Nov. 28, 1961 R. L. REHER 3,010,633

BULK CONTAINER REINFORCEMENT

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FIG. 1

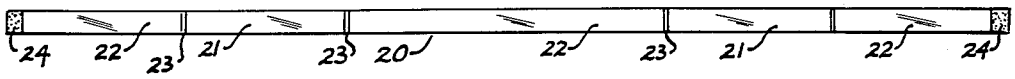


FIG. 2

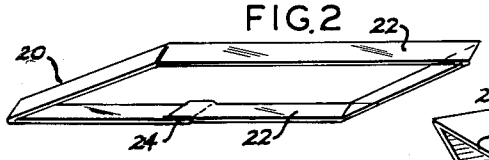


FIG. 3

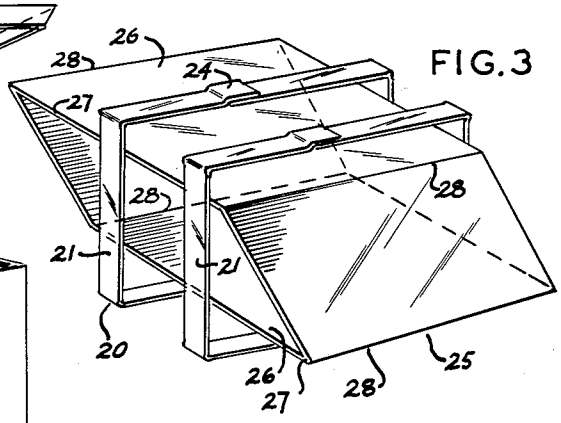


FIG. 4

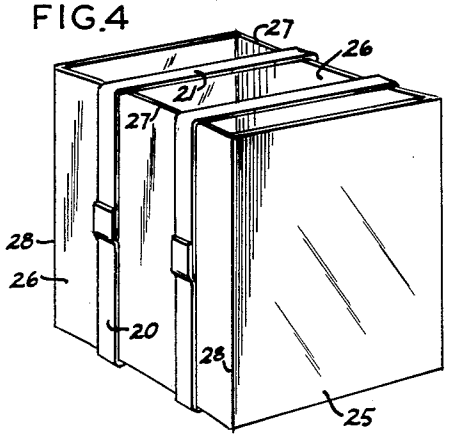


FIG. 5

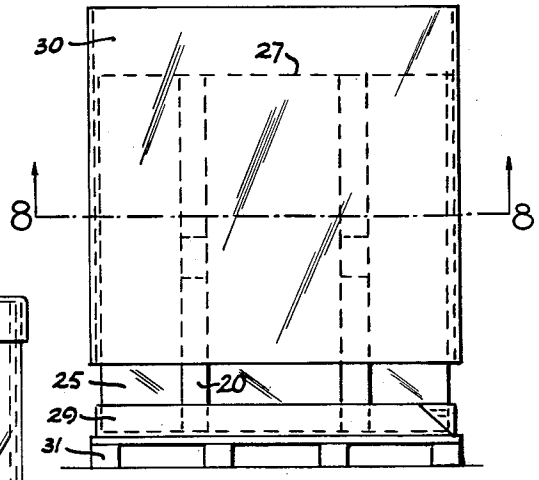
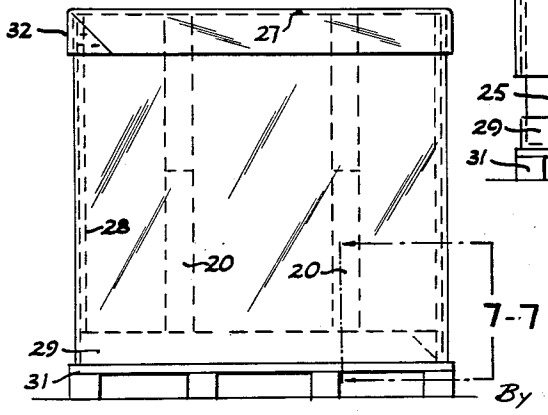


FIG. 6



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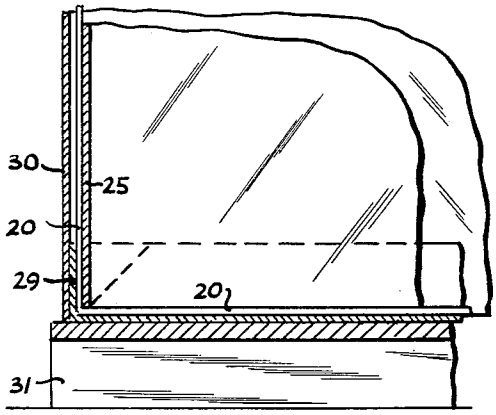


FIG.7

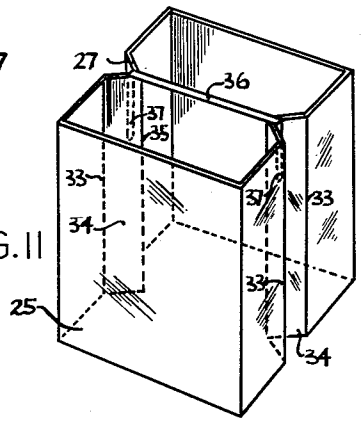


FIG.11

FIG.8

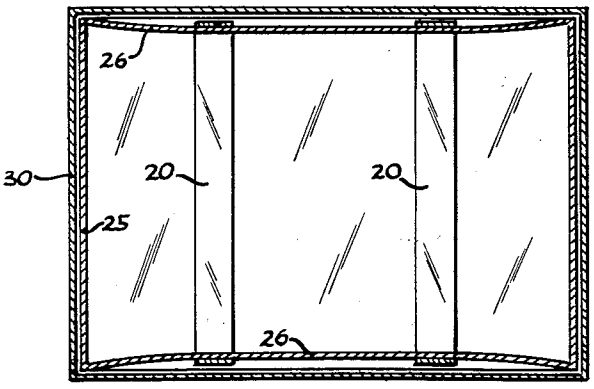


FIG.9

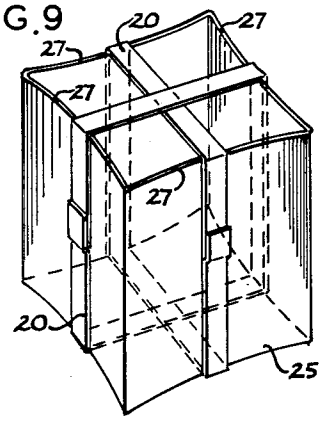
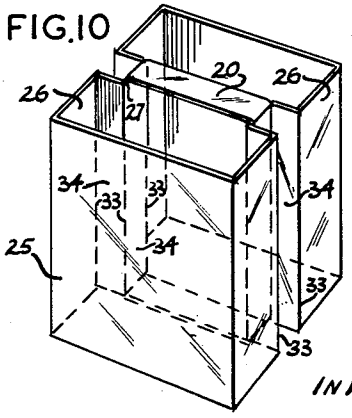


FIG.10



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United States Patent Office 3,010,633 Patented Nov. 28, 1961

3,010,633

BULK CONTAINER REINFORCEMENT

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Filed Aug. 26, 1959, Ser. No. 836,249
7 Claims. (Cl. 229—14)

The invention pertains broadly to improvements in bulk containers constructed of corrugated or solid fibreboard or other suitable bendable materials, for relatively large quantities of free flowing contents such as materials in granular, powder, or pellet form or having a like characteristic in exerting outward stress on the container walls as the contents settle during shipping and handling.

More particularly, the invention pertains to an improvement in bulk containers having an inner wall member disposed within the container outer walls and top end closures, the inner wall member having at least a pair of opposed walls inwardly deflected and retained under tension prior to filling.

Heretofore, the maximum weight of such materials that could be packaged in a paperboard container was often determined by the tendency to cause serious outward deflection or bulging of the walls of the container and the consequent loss of top load compression resistance which contributed to possible failure of the package in stacking. In addition, the unrestrained outward deflection of the container contributed to rupturing of the container walls and loss of the materials from the container with attendant great inconvenience.

An embodiment of the invention is herein described whereby preformed corrugated or solid fibreboard bands, or other suitable tensioning means are used to impart improved properties to bulk pack paperboard containers of the kind disclosed in Patent No. 2,762,551, dated September 11, 1956, entitled "Heavy Duty Container for Bulk Material." These containers are designed to carry 500 to 1500 pounds of material and comprise a bottom tray with relatively shallow upstanding walls enclosed between the bottom marginal edges of inner and outer upstanding tubular sleeves closed by a telescoping cover. The invention may be practiced in a like manner in conjunction with other bulk containers having an inner wall member.

There has been a continuing need for a reasonable means of ridigifying paperboard bulk container for flowable materials. It is therefore an object of this invention to provide an effective and economical means of restraining the distortion of a bulk container for loose flowable materials which exert an outward stress on the container.

A further object of the invention is to provide in a container, an inner wall member with at least a pair of opposed walls inwardly deflected and under tension, adapted to resist lateral outward stress from the flowable contents.

Still a further object is to provide, in a container, an inner tubular member longitudinally scored to implement the inward deflection of the member, the deflection restrained under tension of at least one band connecting opposed inwardly deflected paired edges of said member.

These and other objects will be apparent upon a further understanding of the invention as described and set forth in the following description.

FIG. 1 is a plan view of a preformed band which may be employed in an embodiment of the invention.

FIG. 2 is a perspective view of a preformed band with the ends secured together preparatory to positioning on the inner tubular member.

FIG. 3 is a perspective view of preformed bands positioned on an inner tubular member preparatory to the erecting of the tubular member to the fully opened condition.

FIG. 4 is a perspective view of an inner tubular member in an erected condition with preformed bands under tension inwardly deflecting the opposed walls of the tubular member.

FIG. 5 is a front elevation of a bulk container positioned on a pallet and in a stage of erection prior to filling, with the inner tubular member under tension of preformed bands.

FIG. 6 is a front elevation of a fully assembled container positioned on a pallet with top closure means in place, the inner tubular member being inwardly deflected and retained under tension independent of the final closure securing means or banding means for unitizing the pallet and container.

FIG. 7 is a vertical view through section 7—7 of FIG. 6.

FIG. 8 is a horizontal view through section 8—8 of FIG. 5.

FIG. 9 is a perspective of an inner tubular member having pairs of opposed walls inwardly deflected and retained by encircling bands.

FIG. 10 is a perspective view of an inner tubular member inwardly deflected along parallel vertical score lines and secured under tension by banding means.

FIG. 11 is a perspective view of a further embodiment wherein inwardly deflected panels are defined by vertical scores and restrained by an interrupted banding means.

In one embodiment of the invention a preformed band **20** illustrated in FIG. 1 is utilized. The preformed band is constructed of corrugated or solid fibreboard or other suitable bendable material. The band comprises end panels **21** and side panels **22** defined by transverse scores **23** and end portions **24**. The overlapping end portions **24** may be secured together, preferably by adhesive, preparatory to usage, as illustrated in FIG. 2. It is convenient, as illustrated in FIG. 2, to form the overlap of the end panels centrally in a side panel, but it is within the scope of the invention to form the overlap at any position in the side or end panels of the preformed band **20**, and the overlapping end portions **24** may be secured together by other well known means such as metal stitches, metal clips, or adhesively secured tape.

In FIG. 3 is illustrated a container inner tubular member **25** in partially erected condition with preformed bands **20** positioned about opposing panels **25**. The inner tubular member comprises opposing pairs of normally upstanding walls connected together on their side marginal edges **28** and having free top marginal edges **27** defining the open top end of the tube. The preformed bands **20** are dimensionally proportioned in respect to the inner tubular member **25** so that as the inner tubular member is erected to the fully open erected condition as illustrated in FIG. 4 the bands under tension inwardly deflect the opposing panels **26**, said panel converging inwardly and centrally of the tubular member.

More particularly, the preformed band end panels **21** connecting the inner tubular members free top marginal edges **27** of the opposing panels **26** are determined in length to be less than the perpendicular distance between the planes of the respective side marginal edges **28** of the opposing wall panels **26**, so that the opposing panels **26** are centrally inwardly deflected from the plane of their side marginal edges **28**.

FIG. 5 illustrates a bulk container of a type adapted to utilize the invention to advantage. The container is shown partially erected and prior to filling with free flowing materials such as granules, powder, pellets, or other materials have a like characteristic in exerting outward stress on the container walls as the contents settle during shipping or handling. The container at this stage of erection comprises an inner tubular member **25** with the reinforcing bands **20** in position thereabout, a shallow tray **29**,

and a telescoping outer sleeve 30. The container assembly is preferably supported on a pallet 31 as illustrated to facilitate handling of the unit, which may weigh up to 1500 pounds or more upon being filled with free flowing material.

It is to be noted that the reinforcing bands 20 are vertically disposed and encircle the inner tubular member 25 about the inwardly deflected opposing panels 26 and the open end marked by the top marginal edge 27. Further the upstanding inner tubular member 25 with the encircling bands 20 is positioned with the tubular member bottom marginal edges disposed within the shallow tray 29 which constitutes a bottom end closure means. The outer sleeve 30 forming an outer wall member is telescoped over the inner tubular member 25 with its encircling bands 20 and the shallow tray 29.

FIG. 6 shows the completely assembled container with top end closure 32 telescoped over the free top marginal edges of the inner and outer wall members. The thus erected and filled container may be made secure and unitized with the pallet 31 by means of encircling external bands in accordance with well known practice. Thus it may be seen that the reinforcing bands 20 are particularly adapted to inwardly deflect the opposing panels 26 of the inner tubular member 25 prior to the filling of the container and the positioning of the top end closure means 32. In vertical sectional view FIG. 7, it is shown that the bands 20 are positioned outwardly of the inner wall member and inwardly of the outer wall member 30 and end closure 29.

The particular and specific function of the bands 20, as hereinbefore outlined, is further illustrated in the horizontal sectional view FIG. 8. It has been determined that the inward deflection of the container inner wall member and the detention under tension prior to the filling of the container with flowable contents provides unique advantages. By this means the outward stress on the container walls exerted by said flowable contents is restrained by the bands 20 and the container outer wall member 30 is preserved in the desired essentially planar condition. This results in maximum realization of the potential top load stacking strength of the container wall members, reduction of the rupturing of the container walls which may result after undue bulging and distortion thereof and convenience in handling and stacking of the filled containers due to the greater efficiency and utilization of available stacking space.

A modification of the invention is illustrated in FIG. 9 wherein the inner tubular member 25 is essentially square in transverse section and the outward stress of the contents may be equally divided among the several wall panels, thus it may be advantageous to inwardly deflect each pair of opposing walls of the inner section by means of bands 20.

The amount of inward deflection that may be desirable is variable depending on the size of the container and a compromise of other variable factors. However, in a container of the type described, an inward deflection of one inch or more from the normal planar relation of the inner wall member opposed panels 26 is desirable. The benefits to be derived from the practice of the invention begin to accrue as the opposed panels are placed under tension even though the actual deflection may be small. The extreme limits of the amount of the deflection are determined by the point that a deleterious effect on the structure of the board comprising the respective wall panels is obtained which is a variable factor depending primarily on the width of said panels. Further, the practical limits of the amount of deflection may be limited by the practical consideration of avoiding excessive and uneconomical void space in the container.

Another embodiment of the invention is illustrated in FIG. 10 wherein the opposing wall pair 26 is inwardly deflected about vertically disposed scores 33 which serve to implement and increase the amplitude of the inward deflection of said wall members. It has been demonstrated that when this embodiment of the invention is included in containers of the type hereinbefore described, a further increase in top load stacking strength and before mentioned related advantages have been obtained.

A somewhat simplified modification of the last described embodiment of the invention is illustrated in FIG. 11. The opposed panels 26 of the inner tubular member 25 are inwardly deflected about scores 33, defining deflected wall portions 34, and the innermost converging deflected portions of the wall pairs is determined by the apical scores 31. In this modification the innermost portion of the free top marginal edges are connected by an interrupted band 36. The interrupted band 36 does not encircle the inner tubular member, but as an alternative end portions 37 are secured, preferably by adhesive, to the inwardly deflected wall portions 34. It has been demonstrated that a single interrupted band 36 positioned across the top open end of the inner tubular member 25 provides advantageous results, but under certain conditions an identical band may be positioned connecting the bottom marginal edges of the inner tubular member 25 in a like manner. The utilization of an interrupted band 36 connecting the bottom marginal edges may be an alternative or a mere addition to the top positioned band.

It is anticipated that the invention may be practiced in other containers than the one described as for example other bulk containers for flowable materials having an inner tubular member capable of being inwardly deflected and restrained under tension. In particular, containers of this type having foldably connected bottom closure or reinforcing flaps integral with the bottom marginal edges of the inner tubular member. These and other modifications fall within the intended limits of the invention claimed in the following claims.

What I claim is:

1. In a container having upstanding walls and end closure means, an open top interior member having opposed pairs of upstanding walls with side margins foldably connected and free top marginal edges, at least a pair of opposed walls of said interior member centrally and vertically inwardly deflected from the side margins, at least one band member intervening said container walls and the interior member, the band member connecting opposing free top marginal edges of the inwardly deflected walls and restraining same under tension.

2. In a heavy duty bulk container for flowable materials exerting an outward stress on the container walls, the container having telescoping inner and outer upstanding wall members and end closure means, the inner wall member being a tubular sleeve open on the top and having opposing pairs of wall panels connected together on the side margins, at least a pair of opposed walls centrally and vertically inwardly deflected from the side margins, a band member disposed in flatwise relation to the exterior surface of the inner wall member pair of opposed panels, said band tensioned and restraining the opposed wall panels inwardly deflected condition.

3. The container as defined in and by claim 2 wherein the inner wall member has bottom marginal edges defined by score lines and bottom end closure panels foldably attached along said score lines.

4. In a heavy duty bulk container for flowable materials exerting outward stress on the container walls, the container having telescoping inner and outer upstanding wall members and end closure means, the inner wall member comprising an open top tubular sleeve and having opposing pairs of wall panels connected together on the side margins, at least a pair of opposed walls inwardly deflected from the plane of the marginal edges about vertical scores centrally positioned in said panels, a band member disposed about the inwardly deflected walls and restraining the same under tension.

5. The container as defined in and by claim 4 wherein the centrally positioned vertical scores of the inner wall

member define the inwardly deflected portions of the respective walls.

6. In a heavy duty bulk container for flowable materials exerting outward stress on the container walls, the container having telescoping inner and outer upstanding wall members and end closure means, the inner wall member comprising an open top tubular sleeve and having opposing pairs of walls panels connected together on the side edges, vertical scores centrally positioned in a pair of opposed panels, said opposed walls inwardly deflected from the plane of the marginal edges about said vertical scores, a band disposed in a vertical plane and encircling the inner tubular sleeve about said pair of inwardly deflected opposed walls and restraining the same under tension in the deflected condition.

7. In a heavy duty bulk container for flowable materials exerting outward stress on the container walls, the container comprising inner and outer upstanding tubular members open on the ends and each having opposed pairs of wall panels, a shallow tray having an upstanding wall

thereabout, the tray walls disposed between the bottom marginal edges of the telescoping tubular members, the inner tubular member having at least a pair of opposing walls vertically scored to define converging inwardly deflected wall portions intervening and spaced from the side margins of the respective walls, a band disposed about the inwardly deflected wall portions, whereby the outward stress on the container walls is restrained by said band and outward deflection of the outer wall member is controlled.

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