

[54] **PROCESS AND APPARATUS FOR HANDLING BULK BUILDING MATERIALS AT CONSTRUCTION SITES**

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[56]

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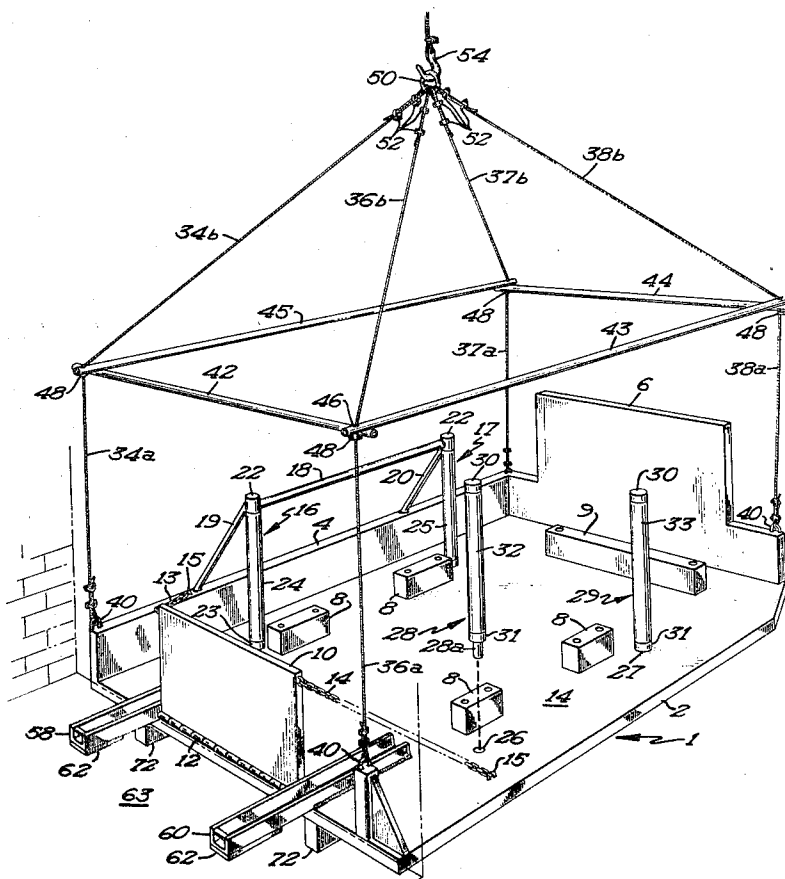
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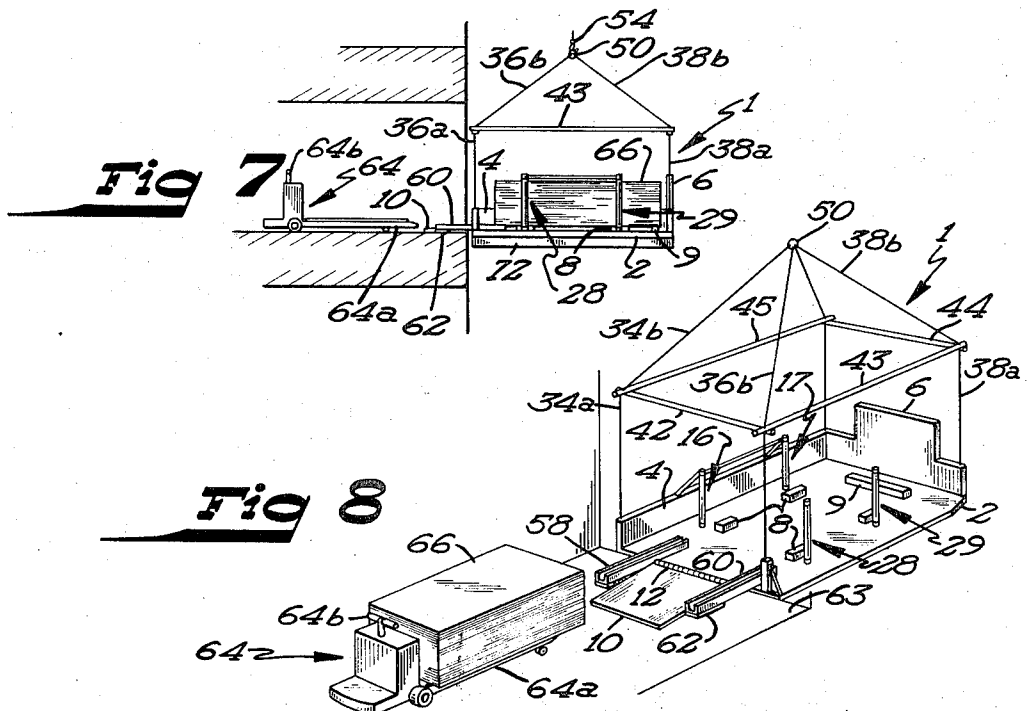
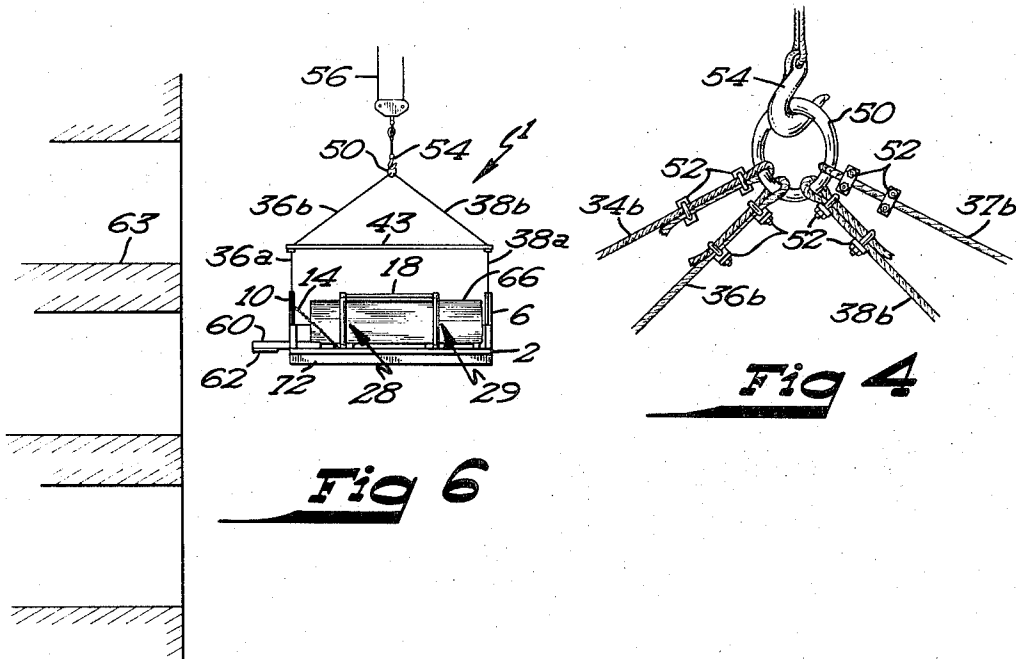
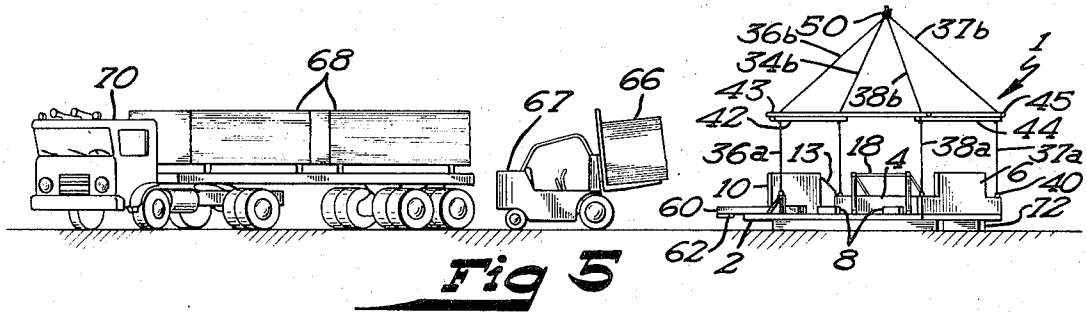
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ABSTRACT

Bulk materials, such as wallboard panels, are carried to a desired floor level of a building under construction from a source of supply at the building site by loading the bulk material onto raised support members on the deck of a pallet carrier through an open side thereof by a mechanical lift device, hoisting the loaded pallet carrier to the desired floor level of a building having a side wall opening, and engaging the outer edge of the building floor with friction padded support extensions projecting forwardly from the front end of the pallet carrier deck. A hinged ramp at the front end of the pallet carrier is then lowered against the building floor to permit a hand operated lift dolly to be rolled onto the carrier deck under the raised load to pick up the load of bulk material and deposit it on the building floor. Four lift cables extending from the corners of the pallet carrier are attached to the corners of a rectangular bar assembly, which, when held in an elevated position over the pallet carrier deck, holds the four lift cables in vertically extended positions wherein they do not interfere with the loading or unloading of the carrier.

9 Claims, 8 Drawing Figures





PROCESS AND APPARATUS FOR HANDLING BULK BUILDING MATERIALS AT CONSTRUCTION SITES

BACKGROUND OF THE INVENTION

One of the problems associated with the construction of high rise buildings is the handling and lifting of bulk building materials to deposit them on desired floor levels of the building under construction. This task has traditionally been performed by cranes of various types utilizing a lift cable. It is a known procedure to lift loads of bulk material from ground level by such cranes, and to deposit the loads onto elevated floors of the building through side wall openings at the desired floor level. However, there are a number of continuing problems associated with attempts to convey bulk materials onto elevated floor levels of buildings under construction in such a manner. There is a great danger of injury to workmen in attempting to pull a suspended load of bulk material into a building opening while the load is being held by the lift cable of a crane. Also, the lift cable tends to damage the wall of the building opening as the load is pulled in through the opening to deposit it on the floor. Moreover, the known lift devices utilized for such bulk handling operations at building sites simply do not lend themselves to efficient, economical handling of large loads of bulk material, such as stacks of wallboard. Attempts which have been made to overcome these problems are reflected in U.S. Pat. Nos. 3,521,924 and 3,675,961.

BRIEF SUMMARY OF THE INVENTION

Having in mind the foregoing problems associated with the handling and lifting of bulk materials at building sites, we have developed a pallet carrier and method of using same which permits a load of bulk material to be quickly and safely loaded onto the pallet carrier from a supply source, lifted to the desired floor level of a building under construction by a crane, and unloaded onto the floor of the building through an opening in the building side wall, without any direct handling of the material by workmen.

These basic objectives and advantages are realized by utilizing a pallet carrier which is particularly characterized by an elongated bottom deck having upright, load retaining structures on three sides, and open along one side for receiving a load, the retaining structure on the front end of the pallet carrier being in the form of a normally upright unloading ramp which is swung downwardly to a substantially horizontal position for unloading bulk material from the deck of the carrier. Spaced apertures in the deck of the carrier along the normally open side receive upright posts which are placed in position after the carrier is loaded to serve as a removable retaining barrier on the normally open side of the carrier deck.

Both the fixed load retaining structure along one side of the pallet deck and the removable barrier on the normally open side of the pallet deck have vertically extending rollers thereon, whereby a load of bulk material will be guided by the rollers during an unloading operation forwardly of the pallet deck, and will not be impeded by engagement with the load retaining structure or barrier along either side of the deck, between which the load is positioned.

A plurality of load supporting members, in the form of spaced apart blocks on the deck of the pallet carrier, project upwardly and serve to support a bulk load at an elevated level above the deck, thereby permitting unloading lift device to be extended under the load for lifting it and removing it from the pallet, without direct handling by workmen.

A particularly advantageous feature of our improved pallet carrier resides in the use of a rectangular bar assembly for attachment and upright support of four lift cable members which are connected to each of the four corners of the pallet carrier. A second set of cable members extends inwardly from the corners of the rectangular bar assembly to points of attachment at the inner ends thereof to a common coupling member disposed centrally of the pallet carrier. The common coupling member is utilized as a connecting device for the hook on the end of a lift cable of a crane. When this coupling member is attached to the cable lift hook, and lifted upwardly, the aforesaid rectangular bar assembly will be disposed at an elevated position above the carrier deck, thereby supporting the four lift cables attached to the corners of the pallet carrier in substantially vertical positions, wherein they do not interfere with the loading or unloading of the deck of the carrier.

As a further beneficial feature of our pallet carrier, we provide support extension means in the form of a pair of elongated beam members protruding forwardly from the front end of the carrier deck, and having friction pads on the bottom thereof to firmly engage the outer edge of the floor of a building opening against which the pallet carrier has been positioned by a hoist for unloading purposes.

These and other objects and advantages of our invention will become readily apparent as the following description is read in conjunction with the accompanying drawings, wherein like reference numerals have been used to designate like elements throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing the pallet carrier of this invention in use;

FIG. 2 is a side, elevation view of the carrier of FIG. 1, showing building materials being unloaded therefrom;

FIG. 3 is a perspective view of the pallet carrier of this invention shown without a load for clarity in its unloading position against the edge of a building floor;

FIG. 4 is a fragmentary view, on an enlarged scale, showing the coupling ring connection between lift cables on the pallet carrier and a hoist hook; and

FIGS. 5 through 8 are partially schematic views showing the series of steps through which a load of bulk material is handled to deliver it from a source of supply to a desired floor of a building under construction.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, we have shown in FIG. 3 a perspective view of the pallet carrier of this invention, generally designated by reference numeral 1. Carrier 1 has an elongated bottom deck 2 closed along one side by an upright wall 4, and across its rear end by an upright wall structure 6. A plurality of upwardly projecting, load supporting members in the form of blocks

8 and 9 are secured to deck 2 at spaced apart locations as shown in FIG. 3. As is hereinafter pointed out, blocks 8 and 9 serve to support a load of building material at an elevated level above deck 2 so that an unloading lift device may be extended under the load for removing it from pallet carrier 1.

The front end of carrier 1 is normally closed for load retaining purposes by an unloading ramp 10 attached to the front edge of deck 2 by a hinge 12. Ramp 10 is normally held in the upright position shown in FIG. 3 by a pair of chains 13 and 14 removably attached to U-connectors 15 on the deck 2 and the sidewall 4 of the carrier. For this purpose, the end links of chains 13 and 14 may be open to permit their hooking engagement with connectors 15. When chains 13 and 14 are disengaged from connectors 15, the ramp 10 may be swung downwardly to the substantially horizontal, unloading position shown in FIG. 8.

For the purpose of retaining a load on the closed side of pallet carrier 1 along which wall 4 extends, a pair of spaced apart, upright post assemblies 16 and 17 connected by a cross beam 18 are provided at inwardly spaced locations from wall 4. Struts 19 and 20 attached to wall 4 assist in supporting post assemblies 16 and 17. At the top and bottom of post assemblies 16 and 17 are bearings 22 and 23 between which elongated rollers 24 and 25 are rotatably supported along the lengths of each post assembly. On the opposite, normally open side of carrier 1 are a pair of spaced apart apertures 26 and 27 utilized to removably receive a pair of upright post assemblies 28 and 29. These post assemblies are normally not positioned in place until after a load of bulk material has been placed on the deck 2 of carrier 1. Reduced diameter bottom ends 28a on each of the post assemblies 28 and 29 fit into apertures 26 and 27. Bearings 30 and 31 at the top and bottom respectively of post assemblies 28 and 29 rotatably support elongated rollers 32 and 33. Rollers 24, 25, 32, and 33 serve to guide a load of bulk building material during unloading from the front end of carrier 1.

The pallet carrier is provided with attachment means for the lift cable of a hoist, as may best be understood by reference to FIG. 3. A first set of four flexible cable members 34a, 36a, 37a, and 38a are attached to the four opposite corners of pallet carrier 1 by means of U-connectors 40. At their opposite ends, each of the cable members 34a, 36a, 37a, and 38a are attached to corner portions of a rectangular bar assembly comprised of four elongated, rigid bars 42, 43, 44, and 45. A second set of flexible cable members 34b, 36b, 37b, and 38b extend from points of attachment at the outer ends thereof to the corners of the rectangular bar assembly, inwardly to a coupling member in the form of a ring 50. The free ends of cable members 34b, 36b, 37b, and 38b are looped through ring 50 and secured to their respective cable members by means of U-bolt clamps 52. Ring 50 serves as a connecting means for the grappling or lift hook 54 secured to the hoist cable 56 of a crane, such as a tower crane conventionally used in the construction of high rise buildings. Any type of hoist or lift crane having a cable for lifting pallet carrier 1 may obviously be utilized, and the crane or hoist has not been shown, since it forms no part of this invention. The two sets of cable members 34a, 36a, 37a and 38a and 34b, 36b, 37b, and 38b may actually be separate lengths of cable attached to the ends of bars 42, 43, 44 and 45; or, the cable segments 34a-34b,

36a-36b, 37a-37b, and 38a-38b may each be a single, continuous length of cable extending from the corners of pallet carrier 1 to the corners of the rectangular bar assembly and thence upwardly to coupling ring 50. With such a cable arrangement, which has been illustrated in FIG. 3, there would only be four continuous lengths of cable comprised of upper and lower cable members or segments. Each of the four elongated cables extends through aligned apertures 46 near the ends of bars 42, 43, 44 and 45 where these bars intersect at the corners of the rectangular bar assembly, with the upper ends of the cables then being attached to ring 50. U-bolt clamps are secured to the upper ends of each of the cable members 34a, 36a, 37a, and 38a just below crossbars 42 and 44 to keep the bar assembly from sliding downwardly along these cable members.

At the front end of the pallet carrier, projecting forwardly from the front end of deck 1, extension members are provided for the purpose of supporting the pallet carrier during unloading, and holding it in firm engagement with the floor of a building opening. The extension members preferably take the form of a pair of elongated beams 58 and 60 which project forwardly from the front end of deck 1 in a generally horizontal plane. Extension members or landing beams 58 and 60 are positioned at spaced apart locations on opposite sides of unloading ramp 10, so as to avoid interference with ramp 10 when it is lowered to its unloading position shown in FIG. 8. Beams 58 and 60 have a resilient, friction surface on the bottom thereof, in the form of rubber pads 62 shown in engagement with the floor 63 of a building under construction onto which a load of building material is being deposited from carrier 1 as shown in FIGS. 1 and 2. For this purpose, a hand car or dolly 64 of the well-known type having a lift bed 64a actuated by the reciprocating movement of handle 64b is utilized. Cart 64 may have either a mechanical or hydraulic mechanism for elevating the lift bed 64a under a load, and may be either of the push type shown in FIG. 2, or the self-propelled, riding type shown in FIGS. 7 and 8.

The operation of our pallet carrier in the process of delivering a load of bulk building material from a source of supply to a particular, elevated floor level of a building under construction may best be understood by reference to FIGS. 5 through 8. In FIG. 5, we have shown a mobile lift device in the form of a fork lift truck 67 picking up a load of bulk material 66 from a supply 68 stacked on a truck 70. For purposes of illustration, the material being handled is shown as wallboard panels delivered to the building site by truck 70. Any type of mobile lift device may obviously be used to convey a load of the wallboard from truck 70 to the deck of pallet carrier 1. For example, a truck crane as well as a fork lift truck could be utilized for this purpose. The stack of wallboard 66 removed from truck 70 is placed on the deck 2 of pallet carrier 1 through the open side thereof, which the fork lift truck 67 is shown approaching in FIG. 5. Prior to placing a load on the deck 2 of the pallet carrier, the lift hook 54 of a cable hoist is engaged with ring 50 and lifted by the hoist. Ring 50 will be elevated to a position substantially as shown in FIGS. 3 and 5 wherein it is located centrally of the pallet carrier and rectangular bar assembly directly above deck 2. The engagement and elevation of coupling ring 50 by lift hook 54 will have the effect of extending the second set of cable members 34b, 36b,

37b and 38b upwardly in a generally pyramidal configuration as shown in FIG. 3. The first set of cable members attached to the corners of the pallet carrier, 34a, 36a, 37a and 38a will be extended generally vertically upwardly from the corners of the pallet to the corners of the rectangular bar assembly, thereby avoiding any interference of the cables or bar assembly with the placing of a load on the deck 2 of the carrier. It is to be noted that cable members 34a, 36a, 37a and 38a are spaced apart from each other at predetermined corner locations on the pallet carrier to provide free and unobstructed spaces along the open side of the pallet carrier, as well as at the front end thereof for the loading of material onto the carrier, and for the unloading operation through the front end of the pallet carrier over ramp 10.

After ring 50 and the lift cables and bar assembly are elevated by a hoist or crane in the aforesaid manner, the load of dry wall or wallboard panel 66 is deposited on blocks 8 and 9 on deck 2 through the open side thereof by fork-lift truck 67. The longitudinal spacing of blocks 8 along the length of deck 2 permits the forks of the lift-truck to extend between these blocks to place a load on them. The stack of wallboard will thus be supported at an elevated level above bottom deck 2. Next, removable post assemblies 28 and 29 are placed in apertures 26 and 27 in the deck 2 of the pallet carrier to serve as a load restraining means on the normally open side of the pallet. The load of wallboard panels will thus be restrained against lateral shifting movement between the opposed pairs of upright post assemblies 16, 17 and 28, 29.

Pallet carrier 1 is then hoisted by lift cable 56 to a predetermined floor level of a building having a side wall opening as shown in FIGS. 1 and 6. The boom of a tower crane or other suitable hoist device is utilized to move the pallet carrier inwardly towards the building at the desired elevation so that landing beams 58 and 60 extend inwardly over the outer edge of building floor 63 in engagement therewith as shown in FIGS. 3 and 7. The rubber pads 62 on the bottom of landing beams 58 and 60 are effective, under the compression weight of the load 66 on the pallet carrier, to assist in holding the carrier against the outer edge of floor 63. With pallet carrier 1 so positioned as shown in FIG. 7, ramp 10 is lowered to the unloading position shown in FIG. 8 by releasing chains 13 and 14. The front end of unloading ramp 10 will rest on building floor 63 in the manner shown. The unloading operation can now be carried out utilizing hand or self-propelled cart 64. For this purpose, cart 64 is rolled over ramp 10 across the front end of deck 2 to position its lift bed 64a under the load of wallboard panels. With the load supported on blocks 8, this is readily accomplished. Lift bed 64a is then elevated under the load, and cart 64 is backed over ramp 10 onto building floor 63. The load of wallboard panels is then placed on floor 63 from cart 64 by lowering lift bed 64a. For this purpose, spaced apart beams or blocks may be utilized to receive the load of panels 66 in a manner similar to that in which blocks 8 and 9 are utilized on pallet deck 2.

During the unloading operation by cart 64, rollers 24, 25, 32 and 33 on the upright post assemblies prevent the load from binding against these restraining posts. As cart 64 moves backwards over ramp 10 with the load, rollers 24, 25, 32 and 33 serve to guide the load rearwardly. Thus, during the unloading operation there

is no need for a workman to step onto carrier deck 2 for the purpose of pushing the load of bulk material away from the restraining posts, and post assemblies 28 and 29 do not have to be removed to unload the bulk material from the deck of carrier 1. It is also to be noted that the vertical extension of lift cables 34a, 36a, 37a and 38a by the use of the rectangular bar assembly comprised of bars 42, 43, 44 and 45 avoids the inward pulling of these lower lift cables, and resulting binding of the lift cables against the stack of drywall panels. Since the load carrying space on deck 2 is never obstructed by the lift cables, a high, wide load such as the stack of drywall panels shown can be quickly and easily loaded, and freely unloaded through the front end of the pallet carrier without disconnecting, loosening or adjusting the lift cables in any way. Also, the rectangular bar assembly comprised of bars 42, 43, 44 and 45 stabilizes the load in transit by preventing the tipping of pallet carrier 1 when it is being hoisted.

We anticipate that various changes may be made in the size, shape, and specific structural features of our pallet carrier, and the process of using it, without departing from the spirit and scope of our invention as defined by the following claims.

We claim:

1. A pallet carrier for lifting and handling bulk building material comprising:
 - an elongated bottom deck;
 - an upright load retaining structure extending along one side of said deck, the opposite side of said deck being normally open to permit the unimpeded placement of bulk materials on said deck;
 - removable barrier means positioned along said normally open side of said pallet carrier to assist in retaining a bulk load being transported thereon;
 - vertically extending rollers on both said upright load retaining structure on said one side of said pallet deck and said removable barrier means on the opposite side of said pallet deck, said rollers being rotatable about vertical axes, whereby a load of bulk materials resting on the deck of said pallet between said load retaining structure and said removable barrier means will be guided by said rollers during unloading of said bulk material forwardly of said pallet deck and will not be impeded by engagement with said load retaining structure or said removable barrier means.
2. A pallet carrier for lifting and handling bulk building materials comprising:
 - an elongated bottom deck;
 - an upright load retaining structure extending along one side of said deck, the opposite side of said deck being normally open to permit the unimpeded placement of bulk materials on said deck;
 - an upright load retaining structure extending across the rear end of said deck;
 - a plurality of load supporting members on said deck projecting upwardly on which a load may rest at an elevated level above said deck, thereby permitting an unloading lift device to be extended under the load for lifting the load and removing it from said pallet;
 - attachment means for a hoist affixed to said pallet and having a lift connecting means normally disposed at an elevated level above said deck when said pallet is being carried by a hoist; and

support extension means protruding forwardly from the front end of said pallet carrier deck in a generally horizontal plane for engaging the floor edge of a building opening into which bulk material is to be unloaded from said pallet carrier at an elevated, above-ground level while said carrier is being held by a hoist, said extension means having a friction surface on the bottom thereof to assist in holding said pallet carrier in engagement with the outer edge of a building floor.

3. A pallet carrier as defined in claim 2 wherein:

said deck has a plurality of apertures therein along said normally open side of said deck, and removable barrier means comprising a plurality of posts removably inserted in said apertures in an upright position.

4. A pallet carrier as defined in claim 2 wherein:

said extension means comprises a pair of elongated members protruding forwardly beyond the front end of said deck.

5. A pallet carrier as defined in claim 4 wherein:

said friction surface on the bottom of said extension means comprises a rubber pad on the bottom of each of said elongated members.

6. A pallet carrier for lifting and handling bulk building materials comprising:

an elongated bottom deck;

an upright load retaining structure extending along one side of said deck, the opposite side of said deck being normally open to permit the unimpeded placement of bulk materials on said deck;

an upright load retaining structure extending across the rear end of said deck;

a normally upright unloading ramp on the front end of said pallet carrier opposite said rear retaining structure and hingedly attached to said deck for swinging movement about a substantially horizontal axis defined by hinge means, said ramp being swingable downwardly to a generally horizontal position wherein it serves as a ramp for moving a bulk material load out of the front end of said pallet carrier;

a plurality of load supporting members on said deck projecting upwardly on which a load may rest at an elevated level above said deck, said load supporting members being spaced longitudinally and laterally with respect to each other along said deck a sufficient distance apart to permit the insertion of a lift device between said load supporting members from either the front or the normally open side of said deck, whereby a lift device may be extended between said load supporting members for side loading of said pallet carrier and front unloading thereof.

7. A process for transporting a load of bulk building material from a source of supply to an elevated floor of a building under construction by means of a pallet carrier with an elongated bottom deck having one normally open side, a normally upright, hinged unloading ramp at the front end thereof, and load supporting members projecting upwardly from said deck, comprising the steps of:

picking up a load of bulk building material from a source of supply with a mobile lift device;

placing said load on said load supporting members of said pallet carrier at a raised level above said bottom deck through said open side thereof, with said mobile lift device;

hoisting the loaded pallet carrier to a predetermined floor level of a building having a side wall opening at said floor level, and engaging the front end of said pallet carrier deck against the outer edge of the floor of said building opening;

lowering said carrier ramp so that its front end rests on said building floor;

moving a mobile lift device from said building floor over said ramp onto said carrier deck and lifting said load of building material by lift means on said lift device inserted under said load above the carrier deck between said load supporting members; and

moving said mobile lift device back over said ramp across the front end of said deck onto said building floor and unloading the building material from said lift device onto said building floor.

8. A process for transporting building material as defined in claim 7, and further including:

positioning removable barrier means in place along said normally open side of said deck, after said load of building material has been placed on said load supporting members of said pallet carrier.

9. A process for transporting building material as defined in claim 7 wherein:

said pallet carrier has four flexible cable members extending from corner portions thereof to points of attachment with the corners of a rigid, bar assembly having cables extending therefrom to a coupling member utilized for attachment to a hoist, and attaching said coupling member to a hoist and lifting said coupling member by said hoist to hold said bar assembly at an elevated position above the deck of said pallet carrier, with said four cables extending substantially vertically upwardly from the corners of said carrier, prior to the placing of said load of building material on said pallet carrier, whereby said cables and bar assembly do not interfere with the placing of a load on said pallet carrier.

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