WOODEN DOWEL IN PALLET ASSEMBLY

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ABSTRACT
An improved pallet that is capable of easy assembly, functionally adequate for some situations and capable of easy disassembly. In one form of the invention, a pallet is provided that is made of all wood. In one embodiment, the pallet may be comprised of a plurality of stringers with bores, a plurality of deck boards with openings, and a plurality of wooden dowels disposed in the bores and openings to connect the stringers and deck boards.
Fig. 7

Part 1
Providing a plurality of wooden dowels, each dowel comprising first and second portions, each dowel having at least two contiguous dowel sections having sidewalls of different cross-sectional size.

Part 2
Providing at least two elongated runners, each runner having a longitudinal mounting surface having a plurality of bores formed therein in spaced relation along the mounting surface, the bores being configured to receive a selected portion of one of the dowels.

Part 3
Providing a plurality of pallet boards, each pallet board having first and second ends with each end having an opening adapted for aligned relation with a selected bore in one of the runners, the openings configured to receive a remaining portion of the dowel.

Part 4
Applying adhesive material to the runners and boards such that some of the adhesive material falls into the bores and openings.

Part 5
Positioning the runners in parallel relation with the mounting surfaces substantially coplanar, and positioning the pallet boards in parallel relation transverse to the mounting surfaces.

Part 6
Inserting the dowels into the openings of the pallet boards and into the aligned bores of the runners in a snug relationship to thereby connect the pallet boards to the runners.
WOODEN DOWEL IN PALLETFIELD OF THE INVENTION

[0001] The present invention relates generally to pallets, and more particularly to a pallet having deck boards connected to stringers with wooden dowels having stepped diameter peripheral surfaces which act as internal clamps.

BACKGROUND OF THE INVENTION

[0002] Pallets of various types are known in the art. Typical pallets are constructed of wood and include parallel stringers to which transverse deck boards are then nailed or otherwise secured with metal fastener devices to form the pallet. Pallets need to have sufficient strength to withstand the weight of objects loaded thereon and other impact forces to which the pallets are subjected when objects are loaded onto them and when the pallets are moved, as by a forklift truck or the like.

[0003] In many pallets, pallets are damaged at their lead boards. As a fork lift or other mechanism is brought to engage a pallet, it will often impact the lead board of the pallet with significant force. This shearing force may disengage the lead board or otherwise damage it, yielding a worn or damaged pallet that may not work as well and may be dangerous to users and merchandise.

[0004] Also, as pallets are used, they can become worn and weakened, causing some of the stringers or deck boards to break or become at least partially detached, rendering the pallet inoperable or in a dangerous condition. The use of nails or other metal fastener devices can also render pallets dangerous. Many times, the damage to a pallet occurs where the metal nail goes into the wood. The use of metal fasteners can cause checking in the stringers or deck boards. Further faults include product damage or personal injury caused by exposed fasteners and inadequate joint stiffeners.

[0005] In an effort to save money and resources, the undamaged portions of worn or damaged pallets are often salvaged and reused in making recycled pallets, used as fuel or sawdust, or put to other uses. Those in the art have employed many methods in their attempts to salvage worn-out pallets by stripping or otherwise disassembling the stringers and deck boards from each other. However, many of these methods require costly machinery or a great deal of time and effort and put workers at significant safety risk. Nails and other metal fastener devices are often a great hindrance in efforts to disassemble pallets. The presence of, for example, nails prevents the use of standard saws or similar devices, which do not effectively cut through nails. Devices that are able to disassemble worn-out pallets that include nails face other disadvantages. First, they are often large, unwieldy and expensive. Second, often times the nails remain in the stringers or deck boards after disassembly. In order to reuse the boards in optimal condition, the nails need to be removed, requiring additional time with attendant increased cost and expense.

[0006] More recently, companies who utilize pallets have turned to Radio Frequency Identification ("RFID") technology to monitor and track pallet location and other information. To use such technology, encoded RFID tags or devices are placed on a pallet. As the pallet moves through distribution channels, RFID readers scan the devices. By, for example, placing a RFID reader at a dock door of a warehouse, a supplier and customer know when a pallet arrives. Wal-Mart has imposed RFID deadlines on its major suppliers. However, there have been problems implementing RFID systems. One problem that faces RFID technology is the ability to read metal products because metal can prevent RFID readers from operating properly. A pallet without metallic fasteners would thus be desired. Further, liquid inside of objects can absorb RF signals, making reading more difficult. It is thus desirable to have a wooden pallet that can be constructed with drier wood. However, nails and other metal fasteners often cannot be used to construct a pallet with dry wood because they will cause checking and damage to the wood during construction.

[0007] In response to these problems, construction of pallets without utilizing metal fasteners has been attempted. One such method uses only one of the bore connected stringers to deck boards. However, there are numerous disadvantages to such a pallet. One is that the connection is often times not strong enough to resist typical shearing or other forces. A second disadvantage to such a pallet is the required use of external clamps or similar devices to hold the pieces together while the glue sets. A third disadvantage of this technique is the waste of time between initial alignment and ultimate formation of the pallet. This waste of time stems from the requirement of waiting for the glue to set before use of the pallet. There thus exists a need for a pallet that can be readily and economically assembled, can withstand substantial impact and load forces, can be easily disassembled, including with dry wood, and will not interfere with RF signals or prevent RFID readers from operating properly.

SUMMARY OF THE INVENTION

[0008] In carrying out one embodiment of the invention, a pallet made predominately of wood comprises a plurality of wooden stringers. Each wooden stringer comprises four elongated longitudinal surfaces and two end surfaces. A selected longitudinal surface is designated as a mounting surface and has a plurality of bores formed therein so that the longitudinal axes of the bores are generally normal to the mounting surface. The size of the bores can range in depth completely through the stringer to a smaller depth sufficient to receive a portion of a dowel.

[0009] The deck boards can be connected to the stringers by a plurality of wooden dowels. Each of the dowels preferably has a first and second portion. The dowel comprises at least two contiguous dowel sections having different cross-sectional size. The dowels are preferably constructed so that one portion fits into one of the bores in the stringer while the other portion fits into one of the openings in the deck board, thereby connecting the stringer to the deck board. Adhesive is used to augment that connection. The second end of the deck board can be similarly connected to a second stringer so that the deck board is transverse the wooden stringers. A pallet can be formed by so connecting a plurality of deck boards to the stringers.

[0010] One benefit of the present invention is to provide a pallet that can be easily assembled through the use of wooden dowels that facilitate attachment of transverse deck boards to parallel stringers in a quick and efficient manner.

[0011] Another benefit of the present invention is to provide a pallet of the aforementioned type that may in one
embodiment employ an adhesive in conjunction with the dowels, the dowels being configured to eliminate the need for external clamps to hold the parts together while the adhesive sets or cures. Thus, there is no time wasted after initial alignment and connection because the dowels provide sufficient connectiviy to allow for immediate handling and use of the formed pallets.

Another benefit of the present invention is to provide a pallet that works properly. The dowels provide for a connection that is sufficiently strong to resist standard shear and other forces.

Another benefit of the present invention is to provide a pallet that can be more easily disassembled. In the preferred embodiment the dowels are made of wood; therefore, the pallet can be more readily stripped or broken down using standard wood-cutting saws. This allows for an increased number of customers for used or worn pallets, because those customers have no need for specialty equipment to grind up nails.

Another benefit of the present invention is to provide a pallet which can be a carrier of RFID technology. Because the preferred embodiment does not have metal, the pallet will not prevent RFID readers from working properly. The pallet claimed herein can have a RFID device placed on it, and it will be able to be read by RFID readers without fear of a nail or other metal fastener preventing the RFID reader from working properly.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The drawings may not be to scale. The invention may best be understood by reference to the following description taken in conjunction with the accompanying drawings, in the several figures of which like reference numerals identify like elements, and in which:

FIG. 1 is a perspective view of one embodiment of a deck board and stringer that may be used in the pallet of the subject invention;

FIG. 2 is an elevation side view of one embodiment of a dowel used in the pallet of FIG. 1;

FIG. 3 is an end view of the embodiment of the dowel depicted in FIG. 2;

FIG. 4 is a side view of one embodiment of a dowel utilized in the subject invention to connect a stringer to a deck board.

FIG. 5 is a side view of another embodiment of a dowel utilized in the subject invention to connect a stringer to a deck board.

FIG. 6 is a perspective view of one embodiment of the subject invention showing a pallet comprising stringers, deck boards and dowels.

FIG. 7 sets forth the steps in one embodiment of a method for assembling a pallet according to the subject invention.

FIG. 8 is a side view of another embodiment of the subject invention showing a pallet with a notched stringer.

DETAILED DESCRIPTION

While the present invention is susceptible of embodiments of various forms, there is shown in the drawings, and will hereinafter be described some exemplary and non-limiting embodiments, with the understanding that the present disclosure is to be considered an exemplification of the invention. It is not intended to limit the invention to the specific embodiments listed.

In general terms, one embodiment of the pallet comprises the combination of wooden dowels and adhesive to connect stringers and deck boards to form a pallet.

Referring to FIG. 1, a deck board 10 and a stringer 30 can be seen. The deck board 10 has a first end 11 and a second end 12. The deck board 10 comprises a first pair of opposing elongated longitudinal surfaces 9, 14 with a first width 15, a second pair of opposing elongated longitudinal surfaces 16, 17 with a second width 18 and a pair of end surfaces 19, 20. The first width 15 is greater than the second width 18. Both the first end 11 and the second end 12 have at least one opening 13. Preferably, the openings are in the same elongated surface 16, 17, 19, 20. More preferably, the openings 13 are in one of the first pair of elongated surfaces 16, 17. In one embodiment, both the first end 11 and the second end 12 have a plurality of openings 13. The openings 13 have an inner surface 84. Preferably, the deck board 10 is constructed of wood or like material. Along with first and second ends 11, 12 the deck board 10 can also have a middle section 21, wherein the middle section 21 has at least one opening 13 preferably in the same elongated surface 16, 17, 19, 20 as the openings 13 in the first and second ends 11, 12.

The stringer 30 comprises a first pair of opposing longitudinal mounting surfaces 31, 32 which have a first width 33. The stringer 30 further comprises a second pair of opposing longitudinal mounting surfaces 34, 35 which have a second width 36. The second width 36 is greater than the first width 33. The stringer 30 further comprises a pair of opposing end surfaces 37, 38. At least one of the longitudinal mounting surfaces 31, 32, 34, 35 has a plurality of bores 39 defined therein. The terms bore and opening are herein used synonymously. The different terms are used to more easily reference stringer (having bores) or deck board (having openings). The bores 39 have an inner surface 88. In one embodiment, the plurality of bores 39 are spaced substantially equally along a longitudinal mounting surface 31, 32, 34, 35. In another embodiment, opposing longitudinal surfaces, either 31, 32 or 34, 35, both have a plurality of bores 39. Preferably, the stringer 30 is made of wood or like material.

Referring to FIG. 2, one embodiment of a wooden dowel 50 can be seen. The dowel 50 comprises a first portion 52 and a second portion 54. The dowel may have a plurality of dowel sections, a first section 56, middle sections 58, 60, and last section 62. While in a preferred embodiment, the dowel 50 may have two middle sections 58, 60 other embodiments may have no middle section, one middle section, or three or more middle sections. The first and last sections 56, 62 may have side walls 64, 66 and end walls 68, 70, respectively. Each of the middle sections 58, 60 may have side walls 72, 74 and step walls 76, 78, respectively. In a preferred embodiment, each of the sections 56, 58, 60, 62 are contiguous to another section 56, 58, 60, 62. The sidewalls 64, 66, 72, 74 define a cross-sectional size for their respective
sections 56, 58, 60, 62. In a preferred embodiment, the cross-sectional size of the sidewalls 64, 66, 72, 74 decreases as one progresses from the first section 56 to the last section 62 in a number of steps. In another embodiment, the cross-sectional size of the sidewalls 64, 66, 72, 74 may be any suitable size. The length of each individual dowel section 56, 58, 60, 62 may vary considerably. In one embodiment, the dowel section 656, 58, 60, 62 with the smallest cross-sectional size is as long or longer than the length of any of the other dowel sections. The dowel 50 may have some sections, e.g., 58, 60 or all sections 56, 58, 60, 62 that have grooves 80. The dowel 50 may have other configurations, such as, the dowel shown and described in U.S. Pat. No. 6,267,527, which is hereby incorporated by reference.

[0029] As shown in FIG. 3, an embodiment is depicted having dowel sections 56, 58, 60, 62 having a circular configuration. Other embodiments of the dowel 50 may be constructed so that each dowel section has a substantially square, triangular, or other cross-section. Further embodiments may mix and match square sections with triangular sections, or try other combinations. It is preferred that the dowel 50 be constructed from a single integral piece of wood. The dowel 50 may be constructed of different pieces of wood that are functionally attached to form the dowel 50. The dowel 50 is preferably made substantially of birch, but may also be made of red oak, cherry, ash, beech, or other suitable preferably hardwoods.

[0030] As shown in FIG. 4, the dowel 50 connects the stringer 30 and the deck board 10. The opening 13 of the deck board 10 is configured to receive either the first or second portion 52, 54 of the dowel 50. The opening 13 is preferably sized so that it is slightly smaller than the dowel portion 52, 54 that it is configured to receive. The dowel 50 may fit snugly into the opening 13. Preferably, the dowel 50 and the opening 13 form a friction fit. In a preferred embodiment, the dowel 50 can be partially inserted into the opening 13 by hand. Because of the stepped nature of the dowel 50, the dowel 50 can be partially inserted into the opening 13 with minimal force. The partially inserted dowel 50 in the opening 13 of the deck board 10 is aligned with a selected bore 39 of the stringer 30. The selected bore 39 can configured to receive the portion of the dowel 50, either first or second 52, 54, that the opening 13 of the deck board 10 has not received. Again, because of the stepped nature of the dowel 50, the dowel can be partially inserted into the bore 39 with minimal effort. Through the ability to be partially inserted with minimal force, the dowel 50 provides proper alignment of the opening 13 with the bore 39. The dowel 50 can be substantially or fully inserted into the opening 13 and bore 39 through the use of a suitable pounding device (not shown), such as a hammer or mallet, or through manual strength. The dowel 50 may fit snugly into the selected opening 13 and bore 39. Preferably, the dowel 50 and the opening 13 and bore 39 form a friction fit. Preferably, adhesive (not shown) is disposed between the abutting parts of the dowel 50, stringer 30 and deck board 10.

[0031] As can be seen in FIG. 4, once the dowel 50 is inserted into the opening 13 and the bore 39, the deck board 10 and stringer 30 are connected. Preferably, the deck board 10 and stringer 30 will be aligned transverse each other. The deck board 10 may form a right angle with the stringer 30.

[0032] Referring now to FIG. 5, a second embodiment of the connection between a selected stringer 30 and a selected deck board 10 can be seen. In this embodiment, the opening 13 is such that it defines a hole 82 through the deck board 10. In other embodiments, the bore 39 defines a hole 82 through the stringer 30, or both the bore 39 and the opening 13 define holes 82 in the stringer 30 and deck board 10, respectively. An advantage of this embodiment is that it allows the dowel 50 to be more easily inserted into both the deck board 10 and stringer 30 almost simultaneously. This embodiment also allows for one-step desired alignment of the opening 13 with the bore 39. In this embodiment, the opening 13 and bore 39 can be created at the same time using a properly shaped drill (not shown) or other suitable device. The drill bit (not shown) used with a drill may have many configurations, such as the drill bit shown and described in U.S. Pat. No. 6,267,527, which is hereby incorporated by reference. The deck board 10 can be placed in a predetermined alignment with the stringer 30. An operator can then drill a hole 82 through the deck board 10, creating the opening 13, and then continue to drill into the stringer 30 to create the corresponding bore 39.

[0033] Referring now to FIG. 6, an embodiment of the pallet is depicted as having three stringers 30 orientated in substantially the same plane in a parallel relationship. Many other pallet configurations may be used including, e.g., the stringer design, the block design, skids, stevedore type double wing, plywood panel deck stringer, nine block four-way entry pallet, single wing pallet with optional chamber on board bottoms, or the reversible stringer pallet. This list is given as an example of some types of pallets, and is not intended to be exhaustive. One of skill in the art would recognize that a wide variety of pallet formations can be contemplated and would fall within the scope of the invention.

[0034] As shown in FIG. 6, one embodiment may have first, second, and third stringers 30 arranged parallel to each other. The second stringer 30 is spaced a substantially equal space from the first and third stringers 30, respectively. The distance between the first and third stringer 30 is substantially equal to the length of a pre-selected deck board 10. Each of the first pair of opposing longitudinal mounting surfaces 31, 32 has a plurality of bores 39 (some not shown) defined therein. The embodiment may have a plurality of deck boards 10 arranged parallel to each other and transverse to the stringers 30. Preferably, one of the first pair of opposing elongated longitudinal surfaces 9, 14 of each deck board 10 has a plurality of openings 13 (some not shown) defined therein. The deck boards 10 are arranged such that the openings 13 defined in the first end 11, second end 12 and middle section 21 are aligned with the bores 39 defined in the stringers 30. A plurality of dowels 50 are fit into the openings 13 and aligned bores 39 to connect the stringers 30 to the deck boards 10. One set of deck boards 10 are connected opposing longitudinal mounting surface 31 while a second set of deck boards 10 are connected to opposing longitudinal mounting surface 32.

[0035] FIG. 7 sets forth the steps of a preferred method for forming a pallet. It should be noted that FIG. 7 gives numbers to Parts of the method for ease of reference only. The invention can be performed in an order different than that provided. The reference numerals, e.g. dowel 50, provided below refer to FIGS. 1-6.
Part 1 of FIG. 7 recites the step of providing a plurality of wooden dowels 50. Each of the dowels 50 comprises first and second portions 52, 54 and has at least two contiguous dowel sections 56, 62 having sidewalls 64, 66 of different cross-sectional size. The dowels 50 may be of the type shown in FIGS. 2-6 and described above.

Part 2 recites providing of at least two elongated stringers 30. Each stringer 30 has a longitudinal mounting surface 31 having a plurality of bores 39 formed therein in spaced relation along the mounting surface 31. The bores 39 are configured to receive a selected portion 52, 54 of one of the dowels 50.

Part 3 describes the step of the providing of a plurality of deck boards 10. Each of the deck boards 10 has first and second ends 11, 12 with each end having an opening 13 adapted for aligned relation with a selected bore 39 in one of the stringers 30. The openings 13 are configured to receive a remaining portion 52 or 54 of the dowel 50. The bores 39 and openings 13 can be configured with the use of a drill (not shown) with attendant drill bit (not shown). The drill bit may have many configurations, such as, e.g., the drill bit shown and described in U.S. Pat. No. 6,267,527, which is hereby incorporated by reference. Preferably, the stringers 30 and deck boards 10 provided are comprised of a dry wood. The method can further comprise providing an RFID device (shown as 110 in FIGS. 6 and 8) to be attached to the pallet.

Part 4 recites the application of adhesive material (not shown) to the stringers 30 and deck boards 10 such that some of the adhesive material is disposed in the bores 39 and openings 13. The adhesive material may be applied to the surfaces 31, 32, 34, 35, 13, 14, 16, 17, of the stringers 30, deck boards 10 or side walls 64, 66, 72, 74 of the dowels 50 to strengthen or augment the connection. The adhesive material is preferably PVA, but can be any material that would adequately connect the parts of the pallet together, such as, e.g., elastomers, hot melts, urethane, epoxy, PRF, or urethane/isocyanate. Preferably, during the construction of a pallet, the adhesive is applied to the stringers 30 and deck boards 10 such that some of the adhesive is disposed in the bores 39 and openings 13 prior to the insertion of the dowels 50. The adhesive material may also be applied to the side walls 64, 66, 72, 74 of the dowel 50. In a preferred embodiment, the adhesive applied to the dowel 50 is thinned to allow for more ready insertion and connection. As the dowel is inserted into the bore or opening 13, the adhesive material may be at partially scraped from the side walls 64, 66, 72, 74 to accumulate on the end wall 70 and step walls 76, 78.

Part 5 recites the positioning of the stringers 30 in parallel relation with the mounting surfaces 31, 32 of different stringers 30 in substantially coplanar relation, and positioning the deck boards 10 in parallel relation transverse to the mounting surfaces 31, 32.

Part 6 recites the insertion of the dowels 50 into the openings 13 of the deck boards 10 and into the aligned bores 39 of the stringers 30 in a snug relationship thereby connect the deck boards 10 to the stringers 30. The stepped configuration of the dowel 50 provides easier alignment of the dowel 50 with the opening 13 and bore 39 during the insertion process. Further, significant pressure need be only applied to the dowel 50 during, for example, approximately the last 20 percent of the insertion distance. A pounding device (not shown) may be used to insert the dowels. This device may be a hammer, mallet, or other suitable instrument. Preferably, the dowels 50 fit snugly into the openings 13 and bores 39. Most preferably, the dowels 50 form a friction fit with the inner surface 84, 88 of the opening 13 or bore 39. The snug or friction fit connects the deck boards 10 to the stringer 30. Using a dowel 50 with grooves 80 yields a connection that is stronger. One benefit of the dowel 50 is that it acts as an internal clamping mechanism that holds the pallet together while the adhesive sets or cures. This benefit provides needed flexibility to the manufacturing process, allowing more ready manufacture of pallets. For example, the use of the dowels 50 can eliminate the need for external clamps or other devices (not shown) to maintain connection of the deck boards 10 to the stringers 30 while the adhesive cures. The manufacturer can thus avoid the costs of these external clamps as well as the time, effort, and floor space needed to utilize them. A second benefit of the use of the dowel 50 is that it can allow for the use of a wide variety of adhesive materials. A pallet manufacturing operations using adhesives may have the capability of manufacturing a number of pallets per unit time. However, the need for space to allow for the adhesive in the pallets to set or cure is great. Typically, these operations will thus prefer adhesives with very short set or cure times, even though these adhesives are not optimal on a cost or performance basis. The use of the dowel 50 to connect the runners 10 to the stringers 30 allow for the practical use of adhesives with longer cure times because the pallet can be handled and used while the adhesive is setting or curing. It also allows for the use of adhesives that are approved for use in the transport of food.

Referring now to FIG. 8, a side view of a preferred embodiment of a pallet is shown. FIG. 8 shows a stringer 30, deck boards 10 and lead deck boards 90. The lead deck board 90 has a height 90a and a width 90b and opposing surfaces 99, 100. The stringer 30 comprises notches 92. The notches 92 can have a first surface 94 and a second surface 96. The notches have a depth 92a and a width 92b. Preferably, the width 90b of the lead deck board 90 is substantially similar to the width 92b of the notches 92 so that the lead deck board 90 can be disposed in the notch 92. Preferably, the height 90a of the lead deck board 90 can be substantially similar to the sum of the width 18 of the deck board 10 and the depth 92a of the notch so that, when disposed in the notch 92, surface 100 can be substantially planar to surface 14 of the deck boards 10. In this embodiment, the lead deck board 90 is able to withstand a greater shearing force because the connection between the lead deck board 90 and stringer 30 receives lateral support from the second surface 96 of the stringer 30. The lead deck board 90 can be connected to the stringer 30 with wooden dowels 50 and adhesive.

In another embodiment, the notches 92 can have an angled second surface 96 (angle not shown). Preferably, a corresponding surface 98 of the lead deck board 90 is angled complimentary to the angled second surface 96 to form, e.g., a dovetail configuration (not shown). Preferably, the deck boards and lead deck boards are connected to the stringer 30 using a wooden dowel 50 and adhesive, as described hereinabove.

In a preferred embodiment, the pallet described herein consists essentially of wood and adhesive. In the most
preferred embodiment, the pallet consists of wood and adhesive. The use of a wooden dowel 50 and wooden stringers 30 and deck boards 10, along with adhesive, can, through construction, create a pallet that exceeds industry requirements for static strength, stiffness, and resistance to rough handling.

Further, the pallet described herein can be substantially lighter than standard pallets that employ nails or other metal fasteners. First, the use of wooden dowels inserted into bores or openings instead of nails creates less weight. The weight of the dowel 50 being inserted is offset by the amount of wood drilled out of the deck boards 10 and stringers 30. With the use of nails, there is no offset. With the use of a large number of nails in typical pallets (sometimes over one hundred for a used pallet), this weight difference can become substantial. Second, the pallet described herein can be made with kiln dried wood, which is lighter than wet or green wood. Typical pallets are made of wet or green wood because hammering in nails in dry wood can cause damage to the wood, such as checking, and result in a damaged or weakened pallet. Through the use of the dowel 50, the pallet described herein can be constructed of wood that is kiln dried. Preferably, the wood is less than 15% moisture and more preferably between 9 and 12% moisture. The pallet described herein can be substantially lighter than typical patents, making them less likely to cause injury to workers during transport, and also yielding substantial savings in fuel economy during transport.

It is believed that the pallet described herein can be constructed so that it meets industry requirements for a rated load of 2800-pounds that is less than sixty pounds. Preferably, such a pallet will be between fifty three and fifty eight pounds. More preferably, such a pallet will be less than fifty three pounds. In contrast, the typical wooden pallet can weigh from seventy to eighty pounds.

The construction of a pallet of essentially all kiln dried wood and adhesive creates further advantages. A significant advantage is that the pallet is less likely to interfere with RFID. As seen in FIGS. 6 and 8, an RFID device 110 can be attached to the pallet. Preferably, the RFID device 110 is attached to an inside surface 34 or 35 of the middle stringer 30 or one of the outside stringers 30. A warehouse (not shown) can have an RFID reader (not shown) near a dock door. When the pallet described herein, with the attached RFID device 110, enters the warehouse, the RFID reader will can read the RFID device 110. RFID readers can have difficulty reading RFID devices which are near liquid, which absorbs RF signals. The pallet described herein can be constructed of dried wood, lessening the amount of RF signal absorption and potentially allowing for higher read rate accuracy. Further, the pallet described herein is preferably constructed without metal. Metal can prevent RF readers from working properly. The pallet described therein is therefore likely to yield higher read rate accuracy.

The preferred lack of metal also allows for the pallet to be subjected to microwave sterilization. This potentially results in a pallet that does not, for example, transport alien organisms or animals from one region to another.

The present invention is not limited to their particular details of the method depicted, and other modifications and applications are contemplated. Certain other changes may be made in the above-described method without departing from the true spirit and scope of the invention herein involved. For example, the present method may be utilized with other styles of pallets, which have different formations of stringers, panel boards, or like members. It is intended, therefore, that the subject matter in the above description shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A method for assembling a pallet comprising:

   providing a plurality of dowels, each dowel comprising first and second portions, each dowel having at least two contiguous dowel sections having sidewalls of different cross-sectional size;

   providing at least two elongated stringers, each stringer having a longitudinal mounting surface having a plurality of bores formed therein in spaced relation along the mounting surface, the bores each being configured to receive a selected portion of one of the dowels;

   providing a plurality of deck boards, each deck board having first and second ends with each end having an opening adapted for aligned relation with a selected bore in one of the stringers, the openings configured to receive a remaining portion of the dowel;

   applying adhesive material to at least part of the longitudinal mounting surface of the stringers, to at least part of the first and second ends of the deck boards, and to the openings, bores, or dowels such that adhesive material is ultimately disposed in the bores and openings;

   positioning the stringers and deck boards in a predetermined orientation;

   inserting the dowels into the openings of the deck boards and into the aligned bores of the stringers in a snug relationship to thereby connect the deck boards to the stringers and assemble the pallet and allowing the adhesive to cure.

2. The method of claim 1, wherein the dowel is wooden.

3. The method of claim 1 wherein the adhesive material is applied so that it is disposed on substantially all of the longitudinal mounting surfaces of the stringers, first and second ends of the deck boards, and to the openings, bores, and dowels.

4. The method of claim 1, further comprising attaching an RFID device to the pallet.

5. The method of claim 1, further comprising creating the openings and the bores with a drill.

6. The method of claim 1 wherein the stringers and end boards are comprised of dry wood.

7. The method of claim 1 wherein the pallet meets industry standards for a rated load of 2800-pounds and weighs less than 60 pounds.

8. The method of claim 1 wherein the dowels are wooden with at least partially grooved sidewalls.

9. The method of claim 9 wherein the dowels have cylindrical dowel sections.

10. The method of claim 9 wherein the dowels have cylindrical dowel sections.

11. The method of claim 1 wherein the dowels are wooden with at least partially ribbed sidewalls.
12. The method of claim 1 wherein the dowels form a friction fit with the openings and bores.
13. The method of claim 1 wherein the adhesive is capable of curing without the use of external clamps.
14. A substantially wooden pallet comprising:
   a plurality of stringers, each including a longitudinal mounting surface having a plurality of bores formed therein;
   a plurality of deck boards having first and second ends, each end having at least one opening; and
   a plurality of dowels, each dowel having first and second portions, wherein the first portions and an adhesive are inserted in the plurality of stringer openings and the second portions and the adhesive are inserted into the deck board openings such that the deck boards are connected to the stringers in a predetermined orientation to form a pallet, wherein each of the dowels comprises at least two contiguous dowel sections having sidewalls of different cross-sectional size
15. A pallet as defined in claim 14 wherein the adhesive is disposed in the bores and openings and on the stringers and deck boards to more securely connect the panel boards to the stringers.
16. A pallet as defined in claim 14 wherein the dowels are wooden and the sidewalls are at least partially grooved.
17. A pallet as defined in claim 14 wherein the dowels include at least three contiguous dowel sections of successively decreasing cross-sectional size.
18. A pallet as defined in claim 17 wherein the dowel is wooden and the at least three contiguous dowel sections are cylindrical.
19. A pallet as defined in claim 14 wherein the dowel sidewalls are at least partially ribbed.
20. A pallet as defined in claim 14, further comprising an RFID device attached to the pallet.
21. A pallet as defined in claim 14, wherein the stringers and deck boards are comprised of dry wood.
22. A pallet as defined in claim 14, wherein the pallet meets the industry standards for a rated load of 2800-pounds and weighs less than 60 pounds.
23. A substantially wooden pallet comprising:
   a plurality of stringers, each stringer including a longitudinal mounting surface having a plurality of bores formed therein, wherein the stringers are comprised of dry wood;
   a plurality of deck boards having first and second ends, each end having at least one opening, wherein the deck boards are comprised of dry wood;
   a plurality of dowels, each dowel having first and second portions, wherein the first portions and an adhesive are inserted in the plurality of stringer openings and the second portions and the adhesive are inserted into the deck board openings such that the deck boards are connected to the stringers in a predetermined orientation to form a pallet, wherein each of the wooden dowels comprises at least two contiguous dowel sections having sidewalls of different cross-sectional size; and
   an RFID device attached to an inner surface of a stringer or deck board, wherein the pallet comprises no metal.
24. The pallet of claim 23, wherein the fasteners are wooden dowels comprising at least two contiguous dowel sections having sidewalls of different cross-section sizes.
25. The pallet of claim 24, wherein the stringers have a plurality of bores formed therein configured to receive a first portion of the dowel and the deck boards and lead deck boards have a plurality of openings formed therein configured to receive a second portion of the dowel.
26. The pallet of claim 23 wherein an adhesive is disposed in the bores and openings and between the stringers and deck boards and lead deck boards.
27. The pallet of claim 23 wherein the dowels allow the adhesive to cure without the use of external clamps.
28. The pallet of claim 23, wherein the pallet consists essentially of wood and adhesive.
29. The pallet of claim 28, wherein the stringers and deck boards are dry wood.
30. The pallet of claim 24 further comprising an RFID device attached to the pallet.
31. A substantially wooden pallet comprising:
   a plurality of stringers, each stringer including a longitudinal mounting surface having a plurality of bores formed therein, wherein the stringers are comprised of dry wood;
   a plurality of deck boards having a deck board width and first and second board ends;
   a plurality of lead deck boards having a lead board height and first and second lead board ends
   a plurality of fasteners, wherein the fasteners fasten the first board ends to the inside section of a first stringer and the second board ends to the inside section of a second stringer and the fasteners fasten the first lead board ends to the notched ends of a first stringer and the second lead boar ends to the notched ends of a second stringer, wherein the deck boards and lead deck boards are substantially parallel to each other and are transverse to the stringers,
wherein the lead board height is substantially equal to the sum of the notch depth and deck board width.
32. The pallet of claim 31, wherein the dowels are comprised of wood.
33. The pallet of claim 32, wherein the adhesive substantially covers the ends of the deck boards

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