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(54) **PALLET WITH COMPOSITE COMPONENTS**

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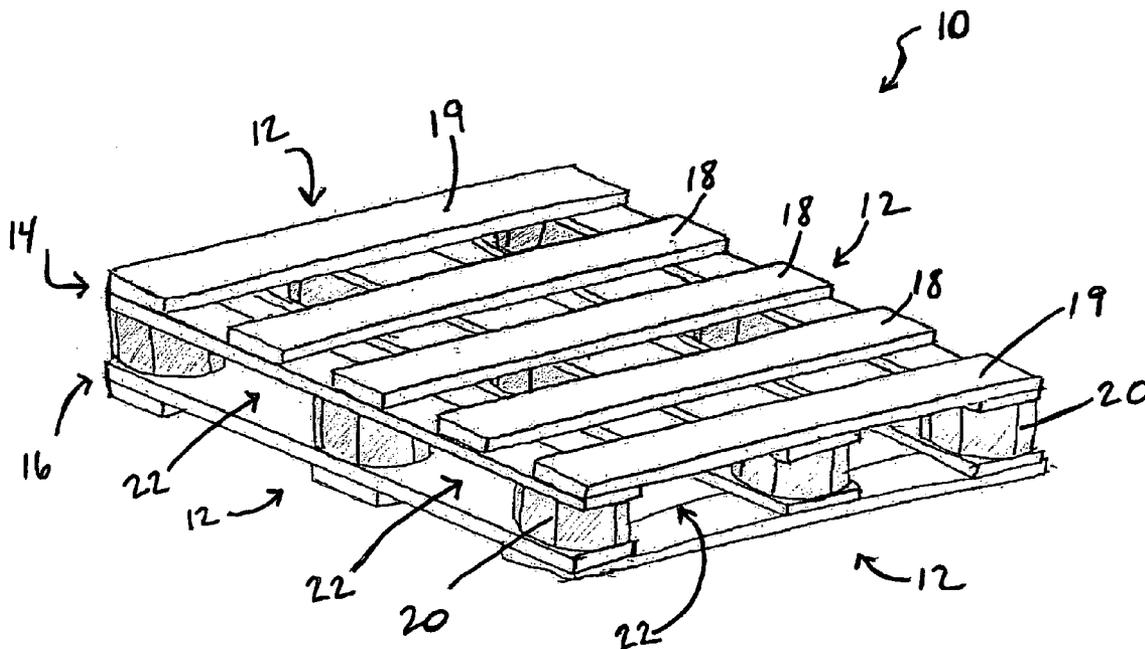
(57) **ABSTRACT**

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A pallet having a first deck, a second deck, and a plurality of composite block members securing the first and second decks together to form a pallet. The composite block members and lead boards of the first and/or second deck comprise a composite material including about 50%-55% by weight of juniper or conifer particles and about 45%-50% by weight of a plastic component including a major portion of polyethylene.

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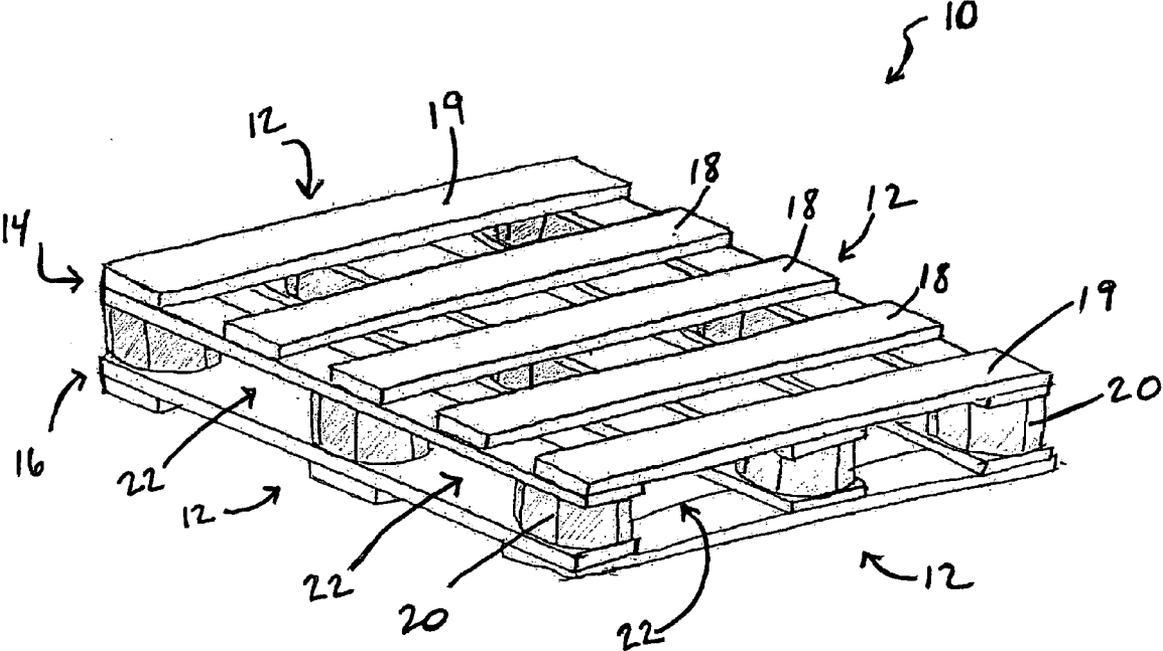


FIGURE 1

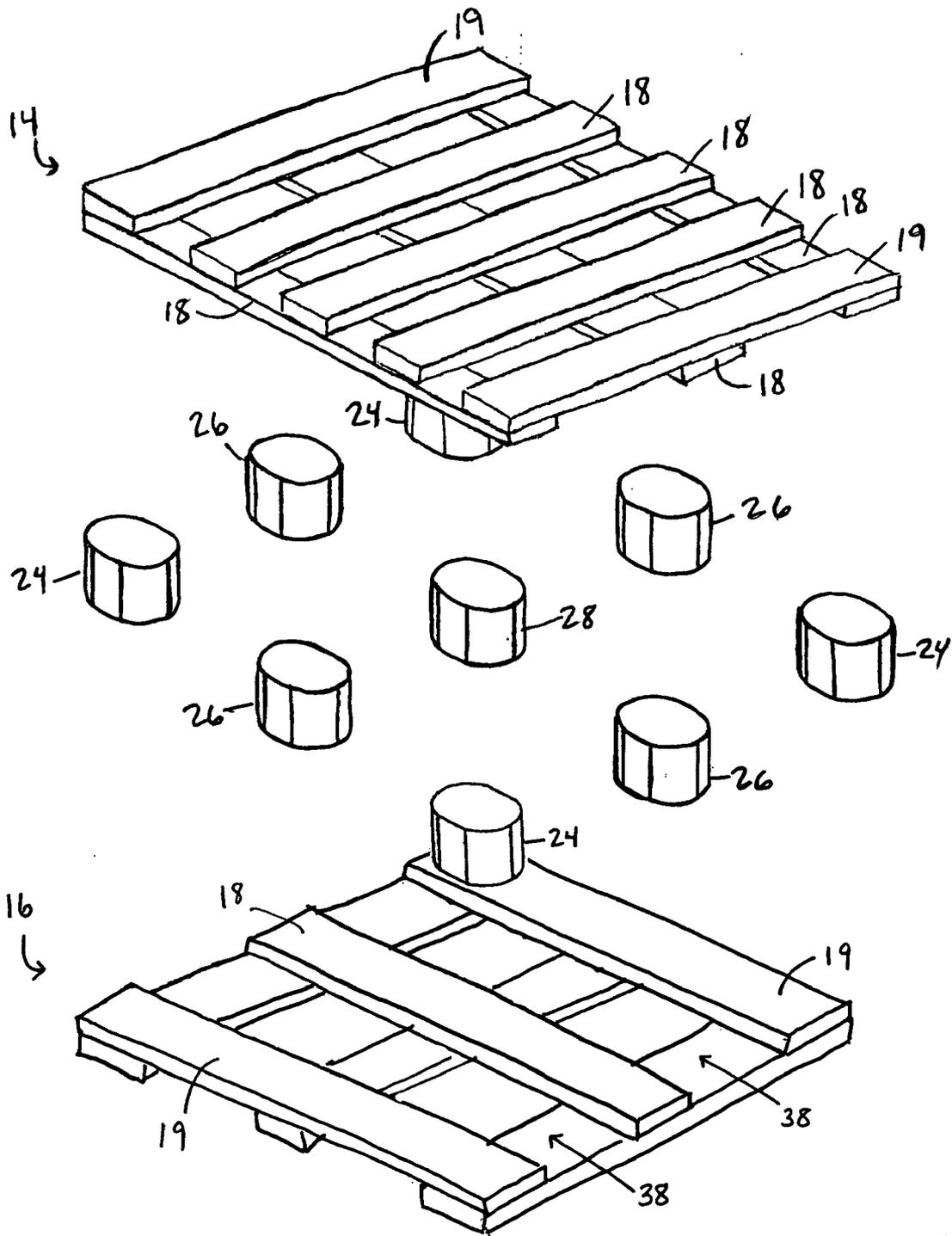


FIGURE 2

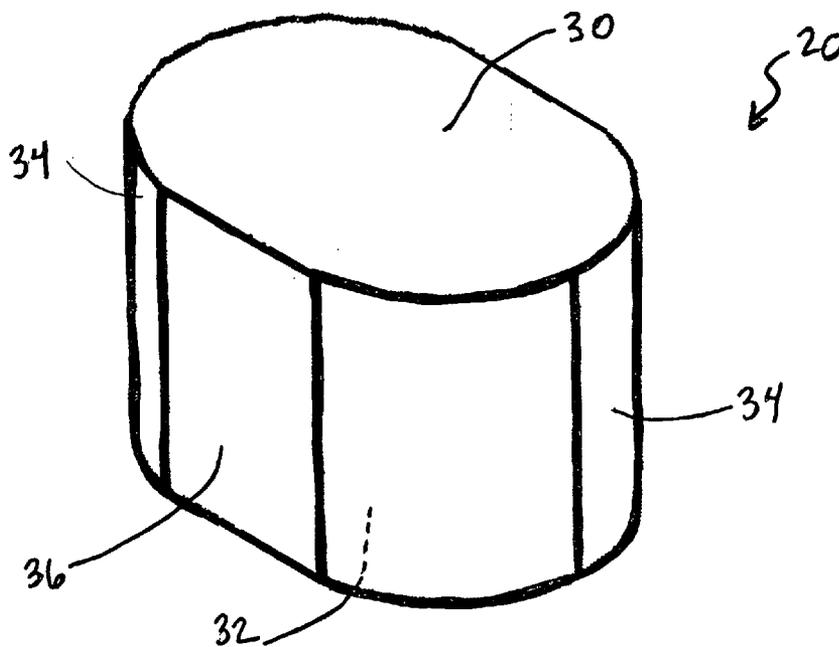


FIGURE 3

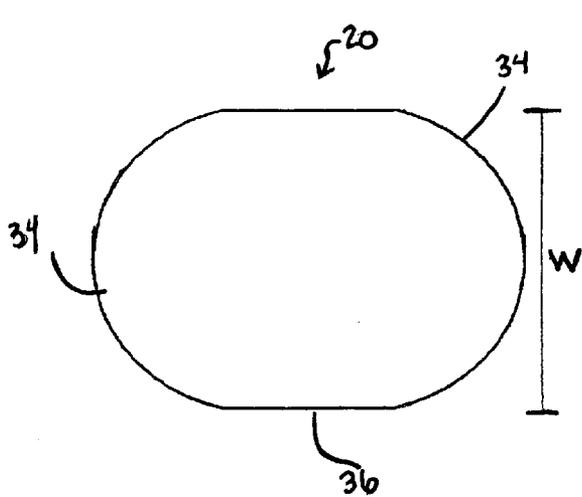


FIGURE 4

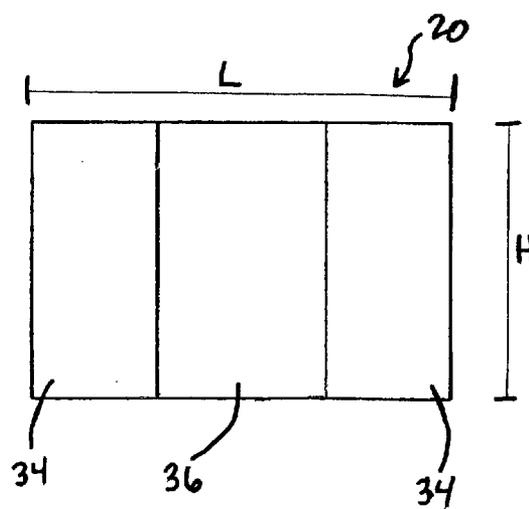


FIGURE 5

PALLET WITH COMPOSITE COMPONENTS

FIELD OF THE INVENTION

[0001] The present invention relates to a pallet, and more particularly, a pallet having composite components.

BACKGROUND OF THE INVENTION

[0002] The common wooden and plastic industrial pallets are generally known in the art. Such pallets, however, have several shortcomings in regards to cost, quality, limitations of their use, and ease of manufacture. Wooden pallets are typically constructed by sandwiching wooden block members between two similar decks or surfaces. Since the aesthetic appearance of pallets may not outweigh the cost, they may often include scrap or recycled wood. The surfaces may be made of a continuous sheet or, more commonly, have a plurality of wooden boards typically arranged in a parallel manner. Generally, the surfaces and blocks are stacked or arranged to provide apertures suitable for access by the tines of a forklift truck or pallet jack from at least one side. In certain instances, the tines of a fork-lift truck make contact with the block members during alignment. If the force is significant, the block members can be damaged.

[0003] By its nature, ordinary wood may be subject to swelling, warping, shrinkage, splintering, deterioration and fungal or bacterial growth after exposure to moisture and other elements. Pallets assembled with inferior quality wood blocks and/or boards may lead to potential cargo damage.

[0004] Attempts to overcome the drawbacks of ordinary wooden pallets with plastic pallets have been faced with similar shortcomings. Prior designs of plastic pallets have had to deal with issues such as the trade off between cost and weight bearing capability. Typically, plastic pallets designed with a significant weight bearing capability have tended to be both heavy and expensive. In the same manner, inexpensive plastic pallets have had both strength and durability issues.

[0005] It is therefore desirable to provide a long-life pallet with outstanding physical attributes that is relatively inexpensive and can be manufactured with relative ease. Specifically, it is desirable to provide a low cost pallet that meets and exceeds stringent strength standards, including the needs and requirements of the Grocery Manufacturers Association (GMA).

SUMMARY OF THE INVENTION

[0006] The present invention provides a pallet having an upper deck and a lower deck. Composite block members connect the upper and lower decks together to form a pallet. Preferably, the block members are formed of a composite material including at least about 20% by weight of a natural material and at least about 20% by weight of a plastic material. In various embodiments, the composite material includes from about 50% to about 55% by weight of natural material particles having an average particle size of less than about 0.25 inches, and from about 45% to about 50% by weight of plastic material particles comprising a major portion of polyethylene. The natural material particles of the present invention include ground particles of whole trees selected from the group consisting of junipers and conifers. The whole trees include root particles, trunk particles, branch particles, needle particles, wood particles, and mixtures thereof.

[0007] The present invention also relates to a pallet including an upper deck having a plurality of cross members, and a lower deck having a plurality of cross members. The decks are joined with block members forming a pallet. The upper and lower decks have a substantially rectangular frame and include a plurality of longitudinally and laterally extending cross members. At least one of the plurality of cross members is a composite material comprising at least about 20% by weight of natural material particles ground from whole trees and at least about 20% by weight of plastic material particles. Preferably, the pallet has at least one composite material lead board.

[0008] Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0010] FIG. 1 is a perspective view of a pallet in accordance with the teachings of the present invention;

[0011] FIG. 2 is an exploded perspective view of a pallet according to the present invention and showing the individual components thereof;

[0012] FIG. 3 is a perspective view of a composite block member;

[0013] FIG. 4 is a top view of the composite block member of FIG. 3; and

[0014] FIG. 5 is a side view of the composite block member of FIG. 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] The following description of the preferred embodiment(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses. For purposes of clarity, the same reference numbers will be used in the drawings to identify similar elements.

[0016] In various embodiments, the present invention provides a pallet including a first deck, a second deck and a plurality of block members connecting the first and second decks together. The block members, and optionally certain boards or cross members of the decks, comprise a high strength composite material. The composite material has excellent resistance to chemicals, including strong solvents, and is not moisture or odor absorbent. Such composite blocks and boards are robust and rugged in construction, configured to withstand the weight of goods stacked on them and to withstand the impact of truck forks driven into them as a result of misalignment. A pallet comprising such composite material also has the capability of being fitted with RFID technology.

[0017] The composite material of the present invention includes a natural material, such as wood, and a plastic

material. As used herein, "natural material" includes wood, for example, material from a tree, including but not limited to leaf material, branch material, trunk material, bark material, needle material, and root material. As used herein, the term "wood" includes, but is not limited to, juniper and conifer trees and other hard and soft wood trees, such as Apache Plume; Ash, single-leaf; Bitterbrush; Cliffrose; Fendlerbush; Juniper, one-seed; Juniper, rocky mountain; Mahogany, curl-leaf; Mahogany, mountain; Mock Orange; Ponderosa Pine; Mormon Tea; and various other cone-bearing gymnospermous trees, spruces, firs, pines, shrubs, and evergreens. Further, as used herein, "plastic material" includes, but is not limited to, various plastic materials, such as thermoplastic polymers resistant to many chemical solvents, bases and acids, for example, polypropylene, polyethylene, polyurethane, polyvinylchloride, and poly(ethylene terephthalate). The plastic material may also include various types and grades of nylon. The plastic may be selected depending on the specific pallet design, load capacity, and other requirements. The plastic can include virgin plastic, recycled plastic, and mixtures thereof.

[0018] In various embodiments, the composite material of the present invention comprises at least 20% by weight natural material particles and at least 20% by weight plastic material particles. In one embodiment, the composite material comprises about 70% by weight natural particles and about 30% by weight plastic materials. According to other preferred embodiments, the composite material comprises greater than about 40% by weight natural material particles, and preferably greater than about 50%, such as between about 50% to about 55% by weight. Preferably, the composite material comprises greater than about 35% by weight plastic materials, and preferably greater than about 45% by weight of plastic material particles, such as between about 45% to about 50% by weight. It should be understood that the weight percentages can be increased or decreased for a desired composite material, depending on the specific design and selection of materials, and these variations are within the scope of the present invention.

[0019] Optional additives for the composite material include colorants, UV protectors, flame and fire retardants, lubricants, soaps, various inert fillers, reinforcements (including, for example, natural, synthetic, and glass fibers), polymerization initiators, coupling agents, and other additives known in the art. Additionally, the composite material is recyclable to itself as filler. In particular, the use of coupling agents in the composite matrix may improve thickness swell and increase the resistance to UV exposure and surface popping. Coupling agents increase the bond between the natural and plastic materials which typically increases the stiffness and strength by up to about 30%. Alternatively, if it is not desirable to use a coupling agent, the average particle size can be slightly decreased to maintain an equivalent strength.

[0020] The wood particles used in the present invention are preferably elongated shapes having a width or average particle size that is about $\frac{1}{4}$ (0.25) inch or less. In various embodiments, the width is $\frac{1}{16}$ (0.0625) inch or less, and even more preferably, $\frac{1}{32}$ (0.03125) inch or less. It should be understood that the average particle size can be increased or decreased, depending on the specific design and selection of materials, and these variations are within the scope of the present invention. It should further be noted that the average

particle size is not based on the total number of particles but rather is based on the weight percentage of the material retained in measuring sieve trays in relation to the total sieved material weight. Natural material particles often have unequal dimensions, for example a length greater than a width. In such circumstances, a particle size refers to at least one dimension having the specified size. Particle size distribution can be determined using Gaussian distribution, or other methods known in the art.

[0021] In certain embodiments, and preferably where the composite material is used to manufacture sheet boards that are subsequently cut into lead boards, it may be desirable to use a larger wood particle size and include the use of reinforcing wood fibers. Such wood fibers can be used having an average length of about $\frac{3}{8}$ inch, $\frac{1}{2}$ inch, $\frac{3}{4}$ inch, or even greater as desired.

[0022] The wood particles can be processed in a hammer-mill using a desired screen size. This enables distribution of the wood material product in a substantially even manner for use in the composite material. In various embodiments, the particles have a random orientation in the final product, although with some embodiments using extrusion techniques it may be desired to have a process-specific orientation. Further, if reinforcing fibers are used, it may be desired to align the fibers for increased strength.

[0023] The manufacture of the composite material of the present invention into various geometries is preferably achieved using press methods and/or extrusion techniques known in the art. Typically, the wood or natural materials are first passed through a mill to obtain a desired particle size. The plastic materials are provided in a form suitable for mixing with the natural materials, for example, in the form of a fluid, pellet, flake, powder, or the like. As will be discussed in more detail, in one embodiment, the composite material is manufactured having a board or panel geometry suitable for use as cross members and/or lead board members for the upper and/or lower deck of the pallet. In another preferred embodiment, the composite material is manufactured having a block or post geometry for use as supporting blocks that join the upper and lower decks to one another.

[0024] Press methods rely on at least one press and include suitable pneumatic, mechanical and/or hydraulic presses that process wood/plastic mixtures into, for example, a block or a composite board. As known in the art, the press typically includes an upper platen and a lower platen. At least one platen is driven upward or downward by a drive mechanism. A composite material assembly is positioned between the upper and the lower platens. A typical composite material press assembly may include a lower caul plate, a frame, the composite mixture and an upper caul plate. According to one embodiment of the present invention, at least one of the platens is heated to a temperature sufficient to melt the plastic component of the composite material. Heating of the platen(s) occurs optionally before or after engagement of the drive mechanism. In one embodiment, both platens are heated prior to application of pressure to the composite mixture. Preferably, the drive mechanism drives the lower platen upwards until the upper platen contacts the upper caul plate and compresses the composite mixture.

[0025] The plastic component of the composite material mixture melts from the heat and disperses throughout the discontinuous wood phase. The composite material essen-

tially forms a slurry of liquid plastic and wood particles. Preferably, air (and any other gas that may be present) exits the composite mixture during this process or it is alternatively compressed and trapped within the slurry. The slurry is typically of a density greater than that of the composite mixture and occupies a lesser volume than the mixture. The slurry is then cooled and forms a relatively rigid composite product, such as a board. Rigidity and strength of the final product will depend upon the thickness, the type of plastic used, the ratio of natural and plastic materials, the amount and pressure of any entrained gas, and whether a reinforcing material, such as rods, bars, or a mesh, is incorporated into the slurry. It should be understood that caution is required when positioning the materials into the press to avoid segregation of the wood and plastic materials. Minimized segregation often forms a higher quality composite board.

[0026] Preparation of the natural material, such as wood, typically includes the main steps of: logging, grinding, screening, washing, and drying. Logged whole trees are ground to particles having a maximum dimension of about 12 inches. The wood particles are then placed in a grinder, such as a hog grinder, and ground having a maximum dimension from about 3 to about 5 inches. The ground wood is screened, washed, and dried to remove debris, such as dirt and sand. Preferably, the drying step reduces moisture content of the ground, screened and/or washed wood to a moisture content of less than about 15% by weight, preferably to a moisture content of less than about 10% by weight, and even more preferably to a moisture content of less than about 5% by weight. Next, the wood is ground to a maximum particle size less than about 0.5 inches, preferably to a particle size less than about 0.25 inches, more preferably to a particle size less than about 0.0625 inches, and even more preferably to a particle size less than about 0.03125 inches. Larger wood fibers can also be added for additional reinforcement.

[0027] Washing conditions and screening conditions should be selected to facilitate further processing and to enhance the quality of the final product. For example, additives known to affect wood are optionally added to the washing solution. Such non-limiting additives include acids, bases, enzymes (e.g., cellulosic enzymes), gas concentrations, and the like. Environmental conditions of the washing solution, such as temperature and pressure, are also adjustable to promote overall efficiency. It should be understood that the effect of additives and environmental conditions can be cumulative and/or synergistic, and operate through physical and/or chemical principles. Washing optionally includes washing with a gas, such as delivering gas at a pressure sufficient to remove debris.

[0028] In certain embodiments, flaking of washed and/or screened chips is performed in a processing facility. One purpose of flaking is to reduce the size of tree chips to a desired size. In one preferred embodiment, tree chips are flaked to a size of less than approximately 2 inches, and more preferably to less than approximately 0.5 inches. Flaked tree chips are herein referred to as flakes.

[0029] In one preferred embodiment, the wood preparation methods and press and/or extrusion methods can be combined into one production process. For example, a wood receiver can be used for receiving wood that is transported to a screen for screening out undesirable larger pieces of

wood. Once screened, the wood is transported to a reducer for reducing the size of the screened wood. The reduced wood is transported to a washer and/or screener that can optionally include a re-chipper for further reduction of the screened wood particle size. Next, the washed wood is flaked using an appropriate flaker and transported to a flake receiver that optionally includes a heater and/or dryer and/or a dust burner. Flakes are then transported to a grinder for grinding and/or sizing of the wood. The ground wood is then transported to a sifter for sifting fines from larger pieces of wood. Fines are transported to and stored in a fines receiver while the larger pieces are transported to and stored in a processed wood receiver. The fines receiver and processed wood receiver can optionally use filters. The processed wood and/or fines are then ready for further processing and/or combination with plastic.

[0030] Plastic materials typically enter the production process through a plastic receiver. The plastic in a plastic loader is optionally transported to a plastic storage receiver for storage and/or further processing. The plastic storage receiver optionally includes a filter. Once the plastic has been processed and/or stored, it is then transported to a measurement system, for example, a weigh station system and/or flow measurement system. The plastic and wood are transported to a blender for blending plastic and wood. Blended plastic and wood are transported to a production line that includes a press and/or an extruder. The production line produces a final product or optionally has additional equipment for performing additional steps for producing the final product. For example, the production line can optionally include an unloader and/or cooler; at least one trimmer and/or borer; at least one transfer and/or inspection unit; a sander; a paint unit, for example, for spray painting (if desired); an oven, for example, for curing paint and/or other coating material; a grade station; and/or a stacker, for stacking product.

[0031] One presently preferred extruded composite material includes a low density polyethylene (LDPE) film mixed with conifer or juniper material. The composite material includes approximately 45% to about 50% by weight LDPE film and approximately 50% to about 55% by weight conifer or juniper. Preferably, the conifer or juniper material particles have an average particle size less than about 0.0625 inches. In certain embodiments, wood fibers are included having an average length of from about $\frac{3}{8}$ to about $\frac{3}{4}$ inches. The LDPE film is preferably a nominal $\frac{1}{4}$ inch grind according to a sieve analysis conducted on the plastic material to determine the particle size distribution and approximate average particle size. A 50% by weight plastic level is preferred to make a superior exterior board substrate. In various embodiments, the composite material has a density of 50 pcf, and an average water absorption of less than about 15% by weight.

[0032] As shown in FIG. 1 and generally referenced by the number 10, the pallet of the present invention has four peripheral sides 12, or edges, defining the perimeter. Preferably each side 12 is disposed at a substantially right angle, thereby forming a rectangular shape. In one preferred embodiment, the pallet is constructed having the industry standard size and dimensions, which is currently 40 inches wide by 48 inches long (1.0 m by 1.2 m), although it may be made in any desired size or shape. The pallet 10 includes an upper deck 14 and a lower deck 16, each preferably being

formed of a plurality of longitudinally and laterally extending cross members **18** and lead boards **19**. As shown, the lead boards **19** may be the same size as the remaining cross members **18**, or slightly larger to provide suitable additional strength. Preferably, they have dimensions of about 5½ inches wide, 40 inches long and 11/16 inches thick. Once assembled, the upper and lower decks **14**, **16** are held together with a plurality of separating members, or blocks, generally referenced by the number **20**.

[0033] As previously mentioned, at least one of the block members **20**, and optionally certain cross members **18** of the decks, such as the lead boards **19**, comprise the high strength composite material of the invention. For example, in certain embodiments, the block members **20** comprise the composite material, and the cross members **18** are standard wooden pieces. In other embodiments, the block members **20** and lead boards **19** comprise the composite material. In still other embodiments, each member of the pallet **10** can comprise the composite material. It should be understood that numerous combinations and designs incorporating composite material blocks **20** and composite board cross members **18** and lead boards **19** are possible, and all of the variations are within the scope of the invention.

[0034] FIG. 2 depicts an exploded perspective view of the pallet **10** of FIG. 1, showing the individual components spaced apart from one another, and which comprise the upper deck **14**, the lower deck **16**, the cross members **18**, and the plurality of blocks **20**. Each block **20** holds the upper and lower decks **14**, **16** together, while bearing and distributing the cargo loads placed on the upper deck **14**. In preferred embodiments, the blocks **20** are mechanically fastened to the upper and lower decks, for example, with nails or screws. Preferably, there are nine blocks **20**, aligned in three rows of three, defining two apertures **22** on each side **12** of the pallet **10**. Ideally, each pallet has four corner blocks **24**, four mid-side blocks **26**, and one center block **28**. The size of the apertures **22** will depend upon the size and length of the blocks **20**.

[0035] Preferably, the blocks **20** are of a sufficient size so that the apertures **22** define a space suitable for access by the tines, or forks, of a forklift truck or pallet jack from any of the four sides **12** of the pallet **20**. The current industry standard is to have apertures **22** with a separation distance D of about 3.5 inches between the upper deck **14** and lower deck **16**. Thus in one embodiment as shown in FIGS. 3-5, the blocks have a height H of about 3.5 inches, a width W of about 3.65 inches, and a length L of about 4.75 inches.

[0036] For additional impact resistance, the blocks **20** are preferably provided with curved ends, thereby minimizing potential damage which may occur upon collision or brunt contact. As shown, the blocks **20** have an elongated elliptical shape, including a planar top surface **30**, a planar bottom surface **32**, and two substantially circular side sections **34** sandwiching a substantially flat section **36**. It should be understood that the specific size and shape of the composite block members can be modified as necessary and desired, and variations of the overall size and shape are within the scope of the present invention.

[0037] In various embodiments, the upper deck **14** defines a generally planar load bearing surface upon which objects and goods may be positioned for transport and storage. The lower deck **16** defines a substantially planar bottom surface

for the secure placement of the pallet on the ground or other resting surface. This also allows for the stable stacking of the pallet onto a similarly designed pallet. In certain embodiments, the upper and/or lower decks **14**, **16** can comprise a continuous sheet of material (not shown). In these embodiments, a number of indentations and projections such as ridges and channels (not shown) may be formed in the top of the upper deck to allow for the drainage of any liquids that may accumulate thereon. Alternate embodiments may include further channels configured to direct fluid to the sides of the pallet if necessary. It should be noted, however, that the number, orientation, size and shape of any ridges or channels can be varied in many alternate configurations for optimized strength. Of course, the upper or lower deck **14**, **16** may also have a continuous surface without apertures if so desired.

[0038] The load bearing surface may have a texture or an etched or imprinted geometrical pattern thereon (not shown) that acts as a non-skid surface to prevent objects from sliding during transport. Alternatively, any suitable type of friction tape, or friction coating may be applied or laminated to the load bearing surface in order to help prevent movement of objects on the pallet.

[0039] Preferably, the lower deck **16** includes longitudinally and laterally extending cross-members aligned and connected to form a substantially rectangular shaped outer frame. As shown, one arrangement of the cross-members includes two relatively large apertures **38** allowing air flow through the pallet and also for accommodating pallet jacks. While shown as substantially rectangular in shape, the apertures **38** may be sized and shaped for other desired applications. Additional cross-members may be used, depending upon the desired load capacity of the pallet **10**. In alternate embodiments, the size and number of apertures **38** will depend upon the placement and number of cross-members used.

[0040] The description of the invention is merely exemplary in nature and, thus, variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Such variations are not to be regarded as a departure from the spirit and scope of the invention.

What is claimed is:

1. A pallet comprising:

a first deck;

a second deck; and

a plurality of block members connecting the first and second decks together to form a pallet, the block members comprising a composite material including at least about 20% by weight of natural material particles and at least about 20% by weight of plastic material particles.

2. The pallet according to claim 1, wherein the natural material particles comprise ground particles of whole trees selected from the group consisting of junipers and conifers, the whole trees including root particles, trunk particles, branch particles, needle particles, wood particles, and mixtures thereof.

3. The pallet according to claim 2, wherein the natural material particles comprise at least one wood selected from the group consisting of: Apache Plume; Ash, single-leaf; Bitterbrush; Cliffrose; Fenderbush; Juniper, one-seed; Juni-

per, rocky mountain; Mahogany, curl-leaf; Mahogany, mountain; Mock Orange; Ponderosa Pine; Mormon Tea; and mixtures thereof.

4. The pallet according to claim 1, wherein the plastic material particles comprise at least one material selected from the group consisting of polypropylene, polyethylene, polyurethane, polyvinylchloride, poly(ethylene terephthalate), nylon, and mixtures thereof.

5. The pallet according to claim 1, wherein at least one of the first and second decks comprises a substantially rectangular frame having a plurality of longitudinally and laterally extending cross members, further wherein at least one of the plurality of cross members comprises a composite material comprising at least about 20% by weight of natural material particles ground from whole trees and at least about 20% by weight of plastic material particles.

6. The pallet according to claim 5, wherein the at least one cross member comprises a lead board.

7. The pallet according to claim 1, wherein the block members comprise at least about 50% by weight of natural material particles.

8. The pallet according to claim 1, wherein the block members comprise at least about 45% by weight of plastic material particles.

9. The pallet according to claim 8, wherein the block members comprise at least about 45% by weight of a thermoplastic component comprising a major portion of polyethylene.

10. The pallet according to claim 1, wherein the block members further comprise at least one filler selected from the group consisting of colorants, UV protectors, flame and fire retardants, lubricants, soaps, polymer initiators, coupling agents, and mixtures thereof.

11. The pallet according to claim 1, wherein the block members have an average water absorption of less than about 15% by weight.

12. The pallet according to claim 1, wherein the block members are press-formed.

13. The pallet according to claim 1, wherein the block members are formed using extrusion techniques.

14. The pallet according to claim 1, wherein the natural material particles have an average particle size of less than about 0.25 inches and have a random orientation in the composite material.

15. The pallet according to claim 14, wherein the natural material particles have an average particle size of less than about 0.0625 inches.

16. A pallet comprising:

a first deck comprising a first plurality of cross members;

a second deck comprising a second plurality of cross members; and

a plurality of block members connecting the first and second decks together to form a pallet, wherein at least

one block member and at least one cross member of the first or second plurality of cross members comprise a composite material including at least about 50% by weight of a natural material and at least about 45% by weight of a plastic material comprising a major portion of polyethylene.

17. The pallet according to claim 16, wherein the at least one cross member comprises a lead board.

18. The pallet according to claim 16, wherein the at least one cross member comprises a composite material including wood fibers having an average length of from about 3/8 to about 3/4 inches.

19. The pallet according to claim 16, wherein the plastic material comprises at least one material selected from the group consisting of polypropylene, polyethylene, polyurethane, polyvinylchloride, poly(ethylene terephthalate), nylon, and mixtures thereof.

20. The pallet according to claim 16, wherein the block members further comprise at least one filler selected from the group consisting of colorants, UV protectors, flame and fire retardants, lubricants, soaps, polymer initiators, coupling agents, and mixtures thereof.

21. A pallet comprising:

a first deck comprising a first plurality of cross members;

a second deck comprising a second plurality of cross members; and

a plurality of extruded, elliptical shaped composite block members connecting the first and second decks together to form a pallet, wherein the block members and at least one cross member of the first or second plurality of cross members comprise a composite material including from about 50% to about 55% by weight of natural material particles having an average particles size of less than about 0.25 inches, and from about 45% to about 50% by weight of plastic material particles comprising a major portion of recycled, low density polyethylene.

22. A method of making a pallet comprising:

preparing and blending a mixture comprising from about 50% to about 55% by weight of natural material particles and from about 45% to about 50% by weight of plastic material particles;

heating and extruding the mixture forming a composite material of a desired shape;

cutting the composite material into blocks; and

securing the blocks to substantially rectangular shaped upper and lower decks to form a pallet.

* * * * *