Nov. 10, 1959 W. R. TAYLOR 2,912,137

LINER FOR CONTAINER

Filed April 9, 1956 2 Sheets-Sheet 1

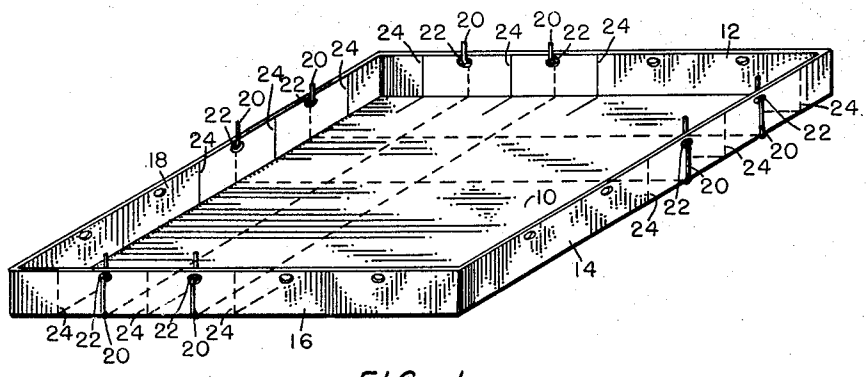

FIG. 1

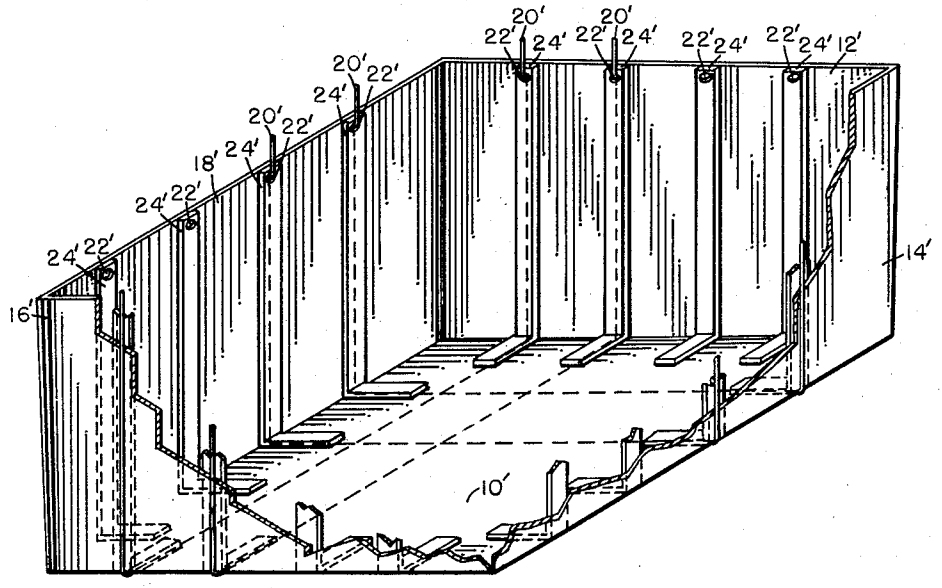

FIG. 2

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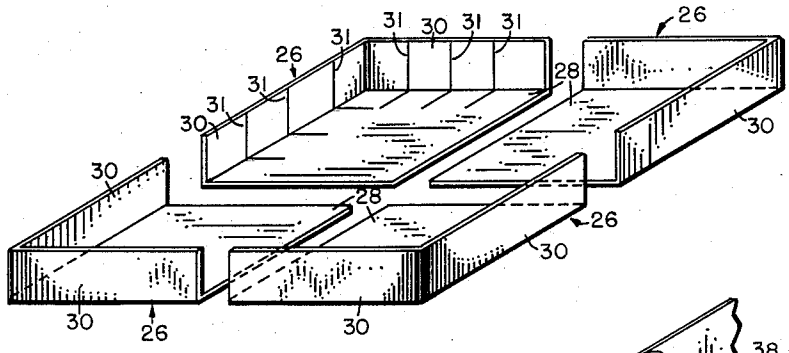


FIG. 3

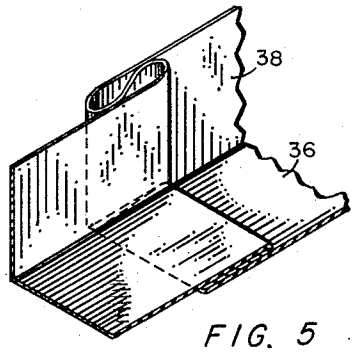
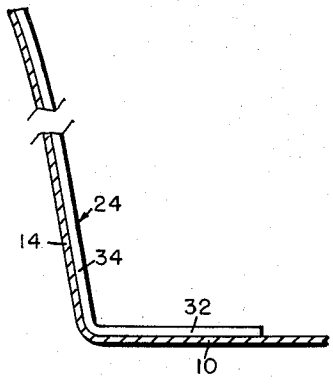


FIG. 5



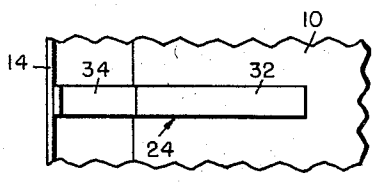


FIG. 4

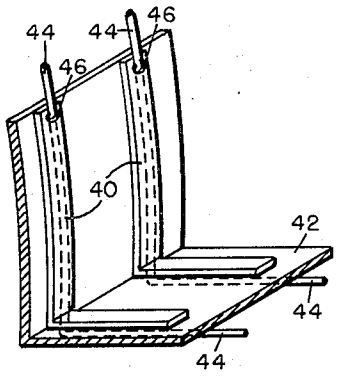


FIG. 6

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LINER FOR CONTAINER

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Application April 9, 1956, Serial No. 576,960

2 Claims. (Cl. 220—65)

This invention relates to improvements in the transportation of materials in re-usable containers, and more particularly relates to new and improved liners for such containers.

Many different types of re-usable containers are employed in commerce, ranging from relatively small boxes, packages and the like, to larger equipment adapted for bulk shipment such as tank cars, railroad cars, trucks and other vehicles, barges, ships, aircraft and the like. One common difficulty frequently encountered in employing re-usable containers in successive carriage of different materials, especially when finely-divided solid or liquid materials are to be transported, has been the difficulty in preventing product contamination when different and frequently non-compatible materials are carried.

In the past, this problem has been dealt with variously as, for example, by resorting to intensive cleaning of the equipment between carriage of different materials likely to contaminate each other. However, while such a procedure may provide at least a partial solution with respect to small containers, it has failed to provide a completely satisfactory answer, especially with respect to large containers for carrying bulk materials such as, e.g., barges, ship's holds, freight cars, and the like.

Another prior approach has been to provide liners sealed in place in such equipment and supported by use of clamps, fixtures and the like. While such liners do undoubtedly provide certain improvements over the prior practice, difficulties still are to be expected especially when carrying successive loads of material having different densities or other differing physical and/or chemical properties. Moreover, such prior liners generally have required support and sealing to the container with which they are employed in order to minimize contamination and/or other injury to the product being carried. Hence, while this prior type of liner has provided certain advantages, it, too, has not proved to be a completely satisfactory solution to the problem.

Accordingly, it is to the provision of a new and improved type of container liner that the present invention is directed.

A further object of this invention is to provide a new and improved liner structure adapted for use with a variety of re-usable transportation containers.

A still further object of this invention is to provide a liner especially adapted for the successive carrying of materials of different physical and chemical properties. A still further object of this invention is the provision of a novel barge or ship's hold liner.

These and other objects and advantages of the invention will appear more fully from the following description thereof.

Briefly, the present invention contemplates a thin-walled flexible liner adapted to conform to the configuration of a container and to be self-supporting therein when empty for at least a portion of its height when full.

A preferred embodiment of the invention comprises a liner which additionally is self-sealing within a container so that no separate sealing means or fittings need be employed between the container and the liner.

More specifically, a liner of the present invention comprises a thin-walled flexible member adapted to conform to the configuration of a container such as a ship's hold or barge hold, or other re-usable transportation container and to be self-sealing within the container, i.e., substantially self-conforming against the inner surface of the container, and self-supporting when empty for at least a portion of its height when full, there additionally being provided underlying reinforcing means adapted to facilitate unloading of a container housing a liner of this invention. The reinforcing means desirably may comprise a plurality of flexible members, such as ropes or cables, underlying the floor of such liner and extending in contact with the upstanding sides of said liner and terminating in loops or other fixtures adapted to be engaged by unloading equipment. It will be appreciated that by partially or completely lifting said liner, for example, when partially empty, via such underlying reinforcing means that the remaining product can be quickly concentrated at the lowest point in the container whereby unloading can be accomplished in far shorter time than might be expected using prior types of liners.

A preferred embodiment of the invention also utilizes a plurality of upstanding generally L-shaped rigid, yet flexible, supporting and sealing members adapted to be secured to the upper surface of the floor of said liner or to underlie the floor, and to upstand in contact with the walls of the liner while pressing laterally against the wall of the container with which said liner is employed, thus providing a means both to support said liner in said container without involving the use of other equipment, clamps, adhesives and the like. It will be understood, of course, that the dimensions of these upstanding supporting and sealing members as well as the number employed and their spacing generally will be dictated by the specific application intended.

Referring now to the accompanying drawing:

Fig. 1 illustrates schematically a liner embodying the invention;

Fig. 2 illustrates another modification of a liner embodying the invention;

Fig. 3 illustrates still another modification of the invention utilizing a plurality of interchangeable liner sections;

Fig. 4 is a fragmentary plan and elevational view of a portion of a liner floor and wall illustrating one form of self-supporting and sealing means;

Fig. 5 is a fragmentary view illustrating the adjustment of a liner of this invention to fit a specific container; and

Fig. 6 is a fragmentary perspective view of another embodiment of the invention.

Generally, liners embodying this invention may be formed of any flexible thin-walled material, preferably completely impervious to the material to be transported in the container. Typically practicable materials include heavy paper, fibrous paper products, fabrics such as canvas, cotton, or other woven or non-woven natural or synthetic fiber fabrics, resinous plastic films or sheets formed from various thermoplastic materials such as vinyl resins such as polyvinyl acetate; polyvinyl halides, such as polyvinyl chloride; various copolymers, e.g., polyvinyl chloride-polyvinyl acetate; and the like, as well as coated fabrics, rubber sheeting and the like, dictated by the specific nature of the material to be carried and the type of container involved.

Referring now more specifically to the drawings, Fig. 1 illustrates, with parts broken away for clarity, one embodiment of a liner embodying the present invention. As

there shown, the liner comprises a floor **10** and a plurality of upstanding walls **12**, **14**, **16** and **18**, comprising a unitary structure either formed from a single piece of material or assembled via sewing, adhesive, machine fastenings, or the like. Underlying the floor and secured to the outside of the upstanding walls are a plurality of flexible, reinforcing elements, e.g., strands, ropes, cables, or the like, indicated generally at **20**. These reinforcing elements **20** terminate in rings **22** or other engageable fixtures (not shown) adapted to permit lifting of the entire liner to facilitate unloading and/or removal of the liner from the container.

Also provided are self-supporting and self-sealing means generally designated at **24** and shown in more detail in Figs. 4 and 6. It will be understood, of course, that in Fig. 1 only a few of the plurality of underlying reinforcing elements **20** and self-sealing and self-supporting means **24** employed are shown for clarity. In practice, it is contemplated that in many instances there would be a larger number of underlying and supporting elements **22** and self-sealing and supporting members **24** spaced around the floor and upstanding walls of the liner as necessary to achieve the desired self-sealing, support, and reinforcing characteristics.

Fig. 2 illustrates another embodiment of a liner similar to that shown in Fig. 1 but indicating the use of a liner in a container having a substantially greater depth or where the properties of the material to be carried are such that a higher walled liner is necessary. The structure shown in Fig. 2 again comprises a floor **10'**, upstanding walls **12'**, **14'**, **16'** and **18'**. There also are provided underlying supporting means **20'**, and rings **22'** or other engageable means (not shown) as spaced intervals around said linear, and a plurality of self-supporting and self-sealing members **24'** spaced around the liner and secured to the upstanding walls and floor of the liner.

Fig. 3 illustrates another embodiment of the present invention especially advantageous when it is desired to line a number of varying types of containers, or containers of varying dimensions in accordance with this invention. As shown in Fig. 3, it will be observed that the liner as employed in Fig. 3 contemplates a plurality of interchangeable liner sections indicated generally at **26**. Each of these sections **26**, shown in Fig. 3 especially as adapted for the lining of a generally rectangularly shaped container, comprises an identical unit having a floor member **28**, upstanding walls **30**, and self-sealing and self-supporting members **31**, a number of the latter, together with underlying supporting means, being omitted for clarity.

In operation, the floor and wall sections are merely overlapped as necessary to fit the container to be lined, thus providing an accurately fitting sealing and lining means and permitting the interchangeable use of a number of sectionalized liner elements.

Fig. 4 fragmentarily illustrates the self-supporting and self-sealing means indicated at **24** in Fig. 1 and **24'** in Fig. 2. As shown in Fig. 4, the liner floor **10** and liner wall **14** have bonded thereto, preferably on the inside thereof, by adhesive, rivets, or other suitable fastening means a generally L-shaped self-supporting and self-sealing member **24** having a base **32** and an upstanding reinforcing and sealing rib **34**, the height of which rib is dictated by the particular application intended, it generally being preferred to employ a reinforcing and sealing rib extending to the top of the liner wall. The rib **34** is curved outwardly at its upper end better to press laterally against the wall of a container in which it is employed, thus providing an effective seal. It will be appreciated that a plurality of the self-sealing and self-supporting members **24** and **24'** are to be spaced at suitable intervals around the periphery of the liner, a typically practicable spacing in a barge liner construction being about 2 foot intervals. An especially preferred embodiment of the invention contemplates that the supporting and sealing means be located at the same points around the liner as the underlying supporting means, e.g., as shown in Figs. 1 and 6.

The self-supporting and self-sealing members **24** and **24'** may be formed of various materials capable of providing the desired supporting and sealing action such as rubber, plastic, metal, and the like, or combinations of such materials. If desired, an L-shaped member hinged to permit free opening but locking against closure beyond the desired angle, also may be used. As will be appreciated, the self-supporting and self-sealing members serve to support the liner walls when empty for at least a portion of their height when full and effectively to seal the liner in the container by outward lateral pressure against the container walls.

Referring now to Fig. 5, there is illustrated fragmentarily the manner in which a unitary liner embodying the present invention may be overlapped to adjust a given liner to fit varying sized containers. As shown in Fig. 5 a floor portion **36** and a wall portion **38** are readily folded over or overlapped to adjust the dimensions of the liner to fit the container in which it is employed.

Fig. 6 illustrates, fragmentarily, a preferred arrangement of the underlying and supporting means and the self-supporting and self-sealing means. As shown in Fig. 6, a plurality of L-shaped members **40** are provided inside a liner **42** there serving to support the upstanding liner wall. There also are provided a plurality of underlying supporting cables or ropes **44** which are secured to the outside of the liner throughout substantially their entire length but the ends of which extend through the liner walls and upper end of the L-shaped members **40** and terminate in loops **46** to provide a smooth outer upper edge of the liner.

While the embodiments of the invention shown in the drawings and hereinbefore described generally have indicated a liner generally rectangular in shape, it will be understood, of course, that it is within the contemplation of this invention that other shaped liners also may be employed, the intent being thus far to describe liners especially adapted for use in ship's holds or barge holds adapted successively to carry differing materials such, e.g., as soda ash and chrome ore. It will be appreciated that chrome ore has a much greater density than soda ash and that there would be involved a smaller than a corresponding weight of soda ash in a typical shipment by barge or ship wherein the quantity carried is dictated not only by the volume but by the total weight.

Hence, it will be appreciated that by the practice of this invention soda ash advantageously may be carried in one direction utilizing a liner of this invention and at the end of the journey the liner employed may be readily removed and either the chrome ore loaded directly into the ship's hold or other container, or into a second liner embodying the present invention for the return trip of the container. It will be appreciated that by the practice of this invention no separate clamping nor sealing means need be provided in connection with the container itself. Moreover, it will be appreciated that the self-sealing and self-supporting means characterizing liners of this invention provide sufficient sealing against the walls of the container, thus providing a maximum usable space and minimizing possible damage or injury to the liner itself.

As pointed out hereinbefore, unloading of a container employing a liner of this invention is simplified in that when only partially full, the liner may be completely or partially lifted from the container, thus concentrating the contained material towards the center of the liner where it may be more readily removed. Not only does such a procedure facilitate rapid unloading but insures complete unloading, since as the material approaches complete removal from the container, the entire liner and

contained material may be bodily removed from the container and the material carried discharged therefrom.

It is to be understood that although the invention has been described with specific reference to particular embodiments thereof, it is not to be so limited, since changes and alterations therein may be made which are within the full intended scope of this invention as defined by the appended claims.

What is claimed is:

1. A reusable liner for a container, said liner comprising a thin-walled, flexible member having a floor and four upstanding side walls forming a unitary structure which is substantially self-conforming and sealing against the inner walls of the container, a plurality of generally L-shaped flexible reinforcing elements spaced around the periphery of the structure and having base and rib portions, said base portion being secured to the inner surface of the floor of the structure, the rib portion being secured to the inner surface of the side wall and extending to the top edge thereof, said flexible reinforcing elements being curved outwardly at their upper ends and of sufficient stiffness to support the side walls in an upright position when the liner is empty, and rope members extending along and secured to the outer surface of opposite side walls and the floor underlying said flexible reinforcing elements and passing through the side walls and flexible reinforcing elements at the top edges of the side walls and attached to said flexible reinforcing elements at the locations where they pass through these elements.

2. In combination, a barge hold and liner therefor, said hold having a generally box-like configuration, said liner comprising a reusable thin-walled, flexible member, having a floor and four upstanding side walls forming a unitary structure which is substantially self-conforming and sealing against the inner walls of said hold, a plurality of generally L-shaped flexible reinforcing elements spaced around the periphery of the structure and having base and rib portions, said base portions being secured to the inner surface of the floor of the structure, the rib portions being secured to the inner surface of the side walls and extending to the top edge thereof, said flexible reinforcing elements being curved outwardly at their upper ends and of sufficient stiffness to support the side walls in an upright position when the liner is empty, and lifting and supporting rope members extending along and secured to the outer surface of opposite side walls and the floor underlying said flexible reinforcing elements and passing through the side walls and flexible reinforcing elements at the top edges of the side walls, said rope members also being attached to said flexible reinforcing elements at the locations where they pass through the elements and having free ends of sufficient length to be attached to a lifting mechanism for removal of said liner from the barge hold.

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