March 11, 1969 H. L. CARPENTER, JR., ET AL 3,432,070

DRUM LINER WITH FLEXIBLE NECK

Filed Aug. 16, 1967

Sheet 1 of 2

FIG. 1

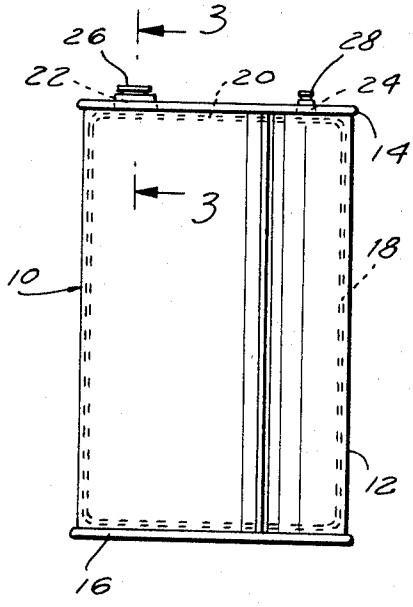


FIG. 2

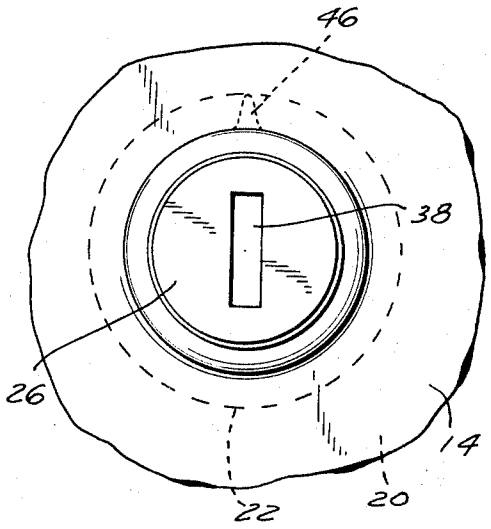
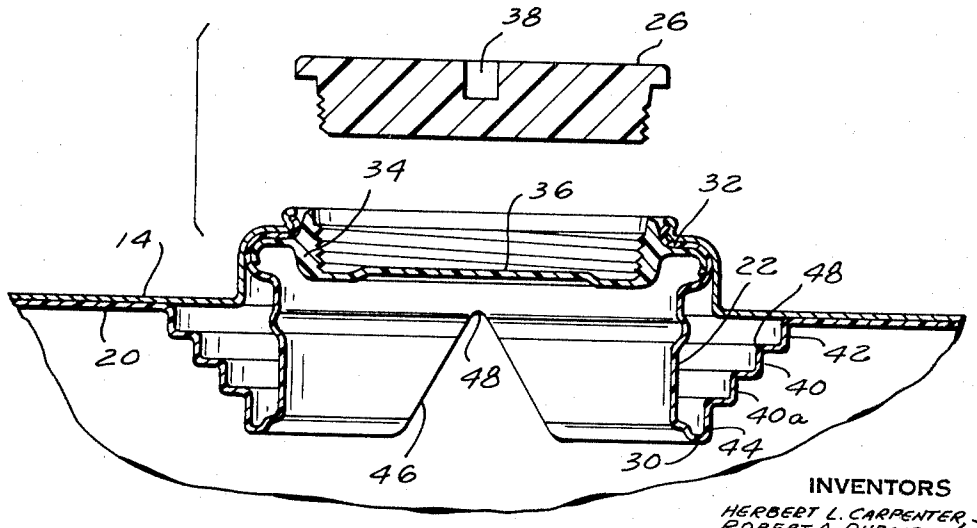


FIG. 3



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Filed Aug. 16, 1967 Sheet 2 of 2

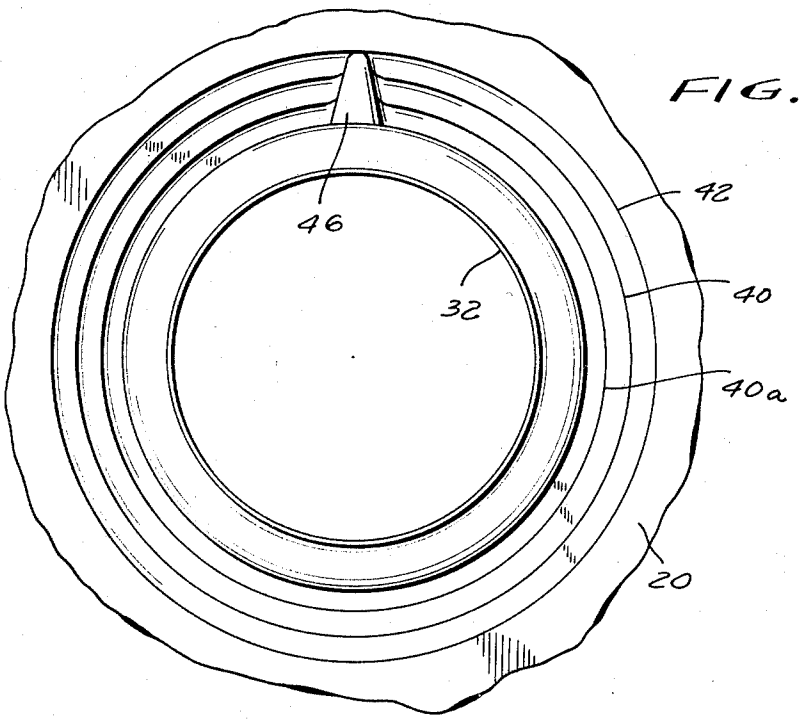


FIG. 4

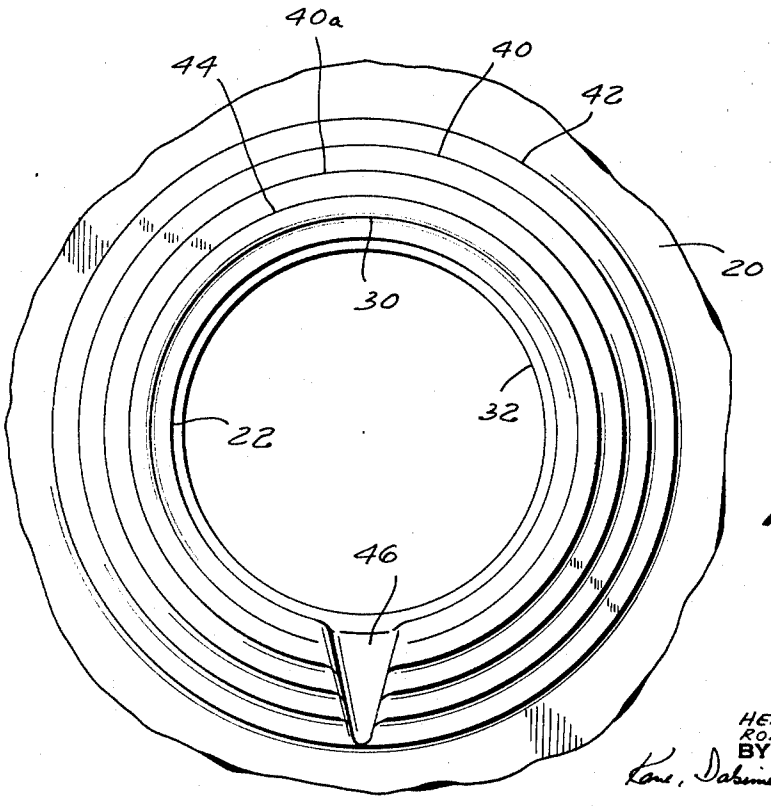


FIG. 5

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DRUM LINER WITH FLEXIBLE NECK

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U.S. Cl. 220—63 7 Claims
Int. Cl. B65d 25/14, 5/56, 5/40

ABSTRACT OF THE DISCLOSURE

A plastic drum liner having a neck defining an opening into the interior thereof which is flexibly coupled to the liner top. The coupling means comprises a multiplicity of integral accordion pleats circumferentially disposed about the neck and concentric therewith. The accordion pleats downwardly incline from an outermost pleat having portions thereof integral with the liner top to an innermost pleat having portions integral with the lower peripheral edge of the neck which is disposed below the plane of the liner top. The flexible coupling permits three dimensional movement of the neck with respect to the liner top.

Background of the invention

Plastic lined drums are being utilized in ever increasing numbers for shipping and storing purposes. Drums of this type are desirable because they are inexpensive and lightweight and also because the plastic linings have numerous adherent advantages and characteristics such as imperviousness and chemical inertness. The outer shell of plastic lined drums may be made from fibrous material or may be metallic.

To permit the filling and emptying of such drums, the liner top is usually provided with a pouring neck and vent neck which define openings into the drum interior. The necks must extend through the top of the drum cover to allow access to the interior and thus extend away from the liner top. The drum cover is usually metallic and provided with openings to receive the necks. Occasionally, shrinkage occurs during the manufacture of the container liner which causes one or both of the necks to be slightly misaligned with respect to the opening or openings in the metal drum cover. In this case, some slight force must be exerted on the neck to force it to protrude through the cover opening. Because of the relatively thin cross-section of the prior art neck, the liner was subject to ripping, tearing or fracturing if too great a force were so exerted. Also, due to the rough handling during the normal course of handling associated with the transportation of this type of commercial container, the prior art neck often suffered fracturing, ripping or tearing as a result of sudden shock loads applied to the neck. The problem of shock damage to the container neck is not unique to lined drums but applies to unlined drums as well.

Summary of the invention

It is therefore a principal object of this invention to provide an improved drum liner having a neck portion thereon which can be moved slightly in any direction so as to allow proper alignment between the liner top and drum cover.

A further object of this invention is to provide a neck which can absorb sudden shock loads without causing undue stress and strain on the liner.

These and other objects and advantages may be most effectively attained by providing a plastic drum liner with a flexibly mounted neck. The flexible coupling between the neck and liner comprises a multiplicity of accordion pleats circumferentially disposed about the neck and integral with both the neck and liner top. The lower

peripheral edge of the neck is disposed below the top of the liner and the pleats incline downwardly from an outermost pleat having surfaces integral with the liner top to an innermost pleat having surfaces integral with the lower peripheral edge of the neck. The pleats provide flexibility to the neck and thus serve to allow the neck freedom of universal motion in three dimensions and in all directions. The pleats further serve to absorb any sudden shocks that the neck might be subjected to.

If a liquid was stored within a container provided with a flexible neck as described above, some difficulty would be encountered in removing the last amount of liquid from the drum since the accordion pleats depend below the liner top and thus tend to form a dam-like structure about the opening in the drum interior. Where the drum contains expensive or valuable compounds such as perfumes, pharmaceuticals, certain chemicals, etc., it is especially important to remove this last small amount because of the cost involved. To facilitate the removal of the last amount of liquid, a channel may be provided through the flexible coupling. The channel would have at least one surface substantially coplanar with the interior surface of the liner top and would serve to connect the opening defined by the neck with the inner surface of the liner top and thus allow any remaining liquid to flow out of the container through the opening.

Description of the drawings

In the accompanying drawings:

FIG. 1 is a side sectional elevational view of a drum having a liner provided with a flexible neck in accordance with the present invention;

FIG. 2 is a fragmentary top plan view of a drum liner having a flexible neck in accordance with the present invention, a threaded insert and closure cap are shown positioned within the neck;

FIG. 3 is a side elevational sectional view along line 3—3 of FIG. 2;

FIG. 4 is a top plan view of a drum liner having a flexible neck in accordance with the present invention;

FIG. 5 is a bottom plan view similar to FIG. 4.

Description of the preferred embodiment

Reference is now made to FIG. 1 in particular in which a drum **10** is depicted as being comprised of an outer shell **12** and having top and bottom closures **14** and **16** respectively. The drum **10** is provided with an inner plastic liner **18** which may be manufactured by any conventional method but is particularly well suited to blow-molding manufacture. The liner **18** includes a top portion **20** which has an outwardly extending pouring neck **22** and vent neck **24**, the necks defining openings into the interior of the liner. The top closure **14** of the drum **10** is provided with suitable holes through which the pouring neck **22** and vent neck **24** may protrude. Closure caps **26** and **28** are provided for sealing the openings defined by the pouring neck and vent neck. The construction of both the pouring neck and the vent neck is basically the same and the following description would apply equally to both.

Referring now to FIGS. 2 and 3, the pouring neck **22** is shown as comprising a substantially cylindrical member having portions thereof extending above the liner top **20** and having a lower peripheral edge depending below the inner surface of the liner top **20**. The upper peripheral edge **32** of the neck **22** may be conveniently adapted to receive a threaded insert **34** so as to enable the pouring cap **26** to threadedly engage the neck in a sealing relationship. In the embodiment shown, the insert **34** is of the type having a knock-out diaphragm **36** originally sealing the opening but which may be removed when the drum

is initially opened and thereafter the cap **26** can be used to seal the contents of the drum. The cap **26** is provided with a slot **38** to accommodate a screwdriver or other tool to facilitate the placement or removal of the cap **26**.

The neck **22** is coupled to the liner top **20** through the integrally connected accordion pleats **40**. The pleats **40** are circumferentially disposed about the neck **22** and incline downwardly from the outermost pleat **42** which has surfaces thereon integral with the liner top **20** to the innermost pleat **44** which includes portions integral with the lower peripheral edge **30** of the neck **22**. The apex rim **48** of each such pleat **40** describes a plane substantially parallel to the plane of the liner top. The multiplicity of pleats **40** provide the neck with considerable flexibility and allow substantial movement of the neck **22** with resect to the liner top **20**. As can readily be appreciated, the pleats will allow movement of the neck **22** in all directions including movement in planes parallel, transverse, and inclined to the axis of the neck.

Because the accordion pleats **40** depend below the inner surface of the liner top **20**, difficulty would be experienced in draining the last small amount of any liquid contained within the drum **10** since the depending pleats **40** would serve as a dam about the opening defined by the neck **22** and thereby block access of such liquids to the opening. To overcome this problem, a channel **46** may be formed through portions of the inclined accordion pleat **40**. The channel must have at least one surface **48** substantially coplanar with the inner surface of the liner top **20** to insure the complete drainage of the drum contents. The channel may be in the form of a funnel-shaped deformation through the accordion pleats **40** and would serve to guide the last small amount of liquid within the container to the opening and thus permit its removal. FIGS. 4 and 5 depict the location of such a channel with respect to the accordion pleats **40**.

It will be readily appreciated by one skilled in the art that the above described invention would apply equally well to an unlined plastic container as to the container liner of the preferred embodiment. In this case the liner of the preferred embodiment would also serve as the container outer shell.

It should also be understood that modifications may be made in the illustrated and described embodiments of my invention without departing from the invention as set forth in the accompanying claims.

We claim:

1. A plastic liner for use with a drum comprising sidewalls and top and bottom connected thereto, a neck extending outwardly from said top and defining an opening into the liner interior, and flexible coupling means defining a universal joint integral with both said neck and liner and coupling said neck to the liner top thereby permitting the neck to absorb shock loads applied thereto wherein the lower peripheral edge of said neck describes a plane disposed below the plane of the liner top and said coupling means comprises a multiplicity of accordion pleats concentric with and disposed about the neck and downwardly inclining from an outermost pleat having portions thereof integral with said top to an innermost pleat having portions thereof integral with the lower edge of said neck.

2. A drum comprising sidewalls, a top and bottom connected to said sidewalls, the neck extending outwardly from said top and defining an opening into the drum interior, and flexible coupling means integral with both the neck and top and coupling said neck to said top thereby permitting the neck to absorb shock loads applied thereto, wherein the lower peripheral edge of said neck describes a plane disposed below the plane of the liner top and said coupling means comprises a multiplicity of accordion pleats concentric with and disposed about the neck and downwardly inclining from an outermost pleat having portions thereof integral with said top to an innermost pleat having portions thereof integral with the lower edge of said neck.

3. The liner in accordance with claim **1** wherein said coupling means includes portions thereon defining a channel therethrough and said channel has portions thereof in communication with the opening defined by the neck.

4. The liner in accordance with claim **1** wherein said channel has one surface coplanar with the liner top so as to permit the last small amount of liquid in the drum to be removed.

5. The drum in accordance with claim **2** wherein said flexible coupling means defines a universal joint.

6. The drum in accordance with claim **2** wherein said coupling means includes portions thereon defining a channel therethrough and said channel has portions thereof in communication with the opening defined by the neck.

7. The drum in accordance with claim **2** wherein said channel has one surface coplanar with the liner top so as to permit the last small amount of liquid in the drum to be removed.

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U.S. Cl. X.R.

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