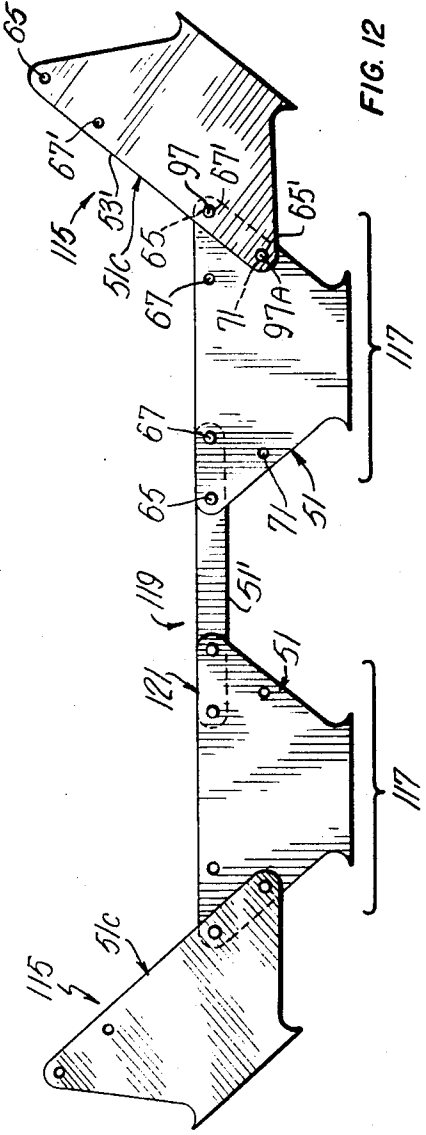


FIG. 12

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PALLETS

BACKGROUND OF THE INVENTION

1. Field of Invention

This invention relates to an improved pallet construction.

More particularly, the invention relates to an improved pallet construction employing a plurality of at least one type of constructional unit, which units can be assembled together in various ways depending upon the size and type of pallet required and the load it is to support.

2. Description of Prior Art

Pallets, to be useful, must be cheap to manufacture and yet strong to support and carry a load. The pallets preferably should be stackable so as to occupy a small space when not in use, should be of a standard height, and should be constructed so they can be lifted and/or moved by a forklift truck from any side of the pallet. Many pallets satisfying the above requirements are known.

However, known pallets, particularly those made in one piece from thermoplastic or thermosetting materials, are usually made in only a few sizes and/or with only a few specific types of construction because of the high initial cost of the equipment required to manufacture them. It is very expensive to provide odd sizes of thermoplastic or thermosetting pallets or pallets designed to withstand unusual loadings having the most efficient construction since each type or size of pallet requires a separate mold.

SUMMARY OF THE INVENTION

It is the purpose of the present invention to provide a pallet construction employing constructional units which can be easily assembled to form pallets of different sizes and/or pallets having the most efficient construction for supporting different loads, particularly when made of thermoplastic or thermosetting material, while still providing the advantages of known pallets at a competitive cost.

The invention comprises providing at least one type of pallet constructional unit, a plurality of which can be arranged and maintained in various ways by connecting means to form a rigid pallet. The number of units used, the type of unit and the manner of assembling the units can be varied depending on the size, type, strength and cost required of the pallet.

The basic type of pallet constructional unit used is of a standard pallet height. The pallet construction preferably also employs a second type of constructional unit which is much shorter in height than the first type in order to reduce costs. The two types of pallet constructional units, together with a plurality of connecting means, permits construction of a variety of pallets at optimum cost.

Preferably, the pallet constructional units are made of thermoplastic and/or thermosetting material which permits construction of a "hygienic" pallet, that is, one that is capable of maintaining the standards of cleanliness required for the food industry. In addition, thermoplastic material permits pallets to be manufactured of different colors. The pallet constructional units are relatively small compared to the size of an assembled pallet thus making it more economical for them to be molded of thermoplastic or thermosetting material than if the pallet were to be molded in one piece.

The pallets constructed from the constructional units can be made, depending on the type of units and the material they are made from, to be either disposable or reusable. The pallets can also be made to have a single support surface or two opposed support surfaces thus forming a double-sided pallet. The pallet can also be constructed to be lifted by a fork truck from opposed sides, from pairs of opposed sides or from projecting surface extensions, thus providing either two-way, four-way, or winged-type pallets.

The invention is particularly directed to a pallet comprising a plurality of constructional units, each unit having a base surface and a support surface. Each unit has first and second spaced apart receiving means. The units are arranged in a series of rows with the units in one row overlapping the units in an adjacent row. The pallet includes a plurality of elongated connecting means which extend parallel to the platform surface of the pallet. Each connecting means nonrotatably cooperates with one of the first or second receiving means in each unit in one row of the units and with the other of the first or second receiving means in each unit in an adjacent overlapping row of units whereby the support surfaces of the units form a rigid platform surface for the pallet.

The invention further relates to a pallet wherein at least some of said constructional units have a height substantially less than the height of other of said units.

The invention more particularly relates to a pallet construction wherein at least some of the constructional units comprise a plurality of isosceles trapezoidal blocks, the base surface in each block being smaller in area than the support surface. Each receiving means in each of the blocks preferably comprises a pair of spaced apart apertures in the block, a first one of each pair of apertures located adjacent each end of the support surface. The axes of all the apertures are aligned in a plane which is parallel to the support surface. Each connecting means comprise a pair of rods.

The apertures of each receiving means preferably are spaced apart equal but opposite lateral distances from a plane extending perpendicular to the support surface, which plane bisects an end surface of the block joining the base and support surface at a distance from the support surface equal to half the distance between the base and support surface. This feature, together with each trapezoidal block having complementary interlocking means adjacent the ends of the end surface, permits the trapezoidal blocks in one pallet to interlock with blocks in a second pallet, thus forming a double-sided pallet.

Two additional apertures can be provided in each trapezoidal block, each spaced from the first aperture of an aperture pair adjacent the end of the support surface the same distance as the second aperture of the aperture pair is spaced from the first aperture, thus permitting the blocks to be used in forming side walls for the pallet.

BRIEF DESCRIPTION OF DRAWINGS

The invention will now be described in detail having reference to the accompanying drawings, wherein:

FIG. **1** is a schematic view of a partial pallet construction according to one embodiment of the invention;

FIG. **2** is a front elevation view of one of the constructional units used in constructing the pallet shown in FIG. **1**;

FIG. **3** is a side elevation view of the constructional unit shown in FIG. **2**;

FIG. **4** is a front elevation view showing two pallets, each of the type shown in FIG. **1**, in internested relation;

FIG. **5** is a side elevation of the internested pallets shown in FIG. **4**;

FIG. **6** is a schematic view of a partial pallet construction according to a second embodiment of the invention;

FIG. **7** is a front elevation view of one preferred type of constructional unit used in the pallet shown in FIG. **6**;

FIG. **8** is a front elevation of a second type of constructional unit used in the pallet shown in FIG. **6**;

FIG. **9** is a side elevational view of a modified pallet construction somewhat similar to that shown in FIG. **6**;

FIG. **10** is a front plan view of another pallet construction using the type of constructional unit shown in FIG. **7**;

FIG. **11** is a front plan view showing still another pallet construction using two internested pallet units; and

FIG. **12** is a front plan view showing another pallet construction with retaining side walls.

DESCRIPTION OF PREFERRED EMBODIMENTS

The pallet **1** shown in FIG. **1** comprises a plurality of construction units **3** arranged and held together to provide a rigid platform surface for the pallet. The constructional units **3** can comprise a plurality of identical blocks **7**, as shown in FIG. **2**,

each block having an upper support surface 9 which forms a part of the rigid platform surface of the pallet 1 and a lower base surface 11 spaced from the support surface. The base surface 11 of each block 7 supports the pallet and preferably extends parallel to the support surface 9. Each block 7 has first and second spaced apart receiving means 13, 15. The blocks are arranged in a series of rows, and the number of rows together with the number of blocks in each row can vary depending upon the size of pallet desired. Three rows 17, 19, 21 are shown in FIG. 1. The blocks in each row are arranged so that the blocks in one row overlap the blocks in an adjacent row whereby one of the first and second receiving means 13, 15 in each block in one row are aligned with the other of the first and second receiving means in each block in an adjacent row. Connecting means 23 are then passed through the aligned receiving means 13, 15 to nonrotatably connect the blocks in one row to the blocks in an adjacent row to form a pallet having a rigid platform surface.

In one embodiment as shown in FIGS. 2 and 3, the blocks 7 can have a somewhat rectangular shape with the base and support surfaces 11, 9 being of the same length and with the corners bevelled. Preferably, the end surfaces 25, joining the support 9 and base 11 surfaces, each comprise a first end surface 27, extending outwardly at an angle of 45° to the support surface, and a second end surface 29 extending outwardly at an angle of 45° to the base surface and of the same length as the first end surface 27 and joining it to form corner 31. The corner 31 can be rounded as shown in FIG. 2.

The first and second receiving means 13, 15 can comprise rectilinear slots 33, 35. The slots 33, 35 preferably are square as shown in FIG. 2. Each slot 33, 35 is located so its center is a distance "*d*" from the support surface 9 equal to one-half the distance "D" between the base 11 and support 9 surfaces, and so the center of each slot is also an equal distance from each corner 31. Blocks with this construction are symmetrical about a central axis and can be used with either the support or base surface 9, 11 forming part of the rigid platform surface of the pallet.

In a preferred embodiment, the center of each slot 33, 35 is located in a plane "P" extending perpendicular to the support surface, which plane intersects the first end surface 27 at a distance "*d'*" from the support surface equal to one-quarter the distance "D" between the support and base surfaces. This construction permits one pallet 1 constructed from this type of block to be partially internested with a second identically constructed pallet 1' as shown in FIGS. 4 and 5, thus reducing the amount of storage space required for unused pallets.

As shown in FIGS. 4 and 5, the pallets 1, 1' are positioned so the second end surfaces 29' of the blocks 7' in the second pallet 1' rest on the first end surfaces 27 of the blocks 7 in the first pallet 1, with the blocks 7' in each row 17', 19', 21' of the second pallet 1' offset with respect to the blocks 7 in each corresponding row 17, 19, 21 in the first pallet. The blocks 7' in each row of the second pallet can be offset from the blocks 7 in a corresponding row in the first pallet a distance equal to the width of the blocks. In order to facilitate internesting of the pallets however, it is preferable to provide a spacing bead or ridge on each side surface 36 of each block 7 which abuts with a spacing bead or ridge on an adjacent overlapping block to prevent the side surfaces 36 from abutting. The spacing bead can comprise a ridge 37 on each side surface 36 surrounding each aperture 33, 35. The blocks 7' in pallet 1' have an identical ridge 37'.

If desired, spacer elements of various lengths (not shown) can be used with the blocks 7 to form the pallet. The spacer elements can comprise tubular elements threaded on the connecting means 23 to space the blocks in each row from one another. This provides a pallet with a much more open support surface.

The connecting means 23 comprise rods or tubes having a cross-section shape which matches but is slightly smaller than the shape of the slots 33, 35. Thus, the connecting means 23 as shown in FIG. 1 comprises square rods 38 cooperating with the square slots 33, 35. Suitable means can be provided to lock the rods or tubes in place once passed through aligned apertures in the blocks. The shape of the slots and cooperating rods or tubes must be such that the blocks cannot rotate about the rods in order to provide a pallet having a rigid platform surface.

It will be seen that with the type of construction described, using a plurality of identical symmetrical blocks 7, the pallet 1 can be made in various lengths and in various widths, depending upon the size of the blocks, the number of blocks used in each row, and the number of rows used. The blocks can, if desired, have lightening holes formed therein to reduce their weight. Preferably, apertures 39 are formed in the blocks permitting passage of the tines of a fork lift truck from a direction transverse to the plane of the blocks 7 to permit the assembled pallet to be moved.

A preferred pallet construction 41 is shown in FIG. 6. The pallet again comprises rows 43, 45, 47 of constructional units 49 with the units of one row overlapping the units of an adjacent row. The constructional units 49 can comprise large and small blocks 51, 51'.

The large blocks 51 preferably are isosceles trapezoidal in shape, as shown in FIG. 7, with an upper support surface 53 forming a part of the rigid platform surface of the pallet 41, and a base surface 57 which extends parallel to the support surface 53 and which is shorter than the support surface 53. The support and base surfaces are joined together by end surfaces 59.

The block has first and second receiving means 61, 63, each of which preferably comprise a pair of spaced apart cylindrical apertures 65, 67. The axis of the apertures extends transversely to the longitudinal axis of the support surface 53. A first aperture 65 of each pair of apertures is located closer to an end 69 of the support surface 53 than the second aperture 67 of each pair. The axes of all four apertures lie in a plane which is spaced slightly below the support surface 53 and which extends parallel thereto.

A third cylindrical aperture 71, identical to the first and second apertures, can also be provided, located from the first aperture 65 the same distance that the second aperture 67 is located from the first aperture 65. The purpose for this additional aperture 71 will be described later. The block 51 is also provided with a central substantially rectangular aperture 73 which both reduces its weight and provides an entry for the tines of a fork lift truck.

The small blocks 51', shown in FIG. 8, comprise an elongated rectangular block having first and second receiving means 79, 81, a support surface 83 and a base surface 85 parallel to the support surface. The support and base surfaces are joined by end surfaces 87 which are preferably rounded. Each of the first and second receiving means 79, 81 can comprise a pair of spaced apart circular apertures 89, 91. One aperture of each pair is located adjacent each end surface 87. The axes of the apertures lie in a plane parallel to the support surface and closely adjacent thereto. The spacing and size of the apertures 79, 81 and their distance from the support surface 83, match the spacing and size of the apertures 65, 67 and their distance from the support surface 53 in the large blocks 51. The height "*a*" of the small block 51' is much less than the height "G" of the large blocks 51.

The large and small blocks 51, 51' are arranged in rows in a similar manner as the blocks 7, to form different pallet constructions depending on the size of the pallet required, the load it is to support, and its function. The large blocks 51 form the legs 93 of the pallet as shown in FIG. 6. In one construction, as shown in FIG. 6, the first and third rows 43, 47 start and end with the large blocks 51 and with the small blocks 51' making up the remainder of the rows and also all of center row 45. The blocks in each of the rows overlap the blocks in an adjacent row so that the one of the first or second pair of apertures in the blocks in one row are aligned with the other of the first or second pair of apertures in the blocks of the adjacent row. Connecting means 95 are then passed through the aligned pairs of apertures.

Each connecting means can comprise a pair of rods **97, 99**, which are either solid or tubular and which can be made of plastic, wood, metal or suitable material. The two rods **97, 99** prevent the blocks in adjacent rows from rotating relative to each other and provide for a rigid pallet construction. The support surfaces of both the blocks **51, 51'** form the rigid platform surface of the pallet. The pallet **41** can be made in various lengths and widths depending on the number of blocks used in each row and the number of rows used.

If desired, the pallet shown in FIG. **6** could be strengthened by replacing one or more of the small blocks **51'** with large blocks **51**. As shown in FIG. **9**, for example, the small block **51'A** in the center of the central row **45** of the pallet shown in FIG. **6** has been replaced by a large block **51A** to provide additional support for the pallet and thus provide a stronger pallet **100**. In addition, small blocks **51'B** can be added, using longer rods **97, 99**, to the rows of blocks at one or both ends of each row to form lateral extensions **102** to the pallet. This type of pallet construction, having the extensions **102**, provides a winged pallet with the spaces **104** beneath the extensions receiving means to move the pallet.

If a very strong pallet construction is required, it may be constructed using only large blocks **51** in each row. Such a construction is shown in FIG. **10** where each row **103, 105**, and **107** of the pallet **101** comprise large blocks **51**.

A pallet having first and second platform surfaces and/or a still stronger pallet can be constructed by using two pallets constructed from the blocks **51** with the blocks **51** having a specific location for apertures **65, 67** of each pair, each aperture **65, 67** positioned an equal but opposite lateral distance "E" from a plane "*x*" extending perpendicular to the support surface, which plane bisects the end surface **59** at a distance "F" from the support surface equal to half the distance "G" between the base and support surfaces; and having complementary interlocking means on the ends of their end surfaces. As shown in FIG. **7**, the complementary interlocking means can comprise a convex surface **121** at one end of the end surface **59** adjacent the support surface **53** and a concave surface **125**, complementary to the convex surface **121** at the opposite end of the end surface **59** adjacent the base surface **57**. Two pallets **101A, 101B** made from the blocks **51** having the specific spacing of the apertures **65, 67** and the complementary interlocking means can be internested and interlocked as shown in FIG. **11**. The pallets **101A, 101B**, each constructed, for example as the pallet **101** shown in FIG. **10**, are positioned with the base surfaces **109A, 109B** of each of the blocks **51A, 51B** facing each other. The two pallets are arranged so that each block in one row of one pallet **101A** is between or adjacent blocks in a corresponding row of the other pallet **101B** with the rows in one pallet aligned with the rows in the other pallet. The two pallets are then moved together to interlock as shown in FIG. **11** to form a double platform surfaced pallet **111**. The blocks **51A** in pallet **101A** interlock with the blocks **51B** in the pallet **101B**, through at least one convex surface **121A** on each block **51A** adjacent its support surface **53A**, fitting into at least one concave surface **125B** on each block **51B** adjacent its base surface **57B** and through at least one convex surface **121B** on the blocks **51B** fitting into the concave surface **125A** on the blocks **51A**. The convex surfaces **121** move past a resilient protruding edge **76** formed on the blocks **51** when the concave surface **125** is formed so the blocks interlock with the end faces of certain of the blocks from the two pallets abutting and with the base and support surfaces lying in the same plane. This interlocked construction forms a substantially solid pallet **111**. The pallet can still be lifted by a fork lift truck but only through aligned apertures **73A, 73B**.

The pallets **101A, 101B** can also be constructed with short blocks **51'** replacing some of the large blocks **51**. The end surfaces **87** of the short blocks are preferably complementary to the concave surfaces **125** on the large blocks thereby permitting them to be snapped into the concave surfaces **125** wherever the short blocks are in cooperating relation with the large blocks when the pallets are internested. To more easily permit internesting, the blocks **51, 51'** could also be formed with raised beads **127, 127'** on their side surfaces **129, 129'** surrounding the apertures **65, 67** and **89, 91**.

Additional blocks **51, 51'** can also be used to form side retaining walls **115** for a pallet in cooperation with the blocks **51** used to form the pallet platform. As shown in FIG. **12**, additional blocks **51C** are positioned adjacent the blocks **51** in the outer rows **117** of the pallet **119**. Each additional block **51C** is positioned so one pair of its apertures **65', 67'** are aligned with apertures **65, 71** of block **51**. One of the support rods **97** holding the blocks **51** together passes through apertures **67'** of block **51B**. An additional rod **97A** passes through aperture **65'** of block **51B** and aperture **71** of block **51**. The support surfaces **53'** of blocks **51C** extend at an angle to the platform surface **121** of the pallet and thus form retaining walls which can assist in retaining bar, strip or rod material on the pallet platform. Short blocks **51'** may be used in place of large blocks **51**. As many additional blocks **51, 51'** can be used as required to form retaining walls on both sides of the pallet.

While the preferred form of the blocks **51, 51'** described has cylindrical apertures **65, 67, 71**, other types or shapes of receiving means could also be used, if desired. The apertures could, for example, be square or rectangular. Alternatively, the material between the apertures **65, 67** could be removed, forming elongated slots instead. The cross-section shape of the connecting means matches the shape of the slot or apertures and is such as to prevent rotation of the block about the connecting means.

If desired, the support surface and the base surface of the blocks can be roughened during or after manufacture to provide a surface which is less slippery and which will assist in retaining articles stacked on to the platform surface during transportation.

The large and small blocks **51, 51'** preferably are injection molded from thermoplastic material. The blocks are dimensioned to permit formation of standard size pallets. In a preferred form, the height or distance "D" of large blocks **51** is preferably 5½ inches if the blocks are to be used in constructing pallets for use in Europe or 5⅝ inches if the blocks are to be used in constructing pallets in North America. Their width is 2 inches. The distance between the centers of the corner apertures **65** is 15½ inches with the centers of apertures **67** and **71** spaced 4 inches from the center of aperture **65**. Preferably, the end surface **59** extends inwardly at an angle of 35° to the support surface **59**.

I claim:

1. A pallet comprising a plurality of constructional units,
each unit having a base surface and a support surface,
first and second spaced apart pairs of apertures in each unit,
the units arranged in a series of rows with their supporting surfaces lying in substantially the same plane,
the units in one row overlapping the units in an adjacent row by a distance substantially less than one-half the length of the units and with one of the first or second pairs of apertures of each unit in one row aligned with one of the first or second pairs of apertures of each unit in an adjacent row,
and a pair of elongated connecting means passing through the aligned pairs of apertures to retain all the support surfaces in substantially the same plane.

2. A pallet as claimed in claim **1**, wherein at least some of the units comprise blocks having an isosceles trapezoidal shape with the support surface being longer than the base surface.

3. A pallet as claimed in claim **2**, wherein end surfaces joining the ends of the base and support surface have a concave surface portion adjacent the support surface and a complementary convex surface adjacent the base surface.

4. A pallet as claimed in claim **1**, wherein the elongated connecting means each comprise a pair of rod or tubular members, each rod or tubular member of the pair extending through an aperture of the units in one row which are aligned with an aperture in the overlapped units of an adjacent row.

5. A pallet as claimed in claim 3, wherein the first and second apertures of each pair are spaced apart a lateral distance equal but opposite from a plane which extends perpendicular to the support surface and which plane bisects an end surface at a distance equal to one-half the distance between the support and base surfaces.

6. A pallet as claimed in claim 5, wherein a third aperture, of the same size as the first and second apertures, is formed in the block, the third aperture spaced a distance from the first aperture adjacent an end surface equal to the distance the second aperture is spaced from the first aperture.

7. A pallet as claimed in claim 1, including an additional aperture in the block and centrally located for receiving the lifting member of a fork lift truck.

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