

[54] **COLLAPSIBLE CONTAINER WITH IMPROVED FASTENER ASSEMBLIES**

[75] Inventors: **James E. Clark**, Williamsville; **Jerol E. Kent**, Clarence, both of N.Y.

[73] Assignee: **Clark Kent, Inc.**, Williamsville, N.Y.

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[51] Int. Cl. **B65d 7/00**

[58] Field of Search **220/4 R, 4 F, 1.5, 75, 220/76, 77, 78; 217/43 R; 206/517; 108/55**

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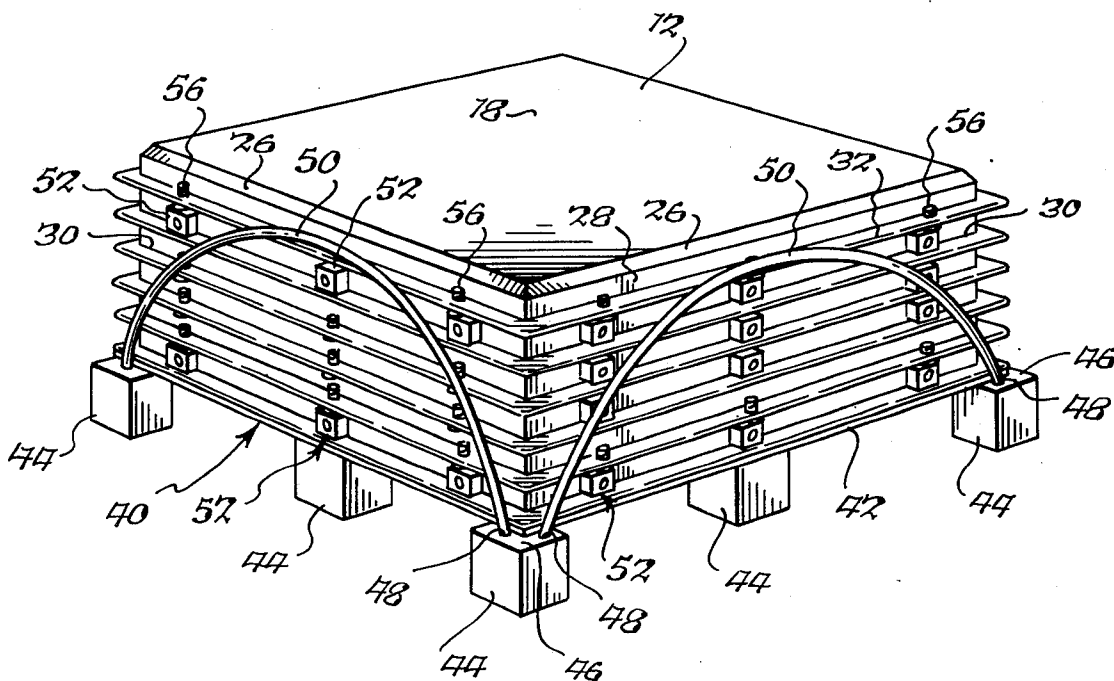
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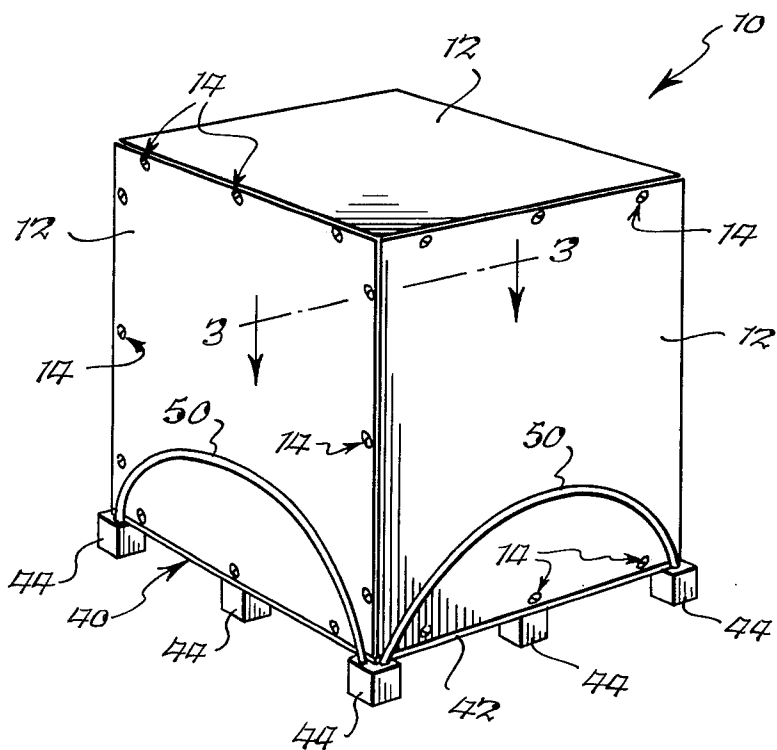
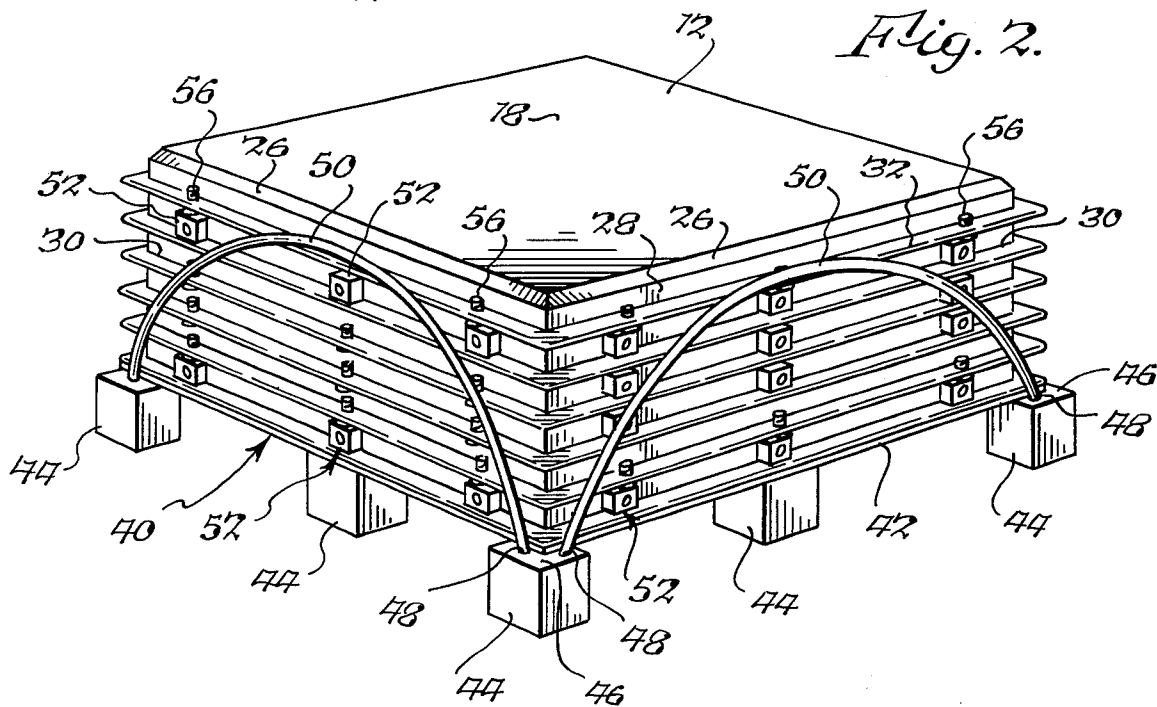
Primary Examiner—William I. Price
Assistant Examiner—Steven M. Pollard
Attorney, Agent, or Firm—Christel & Bean

[57] **ABSTRACT**

A collapsible container, formed of a plurality of light-weight, insulating panel members, is provided for preserving perishables during shipping and storage. The panel members are detachably secured together along their respective edges by novel fastener assemblies, each comprising a stud formed of a synthetic plastic material and a stud receiving element formed of a softer synthetic plastic material to lock the stud in the fully fastened condition. A pallet, associated with a loaded container, serves as a skid in receiving the disassembled panel members in a knocked down, nested condition.

11 Claims, 11 Drawing Figures





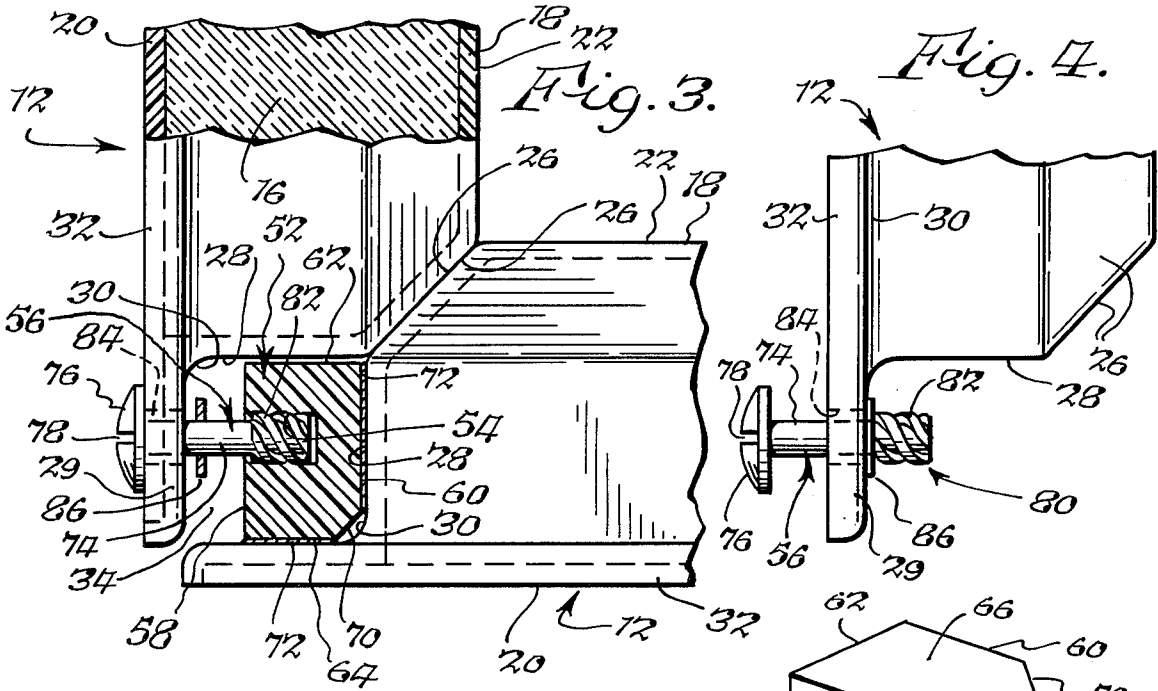


Fig. 5.

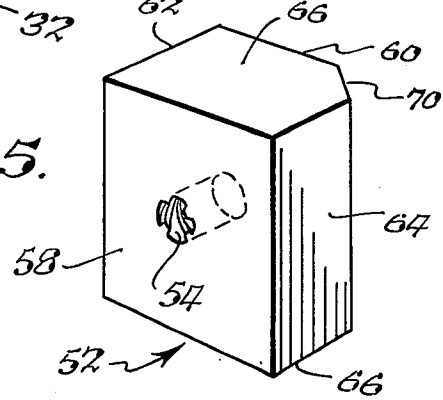


Fig. 6.

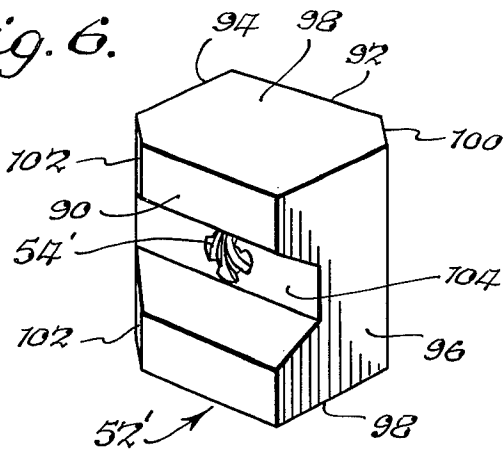
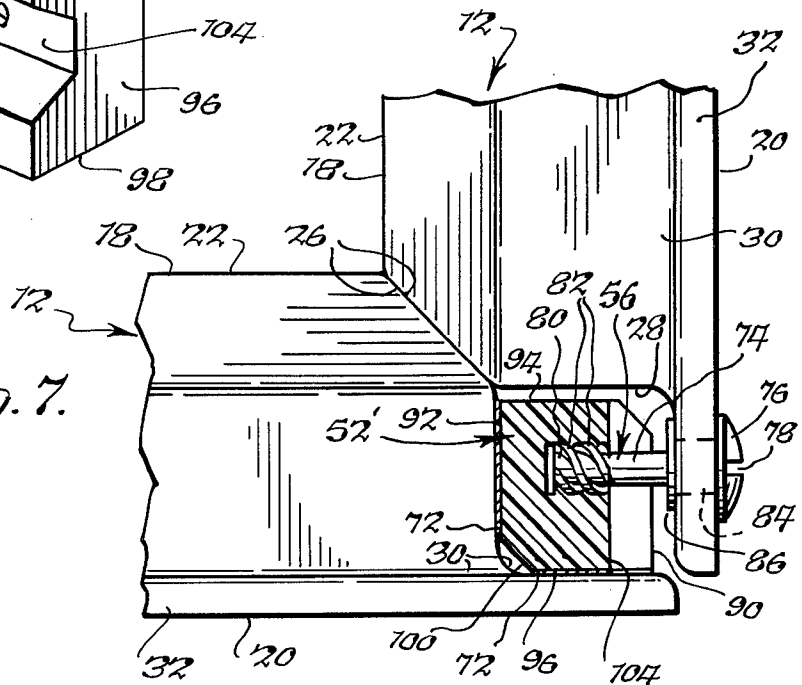
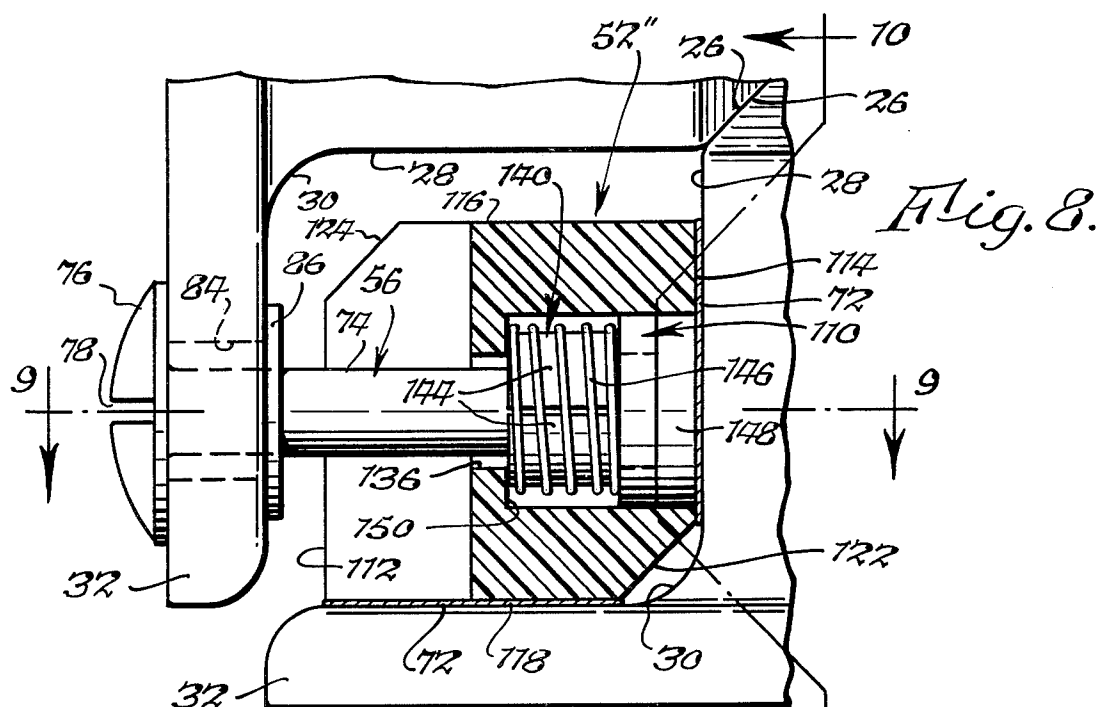
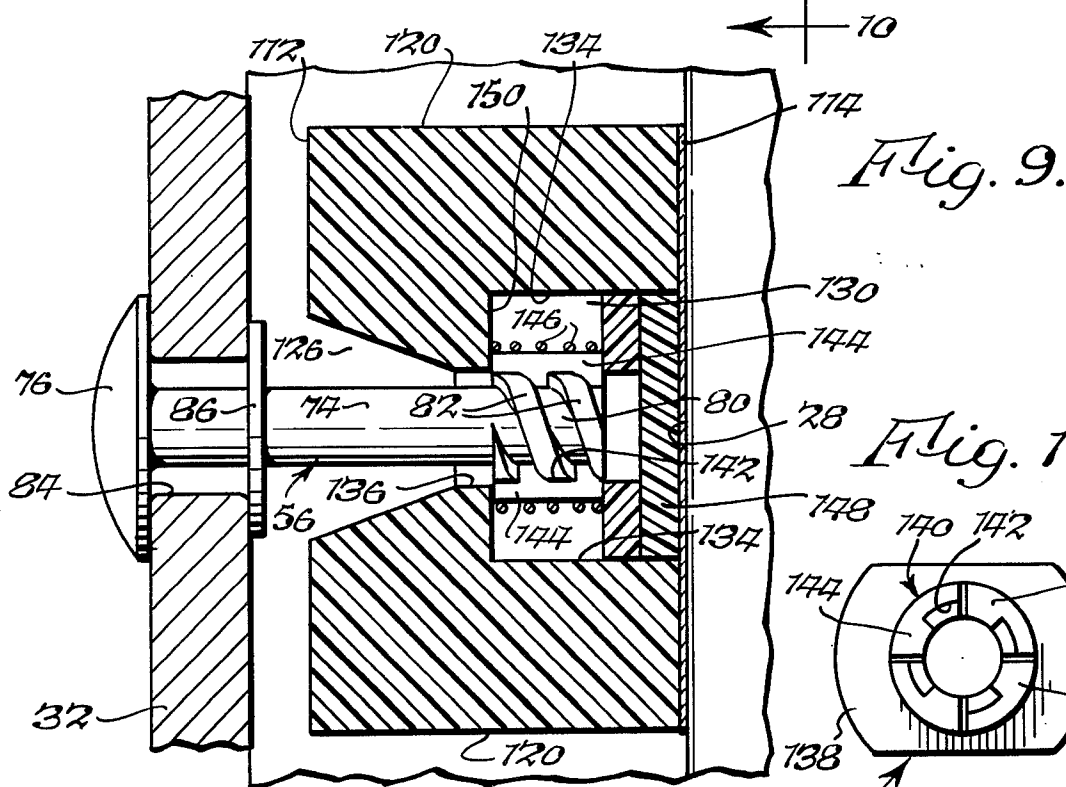
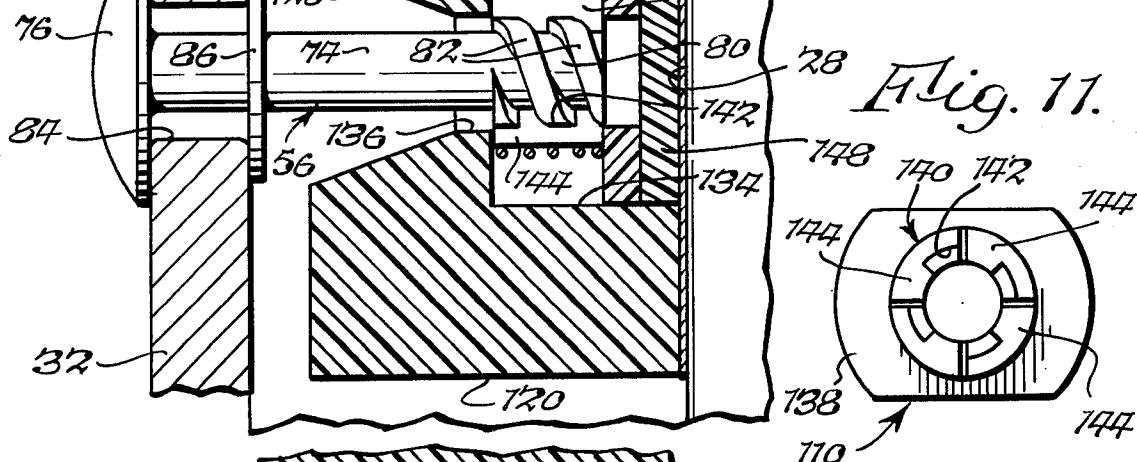
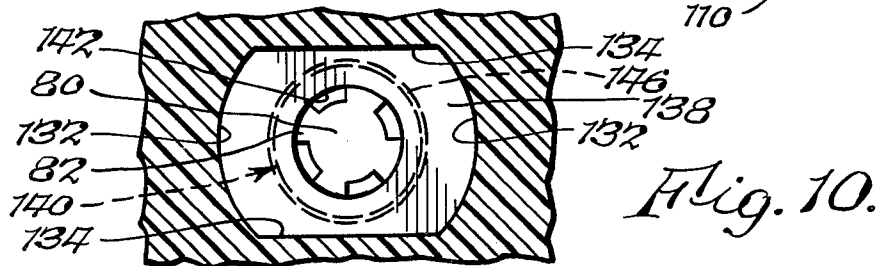


Fig. 7.





COLLAPSIBLE CONTAINER WITH IMPROVED FASTENER ASSEMBLIES

BACKGROUND OF THE INVENTION

This invention relates generally to containers and, more particularly, to collapsible containers formed of separable panels releasably secured together by novel fastener assemblies.

The handling and transportation of frozen foods and perishables from a remote location to the point of sale presents problems in preserving such products against spoilage. As a result, various vehicles and other product handling apparatus provided with refrigeration systems and equipment have been devised for transporting frozen foods and perishables. However, the equipment and power requirements for such refrigerated facilities are expensive, adding materially to the cost of transporting such products. Also, there is a possibility of spoilage when a breakdown in the refrigeration system occurs. Moreover, the transfer of these frozen foods and perishables from one refrigerated facility to another during the course of shipment to their final destination is inconvenient and time consuming, further adding to the costs of transportation and handling.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a new and improved container for preserving perishables against deterioration during storage and transport.

It is another object of this invention to form the foregoing container from a plurality of thermal insulating panels detachably secured together in a manner possessing the requisite stability and strength while being readily dismantled into a knocked down, compact, nested relation.

It is still another object of the present invention to provide a new and improved self-locking fastener assembly for quickly and easily connecting and disconnecting assembled parts.

It is a further object of this invention to provide a new and improved pallet for the foregoing assembled container and which serves as a skid for receiving and retaining the disassembled container panels in a knocked down, nested condition.

The foregoing and other objects, advantages, and characterizing features of the present invention will become clearly apparent from the ensuing detailed description thereof, taken together with the accompanying drawings wherein like reference numerals denote like parts throughout the various views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a container of this invention, shown supported on a pallet constructed in accordance with the present invention;

FIG. 2 is a perspective view, showing the container of FIG. 1 in a collapsed, knocked-down condition supported on the pallet;

FIG. 3 is a horizontal sectional view, on an enlarged scale, taken generally about on line 3—3 of FIG. 1 with portions shown in elevation;

FIG. 4 is a fragmentary side elevational view of a panel, showing a stud of the fastener assembly of this invention attached thereto;

FIG. 5 is a perspective view of the stud receiving element of the fastener assembly of this invention;

FIG. 6 is a perspective view of another form of stud receiving element of the fastener assembly of the present invention;

FIG. 7 is a fragmentary side elevational view of a pair of assembled panels, showing the stud receiving element of FIG. 6 in section;

FIG. 8 is a fragmentary side elevational view, partly in section, on an enlarged scale, showing still another form of stud receiving element of the fastener assembly of this invention;

FIG. 9 is a cross sectional view taken about on line 9—9 of FIG. 8;

FIG. 10 is a fragmentary sectional view, partly in end elevation, showing the head of an insert member employed in the form of stud receiving element shown in FIG. 8; and

FIG. 11 is an end elevational view of the insert member, illustrating the split shank thereof.

DETAILED DESCRIPTION OF AN ILLUSTRATIVE EMBODIMENT

Referring now in detail to the illustrative embodiment depicted in the accompanying drawings, there is shown in FIG. 1 a container, generally designated 10, constructed in accordance with this invention, comprising a plurality of lightweight, thermal insulating panel members 12 detachably secured together along their respective marginal edges by fastener assemblies, generally designated 14, hereinafter described in detail and constructed in accordance with this invention. While container 10 preferably is shown in the illustrative embodiment as being cubical in shape, whereby all panel members 12 are of identical dimensions, it should be understood that container 10 can have a rectangular or some other polygonal shape, if desired, within the purview of this invention.

As shown fragmentarily in FIG. 3, each panel member 12 includes a body 16 of insulating plastic foam material, such as polyurethane for example, completely covered by or sandwiched between an impervious inner skin 18 and an outer impervious skin 20 of plastic material, preferably impregnated and reinforced with fiberglass. Outer skin 20 can be painted or otherwise marked or decorated to provide any effect, as desired. Inner skin 18 is formed to provide an inner, planar wall 22 parallel to the plane of outer skin 20 and a peripheral wall having a chamfered or beveled surface 26 and a straight perimeter wall surface 28 normal to inner wall 22. The perimeter wall surface portion 28 is connected to a peripheral extension 29 at a rounded juncture 30, the extension 29 of inner skin 18 being joined to outer skin 20 to form a peripheral lip or flange 32 having a double wall thickness and extending beyond the marginal edges of panel body 16 in a direction normal to wall surface 28. The right angularly related wall surface 28 and flange 32 define a semi-square opening forming with the corresponding semi-square opening of an adjacent panel member 12 a substantially square shaped opening 34, as best shown in FIG. 3.

The polyurethane foam body 16 of panel member 12 provides insulation, minimizing the transmission of heat into the interior of container 10 and preventing any significant rise of temperature therein to preclude thawing of the frozen foods or spoilage of the perishables stored therein. The construction of panel members 12 offers strength, stability and high resistance against impact for withstanding the abuse they are sub-

jected to in normal usage. A container formed of panel members 12 is sufficiently strong to support other loaded containers 10 in a vertically stacked arrangement. The panel members 12 resist warpage, denting or scoring and the absorption of moisture. Also, panel members 12 provide smooth, impermeable surfaces which are readily cleaned and harsh scrubbing, steam cleaning, dipping and the like will not in any way corrode or adversely affect these panel members 12.

A feature of this invention resides in the provision of a lightweight pallet 40 for supporting one or more containers 10 in a stacked relation and which also serves as a skid for receiving panel members 12 in a knocked down, nested condition as shown in FIG. 2. Pallet 40 comprises a flat platform 42 of a generally rectangular configuration in plan and preferably formed of tempered hardboard. Platform 42 is adhesively or otherwise fixedly secured to and supported on a plurality of spaced blocks 44, preferably formed of a suitable wood. Blocks 44 are arranged in three rows of three blocks each in a manner enabling the tines of a fork lift vehicle to enter therebetween from any one of the four sides of the pallet 40. The four corner blocks 44 project slightly beyond the corners of platform 42 to provide upper exposed faces 46 provided with openings 48 for receiving the opposite ends of arcuately shaped, metallic retaining side rails 50 with a slip fit. These side rails 50 extend upwardly from each marginal edge of pallet 40 and serve to captively secure the assembled container 10 centrally on pallet 40 and also retain the disassembled panel members 12 in a compact, vertically nested relation, as shown in FIG. 2, for convenient storage and return shipment. Each side rail 50 preferably is formed of stainless steel and is slightly sprung or bowed inwardly or outwardly when inserting the same into openings 48 for providing a bias to more securely retain such ends in openings 48. Side rails 50 are readily removed from their associated blocks 44 in order to avoid interference with the loading or unloading of the containers into and out of an assembled container 10.

A significant feature of the present invention resides in the provision of fastener assemblies 14 mounted at spaced intervals along the panel member edges for quickly assembling and disassembling panel members 12. Each fastener assembly 14 comprises a stud receiving element in the form of a block 52 (FIGS. 3 and 5) having a tapped opening 54 therein and a threaded stud 56 for threaded engagement with tapped opening 54. Block 52 is composed of a resiliently yieldable synthetic plastic material, such as urethane for example, and preferably comprises a flat-sided body having a front end face 58, a rear end face 60, a top end face 62, a bottom end face 64 and a pair of side faces 66. It should be noted that the terms top, bottom, up, down, front, rear and similar terms of position or direction as used herein refer to the illustration in FIG. 3, but they are used only for convenience of description and should not be construed as limiting the scope of the present invention, it being understood that all blocks 52 are similarly oriented relative to their associated panel members 12, which may be disposed in any one of six different planes.

The juncture between rear face 60 and bottom face 64 is beveled, as shown at 70 in FIGS. 3 and 5, to insure a flush fit of block faces 60 and 64 with the straight wall surface 28 and flange 32 of the associated panel mem-

ber 12. Blocks 52 are attached to certain of the panel members 12 as component parts thereof with faces 60 and 64 of each block 52 being rigidly secured to surface 28 and flange 32 by a suitable adhesive 72.

The threaded studs 56 are attached to panel flanges 32 along those panel edges adapted to mate with the panel edges provided with blocks 52. The number of studs 56 provided along one flange 32 of a given panel member 12 corresponds to the number of blocks 52 provided in the associated edge of the adjacent panel member 12. It should be understood that the fastening studs 56 are provided only along certain panel edges, i.e. those edges adapted to mate with adjacent panel member edges having blocks 52 affixed thereto. As shown in the illustrative container 10 depicted in FIG. 1, the panel member 12 forming the top of container 10 has no studs 56 attached thereto, indicating that all four panel edges thereof are provided with stud receiving blocks 52. The right front panel member 12 shown in FIG. 1 is provided with studs 56 along the upper and lower horizontal edges only, indicating that the two vertical edges are provided with blocks 52 whereas the left front panel member 12 of FIG. 1 is provided with studs 56 along all four edges. This latter panel member 12 can be removed without disturbing the other panel members 12 so as to serve as an access opening for the entry and removal of contents when it is not desired or necessary to disassemble the entire container 10.

Each stud 56 (FIGS. 3 and 4) comprises a shank portion 74 having a head 76 provided with a slot 78 for receiving an appropriate hand tool. Shank 74 terminates in an enlarged diameter, threaded end portion 80 for engagement with the internally threaded opening 54. The pitch of each of the Acme-type, spiral threads 82 on stud 56 is relatively large, requiring only about a half turn of stud 56 for complete insertion and engagement of portion 80 into tapped opening 54. Stud 56 also is composed of a somewhat resiliently yieldable synthetic plastic material, such as urethane for example, but of a higher durometer rating than the material of which block 52 is formed. As a result, the softer or more resiliently yieldable, elastic internal threads of the tapped opening 54 firmly grip and embrace the harder threads of stud 56 to resiliently lock the latter in the completely assembled relation. This difference in the hardness between the internal threads of block 52 and the external threads 82 of stud 56 renders the fastener assembly 14 self-locking without the necessity of additional hardware as is otherwise required in many conventional fasteners.

Studs 56 are adapted to remain attached to panel members 12 once they are assembled therewith to form component parts thereof. To this end, suitable openings 84 are formed in panel member flanges 32 for receiving studs 56, which are threaded through split washers or retainer rings 86 adapted to seat on shank 74 to prevent withdrawal of studs 56 through openings 84 once the enlarged threaded end portions 80 of studs 56 are advanced past retainer rings 84. As shown in FIG. 3, the thickness of blocks 52 are substantially less than the width of opening 34 to provide a clearance for accommodating the threaded end portions 80 of studs 56 when disengaged from blocks 52. This enables studs 56 to be completely withdrawn from tapped openings 54 while remaining a permanent part of panel members 12, as described above.

In assembling panel members 12 together to form a container 10, the panel edges of one panel member 12 provided with studs 56 are mated with those edges of another right angularly related panel member 12 having blocks 52 affixed thereto. Studs 56 are then turned clockwise approximately a half turn to fully thread the portions 80 thereof into the associated tapped openings 54 to detachably secure the two edges together and bring their associated beveled surfaces 26 into a snug, abutting relation to form a fluid-tight connection therebetween. If desired, a gasket or other suitable resiliently yieldable sealing means may be interposed between beveled surfaces 26 to positively insure a fluid-tight connection. When assembled, a slight clearance exists between the opposed ends of adjacent flanges 32, as shown in FIG. 3, to avoid abutment thereof against each other and possibly prevent a tight, flush fit between beveled surfaces 26. As earlier described, the elasticity of the softer internal threads defining tapped openings 54 serves to lock the harder threads 82 of studs 56 in place to prevent loosening thereof during the handling and transportation of container 10.

All the panel members 12 are similarly attached along their marginal edges to the edges of adjacent, right angularly related panel members 12 to quickly and easily assemble a container 10. One panel member 12, preferably the one having studs 56 mounted along each marginal edge thereof, such as the left front panel member 12 depicted in FIG. 1, remains detached until container 10 is filled with the contents to be shipped. If desired, ice bags or other coolant devices may be placed in container 10 along with the contents thereof to maintain the same at desired lower temperatures.

When completely assembled and loaded, containers 10 can be readily placed in or on cargo carriers, such as trucks, trailers, freight cars and the like with a minimum of handling and shipped in a stacked arrangement to conserve space. When containers 10 are emptied of their contents, they can be quickly and easily disassembled into a collapsed condition by simply threading studs 56 out of their associated tapped openings 54.

Pallets 40 can be shipped along with the loaded containers 10 as a component part thereof for convenience in handling at the point of destination. Also, pallets 40 serve as skids for receiving the disassembled panel members 12 in a knocked-down, stacked condition, as shown in FIG. 2. The disassembled panel members 12 nest securely within side rails 50 of pallet 40 and occupy only about one-third of the space of an assembled container 10 for conserving space in storage and return back to the point of origin.

FIGS. 6 and 7 illustrate another form of block 52' for the fastener assembly 14 of the present invention, which is formed of the same material and serves the same purpose as the block 52 of the form of the invention described in connection with FIGS. 3-5. A tapped opening 54' is formed in block 52' for receiving a threaded stud 56, which passes through flange opening 84 and split retainer ring 86. Block 52' comprises a flat sided body having a front face 90, a rear face 92, a top face 94 as viewed in FIG. 7, a bottom face 96, and a pair of side faces 98. The juncture between rear faces 92 and bottom face 96 is beveled, as shown at 100 in FIGS. 6 and 7, to insure a flush fit of block faces 92 and 96 with the straight wall surface 28 and flange 32 of the associated panel member 12. These faces 92 and 96 are rigidly secured to surface 28 and flange 32 of the asso-

ciated panel member 12 by adhesive 72. Also, since block 52' is of a thickness approximately the width of an opening 34, a beveled surface 102 is formed at the intersection of front face 90 and top face 94 to avoid interference with juncture 30 at such intersection.

In order to provide clearance for the threaded end portion 80 of stud 56 when disengaged from tapped opening 54', a groove 104 is provided in block front face 90 and extends from top face 94 downwardly to bottom face 96. Thus, the threaded end portion 80 of stud 56 can be completely threaded out of engagement with tapped opening 54' for disposal in groove 104 in order to remain attached to the panel member flange 32 as a permanent part thereof.

FIGS. 8-11 depict still another form of block 52'' incorporated in the fastener assembly 14 of this invention, the block 52'' having a construction somewhat like that of block 52' of FIG. 6, but having an insert member, generally designated 110, incorporated therein. Block 52'' is formed of the same material as that of block 52' and comprises a flat sided body having a front face 112, a rear face 114, a top face 116 as viewed in FIG. 8, a bottom face 118, and a pair of side faces 120. The juncture between rear face 114 and bottom face 118 is beveled, as shown at 122 in FIG. 8, to insure a flush fit of block faces 114 and 118 with the straight, angularly related straight wall surface 28 and flange 32 of the associated panel member 12. As in the previous embodiments described, these faces 114 and 118 are rigidly secured to surface 28 and flange 32 of the associated panel member 12 by adhesive 72. Also, a beveled surface 124 is provided at the intersection of front face 112 and top face 116 to avoid interference with juncture 30 at such intersection.

Block 52' has the same outside dimensions as block 52'' and is formed of the same resiliently yieldable material as the latter. Also, a groove 126 is formed in block front face 112 and extends from top face 116 downwardly to bottom face 118 in the same manner and for the same purpose described in connection with the groove 104 of block 52'.

However, in lieu of a tapped opening for receiving the threaded stud 56, block 52' is provided with insert member 110 which has a tapped opening for threadably receiving stud 56. To this end, a cavity 130 is formed in rear face 114 and, as shown in FIG. 10, is defined by a pair of opposed, arcuate side walls 132 and a pair of opposed, flat, parallel side walls 134. A passage 136 is formed between cavity 130 and groove 126 for receiving the shank 74 of stud 56.

Insert member 110, preferably formed of the same material as block 52'', is received within cavity 130 and is provided with a head formation 138 (FIG. 10) having an outer configuration complimentary to the shape of cavity 130 for preventing rotation of insert member 110 therein. A split shank 140 projects axially outwardly from head formation 138 and is formed to provide an internally threaded or tapped opening 142 for receiving the stud threaded end portion 80. Shank 140 is slitted axially along the length thereof at four equally, circumferentially spaced apart lines to form four axially extending, threaded segments 144 constituting the tapped opening 142. These segments 144 are normally urged radially inwardly by a spring 146 wound tightly about the segments 144 to provide a tapped opening just slightly smaller in diameter than the diameter of stud threaded portion 80. As stud 56 is threaded into

opening 142, the segments 144 will yield and be urged radially outwardly against the bias of spring 146. The radial compression of the spring 146 acting against the segments 144 insures a tight self locking fastening engagement.

A suitable plastic plug 148, having a configuration complimentary to cavity 130 and outside dimensions just slightly smaller than cavity 130, is slip fitted thereto. As shown in FIG. 9, this plug 148 fills the space between insert head formation 138 and the panel wall surface 28 and urges the inner face of insert member shank 140 against an abutment shoulder 150 defined by the inner end wall of cavity 130.

The form of the invention illustrated in FIGS. 8-11 offers a tighter self locking fastening assembly than that afforded by the fastening assemblies of FIGS. 3 and 7 to insure a complete fastened engagement under the most severe conditions of vibration encountered in handling and shipping.

From the foregoing, it is apparent that the objects of the present invention have been fully accomplished. As a result of this invention, an improved, lightweight container, formed of a plurality of strong, rigid panel members, is provided for preserving frozen foods and perishables against deterioration during storage and transport. By the provision of the novel fastener assemblies of this invention, the panel members are quickly and easily assembled for use and readily disassembled into a knocked down, compact condition for storage or return shipment. Each fastener assembly comprises a threaded stud formed of a plastic material and a block having a tapped opening therein and formed of a plastic material having a lower durometer rating than the stud to yieldably lock the stud thereto in the fully fastened condition. The relatively large pitch of the thread formation of the stud and associated opening requires only about a half turn of the stud to effect complete engagement or disengagement with the associated tapped opening. A novel pallet is provided for shipment along with the container to facilitate handling thereof and serves as a skid in receiving the disassembled panel members in a knocked down, nested relation for storage and return shipment.

Preferred embodiments of this invention having been disclosed in detail, it is to be understood that this has been done by way of illustration only.

We claim:

1. A container comprising: a plurality of right angularly related panel members each comprising a body of insulating material covered by a skin of plastic material; said skin of each of said panel members being formed to provide an inner wall surface and a perimeter wall surface extending normal to said inner wall surface and a beveled surface joining said inner wall surface to said perimeter wall surface; said skin terminating in a peripheral flange projecting laterally outwardly from said panel member body; the beveled surfaces of adjacent, right angularly related panel members disposed in an abutting relation with the ends of said flanges thereof being slightly spaced from each other; and means for detachably fastening adjacent edges of said right angularly related panel members together.

2. A container according to claim 1 wherein said fastening means comprises a plurality of fastener assemblies each including a stud and a stud receiving element; said stud projecting through a flange of one of said panel members and having a threaded end portion;

5 said stud receiving element secured at least to the inner surface of the flange of an adjacent right angularly related panel member and having a tapped opening therein for receiving said stud threaded end portion.

3. A container according to claim 2 wherein said flanges of adjacent, right angularly related panel members define therebetween an opening extending lengthwise of said flanges; and said stud receiving element mounted within said opening with said tapped opening facing said flange of said one panel member.

4. A container according to claim 3 including means adhesively securing said stud receiving element to said flange and said perimeter wall surface of the other of said right angularly related panel members to form a permanent part thereof.

5. A container according to claim 2 including a washer mounted on said stud on the inner side of said one panel member flange to prevent withdrawal of the threaded end portion of said stud therethrough and disengagement thereof from said flange.

6. A container according to claim 5 wherein said stud receiving element is provided with a longitudinal groove communicating with said tapped opening and extending in a direction normal thereto to provide clearance for the threaded end portion of said stud when disengaged from said tapped opening.

7. A container according to claim 2 wherein said stud threaded end portion has a relatively large pitch to effect complete engagement and disengagement thereof with said tapped opening upon rotation of said stud of approximately a half turn.

8. A container according to claim 2 wherein said stud receiving element is formed of a synthetic plastic material having a lower durometer rating than said stud to resiliently lock said stud threaded end portion in said tapped opening.

9. A container according to claim 1 wherein said fastening means comprises a plurality of fastener assemblies each including a stud and a block; said stud projecting through a flange of one of said panel members and having a threaded end portion; said block secured at least to the inner surface of the flange of an adjacent right angularly related panel member; an insert member mounted in said block and having a tapped opening therein for receiving said stud threaded end portion.

10. A container according to claim 9 wherein said insert member is provided with a shank having said tapped opening formed therein; said shank being slitted axially to form a plurality of resilient segments; and spring means biasing said segments radially inwardly to lockingly engage the external threads of said stud.

11. A container according to claim 1 in combination with a pallet for supporting said container; said pallet comprising a platform mounted on a plurality of spaced blocks; said pallet having upright side rails for supporting an assembled container substantially centrally on said platform and for retaining the disassembled panel members of a knocked down container in a nested condition.

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