

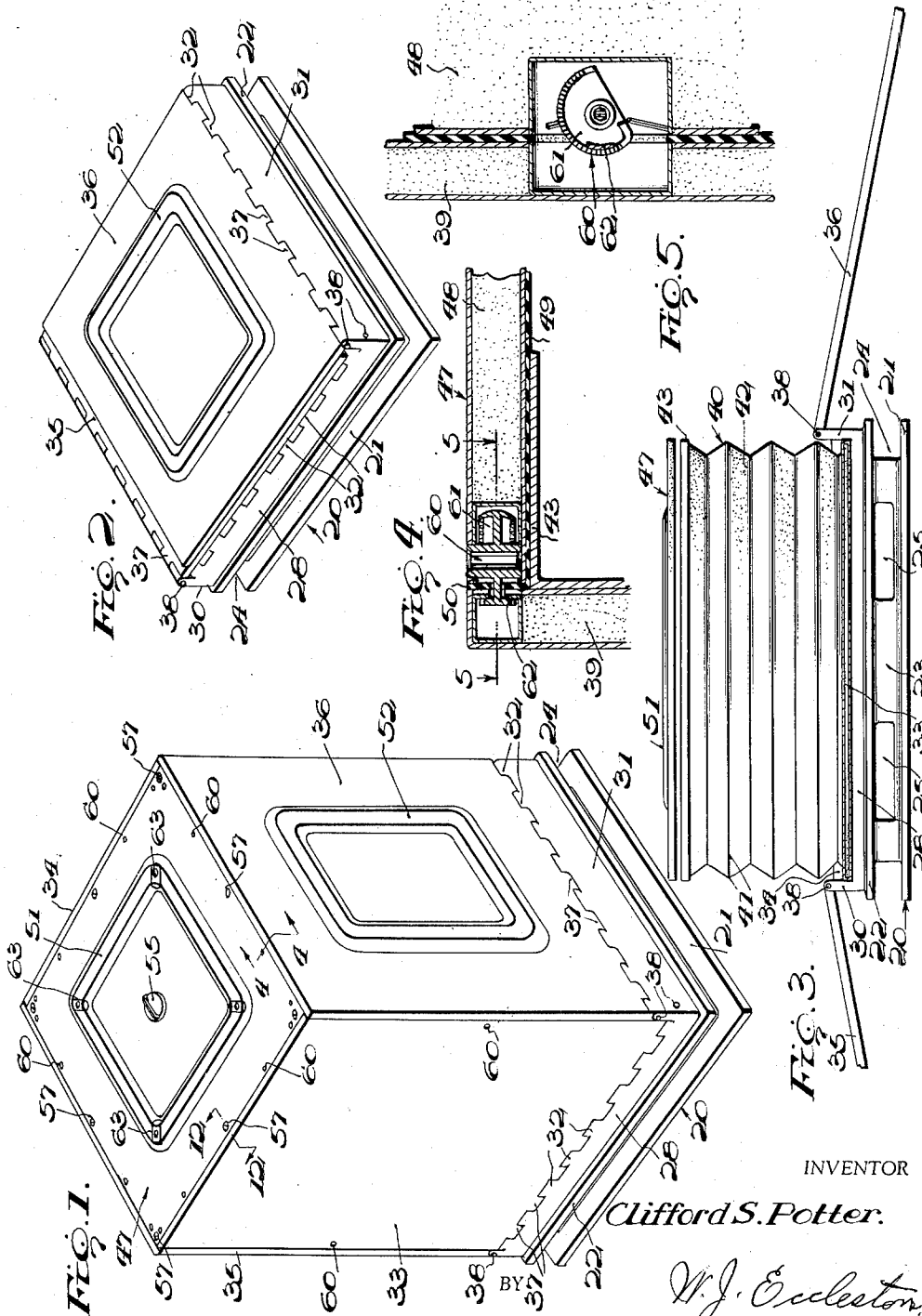
Sept. 13, 1960

C. S. POTTER
COLLAPSIBLE CONTAINERS

2,952,379

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4 Sheets-Sheet 1



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4 Sheets-Sheet 2

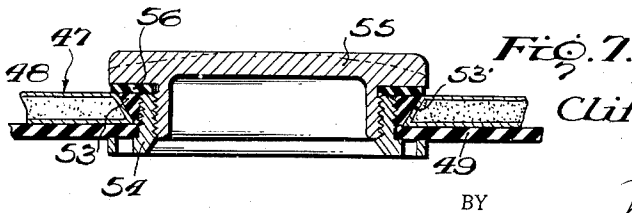
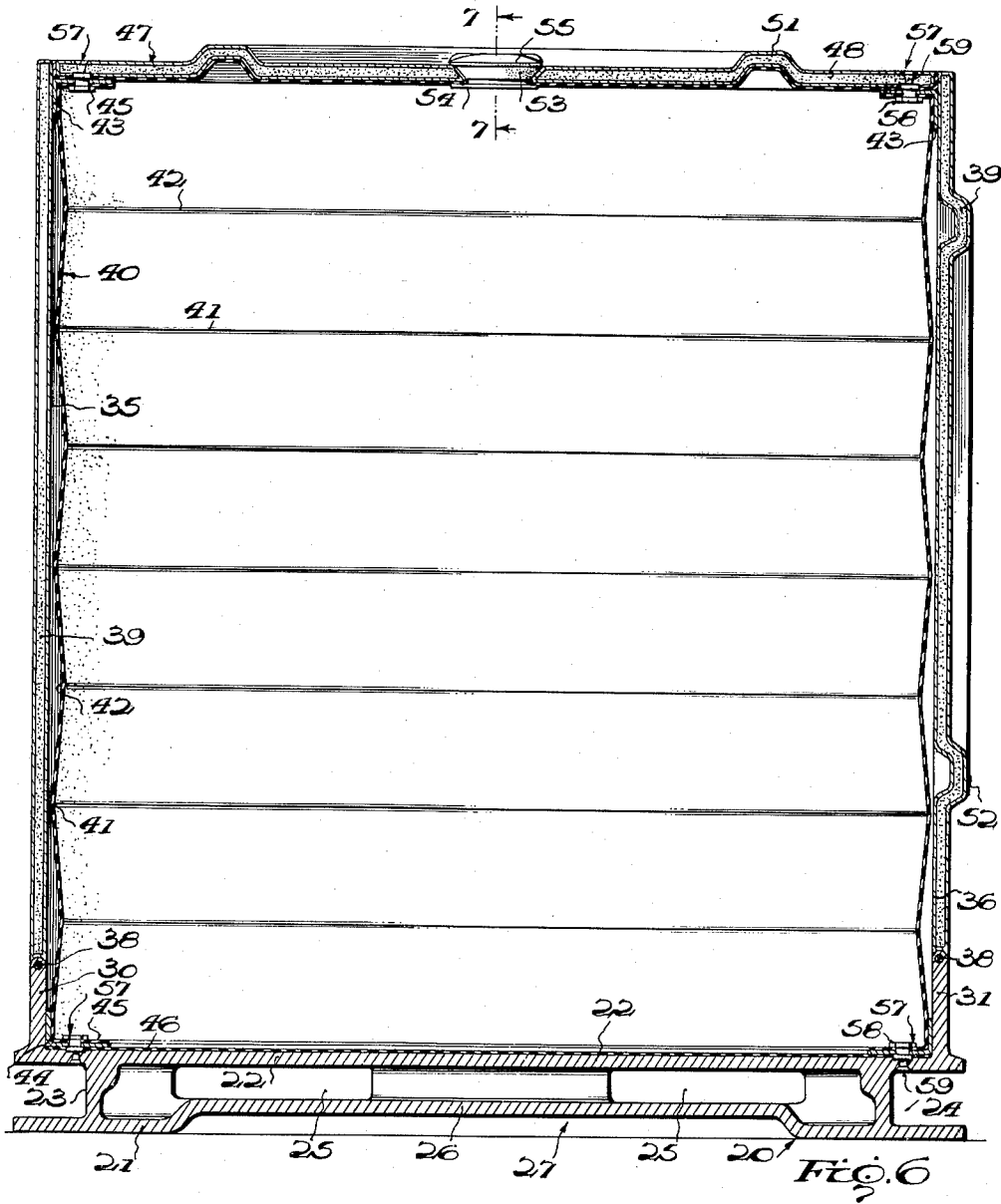


FIG. 7.

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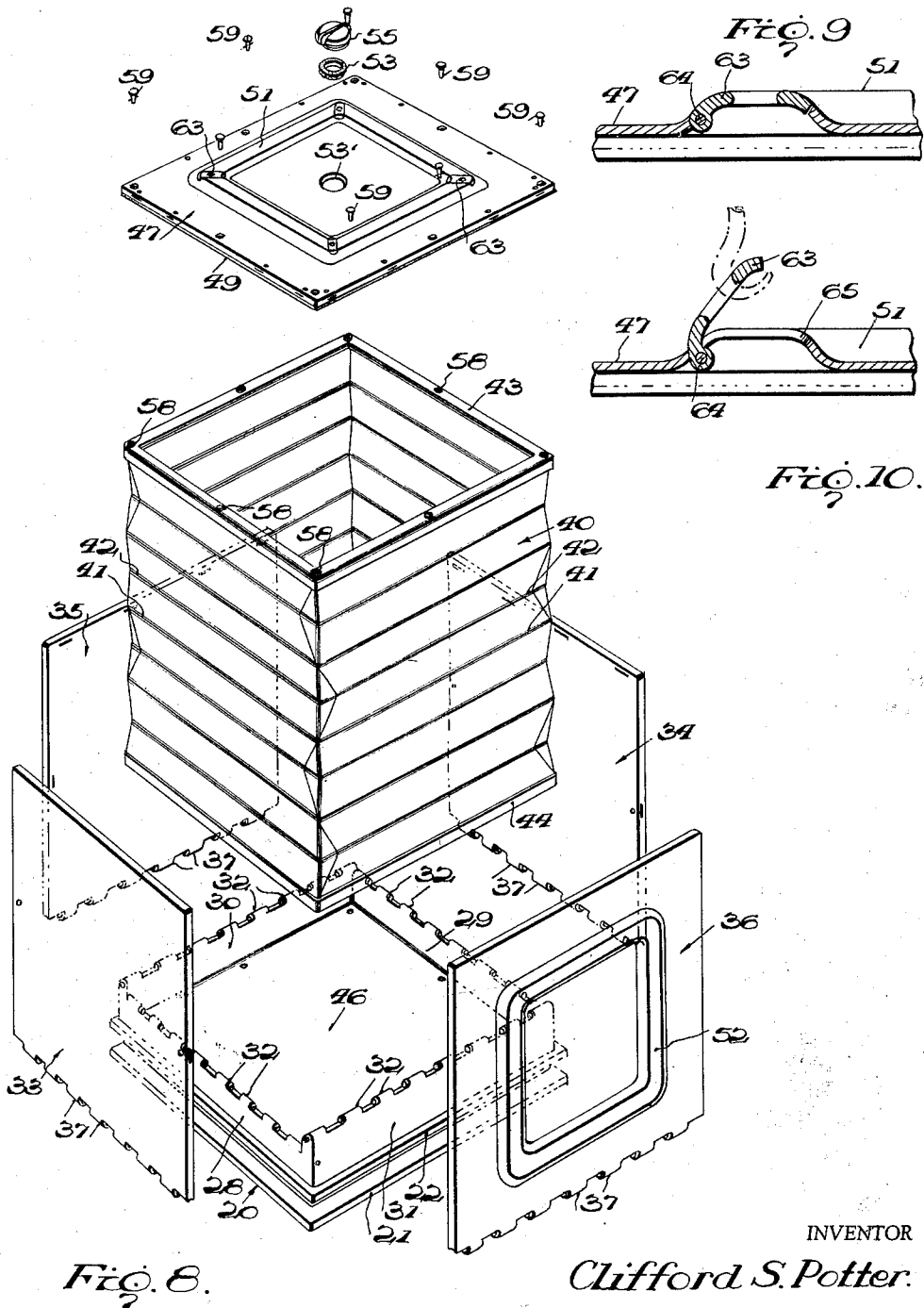
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4 Sheets-Sheet 3



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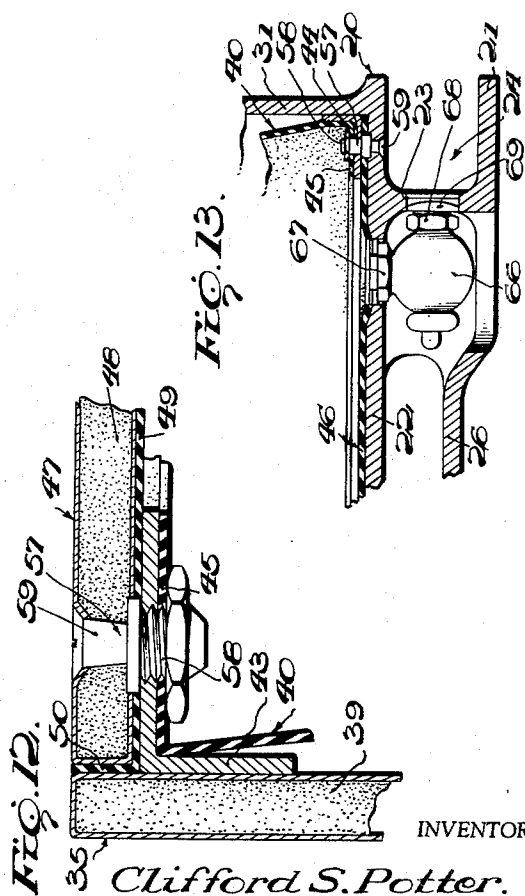
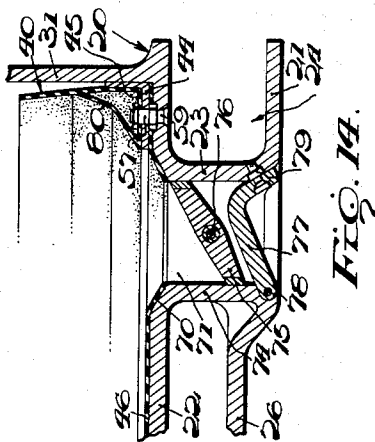
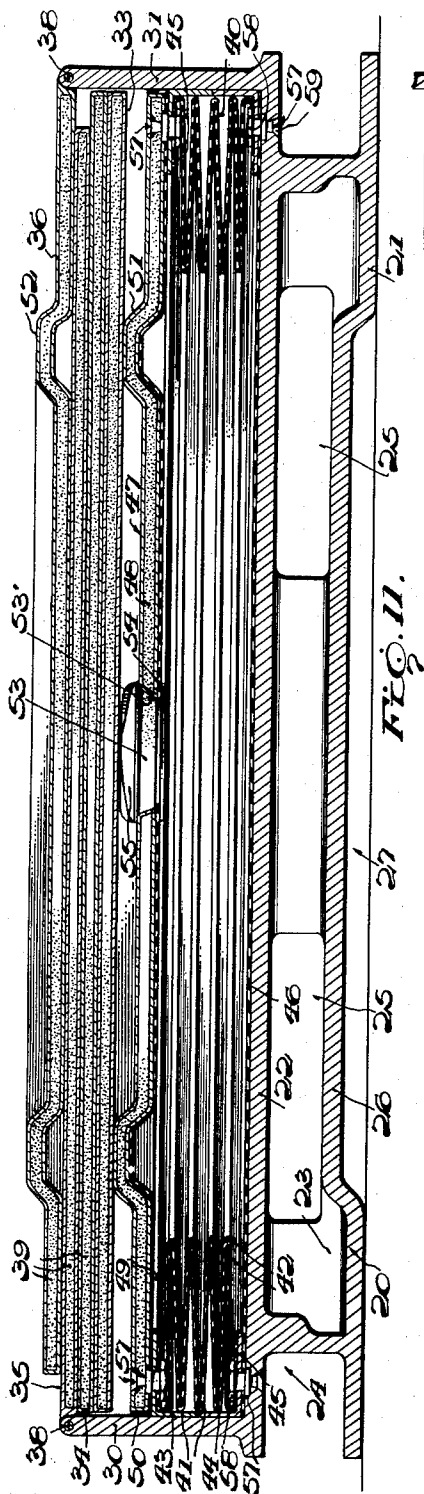
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COLLAPSIBLE CONTAINERS

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4 Sheets-Sheet 4



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COLLAPSIBLE CONTAINERS

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9 Claims. (Cl. 220—6)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein, if patented, may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to collapsible containers.

The present invention constitutes an improvement of the construction disclosed in my application Serial No. 260,293, filed December 6, 1951, for Collapsible Container, now Patent No. 2,720,998, granted October 18, 1955.

A primary object of the invention is to provide a re-usable shipping container having an integral pallet base to facilitate handling the same with conventional materials handling equipment, the container being collapsible for return shipment while empty, thereby greatly reducing the space required to accommodate a large number of empty containers.

Another object of the invention is to provide a re-usable collapsible container having means to facilitate stacking the same while in the collapsed or extended position.

Another object is to provide a container which may handle solids, semi-solids or granular material and liquids.

Another object is to provide a container of the above-mentioned character which is rigid and extremely sturdy while in the extended or operative condition for holding various types of material, yet lightweight and relatively inexpensive to manufacture.

Among the specific advantages of my re-usable container hereinafter described are as follows:

(1) Approximately 85% reduction of cubage while collapsed for return shipment or storage while empty.

(2) Maximum protection to contents from the elements, pilferage, rodents, contamination, etc.

(3) Eliminates a tremendous waste of lumber, banding steel, paper sacks, etc., presently employed in the construction of commercial containers and crates and the wooden pallets for handling the same.

(4) Greatly minimizes time and labor required for packaging and handling a wide variety of bulk commodities.

(5) Allows maximum utilization of storage and shipping space due to rectangular construction.

(6) Eliminates fire and safety hazards involved in the use of expendable type packaging and crating materials.

(7) Forms an integral unit preventing misplacement or misuse of component parts.

(8) Allows economical cleaning and maintenance of the container for indefinite re-use.

(9) Eliminates the need for covered storage or shipping facilities and separate pallets for handling and stacking of containers.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

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Figure 1 is a perspective view of a container in accordance with the present invention, and shown in the extended or operative condition for housing the desired material,

5 Figure 2 is a further perspective view of the container in the collapsed condition for storage or return shipment while empty,

Figure 3 is a side elevation of the container in an intermediate position with the rigid side panels thereof lowered and the flexible liner or sleeve partly extended,

10 Figure 4 is an enlarged fragmentary vertical section taken on line 4—4 of Figure 1,

Figure 5 is a fragmentary horizontal section taken on line 5—5 of Figure 4,

15 Figure 6 is a central vertical section through the container in the extended position,

Figure 7 is an enlarged fragmentary vertical section taken on line 7—7 of Figure 6,

20 Figure 8 is an exploded perspective view of the container,

Figure 9 is an enlarged fragmentary vertical section through an adjustable lifting element and associated elements on the top of the container,

25 Figure 10 is a similar section through the lifting element while adjusted to be engaged by a lifting hook or implement,

Figure 11 is an enlarged vertical section through the entire container in the collapsed condition,

30 Figure 12 is an enlarged fragmentary vertical section taken on the line 12—12 of Figure 1,

Figure 13 is a fragmentary vertical section through a modified form of integral pallet base showing means to facilitate the discharge of liquids from the bottom of the container, and,

35 Figure 14 is a similar view of a further modified form of pallet base having means to facilitate the discharge of granular material from the bottom of the container.

In the drawings, where for the purpose of illustration are shown preferred embodiments of the invention, attention is directed first to Figures 1 to 12 inclusive, wherein the numeral 20 designates generally a pallet base for the container, and constituting a permanent or integral part of the same. The pallet base 20 embodies a pair of vertically spaced superposed rectangular plates 21 and 22, integrally joined together near and inwardly of their marginal edges by a vertical wall 23. The wall 23 forms with marginal portions of the plates 21 and 22 a continuous marginal recess or groove 24 about the four sides of the pallet base 20 for the reception of horizontal bars of a conventional lifting sling or the like. The groove 24 is preferably rectangular in cross section, as shown. At each of the four sides of the pallet base 20, the vertical wall 23 has a pair of spaced slots 25 formed therethrough, in alignment with the corresponding slots 25 at the opposite side of the base, and these pairs of slots render the pallet base capable of receiving the lifting forks of a conventional fork-lift truck from any side of the rectangular container. The upper horizontal wall 22 of the pallet base 20 is flat, as shown, whereas the bottom wall 21 is provided centrally with an upwardly offset horizontal rectangular portion 26 forming a central rectangular recess 27 in the bottom of the pallet base 20 to facilitate stacking the containers, as will be more fully described.

65 Upstanding vertical walls 28, 29, 30 and 31 are integrally secured to the upper horizontal wall 22, near and inwardly of the marginal edges of the same. These vertical walls 28, 29, 30 and 31 extend above the horizontal wall 22 for a relatively short distance and have their upper edges formed to provide a plurality of spaced hinge knuckles 32, arranged about the four sides of the pallet base, as best shown in Figure 8. The heights of

the walls 28, 29, 30 and 31 and the elevation of the hinge knuckles 32 of each wall are unequal, as shown, for a purpose to be described. The wall 28 and its hinge knuckles 32 is slightly lower than the wall 29, which in turn is slightly lower than the wall 30, which in turn is lower than the wall 31.

Four rigid rectangular side panels 33, 34, 35 and 36 are provided, and each of these side panels is provided along its lower edge with a plurality of spaced hinge knuckles 37, adapted to interfit with the hinge knuckles 32 of the adjacent walls 28, 29, 30 and 31. The side panels 33-36 are hingedly secured to the walls 28-31 by means of long hinge pins 38 which engage through the sets of interfitting hinge knuckles 32 and 37, whereby the side panels are freely swingable in vertical planes about their lower edges. When the side panels 33-36 are vertically disposed, Figure 6, their upper edges are at the same elevation, thus, the side panels are unequal in vertical length by the same amounts that the upstanding walls 30-31 are unequal in height.

For the sake of lightness, each of the side panel 33-36 is preferably hollow in construction, as shown, and the interiors of the side panels may be filled with suitable heat-insulating material 39, a honeycomb type strengthening core, or the like, as found desirable.

A rectangular open-ended accordion-pleated liner or sleeve 40 is provided, and preferably formed of rubberized fabric, cord reinforced rubber, plastics material, or the like. The sleeve or liner 40 is preferably air and liquid-tight, and the material of the liner is flexible and tough. The accordion pleated side walls of the liner 40 have their pleats arranged so that corresponding apexes 41 and valleys 42 on all four sides of the liner remain at the same elevation when the liner is extended or collapsed, Figure 8. With this pleating arrangement, the liner 40 is caused to collapse evenly in the manner shown in Figure 11.

End rigid rectangular frames 43 and 44, L-shaped in cross section are permanently secured by cementing, vulcanizing, or the like to inwardly directed marginal flanges 45 of the liner adjacent its top and bottom ends. The flanges 45 and the horizontal webs of the frames 43 and 44 project inwardly of the side walls of the liner 40 for a small distance only, as shown, so that the flexible liner has its opposite ends substantially entirely open. The lower rectangular frame 44 has its vertical web arranged snugly inside of the upstanding walls 28-31 as shown in Figure 6. If desired, the upper face of the horizontal wall 22 may be coated or covered at 46 with rubber or some suitable tough plastic coating composition. The lower rigid frame 44 may rest directly upon this coating 46, as shown in Figure 6. The coating 46 may be omitted entirely, if desired.

A removable rectangular top cover plate 47 is provided, and this cover plate like the side panels 33-36 is preferably hollow and preferably has its interior filled with insulating material 48, a honeycomb type lightweight strengthening core, or the like. The underside and the marginal edges of the cover plate 47 are coated with rubber, plastics material, or the like as shown at 49 and 50, Figure 12, although this coating may be omitted if desired. The cover plate 47 is adapted to engage the top of the rigid frame 43 of the collapsible sleeve 40 when such sleeve is elevated, Figure 6, and the inner faces of the side panels 33-36 are adapted to engage the marginal edges of the cover plate 47 as shown in Figure 6, the top face of the cover plate then being flush with the top edges of the side panels. The cover plate 47 is embossed or formed to provide a large central rectangular upstanding rib 51 thereon for interfitting engagement with the recess 27 in the pallet base 20 of another container to be stacked upon the container shown in the drawings, thus rendering the containers stable while stacked. A similar outwardly projecting rib 52 is preferably formed upon the

side panel 36, centrally thereof to facilitate stacking the containers when they are collapsed, as shown in Figure 2, the side panel 36 then being arranged uppermost, as will be further described. The cover plate 47 is further provided with a central relatively small opening 53' having a screw-threaded bushing 53 of hard plastics material or the like arranged therein, for receiving an upwardly directed internally and externally screw-threaded nut 54. A screw-threaded closure cap 55 engages within the tubular nut 54 and has its head engaging a compressible gasket 56, which in turn rests upon the bushing 53, Figure 7, to thereby form a liquid and gas-tight closure centrally within the cover plate 47.

Means are provided to detachably secure the cover plate 47 to the top rigid frame 43 and to detachably secure the lower rigid frame 44 to the upper wall 22 of the pallet base 20. Such means comprises a plurality of conventional quick-release fasteners 57 arranged near the four corners of the cover plate 47 and upper wall 22 and near the longitudinal centers of the four sides of the cover plate and upper wall 22. As shown in Figure 12, each quick release fastener 57 embodies a female element 58, permanently rigidly secured within an opening of the upper frame 43 and lower frame 44. Each fastener 57 further comprises a removable male element 59 engageable with the female element 58 and passing through a suitable opening of the cover plate 47 and upper wall 22. By this means, the cover plate 47 may be quickly disconnected from the liner 40, and the bottom of the liner may be quickly disconnected from the pallet base 20.

Means are also provided to releasably lock the side panels 33-36 in elevated positions, Figure 1. Such means comprises a plurality of conventional quick-action cam fasteners 60 spaced equidistantly about the marginal edges of the cover plate 47, and midway between adjacent pairs of the fasteners 57, Figure 1. Each fastener 60 comprises a rotatable cam part 61 mortised or recessed within one marginal edge of the cover plate 47, as shown in Figure 5. Each fastener 60 further comprises a fixed locking element or detent 62, recessed into the inner side of one side panel 33, 34, 35 or 36, near the top edge of the same, Figure 5. The rotatable cam parts 61 are turned into engagement with the fixed detents 62, Figure 5, with a wrench from the top face of the cover plate 47, but no part of the fastener 60 projects above the top face of the cover plate 47. Likewise, the quick-release fasteners 57 are flush with the top face of the cover plate 47 and flush with the bottom face of the wall 22. Additional quick-action cam fasteners 60 may be provided, if desired, near the vertical centers of the side panels 33-36 as indicated in Figure 1 for further rigidly securing the side panels in upright position. Such additional cam fasteners 60 are mortised or recessed within the side panels in a manner similar to that shown in Figure 5. If preferred, these additional cam fasteners may be omitted near the vertical centers of the side panels 33-36.

To facilitate lifting or extending the collapsible liner 40 while the cover plate 47 is secured thereto, four lifting eyes or rings 63 are pivoted at 64 adjacent the corners of the embossing or rib 51 of cover plate 47. The eyes 63 are recessed into the rib 51, as shown at 65 so as to be flush with the rib when in the lowered position, Figure 9. The eyes 63 are swung upwardly as shown in Figure 10 for engagement with lifting hooks or the like.

The pallet base 20 is shown modified in Figure 13 to facilitate the discharge of liquid material from the bottom of the container. Adjacent one corner of the pallet base 20, just inwardly of the web 23 is arranged a globe-type right angle outlet valve 66 having a fluid-tight connection at 67 through the wall 22 of the pallet base, and a similar fluid-tight connection at 68 through the web 23 of the pallet base. A removable seal plug 69 is provided for the outlet side of the valve 66, which plug is removed for connecting the valve to a discharging hose line, or the

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like. The inlet side of the valve at 67 communicates with the interior of the liner 40 above the horizontal wall 22, Figure 13. All other parts of the device are identical with those shown and described in connection with the preferred form of the invention.

In Figure 14, the pallet base 20 is further modified to allow the discharging of granular material, and the like, from the bottom of the container. Along one side of the container, the wall 22 is provided with a discharge slot or passage 70 leading to an elongated vertical passage 71 formed by the vertical web 23 and a companion inwardly spaced vertical web 74 formed upon the modified pallet base. An outlet control and agitator blade 75 is pivoted at 76 within the passage 71, and may be turned at one side of the container by a crank or the like, not shown, from the inclined position of Figure 14 to a vertical position allowing downward discharging of the granular material through the passage 71. A vertically swingable closure member or plate 77 is pivoted at 78 to the bottom of the pallet base 20, and releasably held in closed position by quick-release fasteners 79, such as the fasteners 57, previously described. As shown in Figure 14, an inclined gusset 80 may be secured within the lower corner of the collapsible sleeve 40 adjacent the outer side of the discharge slot 70, so that the granular material will not accumulate in such outer corner of the container.

All other parts are identical with those shown and described in connection with the first and preferred form of the invention. When the construction of Figure 14 is used, the lifting forks of the lift truck can approach the container from three sides only of the pallet base 20, as the blade 75 and associated elements will block off or eliminate one pair of the slots 25.

In the use of the device, the side panels 33-36 may be lowered or swung outwardly as shown in Figure 3 and the extensible sleeve or liner 40 may be elevated while the cover plate 47 is secured thereto by the use of the pivotal eyes 63. Fluid or granular material may be introduced into the liner 40 through the opening having the closure cap 55. If a solid object such as a piece of machinery or the like is to be placed within the container, the cover plate 47 is of course bodily removed and the liner 40 is extended upwardly to encompass the solid object, and the cover plate 47 is then locked in place over the object by means of the quick release fasteners 57.

In any case, after the liner 40 is filled and is in the elevated position by virtue of the cover plate 47 resting upon the contents, the side panels 33-36 are swung upwardly and locked to each other and to the edges of the cover plate by means of the cam fasteners 60. The container will then assume the condition shown in Figure 1. In this condition, the rib 51 of the cover plate is arranged uppermost and projects above the closure cap 55 and all other parts of the container. Another container, or a plurality of them may be readily stacked upon the container of Figure 1, with the rib 51 interfitting in the recess 27 of the next uppermost container, and so on. This interfitting relationship of the ribs 51 and recesses 27 provides stability for the stack of containers so that they will not shift laterally in the stack during transportation by means of a fork-lift truck, bar sling, or the like. It should be understood that the slots 25 of the pallet base 20 may now receive the lifting forks of a lift truck, and the marginal passage 24 may receive the bars of a bar type sling, if preferred. When the container is emptied by removal of the cover plate 47, plug 55, or by the means shown in Figures 13 and 14, the accordion-pleated liner 40 may be collapsed flat upon the top wall 22 of the pallet base, Figure 11, while the cover plate 47 is secured thereto. When this is done, the entire liner 40 including the upper frame 43 and cover plate 47 rests snugly inside of the low upstanding walls 28-31, with the cover plate 47 arranged somewhat below the tops of these walls. An important feature of this invention shown clearly in

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Figure 11 is the contacting relation of the marginal vertical webs or sides of the L-shaped frames 43 and 44 when the liner 40 is collapsed upon the pallet base and inwardly of the walls 28-31. The vertical webs of the frames 43 and 44 meet or contact as shown in Figure 11 near the vertical center of the collapsed sleeve 40 and render the same stable and rigid so that the weight of the hinged side panels 33-36 is borne directly by the frames 43 and 44 and the rigid pallet base 20, rather than by the flexible sleeve 40.

After the collapsing of the sleeve or liner 40, as above described, the side panel 33 is swung inwardly and downwardly to lie level upon the rib 51 of the cover plate 47, Figure 11. Next, the side panel 34 is swung inwardly and downwardly to lie flat and horizontal upon the side panel 33. Next, the side panel 35 is swung inwardly and downwardly to lie flat and horizontal upon the side panel 34. Finally, the side panel 36 is swung inwardly and downwardly to lie flat and horizontal upon the side panel 35, Figure 11. It is thus seen that all of the collapsed side panels 33-36 are now nested snugly within the four walls 28-31, with only the rib 52 of the side panel 36 projecting upwardly above the side panel 36 and above the walls 33-36. All of the side panels are now horizontally disposed in superposed contacting relation, and rest upon the upper frame 43 of the flexible liner 40, which in turn rests upon the lower frame 40 to form a rigid and stable collapsed unit which is very low and compact, see Figure 11.

The rib 52 now facilitates stacking or nesting of a plurality of the collapsed containers in the same manner that the rib 51 facilitates stacking of the extended containers.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A collapsible re-usable container comprising a pallet base, relatively low upstanding walls permanently secured to the pallet base and extending about the margin of the pallet base, side panels having corresponding ends hingedly secured to the tops of the upstanding walls and being vertically swingable, a flexible collapsible and extensible sleeve, substantially rigid frames secured to the opposite ends of said sleeve, means for securing one of said frames to the pallet base inwardly of said side walls, a cover plate for the end of the sleeve remote from said pallet base, and means for securing the cover plate to the other of said frames, the cover plate and said other frame being movable toward the pallet base when the sleeve is collapsed upon the pallet base, the cover plate and said other frame then engaging inwardly of said side walls and said frames then contacting, the side panels being foldable inwardly to substantially horizontal superposed contacting positions upon the top of the cover plate and inwardly of said side walls.

2. A collapsible re-usable container comprising a rectangular pallet base, relatively low upstanding side walls secured to the pallet base adjacent the marginal sides of the same, a corresponding number of substantially rigid rectangular side panels having corresponding ends hinged to said side walls and being vertically swingable, a rectangular open-ended flexible sleeve arranged above the pallet base and extensible therefrom and collapsible onto the pallet base, a first rectangular substantially rigid frame secured to the lower end of said sleeve and secured to the top of the pallet base inwardly of said side walls, a companion rectangular substantially rigid frame secured to the upper end of the sleeve in opposition to said first frame, a rectangular cover plate secured to the companion frame and movable therewith toward and from the pallet base when the sleeve is collapsed and extended, said cover

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plate and companion frame being engageable inwardly of the side walls and the companion frame abutting and resting upon the first frame when the sleeve is collapsed onto the pallet base, said side panels being then swingable inwardly to substantially horizontal superposed contacting positions upon the top of the cover plate and inwardly of the side walls, and means for detachably securing the side panels to said cover plate when the sleeve is extended and the side panels are in upright positions.

3. A collapsible re-usable container according to claim 2 wherein said means for detachably securing the side panels to said cover plate is a plurality of quickly releasable cam fasteners associated with the side panels and said cover plate.

4. A collapsible re-usable container comprising a pallet base which is substantially rectangular and having relatively low upstanding side walls extending thereabove near its marginal edges, substantially rigid rectangular side panels hingedly secured to said side walls and adapted to swing vertically, a rectangular collapsible and extensible open-ended sleeve arranged above the pallet base, substantially rigid open rectangular frames secured to the opposite ends of said sleeve and being L-shaped in cross section and having vertical webs arranged in opposed relationship and adapted to contact when the sleeve is collapsed, means for securing one of said frames to the top of the pallet base inwardly of said side walls, a rectangular cover plate for the upper end of said sleeve, means to secure the cover plate to the rectangular frame remote from the pallet base, and means for detachably securing the side panels to said cover plate when the sleeve is extended and the side panels are upright, the cover plate and the rectangular frame secured thereto being adapted to engage inwardly of said side walls when the sleeve is collapsed, said vertical webs of the frames then contacting so that the collapsed sleeve is rendered stable when the collapsed containers are stacked.

5. A collapsible re-usable container according to claim 4 wherein said rectangular L-shaped frames engage snugly within the upstanding side walls when the sleeve is collapsed below the tops of the side walls, whereby the cover plate and side panels may engage inwardly of said side walls above said sleeve when the sleeve is collapsed.

6. A collapsible reusable container comprising a base, upstanding sidewalls fixedly secured to the base near the marginal edge of the same, side panels hingedly secured to said fixed sidewalls and being vertically swingable, a flexible collapsible and extensible sleeve on the top side of said base and having one end secured thereto inwardly of said fixed sidewalls, a cover plate secured to the free end of said sleeve and dimensioned to be received in the space defined by said fixed sidewalls when the sleeve is collapsed onto the base, said side panels being then swingable inwardly into a stacked relation so as to be wholly within the confines of the space defined by said fixed sidewalls and above said cover plate, and means positioned inwardly of said fixed sidewalls to directly support said cover plate independently of said flexible sleeve at a predetermined distance above said base when said sleeve is collapsed onto said base.

7. A collapsible container comprising polygonal base structure, sidewall structure encompassing said base structure adjacent the periphery thereof and upstanding rigidly therefrom, a plurality of rigid panels hinged to the upper edge of said rigid sidewall structure, the elevation of the latter varying from side to side of said base structure by an amount corresponding substantially to the thickness of said panels so that the panels will stack one upon another in a space of minimum height and a predetermined panel will stack outermost when the panels are swung to collapsed position in the order of elevation of said rigid sidewall structure beginning with the lowest and said panels being dimensioned to stack wholly within the confines of the space bounded by said fixed wall struc-

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ture, a collapsible accordion pleated inner liner having an end fixed to said base inwardly of said fixed sidewall structure and a free end, a rigid cover plate secured to the free end of said inner liner, means for releasably connecting together the hinged panels and said cover plate when said inner liner is extended and said panels are in upright position, said inner liner and cover plate being dimensioned to be freely received in the space bounded by said fixed wall structure when said inner liner is collapsed and said panels resting on said cover plate when stacked, a formation of predetermined contour on the underside of said base structure and formations complementary thereto on the said outermost one of said stacked panels and the said cover plate, the first of said formations closely interfitting with the formation in said base structure when the said containers are stacked in collapsed condition one upon another and the second of said formations closely interfitting with the formation in said base structure when the said containers are stacked one upon another in extended operative position.

8. A collapsible container as defined in claim 7 wherein means is provided to support said cover plate and the stacked side wall panels resting thereon at an elevation above said base sufficient to avoid imposition of the weight thereof and of the containers stacked thereon upon the collapsed inner liner.

9. A collapsible container comprising polygonal base structure, sidewall forming structure including a plurality of rigid panels and means for hinging said panels to said base structure for swinging movement between an upright position and an inoperative stacked position, said panel mounting structure constraining said panels to be swung to stacked position in a predetermined order effective to locate a predetermined panel outermost in the stack in order for stacking to be effected, a collapsible accordion pleated inner liner having an end fixed to said base and a free end, a rigid cover plate secured to the free end of said inner liner, means for releasably connecting together the hinged panels and said cover plate when said inner liner is extended and said panels are in upright position, said inner liner being collapsible to an inoperative position on said base and said rigid panels resting on said cover plate when stacked, a formation of predetermined contour on the underside of said base structure and formations complementary thereto on the said outermost one of said stacked panels and the said cover plate, the first of said formations closely interfitting with the formation in said base structure when the said containers are stacked in collapsed condition one upon another and the second of said formations closely interfitting with the formation in said base structure when the said containers are stacked one upon another in extended operative position.

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