

PATENT SPECIFICATION (11) 1 394 897

(21) Application No. 31182/72 (22) Filed 4 July 1972 (19)
 (31) Convention Application Nos. 61390/71 (32) Filed 13 July 1971
 114 732/71 6 Dec. 1971
 114 733/71 6 Dec. 1971
 49785/72 27 April 1972 in



(33) Japan (JA)
 (44) Complete Specification published 21 May 1975
 (51) INT. CL.³ B65D 19/06 B65G 57/03
 (52) Index at acceptance
 B8H
 B8C 10B1A 10BB3X 12A 15A 1A1 1B1A

(54) COLLAPSIBLE CONTAINER AND PALLET ASSEMBLY

(71) We, NIPPON ZEON Co., LTD., a Corporation of Japan, located at 6-1, 2-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a construction for a container and pallet assembly and more particularly to a construction for a collapsible container which is capable of easy and quick assembly and disassembly and is adapted as a general-purpose container and especially for storing and shipping elastomeric goods, such as synthetic rubbers, tending to be spontaneously deformed due to their inherent cold flow.

Containers for storing and shipping elastomeric materials such as synthetic rubbers usually comprise kraft paper bags, carton boxes and the like. Such bags and boxes, however, have the disadvantage that, after loading with a synthetic rubber they tend to be deformed in conformity to the deformation of the synthetic rubber caused by its cold flow and to be often broken especially when stacked.

It is one aim of the present invention to provide a container which can be easily set up for shipping goods and also easily knocked down so as to be sent back to the user as a compact size bundle of the component members thereof for repeated use as a container.

A collapsible container and pallet assembly in accordance with the invention comprises a pallet including spaced parallel runners, a lower set of spaced boards fixed beneath and transverse to the runners, a set of longitudinal boards each fixed along the top of a runner, and upper set of spaced boards fixed above and transverse to the runners and forming a floor, the arrangement being such as to provide vertically clear spaces through the pallet, and a rectangular frame fixed to the upper surface of the pallet; separate container wall members having their lower ends located in the frame; and releasable means arranged to hold the wall members in the erect position. The runners may have downwardly sloped ends and the longitudinal boards extend beyond the upper edges of the runners so as to form an overhang beneath which ropes may be passed for handling the container.

The rectangular frame is preferably of L-shaped cross-section. The releasable means preferably comprises an upper frame, to fit over the upper edges of the wall members, which may be unitary or consist of four separate members.

In one embodiment of the invention the upper frame comprises a set of four upper wall edge frames each having a hinged metallic bar at one end of the outer side and vertical wall edge frames are provided having a hanger at the upper end of the outer side, the metallic bar being capable of being engaged with the hanger, to securely hold the loose or separate wall boards together in position without use of such a holding means as pack tapes wound around the wall boards.

In another embodiment of the invention, four separate upper wall edge frames having hangers at the ends of the outer side are used with suitable vertical edge frames, these upper and vertical edge frames being capable of being locked with each other by inserting a rectangularly bent metallic bar in the adjacent hangers of the adjacent upper edge frames, to securely hold the loose wall boards together in position without use of holding means such as pack tapes wound around the wall boards.

Reference is now made to the accompanying drawings: in which:

Fig. 1 is a perspective view of a pallet according to this invention;

Fig. 2 is a perspective view of a bottom frame to be fixed on the pallet of Fig. 1;

Fig. 3 is a perspective view showing an alternate form of bottom frame construction;

Fig. 4 is a perspective view of a bottom frame-fixed pallet prepared by fixing the frame of Fig. 2 on the pallet of Fig. 1;

Fig. 5 is a perspective view showing an embodiment of a container and illustrating the use of pack tapes and a lid which is optional in the constitution of this invention;

Fig. 6 is a view in vertical section illustrating how a container according to this invention is loaded with articles such as synthetic rubber bales by the use of a plunger;

Fig. 7 is a perspective view of an upper wall edge frame;

Fig. 8 is a perspective view of a modification of the upper wall edge frame of Fig. 7;

Fig. 9 is a perspective view of a vertical wall edge frame;

Fig. 10 is a perspective view of a modification of the vertical wall edge frame of Fig. 9;

Fig. 11 is a perspective view showing in detail the engagement of the vertical wall edge frames of Fig. 10 with the bottom frame of Fig. 3 and upper wall edge frame of Fig. 8;

Fig. 12 is a perspective view showing the engagement of a unitary upper wall edge frame with the vertical wall edge frames of Fig. 9 or 10;

Fig. 13A is a perspective view of a variation of the engagement of Fig. 11, and Fig. 13B is a side elevation showing the working of the engagement mechanism of Fig. 13A;

Fig. 14 is a perspective view of another variation of the engagement of Fig. 11;

Fig. 15 is a plan view partly broken away showing the upper wall edge frames covering the wall boards erected in position;

Fig. 16 is a perspective view showing another embodiment of a container; and

Fig. 17 is a perspective view showing still another embodiment of a container.

Referring now to the drawings, and with particular reference to Fig. 1-6, an embodiment of this invention comprises a pallet 1 on which a bottom frame 6a or 6b is fixed, side walls 7 and end walls 7a, a bottom board 9, upper wall edge frames 8a, a lid 10 made of longitudinal and transverse slats 11, 12 and pack tapes 15, 16 and 17. The pallet 1 comprises spaced parallel base boards 2, spaced parallel runners 3 preferably having sloped ends 3¹, spaced parallel longitudinal boards 4 and spaced parallel transverse boards 5. The runners 3 are fixed on the base boards 2 transversely thereof, the longitudinal boards 4 are fixed on the runners longitudinally thereof, and the transverse boards 5 are fixed on the longitudinal boards 4 transversely thereof. It is

essential that, in the pallet 1, these component members thereof should be generally arranged so that the pallet 1 has therein vertically free spaces 18 through which the tines 19¹ of a plunger 19 may be put into, or out of, the inside of a container construction to be fabricated. The component members of the pallet 1 are made preferably of wood and may be made of other material such as steel or plastics, for example, polyethylene, polypropylene, foamed polystyrene, polyvinyl chloride and fiber reinforced plastics. The fixing of one of the component members on another may be effected by means of nails 14¹, bolts, a synthetic resin adhesive or the like. The pallet 1 is provided thereon with the bottom frame 6a or 6b to form a bottom frame-fixed pallet 1a by fixing the frame on the pallet by means of nails 14¹, bolts or the like being driven through holes 14 in the bottom frame or by means of a suitable synthetic resin adhesive, welding or molding when the pallet and bottom frame are made of plastics. The bottom frame 6a or 6b is generally rectangular in plan view and is composed of bars having a L-shaped cross section, such as angle steel bars, welded at the ends with each other so that they together form a rectangular shape. The frame 6b is provided in the vertical side with projections which will be inserted in the lower holes provided in a vertical wall edge frame to be described later. The frames 6a and 6b are made preferably of steel and may be made of aluminum, wood or plastics. In the bottom frame-fixed pallet 1a, it is preferable that the runners 3 have the sloped ends 3¹, thus forming a wedge-shaped recess between the inclined end 3¹ and the portion of the longitudinal board 4 extending beyond the upper shorter edge of the end 3¹ as illustrated most clearly in Figs. 1 and 5. The thus-formed recesses of the frame-fixed pallet 1a allow the passage of ropes there-through to lift up and lower down the containers according to this invention for loading or unloading, thereby assuring easy and secure loading and unloading of the containers, whereas the passage of ropes through under the bottom of a conventional pallet has hitherto been the customary practice to lift up or lower down a conventional container mounted on the pallet especially in harbor loading or unloading operations. The pallet construction according to this invention further makes it possible to stack several of the containers one upon another for storage, as described below.

Referring particularly to Figs. 5 and 6, square or rectangular side and end wall boards 7, 7a which are sized so that their lower portions are snugly received in the bottom frame 6a, are erected in edge to edge relation with their lower edges being posi-

tioned on the horizontal side of the bottom frame 6a snugly along the vertical side thereof to form the walls of the container and with their upper edge being covered by upper wall edge frames 8a having a channel-shaped cross section. It is to be noted that these wall boards so erected in position are still loose or separate. The bottom board 9 is demountably placed on the frame-fixed pallet 1a within the erected wall boards 7, 7a. The loose wall boards 7, 7a so erected are kept in position without falling outward by binding the outside of the wall boards with the pack tapes 15. The bottom board 9 may be dispensed with in cases where the surface of the bottom frame-fixed pallet 1a is usable as the bottom for holding certain goods thereon. The container as shown in Fig. 5 may be further provided with vertical wall edge frames 13a or 13b shown in Fig. 9 or 10. Goods such as synthetic rubber bales, are charged into the thus-formed open-top container conveniently in the following manner.

With particular reference to Fig. 6 a cargo-handling plunger 19, for example, a three-forked plunger is inserted from under the pallet through the spaces defined by the longitudinal and transverse boards 4 and 5 into the inside of the open-top container to the point that the demountable bottom board 9 is raised by the tines 19¹ of the plunger 19 nearly to the top opening of the container, after which synthetic rubber bales 20 in this case are loaded on the raised bottom board 9 and then the board 9 is lowered through approximately the same height of the bales 20 for further loading other bales 20 in a desired packing arrangement on the previously loaded bales 20, and such loading procedure is repeated until the container is filled up with bales 20, thus making possible the use of an autopalletizer which has been believed difficult to use for loading goods in a box-type deep container of the type described. Cushions as indicated at 25 may be dispensed with.

The open-top container so loaded may be covered with the lid 10 which comprises an optional feature of this invention and, if desired, the lid 10 consisting of crossed slats 11, 12 may be secured to the container body by using the pack tapes 16 and 17.

The wall boards 7, 7a are made preferably of wood or hardboard and may be made of plastics and, in some cases, steel. The bottom board 9 and the lid 10 are made of wood or hardboard and, in some cases, plastics. The upper wall edge frames 8a-8e are made of a metal such as steel or aluminum and, in some cases, of plastics.

In Fig. 5, the container construction comprises the bottom frame-fixed pallet 1a, the side and end wall boards 7, 7a demountably positioned erect along the inside of the

bottom frame 6a of the frame-fixed pallet 1a, the channel-shaped upper wall edge frames 8a, the lid 10 and the pack tapes 15-17 used to securely hold the various component members together. Thus, the container loaded is easily unpacked only by cutting the pack tapes 15-17 to allow the wall boards 7, 7a to fall outward, with the result that the load is easily and immediately taken out of the container. With the tapes cut and the load removed, the container construction may be dealt with as a compact size bundle of the component members for being sent back to the user for repeated use as a container. This is achieved by, after disassembly of the container construction, placing on the bottom frame-fixed pallet 1a the bottom board 9, four loose wall boards 7, 7a, the upper wall edge frames 8a and the lid 10 and packing these members into a bundle thereof of compact size.

With particular reference to Fig. 16, another embodiment of this invention comprises the same essential component members as the container construction shown in Fig. 5 except that the bottom frame 6a and upper wall edge frames 8a are respectively substituted by the bottom frame 6b and upper wall edge frames 8b and that vertical wall edge frames 13b having a L-shaped cross section are additionally used, to more securely hold the various component members together so that they constitute a container. The modified bottom frame 6b has at each end of each vertical side a projection which fits into one of the lower holes provided in the vertical wall edge frames 13b, and the upper wall edge frames 8b are channel-shaped and they are provided at one end a projection which is inserted in the upper hole made in the vertical wall edge frames 13b and at the other end a L-shaped cut which receives the projection-provided end of the adjacent upper wall edge frame 13b.

As illustrated in Fig. 17, still another embodiment of this invention comprises the same essential component members as the container construction shown in Fig. 16 except that the separate upper wall edge frames 8b are substituted by the unitary upper wall edge frame 8c which covers not only the upper edges of all the wall boards 7, 7a but also the upper edges of the vertical wall edge frames 13a thus making the use of the pack tapes 15 unnecessary in holding the wall boards together in position.

With reference to Figs. 13A and 13B, further modified upper wall edge frames 8d are identical in shape with the previously-mentioned frames 8a and have at one end of the outside surface a hinged metallic bar 21 which is engaged with a metallic hanger 22 attached to the upper end of the outside surface of a vertical wall edge frame 13c

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to securely hold the loose wall boards 7, 7a together. Fig. 13B diagrammatically shows how the hinged bar 21 and hanger 22 co-operatively work. As illustrated in Fig. 14, still further modified upper wall edge frames 8e have hangers 23 at the ends of the outside surface, which hangers receive a bent bar 24, thereby serving to keep the loose or separate wall boards 7, 7a together in position. Thus the combined use of the upper edge frames and vertical edge frames as shown in Figs. 13A and 14, will also eliminate the use of horizontally wound pack tapes 15 in securely holding the loose wall boards together in position.

The vertical wall edge frames may be made of the same material as the upper wall edge frames, and the pack tapes or bands may be made of metal such as steel, or kraft paper, or plastics such as polypropylene, polyethylene, nylon, polyester or polyvinyl chloride.

The container constructions shown in Figs. 16 and 17 are further characterized by using the vertical wall edge frames in combination with the separate upper wall edge frames or the unitary one to more securely hold the loose wall boards together in position, although the construction shown in Fig. 16 still needs the use of pack tapes wound around the wall boards as in the case of that shown in Fig. 5.

WHAT WE CLAIM IS:—

1. A collapsible container and pallet assembly comprising a pallet including spaced parallel runners, a lower set of spaced boards fixed beneath and transverse to the runners, a set of longitudinal boards each fixed along the top of a runner, an upper set of spaced boards fixed above and transverse to the runners and forming a floor, the arrangement being such as to provide vertically clear spaces through the pallet, and a rectangular frame fixed to the upper surface of the pallet; separate container wall members having their lower ends located in the frame; and releasable means arranged to hold the wall members in the erect position.

2. An assembly as claimed in claim 1 in which the runners have downwardly sloped ends and the longitudinal boards extend beyond the upper edges of the runners so as to form an overhang beneath which

ropes may be passed for handling the container.

3. An assembly as claimed in any preceding claim in which the rectangular frame is formed of L-shaped cross-section members.

4. An assembly as claimed in any preceding claim further comprising a loose bottom board placed within the frame.

5. An assembly as claimed in any preceding claim in which the releasable means comprise pack tapes tied around the erected wall members.

6. An assembly as claimed in any preceding claim in which the releasable means comprises an upper frame to fit over the upper edges of the wall members.

7. An assembly as claimed in claim 6 in which the releasable means comprise L-section vertical edge frames adapted to co-operate with the corners of the frame on the pallet.

8. An assembly as claimed in claim 6 in which the upper frame is unitary.

9. An assembly as claimed in claim 6 in which the upper frame comprises four separate members having co-operating locking means at their ends.

10. An assembly as claimed in any of claims 6, 8 or 9 in which the upper frame comprises channel section members.

11. An assembly as claimed in claim 7 in which the frame on the pallet has projections adjacent the corners which co-operate with apertures in the ends of the vertical edge frames.

12. An assembly as claimed in claim 7 with any of claims 6, 9, 10 or 11 in which the upper edge frame has a projection at each corner to co-operate with a corresponding aperture in the upper end of each vertical edge frame.

13. A collapsible container and pallet assembly substantially as herein described with reference to Figure 5, Figure 16 or Figure 17 of the accompanying drawings.

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to securely hold the loose wall boards 7, 7a together. Fig. 13B diagrammatically shows how the hinged bar 21 and hanger 22 co-operatively work. As illustrated in Fig. 14, still further modified upper wall edge frames 8e have hangers 23 at the ends of the outside surface, which hangers receive a bent bar 24, thereby serving to keep the loose or separate wall boards 7, 7a together in position. Thus the combined use of the upper edge frames and vertical edge frames as shown in Figs. 13A and 14, will also eliminate the use of horizontally wound pack tapes 15 in securely holding the loose wall boards together in position.

The vertical wall edge frames may be made of the same material as the upper wall edge frames, and the pack tapes or bands may be made of metal such as steel, or kraft paper, or plastics such as polypropylene, polyethylene, nylon, polyester or polyvinyl chloride.

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2. An assembly as claimed in claim 1 in which the runners have downwardly sloped ends and the longitudinal boards extend beyond the upper edges of the runners so as to form an overhang beneath which

ropes may be passed for handling the container.

3. An assembly as claimed in any preceding claim in which the rectangular frame is formed of L-shaped cross-section members.

4. An assembly as claimed in any preceding claim further comprising a loose bottom board placed within the frame.

5. An assembly as claimed in any preceding claim in which the releasable means comprise pack tapes tied around the erected wall members.

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7. An assembly as claimed in claim 6 in which the releasable means comprise L-section vertical edge frames adapted to co-operate with the corners of the frame on the pallet.

8. An assembly as claimed in claim 6 in which the upper frame is unitary.

9. An assembly as claimed in claim 6 in which the upper frame comprises four separate members having co-operating locking means at their ends.

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13. A collapsible container and pallet assembly substantially as herein described with reference to Figure 5, Figure 16 or Figure 17 of the accompanying drawings.

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