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R. L. CARPENTER ETAL
CONTAINER AND LID ASSEMBLY

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3 Sheets-Sheet 1

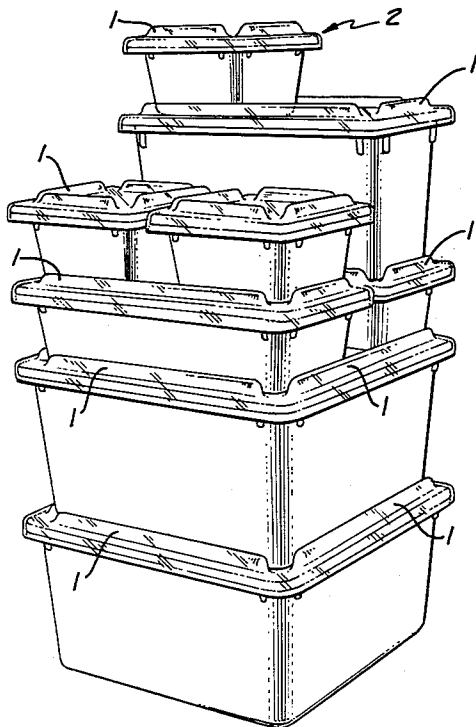


FIG. 1

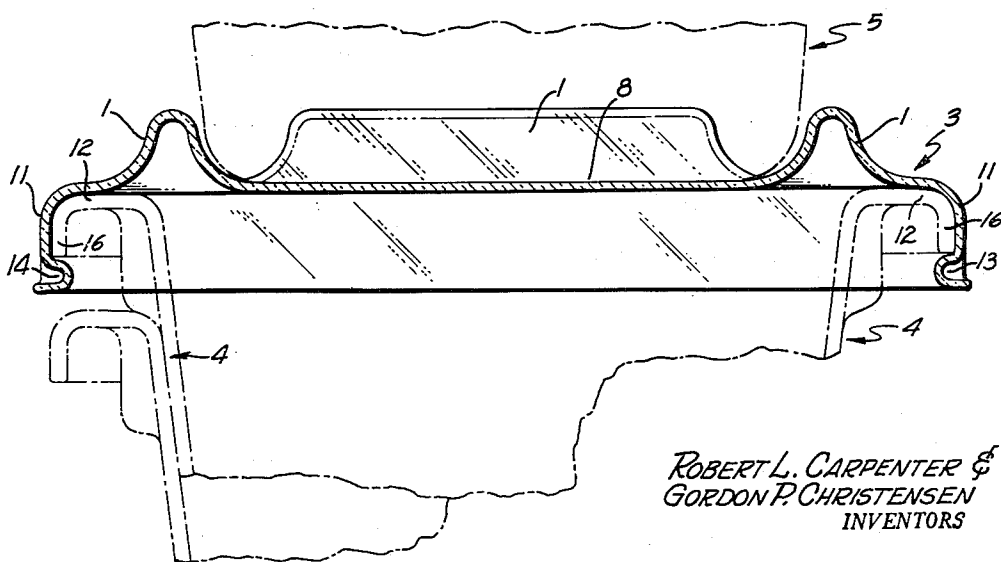


FIG. 3

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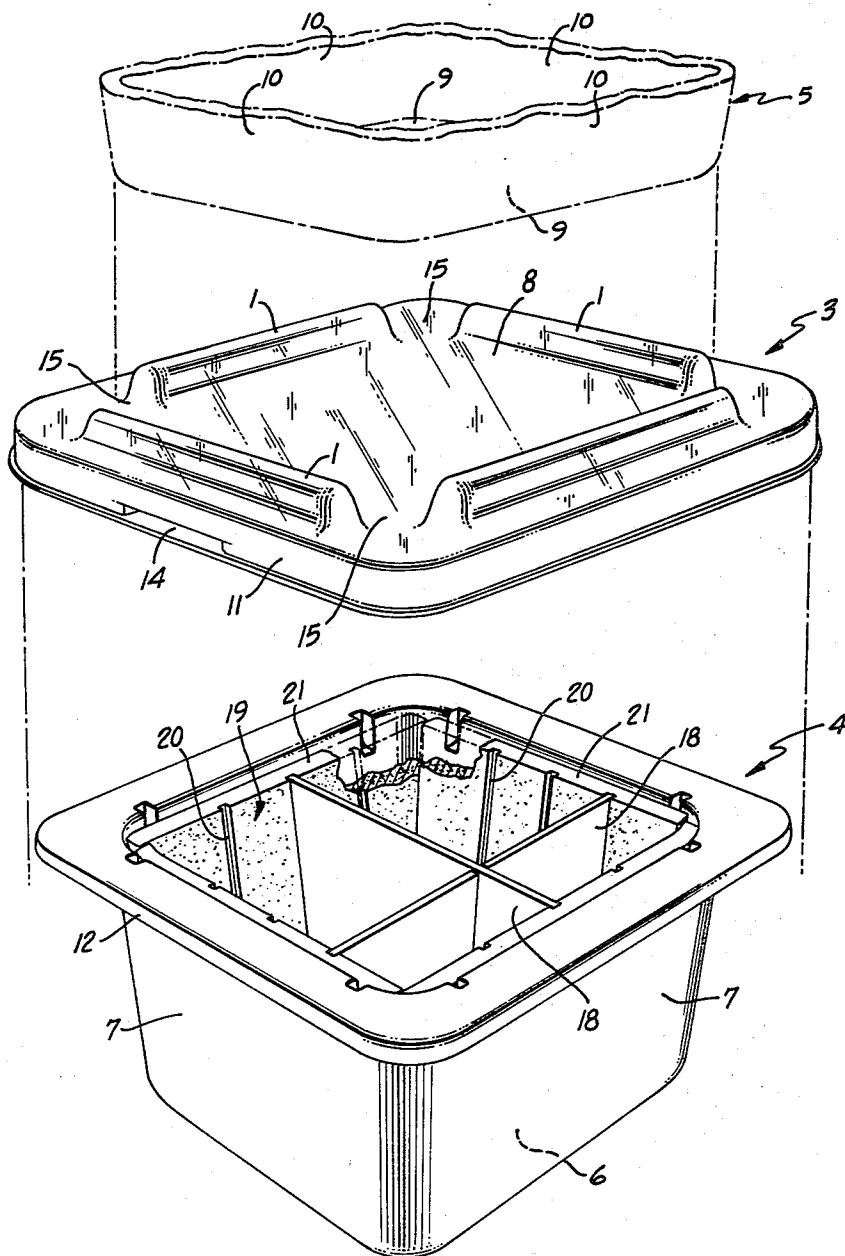
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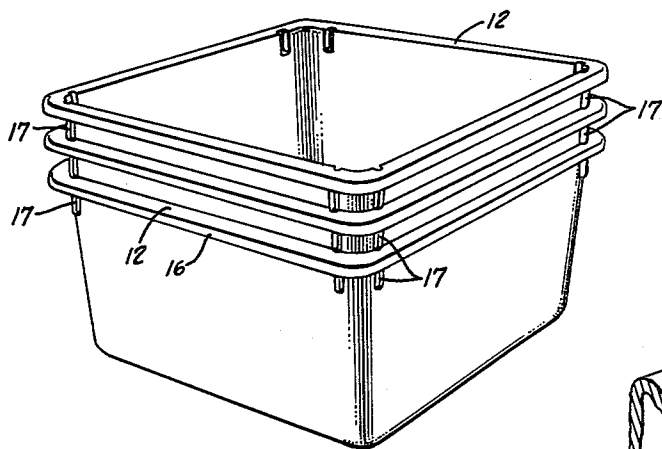


FIG. 4

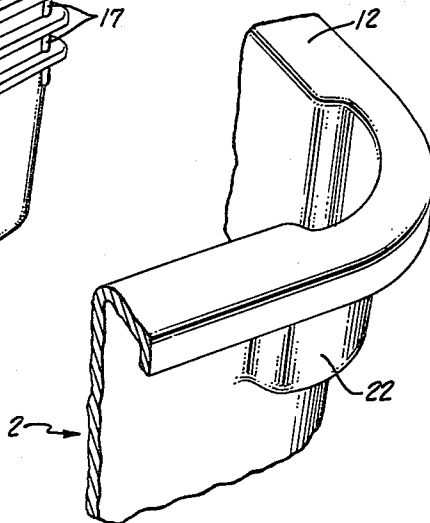


FIG. 5

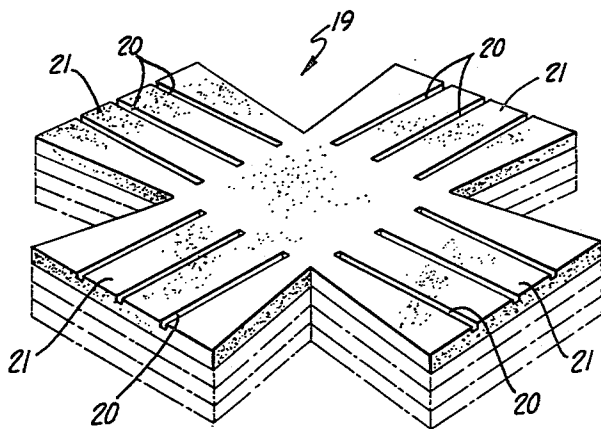


FIG. 6

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CONTAINER AND LID ASSEMBLY

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3 Claims. (Cl. 220-60)

The present invention relates to a materials handling system and more particularly to an integrated assembly of modular-dimensional containers with fitted lids which can be stacked to a substantial height and transported without danger of toppling.

In the field of container materials handling systems it has been the general practice to employ container assemblies of various sizes and types for transportation of parts and components from one work station to another. Although such systems have served their purpose, they have not proved entirely satisfactory under all conditions of service for the reasons that they do not form an integrated unit on the horizontal and vertical planes, and no provisions are made to keep the stacked containers from lateral movement so as to prevent toppling. Moreover, there is no provision for making empty containers in such systems nestable so as to require a minimum of storage space.

The general purpose of this invention is therefore to provide a modular integrated materials handling system which is integrated both vertically and horizontally and all the units making up said system are stackable on or nestable within like units for minimum space requirements. To achieve this, the present invention contemplates a unique arrangement of container, lid, liner and partitions whereby integrated stackability and nestability are realized during the appropriate steps in the materials handling cycle.

An object of the present invention is, therefore, the provision of a modular materials handling system integrated in both the vertical and horizontal planes.

Another object is to provide a modular integrated materials handling system compatible to standard pallets and warehouse accessories.

A further object of the invention is the provision of a modular integrated materials handling system which is stackable and topple-resistant.

Still another object is to provide an integrated materials handling system wherein all components are nestable and stackable when empty to minimize storage space requirements.

Yet another object of the present invention is the provision of containers which are nestable but easily separated.

A still further object is to provide containers which are compartmentalized without affecting the structure of the container.

Still another object of the present invention is to provide containers which include a liner that is removable and capable of being folded flat in order to occupy a minimum of storage space.

Another object is to provide lids which will firmly engage said containers to form a strong modular unit.

Still another object is to provide lids which are dust-proof and yet transparent to provide inspection of the parts therein.

A further object of the invention is to provide lids which do not occupy any internal space of the container.

Yet another object of the present invention is the provision of a lid which has the strength to support a number of loaded units yet will securely retain said units in a proper spaced apart relationship.

A still further object is to provide an integrated mate-

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rials handling system wherein all components that make up said system are readily cleaned.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings.

FIGURE 1 shows a complete, loaded assembly of modular units ready for transportation to the unloading work-station.

FIGURE 2 shows an exploded diagrammatic view of the interrelationship of a single lid to both the container beneath it and the container above it.

FIGURE 3 is a cross-section 1-1 of FIGURE 2 showing details of lid construction.

FIGURE 4 shows empty nested containers with stops holding boxes slightly apart.

FIGURE 5 shows alternate stop means for holding the boxes slightly apart while nested.

FIGURE 6 shows the configuration of liner and its stackability characteristic.

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIGURE 1 a typical assembly of the modular integrated materials handling units in a loaded and stacked condition ready for transportation from the loading station to a second point for unloading. It can be seen from this figure that the larger units must be placed at the bottom of the assembly and progressively smaller units are stacked thereon with finally the small units resting at the top. The dimension of the largest units located at the bottom of the stack are of a dimension such that they are readily stacked on a standard pallet for transportation from one work station to another. The entire assembly as shown in FIGURE 1 can be readily moved from one location to another without danger of toppling by virtue of retaining ridges 1 located in the cover portions of each assembled container unit. The assembly is made up of modular units on both a vertical and horizontal plane; whole integral members of units may be stacked across the top of the next preceding lower large unit lid due to the system's modularity on the horizontal plane; and moreover, these containers are modular in the vertical plane in the sense that the tallest container with lid is only as high as some whole multiple of other unit containers. All of these container units are generally rectangular in shape and the smallest unit 2 shown in FIGURE 1 is approximately square in horizontal cross-section. Such a small substantially square container and lid unit are shown in FIGURE 2 wherein the relationship of single lid 3 to both the container 4 beneath it and the container 5 which rests upon its upper surface is shown in an exploded perspective.

In a preferred embodiment of the present invention a lower container 4, comprised of a generally rectangular bottom panel 6 and for upwardly sloping wall panels 7 of equal height which define a generally rectangular opening, is fitted with a tight-fitting generally rectangular lid 3 upon which a second like container 5 is stacked. The uppermost container 5 is held firmly in position and lateral movement is inhibited because of the retaining ridges 1 in lid 3. These ridges 1 define an internal, rectangular portion or cavity 8 which has an area congruent to but slightly larger than the bottom panel 9 of container 5. Consequently, when the bottom panel 9 of container 5 rests on the surface of cavity 8 of lid 3, the ridges 1 substantially engage the bottom portion of side walls 10 of the container 5.

In order to prevent relative movement between the upper container 5 and the lower container 4 it is also

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necessary to provide the lid 3 with a downward-extending, circumscribing flange 11 to encompass the lip 12 of container 4. To assure positive engagement between container 4 and lid 3, flange 11 is provided with inward indentations 13 and 14 on two opposing flanges whereby the upper surface of indentation 13 grips the bottom surface of the curved-down portion of lip 12 to effect a hinging relationship between the lid 3 and the container 4. Indentation 14 also co-acts on its upper surface with the underside of the down-turned portion of lip 12 and acts as an effective catch. Therefore to remove the in-place lid 3 from container 4 it is necessary to lift the lid from underneath the flange at a position just below the indentation or catch 14. In order to provide the lid, which is normally made of a flexible plastic material, with sufficient pliability to facilitate removal from the container, it is normally preferred that ridges 1 are not continuous but are simply four elongated portions at right angles to one another defining a rectangle 8 but having spaced relationship at the corners as shown by portion 15. That is, if the ridges were continuous so as to include the area shown by 15 considerably more effort would be necessary to bend the lid back at catch 14 sufficient to remove the lid 3 from container 4 because of the stiffening effect of a continuous ridge 1.

The relationship between the lid 3 and the lower container 4 in regards to the engagement of the hinge portion 13 and latch portion 14 of the lid 3 with the lip 12 of the container 4 is more clearly shown in FIGURE 3. The underside of the lid 3 rests on the upper portion of lip 12 of container 4 and also contacts the lower portion of the lip 12, namely flange 16, by virtue of the inwardly bulging or indentation portions 13 and 14 of the lid 3 whereby the lid and container form a tight mechanical seal. When the lid is removed from the container by prying upward beneath portion 14 ridge 1 lends spring support to resist this movement. Consequently, ridge 1 not only restrains lateral movement of the upper container 5 but also provides strengthening cross-section to effect a more secure attachment of lid 3 to container 4. Because of this firm engagement of the lid 3 with container 4 the static loading resulting from the placement of container 5 on top of lid 3 results in compressive stresses in the side walls of container 4. FIGURE 4 illustrates the nestability of various typical container units of the same size in the present system. Stop means 17 maintains a spaced vertical relationship between the containers since the weight of upper containers can often force lower containers into a tight, vacuum fit which renders separation of the containers exceedingly difficult. Stop 17 is an effective means for substantially alleviating this difficulty and is formed by making several indentations normal to the inner upper surface of the container preferably near the corners. Each indentation extends horizontally outward from the inner surface to form a bulge portion which will have a substantially greater cross-section than the inside indentation since the bulge dimension also includes two thicknesses of the container material. Consequently, when an upper container is nested in a lower container, the larger cross-sectional portion of the stop 17 will virtually come to rest on the surface of the rim of the lower box since the cross-section of the indentation directly beneath it is so substantially smaller that practically no insertion of the bulging portion into the indentation is effected. In FIGURE 5 an alternative stop structure 22 is illustrated in which the bulge portion circumscribes the entire corner of the container to prevent sticking during nesting and to also produce a general stiffening of the container.

Because of the smallness of some parts it is often necessary to compartmentize the containers. As FIGURE 2 illustrates partitions 18 are inserted into the container to define areas appropriate to the size of the articles to be handled. To hold the partitions in place a liner 19 with a configuration shown in FIGURE 6 is used.

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This liner 19 fully lines the container inside surfaces without overlap and has vertical slits 20 whereby the dividers or partitions 18 can be slid into position and held in a vertical attitude. However, when a large number of partition pieces are used to form a multi-cell partition, the partition will have substantial structural strength in and of itself such that lateral movement is inherently inhibited. Merely forcing the dividers into the container so as to compress the liner between the ends of the dividers and the inside walls of the container provides a sufficient gripping and retaining force to firmly hold the dividers in place. The liner is preferably made of flat section of polyurethane foam of a design as shown in FIGURE 6 whereby, upon placement inside the container the four extending ear portions 21 bend upwards to line the side walls without any overlapping portions at the corners. Said liner is, therefore, easily removable and stackable after unloading the container. Moreover the partitions are likewise easily disassembled after unloading and, therefore, can be stored so as to require a minimum of space. All of the parts which comprise the integrated materials handling system herein described are preferably made of materials of a plastic base so as to render them readily washable. The container and lid are preferably made of a plastic base material which is substantially pliable and non-brittle.

In order to better understand the utilization of the materials handling system of the instant invention, a typical in-plant cycle is set forth below. A rectangular container 4 is lined with liner 19 so as to substantially cover the inside walls of the container. Partitions 18 if necessary are then set into their appropriate positions and then the article or articles to be handled are placed in the container or portion of the container appropriate for its size. A lid 3 of the proper dimension is then placed over the opening of the container and snapped into place, and after an assortment of containers of various sizes are thus filled, they are then stacked one upon the other with the largest modular unit at the bottom and progressively small units stacked thereon to form a complete assembly suitable for transportation on a pallet or dolly. Because of the retaining ridges 1 which abut against the bottom portion of the box above it, accidental jarring and movement during transportation will not tend to cause the boxes to slip off or topple. The four ridge portion 1 in the lids embraces the respective bottom portions of the box above it to hold the latter against horizontal shifting movement in relation to the supporting container beneath. In the case where two smaller modular units are placed in juxtaposition to one another in the rectangular depression of a lid, only three of the lower wall portions of each container are engaged by ridges 1. However, the containers are constrained from moving in the direction where no ridge 1 is met because the upper lip on that side of each container is in contact with the like lip of its juxtaposed companion container. The cumulative result, therefore, of the retaining effect of ridges and lips in an assembly of containers is to form a stable integrated unit which will have considerable resistance to collapse during transportation. After transporting the assembly to the appropriate unloading area, the boxes are removed and the lids lifted from under the latch portions 11 to remove the lids from the containers on which they are fixed. The article transported therein is removed and the partition and liner removed. The liner, partitions and lid are then stacked and the empty modular container is stacked in a container of like size and dimension. A stack of same sized modular containers can then be interstacked with larger modular container stacks to reduce the space requirements of the containers during storage. When needed the thus stored containers, liner, lids and partitions are moved back to appropriate loading areas and the above cycle is again repeated.

Various modifications are contemplated and may ob-

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viously be resorted to by those skilled in the art without departing from the spirit and scope of the invention, as hereinafter defined by the appended claims, as only a preferred embodiment thereof has been disclosed.

We claim as our invention:

1. A container and lid assembly which can support and be stacked upon similar units to give a stack of containers which are held together in a firm modular arrangement, comprising a one piece container having a bottom panel and four substantially flat wall panels of equal height which slope outwardly from said bottom panel to form an open container; a continuous four cornered lip integral with and extending around the top of said container, said lip extending outwardly from the top edges of said wall panels and having a substantially flat horizontal portion and a downwardly extending end flange, a one piece snap-on resilient plyable lid for said container having a substantially flat upper surface, said lid having a downwardly extending lip for co-operative engagement with the lip of said container, the bottom edge of said lip forming a C shaped bead having the convex portion of said C projecting inwardly of said lid lip, said bead engaging and extending beneath the bottom edge of the downwardly extending end of said container lip when said lid is snapped on said container, said upper surface of said lid having two pairs of vertical disconnected ribs of equal height extending parallel with the side edges of said lid, said ribs being spaced from the side edges of said lid equal distances and one pair of said ribs being spaced from each other a distance approximating the width of the bottom of said receptacle

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and the other pair of ribs being spaced from each other a distance approximating the length of the bottom of said receptacle, said ribs stopping short of said corners and the area of said lid between the edges of said lid and said ribs being coplanar with said flat upper surface, and the area between the ends of adjacent ribs being flat and lying in the same plane as said flat upper surface for permitting said lid to be peeled back readily at said corners.

2. A container and lid assembly as in claim 1 and wherein said assembly includes a one piece cruciform liner of sheet material shaped to conform to the interior of said container.

3. A container and lid assembly as in claim 1 and wherein said container lip is bowed outwardly from the inside at each of said four corners to form in conjunction with their corresponding side walls, an outwardly projecting nesting stop member.

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