

United States Patent

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[54] **BOX STRUCTURES, PARTICULARLY PALLETS**

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

[58] Field of Search108/51-58, 159; 294/67, 68

[56] **References Cited**

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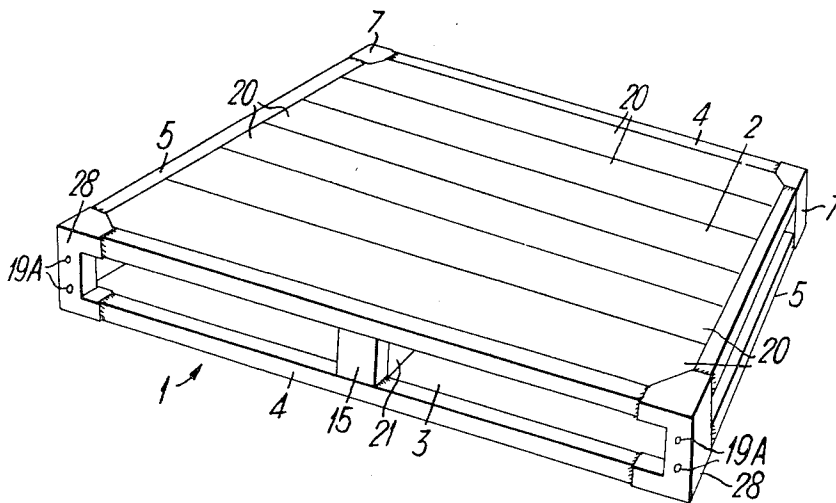
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[57] **ABSTRACT**

A pallet comprising top and bottom floors, a pair of side frames and a pair of end frames connectable together to form a box frame which when it is assembled is adapted to hold the top and bottom floors in position. Each of the frames has a pair of parallel longitudinal grooves, whereby when the box frame is assembled a pair of peripheral grooves are formed which serve for retaining the floors in position.

16 Claims, 5 Drawing Figures



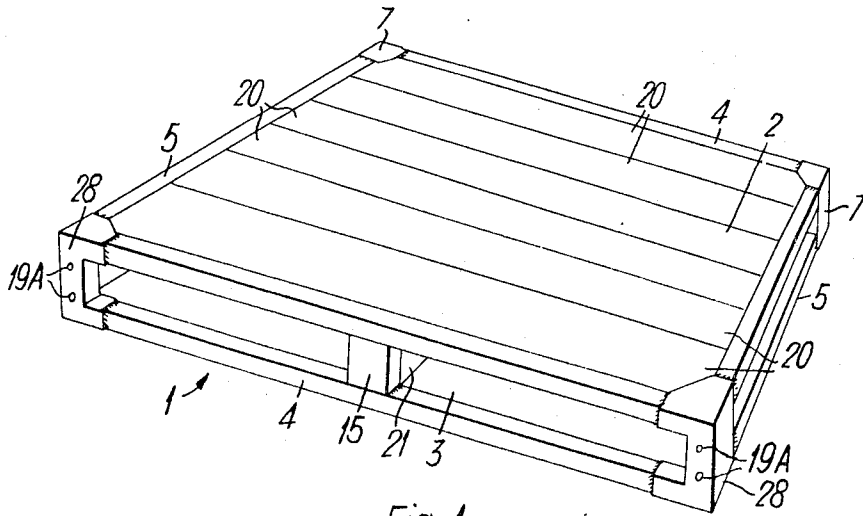


Fig. 1.

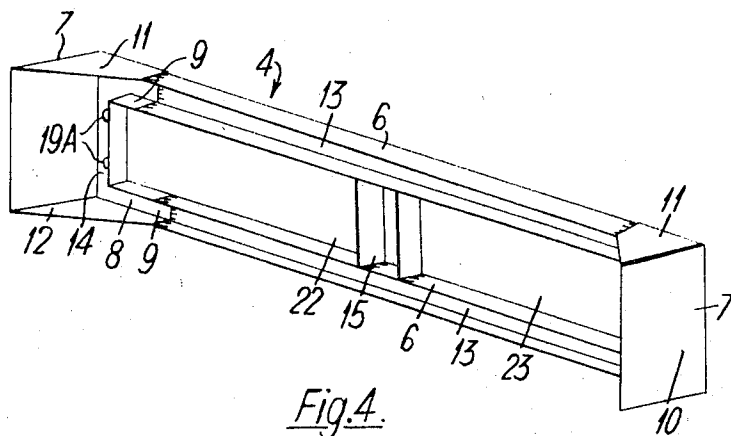


Fig. 4.

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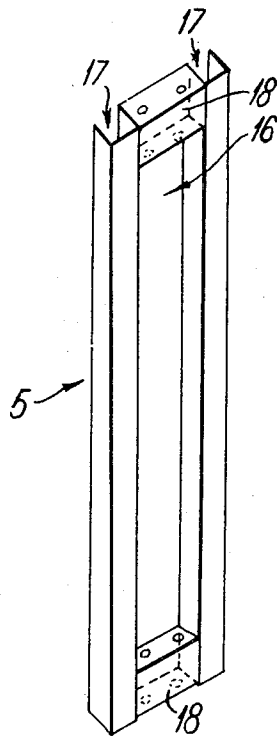


Fig. 2

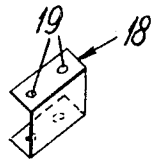


Fig. 3

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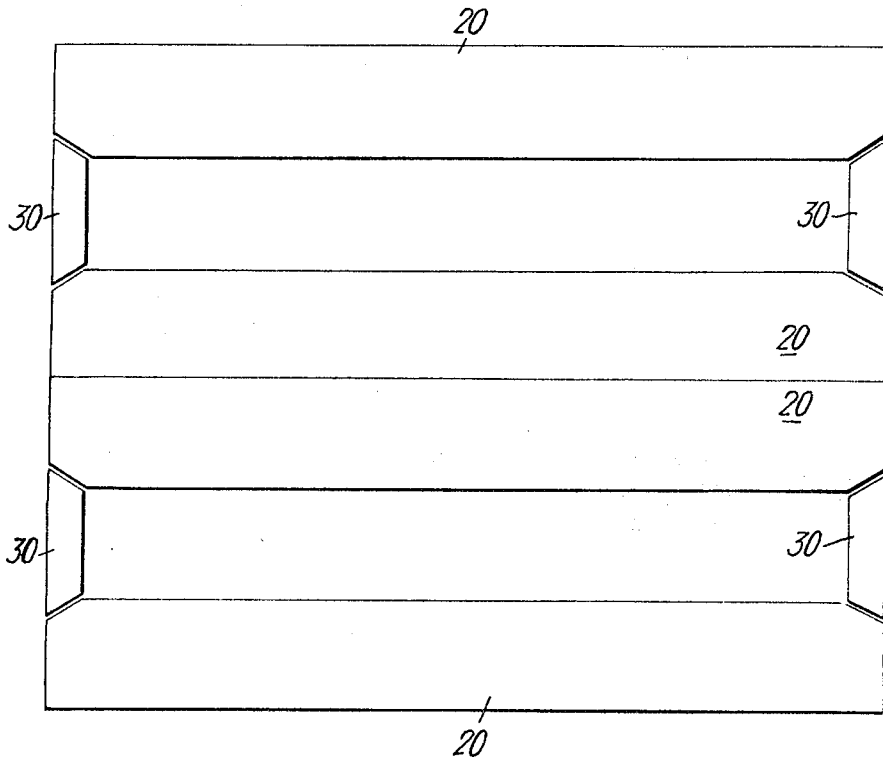


Fig. 5.

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BOX STRUCTURES, PARTICULARLY PALLETS

The present invention relates to box structures, and particularly to pallets.

It is an object of the present invention to provide a robust pallet which can be simply manufactured, and which is easily disassembled for maintenance, storage and transportation. It is further an object of the present invention to provide a pallet which can be conveniently modified to cater for different types of lifting gear.

According to the present invention a box structure comprises a pair of side frames and a pair of end frames connectable together to form a box frame structure, upper and lower longitudinal grooves in each of the frames, upper and lower floors, and means for retaining the frames in assembled condition, the arrangement being such that on assembly of the frame structure a pair of peripheral grooves are formed by the longitudinal grooves and serve for retaining the upper and lower floors in position.

Preferably, at each corner of the frame structure, the side frame or adjacent end frame has a transverse groove at its end to receive an end of the other frame.

Preferably the frames are made from mild steel metal.

In a preferred embodiment, the box structure is in the form of a pallet and at least one aperture is provided either in each of the side frames or in the end frames to facilitate lifting of the pallet.

Additional opposed transverse grooves may be provided in the side or end frames to receive one or more crossbeam linking opposed frames.

Preferably further, each side frame is comprised by a pair of spaced parallel longitudinal channel members providing the longitudinal grooves and a pair of transverse channel members linking the longitudinal channel members at each end, each transverse channel member providing a transverse groove for receiving an end of the adjoining end frame.

One or more intermediately spaced transverse channels may be provided in each side frame, each transverse channel receiving the end of a respective crossbeam.

An embodiment of the present invention will now be given by way of example with reference to the accompanying drawings in which:

FIG. 1 shows a pictorial view of a pallet according to the present invention;

FIG. 2 shows a pictorial view of an end frame of the pallet of FIG. 1;

FIG. 3 shows a view of one of the stiffening and connecting webs of the frame of FIG. 2;

FIG. 4 shows a pictorial view of a side frame of the pallet of FIG. 1, and

FIG. 5 shows a plan view of a modified form of the planked floor of FIG. 1.

Referring to the drawings, a pallet 1 for use with forklift trucks includes top and bottom wooden floors 2,3, a pair of side frames 4, and a pair of end frames 5 connectable together to form a box frame structure which when it is assembled is adapted to hold the top and bottom floors 2,3 in position.

Each side frame 4 (FIG. 4) is built up from a pair of parallel longitudinal channels 6 and a pair of transverse channel members 7, each welded to respective ends of the channels 6, to form a narrow rectangular frame, the channels 6 and members 7 being of mild steel. Each channel member 7 comprises a transverse grooved body 8 and a pair of short longitudinally projecting legs 9 which are welded to the respective ends of the channels 6. For increased rigidity of the box frame structure, the outside walls 10 of the body 8 are of increased width, and upper and lower gusset plates 11,12 are provided in each member 7. There is thereby provided in the side frame a pair of longitudinal grooves 13 and a pair of transverse grooves 14. An additional transverse channel 15 is located centrally in each side frame 4.

Each end frame 5 (FIG. 2) is formed from a channel-sectioned plate, produced by rolling or stamping, and having a central longitudinal recess 16, arranged such that the end

frame is provided with a pair of parallel longitudinal grooves 17 which are spaced apart a distance corresponding to that of the longitudinal grooves 13 of the side frames 4. In the recess 16 a web 18 of channel section (FIG. 3) is welded across between the grooves 17 each end of the recess 16, and each of these channel webs 18 has a pair of threaded sockets 19 or nuts to enable the adjoining side frame 4 to be bolted to the end frame 5, the bottom wall 28 of the corresponding channel member 7 of the side frame having a pair of appropriately positioned bores 19A. These channel rods 18 serve additionally to stiffen the end frames 5. The side and end frames 4,5 can therefore be bolted together to form the box structure, the transverse grooves 14 of each side frame 4 receiving the ends of the adjoining end frames 5; and when the box is assembled there is formed two spaced parallel peripheral grooves from the longitudinal grooves 13,17.

Modifications are of course possible in the frames 4,5. For example, in the end frame 5, the central recess 16 and associated webs 18 could be dispensed with and replaced by a longitudinally extending wooden beam attached to the floor of the channel plate whereby the two parallel longitudinal grooves 13 are formed.

To assemble the pallet, two end frames 5 are bolted to one of the side frames 4, and the planks 20 of the required length are slid transversely into the opposed longitudinal grooves 17 of the end frames 5 to form the top and bottom floors 3,4 a lower edge of each of the bottom planks 20 being received in a respective longitudinal groove 13 of the side frame 4. The length of the end frames 5 and/or the width of the planks 20 are arranged such that, with the final plank 20 of each floor 3,4 in position, the upper edge of this final plank 20 is just proud of the free ends of the end frames 5. A crossbeam 21 is inserted between the floors, and one end of the beam 21 is received in the intermediate channel 15 of the side frame 4. The other side frame 4 is now bolted to the end frames 5; and the longitudinal grooves of said other side frame 4 receive the top edges of the final planks 20, and the other end of the crossbeam 21 fits into the intermediate channel 15, the planks 20 of each floor being pressed together by the bolting down of said other side frame 4 so that a rigid pallet structure 1 is formed.

The two side-by-side apertures 22,23 in each of the side frames 4 serve for receiving the forks of a forklift truck to enable convenient lifting of the pallet 1.

The planks 20 of the floors 3,4 could suitably be in the form of floorboards having tongue-in-groove connections. Alternatively, each of the floors 3,4 could be formed as a unitary panel made from material such as for example chipboard, flexible fiberboard or synthetic resinous plastics material; the unitary panel could of course be formed as a composite structure. Also, additional intermediate channels 15 could be provided in the side frames for receiving additional crossbeams, and alternative means could be used for attaching the side frames to the end frames, such as for example long tie bolts extending between the opposed side or end frames.

The above pallet according to the present invention could be modified to form a crate by blanking off the apertures 22,23 in the side frames 4. The crossbeam 21 may be dispensed with. It will be understood of course that the above crate could be simply converted into a trailer by the attachment of ground engaging wheels and a suitable towing bracket thereto.

In a modification, a pallet of increased length is provided by using side frames 4 of greater length than before: for example the modified pallet may be twice the previous length. Each lengthened side frame includes several transverse channels 15, say for example three, equally spaced along the side frame. It is desirable with the lengthened pallet that the row of planks extending between the end frames 5 be divided, to prevent undue bending of the planks, and there is consequently provided an intermediate member adapted to receive the ends of the adjacent rows of planks. The intermediate member is formed from a pair of end frames, the webs 18 of which are omitted, and these end frames are shortened to such an extent

that when located between the side frames they lie just out-with the grooves of the side frames; the shortened end frames are welded back-to-back and a slot is thereby formed by the recesses 16. This slot receives a central crossbeam, the ends of which project from the slot. The assembly of the elongate pallet would be similar to that of the previously described pallet: the initial structure is formed from one of the elongate side frames to the free ends of which a pair of end frames are respectively attached, the central crossbeam is slid through the slot of the intermediate member and into the central channel of the side frame, other crossbeams being similarly positioned in the remaining channels and the rows of floors are then formed extending between a respective end frame and the intermediate frame and the pallet completed by the bolting on of the remaining side frame. In an alternative arrangement, tongues which replace the central crossbeam are welded into respective ends of the slot of the intermediate member and are received in the central channels of the side frames.

The above intermediate member could of course be used with the previously described pallet, the planks being divided into two adjacent rows each extending between a respective end frame and the intermediate member. Such an arrangement would increase the rigidity of the pallet.

The planked floor could be modified to provide spaces between some of the adjacent planks: this is desirable for use of the pallet with certain types of lifting gear. Thus, referring to FIG. 5, on assembly of the planked floor, short spacers 30 could be inserted into the longitudinal grooves 17 on the end frames 5 between adjacent planks 20; and a space in the upper floor 3 would of course be located over the corresponding space in the lower floor. For tightness of assembly of the pallet, and so that the spacers 30 will be retained in position, each spacer 30 is wedge shaped, the engaging surfaces of the planks 20 being shaped correspondingly. The spaces can be located appropriately in the floors, and need not be the same in the top and bottom floors.

I claim:

1. A box structure comprising a pair of side frames and a pair of end frames connectable together to form a boxframe structure; upper and lower longitudinal grooves in each of the frames arranged such that a vertically spaced parallel pair of peripheral grooves are formed in the boxframe structure on assembly of the structure, a transverse member at each end of each side frame including a groove transverse to the frame to receive an end of an adjacent end frame; upper and lower floors adapted to be clamped between the side frames; and fastening means releasably connecting adjacent ends of adjoining side and end frames to permit assembly of said box-frame structure with the peripheral edges of said upper and lower floors located in position in the peripheral grooves, the fastening means effecting clamping of the floors between the side frames.

2. A box structure as claimed in claim 1, wherein the box structure is in the form of a pallet and at least one aperture is provided in any of the side frames and the end frames to facilitate lifting of the pallet.

3. A box structure as claimed in claim 1, wherein a transverse member is provided at each end of each end frame, and the fastening means connect adjacent transverse members of adjoining side and end frames.

4. A box structure as claimed in claim 1, wherein additional opposed transverse grooves are provided in any of the side and end frames to receive the ends of further crossbeams linking opposed frames.

5. A box structure as claimed in claim 1, wherein each side frame is comprised by a pair of spaced parallel longitudinal channel members providing the longitudinal grooves and the transverse members are comprised by channel members linking the longitudinal channel members at each end, each transverse channel member providing the transverse groove for receiving an end of the adjoining end frame.

6. A box structure as claimed in claim 1, wherein the frames are made from mild steel metal.

7. A box structure as claimed in claim 1, wherein the floors are built up from planks, the planks of each floor being slid transversely into respective opposed longitudinal grooves during assembly of the box structure.

8. A box structure as claimed in claim 1, wherein the floors are comprised by a unitary panel.

9. A box structure as claimed in claim 1, wherein each end frame is formed from a channel-sectioned plate having a central longitudinal recess to provide the end frame with the parallel longitudinal grooves.

10. A box structure as claimed in claim 1, wherein each end frame is formed from a channel-sectioned plate having a longitudinally extending beam attached to the floor thereof whereby the two parallel longitudinal grooves are formed in the end frame.

11. A box structure as claimed in claim 3, wherein the fastening means are comprised by bolts extending longitudinally to the end frames and connecting adjacent transverse members of adjoining side and end frames.

12. A box structure as claimed in claim 5, wherein each transverse channel member consists of a main body part providing a transverse groove, and a pair of parallel legs extending from the body part for attachment to the respective ends of the longitudinal channel members of the side frame.

13. A box structure as claimed in claim 5, wherein one or more intermediately spaced transverse channels are provided in each side frame, each transverse channel receiving an end of a respective crossbeam.

14. A box structure as claimed in claim 7, wherein the planks are in the form of floorboards having tongue-in-groove connections.

15. A box structure as claimed in claim 7, wherein at least one pair of spacers are located in opposed longitudinal grooves, between respective adjacent planks, whereby said adjacent planks define a space therebetween.

16. A box structure as claimed in claim 9, wherein a web is provided at each end of the recess and extends between the sidewalls thereof, each web including means to enable the adjoining side frame to be bolted to the end frame.

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