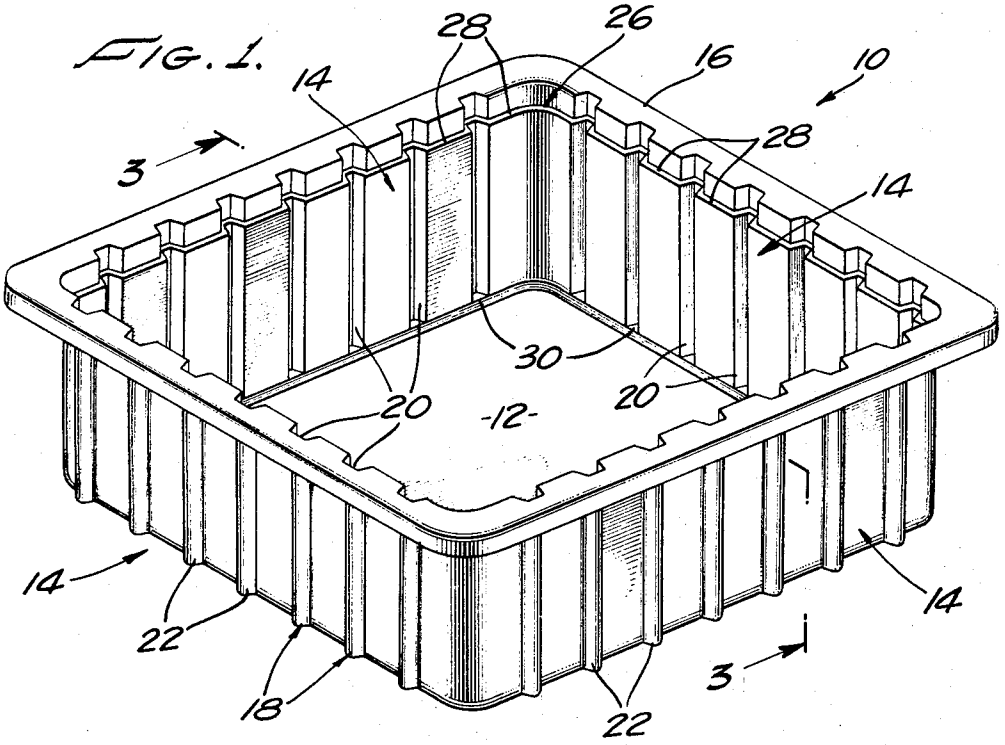
Oct. 1, 1968 D. J. ASENBAUER 3,403,814

STACKING CONTAINER WITH TAPERED LEDGE AND RIB FOR STACKING INTERLOCK

Filed Sept. 26, 1967 2 Sheets-Sheet 1

FIG. 1.



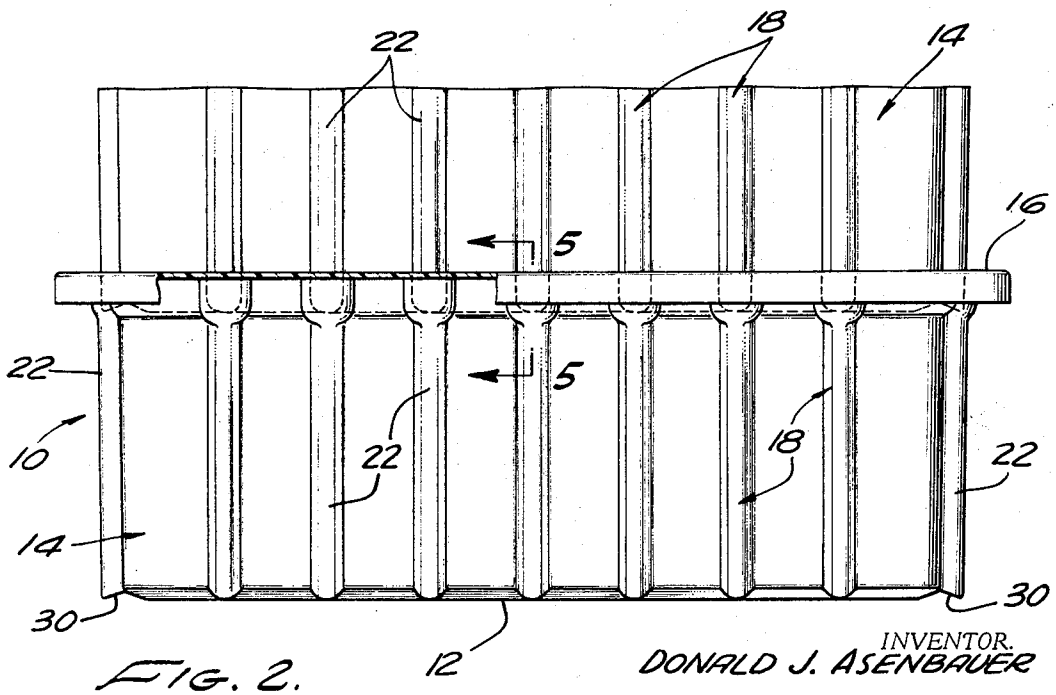


FIG. 2.

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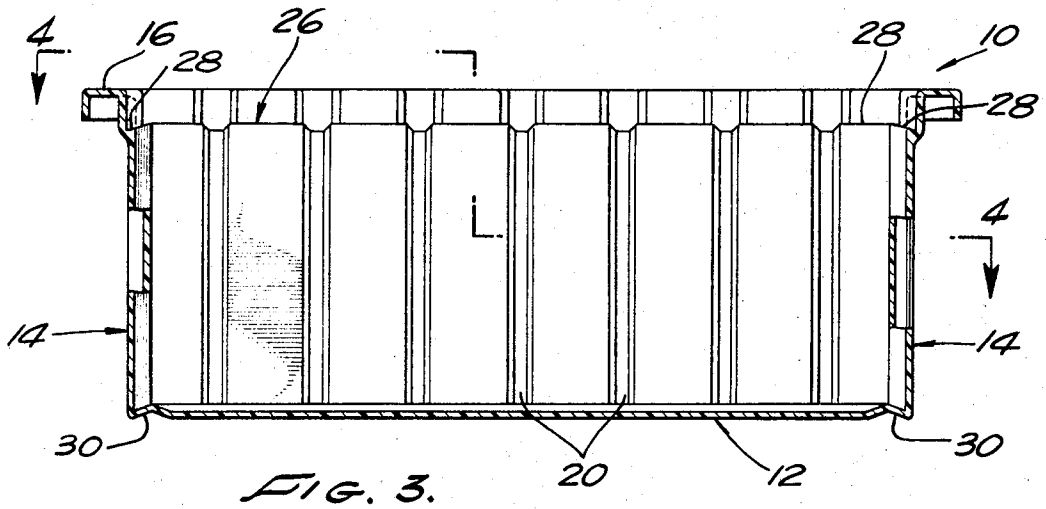


FIG. 3.

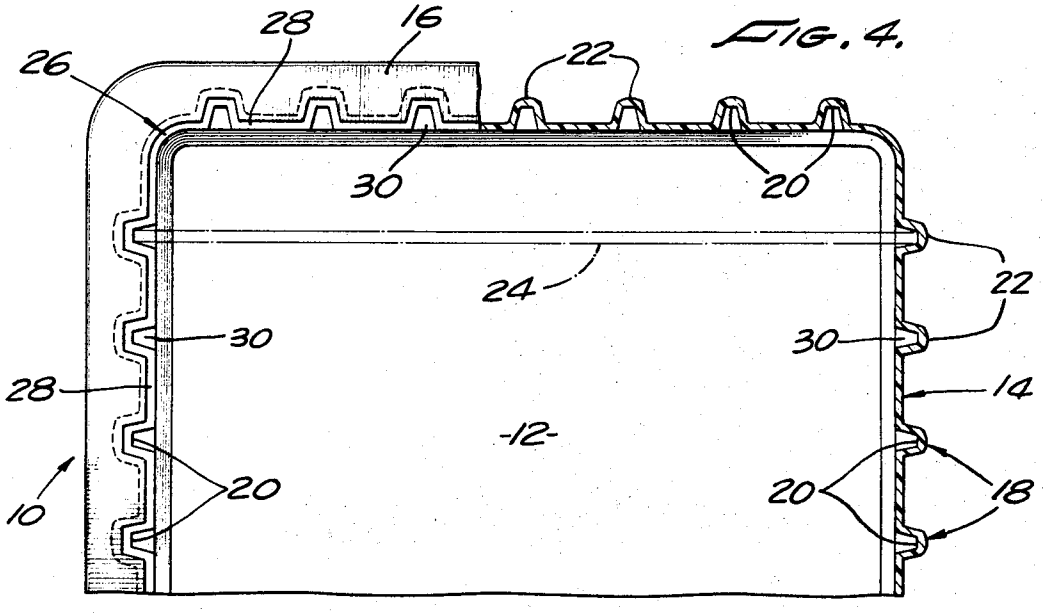


FIG. 4.

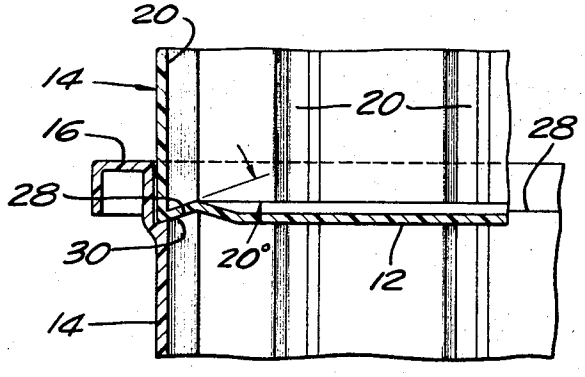


FIG. 5.

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United States Patent Office 3,403,814 Patented Oct. 1, 1968

3,403,814

STACKING CONTAINER WITH TAPERED LEDGE AND RIB FOR STACKING INTERLOCK

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Filed Sept. 26, 1967, Ser. No. 670,662
1 Claim. (Cl. 220—97)

ABSTRACT OF THE DISCLOSURE

A stacking container having a rectangular bottom wall defining a lower marginal stacking surface extending circumferentially about the wall contiguous the edges thereof, vertical side walls of substantially uniform wall thickness rising from the edges of the bottom wall and stepped outwardly a distance at least equal to the wall thickness adjacent their upper edges to define an upper stacking surface extending circumferentially about the inside of the container, whereby a number of the containers may be stacked with the lower stacking surface of each upper container resting on the upper stacking surface of the adjacent lower container, and the stacking surfaces sloping upwardly at the same angle in the lateral direction from their outer edges to their inner edges so as to resist relative lateral displacement of the adjacent containers.

Background of the invention

Field of the invention.—This invention relates generally to containers and more particularly to improvements in stacking containers of the type disclosed in prior art Patent No. 3,172,562.

Prior art.—The aforementioned prior art patent discloses a stacking container which represents an improvement over the earlier stacking containers. Generally speaking, the container disclosed in the patent is characterized by a generally rectangular bottom wall bounded by upstanding side walls generally normal to the bottom wall and having substantially uniform wall thickness. Adjacent their upper edges, the side walls are stepped outwardly a distance at least equal to their wall thickness to define a stacking ledge within and extending about the full circumference of the container. This ledge provides an upper, upwardly presented stacking surface. The lower marginal surface region of the bottom container wall, extending circumferentially about the latter wall contiguous its edges, provides a lower, downwardly presented stacking surface underlying the upper stacking surface. Formed in the inner surfaces of the container side walls are vertical channel-like depressions or grooves which define corresponding projecting ribs on the outer surfaces of the side wall. The grooves on opposing side walls are arranged in pairs of grooves which are aligned in planes normal to the respective side walls.

The container is adapted to be stacked with other like containers in such a way that the bottom stacking surface of each upper container rests on the upper stacking surface of the adjacent lower container. The lower ends of the side wall ribs on each upper container fit within the lower ends of the corresponding side wall depressions or grooves in the adjacent lower container to restrain the adjacent containers against relative lateral displacement. To this end, the upper ends of the grooves, above the upper stacking surface, have a slightly larger cross section than the lower ends of the grooves and are dimensioned to receive the lower ends of the side wall ribs with a relatively snug fit. The side wall grooves also accommodate insertion of partitions within the container. These partitions are vertically dimensioned so that their upper edges are located substantially flush with or slightly below

the level of the upper stacking surface so as to not interfere with stacking of the containers in the manner just explained.

While the container disclosed in the aforementioned prior art patent is completely suitable for many applications, it does possess one inherent deficiency which this invention seeks to overcome. The deficiency referred to resides in the fact that the upper stacking surface of the container is relatively narrow in the lateral direction. Accordingly, the possibility exists that the stacking loads may cause a container in a container stack to slip from the stacking ledge of the adjacent lower container in the stack. This possibility of disengagement of a stacked container from the stacking ledge of an adjacent container is increased by virtue of the fact that the patented container is commonly fabricated from a plastic material. As a consequence, the plastic side walls of the lower container in a container stack may tend to yield outwardly under the stacking load and thereby effectively aid disengagement of its upper stacking surface from the lower stacking surface of the adjacent upper container in the stack.

Disengagement of the stacking surfaces on two adjacent containers in a container stack will permit the upper container to telescope either partially or completely into the lower container. If this occurs, the container stack may topple, particularly if the telescoped containers are located adjacent the bottom of the stack. Moreover, telescoping of the containers in this way may result in damage to the containers and/or their contents. Also, of course, such telescoping of the containers involves the wasting of time and effort to unstack the containers and re-stack the latter properly.

Summary of the invention

This invention provides a stacking container of the character described embodying certain improvements which cure the above noted deficiency of the existing stacking container. These improvements reside in the fact that the upper and lower stacking surfaces of the container are tapered in such a way that these surfaces slope upwardly at substantially the same angle in the lateral direction from the outer edges to the inner edges of the surfaces. When a number of the improved containers are stacked, the lower stacking surface on each upper container rests on the upper stacking surface of the adjacent lower container in the same way as discussed earlier in connection with the patented stacking container. In the present improved stacking container, however, the taper or slope of the engaging stacking surfaces inhibits disengagement of these surfaces under load. In this regard, the taper or slope of the stacking surfaces serves a twofold function. First, the taper inhibits each upper container in a container stack from slipping off the upper stacking surface of the adjacent lower container. Secondly, the taper inhibits outward deflection of the container side walls under load and thereby inhibits disengagement of the upper stacking surface on a container in a container stack from the lower stacking surface on the adjacent upper container. The taper of the stacking surfaces also serves a third, beneficial purpose which involves maintenance of the adjacent container in a container stack in accurate vertical alignment. It is now evident, therefore, that the present improvements provide a stacking interlock between adjacent containers in a container stack which yields a more secure and stable stack.

Description of the drawings

FIGURE 1 is a perspective view of a stacking container according to the invention;

FIGURE 2 is an enlarged side elevation, partly in section, of the container illustrated in FIGURE 1 and showing a second container in stacking position thereon;

FIGURE 3 is an enlarged section taken on line 3—3 in FIGURE 1;

FIGURE 4 is a section taken on line 4—4 in FIGURE 3; and

FIGURE 5 is a section taken on line 5—5 in FIGURE 2.

Description of the preferred embodiment

Turning now to the drawings, there is illustrated a stacking container **10** embodying the invention. This container, except for its improved stacking features, is substantially identical to that disclosed in the aforementioned prior art Patent No. 3,172,562. Accordingly, it is unnecessary to describe the overall structure of the present container in complete detail. Suffice it to say that the container **10** has a generally rectangular bottom wall **12** bounded by upstanding side walls **14** which rise substantially perpendicularly from the bottom wall along its edges. The upper edges of the side walls **14** are turned outwardly and then downwardly to form a rim **16** encircling the open top of the container. The container may be fabricated in various ways and from various materials. Preferably, however, the container is fabricated from a sheet of plastic by a vacuum forming process.

The container side walls **14** are formed with uniformly spaced vertical corrugations **18**. These corrugations define vertical channels or grooves **20** in the inner surfaces of the side walls and corresponding outwardly projecting vertical ribs **22** on the outer surfaces of the side walls. The inner side wall grooves **20** extend from the bottom wall **12** to the upper container rim **16** and open through this rim, as shown best in FIGURE 1. Similarly, the ribs **22** extend from the bottom wall to the under side of the rim, as shown best in FIGURE 2. The side wall corrugations **18** of the present stacking container serve the same multiple functions as those of the stacking container disclosed in the aforementioned prior art Patent No. 3,172,562. Accordingly, it is unnecessary to repeat these several functions in detail in the present disclosure. Suffice it to say that the corresponding corrugations on each pair of opposing container side walls **14** are disposed in common planes normal to the side walls to permit partitions or dividers **24** to be inserted into the side wall grooves **20**, in the manner illustrated in FIGURE 4.

According to an important feature of both the stacking container disclosed in Patent No. 3,172,562 and the present stacking container, the present container walls **14** are provided with a substantially uniform wall thickness and are stepped outwardly a distance at least equal to such wall thickness along the inner section of the side walls with a plane parallel to the bottom wall **12** and located adjacent but slightly below the upper edges of the side walls so as to define an interior stacking ledge **26**. This stacking ledge provides the container with an upper, upwardly presenting stacking surface **28** which extends about the full inner circumference of the container. In this regard, it is significant to observe that the stacking ledge **26** and its stacking shoulder **28** effectively follow the corrugated contour of the container side walls **14** in such a way that the ledge and surface extend into and around each interior side wall groove **20** to provide an upper stacking surface portion within each groove. According to a further feature of both the stacking container disclosed in the aforementioned prior art Patent No. 3,172,562 and the present container, the bottom container wall **12** has a lower marginal surface region **30** extending circumferentially about the latter wall, contiguous its edges, which defines a lower, downwardly stacking surface on the container. This lower stacking surface is furnished, in part, by the lower end surfaces of the side wall ribs **22**. It is significant to note at this point that the transverse dimensions of the side wall corrugations **18**, and hence the transverse dimensions of the side wall grooves **20** and ribs **22**, are substantially uniform throughout their entire length from the bottom wall **12** of the container to its upper stacking surface **28** and are increased somewhat above this surface, in the same way as in the patented container. The upper and lower portions of the side wall corrugations are so laterally proportionated that the lower ends of the side wall ribs **22** are laterally dimensioned to fit slidably within the upper ends of the side wall grooves **20** of a like container, when a number of the containers are stacked in the manner explained below.

The present stacking container **10**, as it is thus far described, is essentially identical to and is adapted to be stacked in the same way as the container disclosed in Patent No. 3,172,562. Thus, when stacking a number of the present containers, each container is placed on top of another container in such a way that the bottom of each upper container telescopes within the open top of the adjacent lower container to a position wherein the lower stacking surface **30** on the upper container rests on the upper stacking surface **28** of the adjacent lower container. The lower ends of the side wall ribs **22** on each upper container fits slidably within the upper ends of the side wall grooves **20** on the adjacent lower container to restrain the adjacent containers against relative lateral displacement. It is significant to note here that the side wall corrugations **18** are symmetrically arranged relative to the longitudinal and transverse medial planes of the container. As a consequence, square containers according to the invention may be stacked with the adjacent containers disposed in any one of four relative positions, and rectangular containers may be stacked with the adjacent container disposed in either of two relative positions.

As noted earlier, the existing stacking container of this type is deficient for the reason that the stacking surfaces **28, 30** are not designed to resist disengagement of the engaging stacking surfaces on adjacent stacked containers. Thus, in the existing containers, the upper and lower stacking surfaces are disposed in planes parallel to the bottom container wall. As a result, it is not too difficult for the bottom of one stacked container to slip from the ledge of the adjacent lower container, due to outward deflection of the lower container side walls or other causes. If this occurs, of course, the container stack may topple.

According to the present invention, this deficiency of the patented stacking container is eliminated by sloping the upper and lower stacking surfaces **28, 30** in the manner best illustrated in FIGURE 5. Thus, it will be observed that these stacking surfaces slope upwardly in the lateral direction, from their outer edges to their inner edges. The sloped angle of the container surfaces is substantially uniform along the entire length of the surfaces and is preferably on the order of 20°. Referring to FIGURE 5, it will be observed that the slope of the stacking surfaces **28, 30** provides an effective interlocking action between the engaging stacking surfaces on adjacent stacked containers which resists outward deflection of the lower container side walls and other relative lateral movements of the containers which would permit separation of the bottom of the upper container from the stacking ledge of the lower container. Moreover, since the stacking surfaces **28, 30** extend about the entire circumference of the container, the slope or taper of the engaging stacking surfaces on adjacent stacking pairs acts to maintain the adjacent containers in centric relation relative to one another. It is now evident, therefore, that the present sloping or tapered stacking surface feature of the invention is effective to provide a stacking interlock action which creates a secure and stable container stack.

Another feature of the invention resides in the fact that the central portion of the bottom container wall **12**, endwardly of its lower marginal stacking surface **30**, provides a supporting base on which the container is adapted to rest on a supporting surface. To this end, the bottom container wall **12** slopes downwardly for a distance from the inner perimeter of the lower stacking

surface **30** to a plane which is substantially flush with or located slightly below the lower outer edge of the stacking surface, and then extends horizontally across the container, as shown best in FIGURE 5. This central horizontal portion of the bottom container wall thus provides the supporting base for the container. Yet another feature of the invention is that the several generally U-shaped portions of the upper stacking surface **28** within the container side wall grooves **20** and the several portions of the lower stacking surface **30** extending across the under sides of the side wall ribs **22** are inclined at the same sloped angle as the remainder of the stacking surfaces. As a result, interengagement of the lower ends of the side wall ribs **22** of each container in the container stack within the upper ends of the side wall grooves **20** of the adjacent lower container serves a two-fold function. First, interengagement of each rib and groove interlocks the adjacent containers against relative lateral movement in directions parallel to the container side walls containing the respective ribbon grooves. Secondly, seating engagement of the stacking surface portions on each interengaging rib and groove resists relative movement of the adjacent containers in directions normal to the container side walls containing the respective rib and groove. Accordingly, the adjacent stacked containers are securely interlocked in all horizontal directions against accidental disengagement of the bottom of each container from the stacking ledge of the adjacent lower container.

The invention has been described in considerable detail in order to comply with the patent laws by providing a full public disclosure of at least one of its forms. However, such detailed description is not intended in any way to limit the broad features or principles of the invention, or the scope of patent monopoly to be granted.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. An integrally formed container adapted to slidably receive vertically disposed compartment dividers and to be stacked with other like containers, comprising:

a substantially rectangular, horizontally disposed bottom wall;

parallel side walls joined to and extending vertically upward from said bottom wall;

parallel end walls joined to and extending vertically upward from said bottom wall and joined to said side walls;

the upper extremities of said side and end walls being stepped horizontally outward by at least the wall thickness to provide an inner shelf extending around the circumference of said container and adapted to stackably support the superimposed identical container, said side walls and end walls continuing vertically upwardly above said shelf and then extending horizontally outward and curving downward to form a rim about the circumference of said container;

said side and end walls being of substantially uniform thickness throughout and having vertical grooves formed in the interior wall surfaces thereof commencing at said shelf and extending downwardly therefrom, the exterior wall surfaces of said side and end walls having vertical ridges formed thereon corresponding to the respective grooves;

the corresponding grooves in said side walls being aligned laterally of said container to form pairs of side wall grooves, and the corresponding grooves in said end walls being aligned lengthwise of said container to form pairs of end wall grooves, each said groove pair being adapted to removably receive a divider;

the portions of said side and end walls extending above said shelf also having grooves formed in the interior wall surfaces thereof in vertical alignment with the first mentioned grooves in the respective side and end walls and adapted to receive the corresponding ridges of a stackably superimposed identical container;

said shelf extending in continuous uninterrupted fashion about the inner wall surfaces of said grooves and across the inner wall surfaces of the intervening side and end wall portions between adjacent grooves, whereby said shelf provides an interior upper stacking surface which is continuous about the entire inner circumference of said container;

the lower wall surfaces of said ridges and the lower marginal wall surfaces of said bottom wall in the regions between said ridges defining a lower continuous and uninterrupted lower stacking surface on said container extending circumferentially about said bottom wall; and

said stacking surfaces sloping upwardly in a lateral direction from their outer edges to their inner edges at substantially equal slope angles which remain constant about the entire circumference of said container, whereby when a number of said containers are stackably superimposed, the lower stacking surface on each upper container rests flush on the upper stacking surface of the adjacent lower container about the entire circumference of the containers.

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