Aug. 3, 1954 R. L. KUSS 2,685,385

LINER FOR RIGID CONTAINERS HAVING A NOZZLE FOR FILLING AND EMPTYING THE SAME

Filed Aug. 11, 1949

FIG. 1.

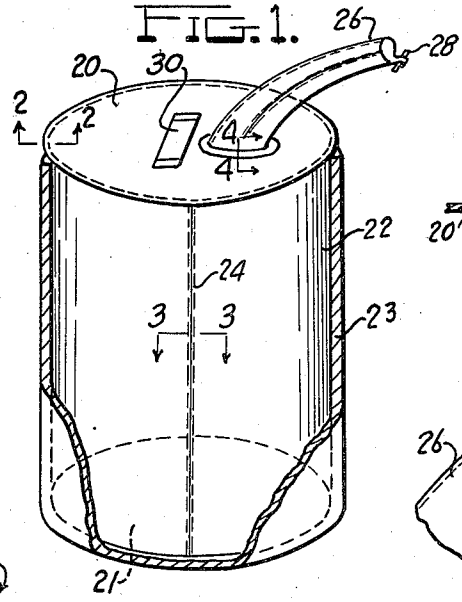

FIG. 2.

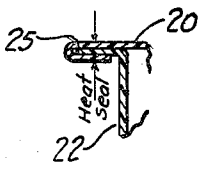

FIG. 3.

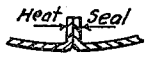

FIG. 4.

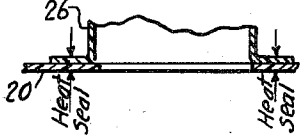

FIG. 5.

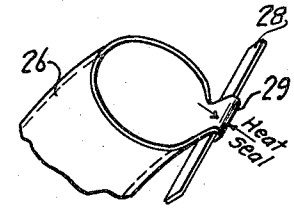

FIG. 6.

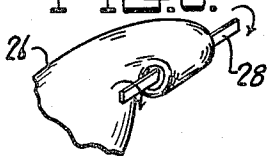

FIG. 7.

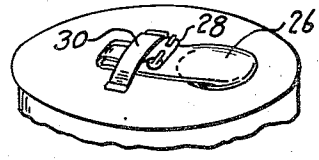

FIG. 8.

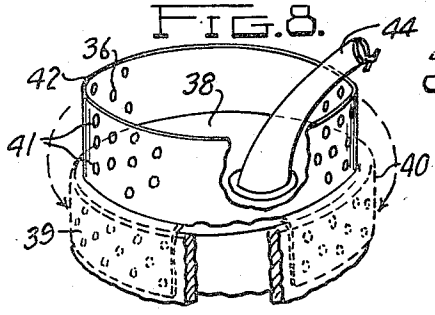

FIG. 9.

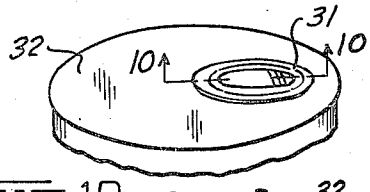

FIG. 10.

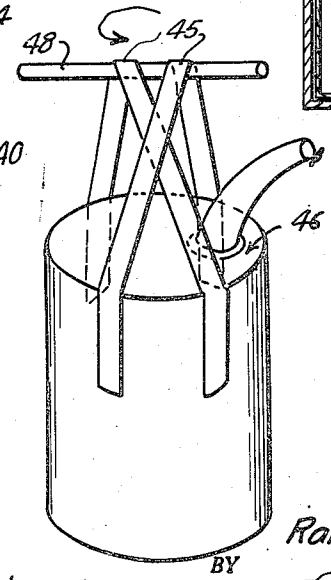

FIG. 11.

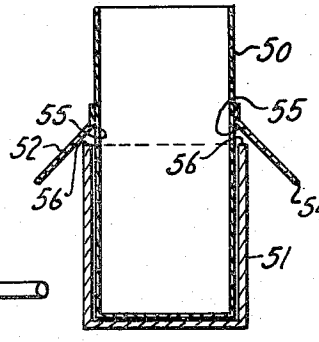

FIG. 12.

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LINER FOR RIGID CONTAINERS HAVING A NOZZLE FOR FILLING AND EMPTYING THE SAME

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5 Claims. (Cl. 222—183)

1

This invention relates to liners for rigid containers, and is particularly directed to preformed, moisture-proof plastic liners for rigid containers, such as large paper shipping drums and the like.

In the past materials, both liquid and solid, have been shipped in wooden barrels, steel drums or glass bottles when large quantities were involved. All such containers have the inherent undesirable feature of greatly increasing the tare weight, so that a considerable proportion of the shipping cost arises from the shipment of the containers themselves. Furthermore, these steel drums, wooden barrels and glass bottles cannot be nested, so that they occupy considerable space when being shipped empty. An additional disadvantage of such containers is that their cost has now risen to the point where they are not generally disposable, but must be returned to the shipper and conditioned for reuse, by cleaning, repairing, and the like.

Many of these disadvantages have been avoided by the use of strong paper drums, which provide a very low tare weight, yet are sturdy and well adapted to the shipping of large quantities of dry material, particularly chemicals. Certain of these containers may be manufactured so economically as to be discarded after a single use, so that no reshipping or reconditioning charges are involved. Furthermore, these containers may be made so as to nest within one another and thus permit shipping of a large number of containers in a small space.

These paper drums, however, are not moisture-proof and cannot be employed for shipping liquids, such as liquid chemicals, oil and the like. Impregnation of these drums to make them liquid-tight is not practical, because different types of impregnation would be required depending upon the contents of the drum. In addition, any breaks or seams produced in the walls of the drums, which are made of stiff cardboard-like material, would result in leakage or seepage. Spraying liquid-tight layers of plastic materials upon the inner surfaces of the drums or otherwise attaching sheets of plastic to these inner surfaces, has not solved the problem of transporting liquids in such containers, since a break in the container itself will normally result in a break of the moisture-proof layer. Here again the cost of the containers has been increased and some attempt at reuse would have to be made. In many cases the inner liner of these drums might be altered, damaged or chemically changed during its use so as to make reuse very difficult, and requiring a major amount of reconditioning before reuse.

It is an object of this invention, therefore, to provide, in combination with a rigid container, a plastic liner which provides a fluid-proof or

2

liquid-proof seal in order to enable liquids to be transported in ordinary liquid-permeable paper drums and the like, and permitting reuse of the container without necessitating any reconditioning.

Another object of this invention is to provide, in combination with a rigid container, a preformed, separate liner whose composition may be altered to transport any particular liquid.

Still another object of this invention is to provide a preformed plastic liner whose preformed shape conforms to that of the container in which it is to be used and which is capable of maintaining a liquid-tight seal within a rigid container, even after the container walls have been cracked, crushed, the ends domed outwardly, or otherwise damaged.

A further object of this invention is to provide in combination with a rigid container a liquid-tight, preformed plastic liner having means thereon for holding the same in such a predetermined position in the container during the filling operation that no stresses in the liner walls occur during filling.

Still a further object of the present invention is to provide in combination with a rigid container a preformed plastic liner having means attached thereto for filling and emptying the liner, either completely or partially.

Other objects and advantages of the present invention will become apparent to those skilled in the art when read in conjunction with the accompanying drawings, in which—

Fig. 1 is a perspective view of a liner embodying the present invention shown in conjunction with a rigid container which is partly broken away to more clearly show the construction of the liner,

Fig. 2 is a fragmentary sectional view taken on line 2—2 of Fig. 1,

Fig. 3 is a fragmentary sectional view taken on line 3—3 of Fig. 1,

Fig. 4 is a fragmentary sectional view taken on line 4—4 of Fig. 1,

Fig. 5 is an enlarged fragmentary view of the free end of the nozzle shown in Fig. 1,

Fig. 6 shows a view of the nozzle in a partially closed position,

Fig. 7 illustrates one method of retaining the closed nozzle in a predetermined position during shipping of the container,

Fig. 8 is a fragmentary perspective view showing a second embodiment of the present invention, which is preferred, and which includes a skirt adapted to fit over the rigid container.

Fig. 9 illustrates a second modification or means for holding the collapsed nozzle in a predetermined position during shipping of the container,

Fig. 10 is a cross-sectional view taken on line 10—10 of Fig. 9,

Fig. 11 shows means for emptying and supporting the liner comprising the present invention, and

Fig. 12 is a cross-sectional view of a skirt attached to the sides of a cylindrical liner.

In developing a separate liner element for a rigid container, it has been found that successful applications occurred only after the liners were fabricated with dimensions somewhat greater than those of the container in which the liner was to be used. Also essential was the provision of positioning means for insuring the absence of stresses in the liner during the filling operation and the subsequent shipping. Experience has shown that unless the liner is allowed to "drape" to the bottom of the container by an amount equal to the excess dimension incorporated in the vertical dimensions of the liner that there are stresses introduced into the bottom panel of the liner which may be responsible for failure of the liner even with a minimum of rough handling during transportation. Further, the most frequent type of damage to a container in transit occurs when a severe blow is sustained by one of the chimes. If this blow is of sufficient severity or if the resulting hydraulic ram generated in the liquid contents is excessive, the failure in the carton takes the form of "doming" the drum end. This "doming" has the practical effect of increasing the capacity of the drum since the surface area of the ends is increased. For this reason also, it is essential that the liner have both horizontal and vertical dimensions that are greater than those of the container used.

The preformed plastic liner comprising the present invention may take many forms. In Fig. 1, the liner includes a top 20 and a bottom 21 connected by a side wall 22. The diameter of the top 20 and bottom 21 is slightly greater than the inner diameter of a container 23 in which the liner is positioned. Also, the height of the wall 22 is greater than the height of the container 23. The purpose of having the dimensions of the liner slightly greater than the inner dimensions of the container is to avoid any strain upon the plastic liner when the container is subjected to buffeting during transportation. Also, when a break occurs in the wall of the container, the excess material in the liner permits expansion of the liner through the break without placing strain upon the plastic material forming the liner. The side wall 22 is produced from a single sheet of plastic material having the ends sealed together preferably by a heat seal along the seam 24. As shown in Fig. 3, the seam 24 is produced by heat-sealing the edges of the plastic sheet together to form an internal seam. Although not shown, it will be obvious to those skilled in the art that the sidewalls may be made seamless by using plastic tubing of the desired diameter. The top 20 and the bottom 21 are connected to the side 22 by an overlap seam, as shown in Fig. 2. One advantage of this overlap seam is that the rim 25 on the wall 22 is protected from burning by the overlapping portions of the top 20.

A nozzle 26 is attached to the top 20 by an over-and-under seam, as shown in Fig. 4, and is in open communication with the interior of the liner. In order to close the open end of the nozzle 26, a strip of metal 28, such as zinc, is held by a heat-sealed loop 29 onto the end of the nozzle 26. By flattening the end of the nozzle 26 and rolling the zinc or other metal strip along

the nozzle to collapse the same, as shown in Fig. 6, closure of the liner may thus be effected. In Fig. 7 the nozzle is shown in collapsed, folded position with the zinc strip 28 folded over the nozzle to close the same. A strap 30, which may be of heat sealable plastic material is positioned on the top 20 so as to hold the collapsed nozzle 26 in a predetermined position during the shipping of the container. An alternate form of positioning of the nozzle during transportation is shown in Figs. 9 and 10, wherein an annular ring 31 of a heat-sealable plastic is heat-sealed to a top 32 so as to provide an annular pocket 34 in which a collapsed nozzle 35 may be positioned.

In the embodiment of the invention disclosed in Fig. 8, an annular skirt 36, positioned in a vertical direction, is attached to a top 38 of a liner and adapted to fold downwardly over the outside of a container 39, as shown in dotted lines at 40 in Fig. 8. The skirt 36 is perforated, as shown at 41, in order to permit air trapped between the liner and the bottom and sides of the container to move upwardly along the sides of the liner and through the perforations 41 in the skirt 36 to the atmosphere. Preferably, the upper rim 42 of the skirt 36 is somewhat smaller in diameter than the container 39 and is of resilient material so as to permit the skirt to frictionally engage the container 39. This skirt construction provides insurance that during the filling operation of the liner through the nozzle 44, the liner will be maintained in a predetermined position in the container 39 such that there will be excess liner material between the top and the bottom of the container.

This feature is more clearly illustrated in Fig. 12, wherein a cylindrical liner 50 is positioned within a cylindrical drum 51. A skirt 52 is attached to the liner by a heat-seal or other suitable means. As above described, the skirt 52 is preferably perforated and has a sufficiently small diameter at its lower end 54 to enable the skirt to hold the bag in a predetermined position while being filled. The juncture of the skirt with the liner forms on its underside at 55 a V-shaped annular groove that provides a stop for the top edge 56 of the container 51. The attachment of the skirt to the liner is so made that the groove 55 is farther from the bottom of the liner than the top edge 56 is from the bottom of the container. As a result, the assemblying of the liner in the container by pulling the skirt 52 down over the outside of the container so that the edge 56 engages the groove 55 will always produce a length of liner wall between the top and bottom of the container greater than the corresponding container wall. No stresses arise upon filling the liner, since none of the walls are in a stretched position.

As an aid in emptying the liner, a plurality of straps 45 may be attached to a liner 46, as shown in Fig. 11. By inserting a bar 48, or merely by use of the hands, the straps 45 may be twisted so as to twist liner 46, thus decreasing the internal volume thereof. As a result, this twisting motion will force the ejection of liquid materials from the liner 46. Opposite ends of each strap 45 are attached at diametrically opposite points on the liner 46, as shown in Fig. 11, because this produces the maximum amount of twist possible. Other methods of attachment, however, may be employed.

Variations and modifications in the present invention, as disclosed in the accompanying draw-

ings, will be apparent to those skilled in the art. For example, the number of separate pieces of plastic sheet material employed in producing the plastic liner may vary from a single sheet to six or more sheets, depending upon the shape of the liner and upon its particular construction. Although various types of heat-sealed seams have been specifically disclosed in the drawings, it will be obvious that other types of heat-sealed seams, as well as seams which are not heat-sealed, may be readily employed. The nozzle shown in the drawings is attached to the top of the liner and covers but a very small area thereof. In actual practice, the nozzle may be connected to the liner at any place where the particular use of the container dictates. The size of the nozzle may also be increased so as to cover the entire top or bottom. A releasable zinc strip is shown in the drawings as being attached to the end of the nozzle for the purpose of closing the nozzle, but it will be obvious to those skilled in the art that this zinc strip, or other metal strip, may be attached to the nozzle near the base or at any point where the metal strip may be folded about the nozzle to effect closure thereof. Other methods of closing the nozzle may be employed, such as heat-sealing, tying and the like.

Although the skirt 36 has been shown as being perforated, and such construction is highly preferable, it is possible to employ an imperforate skirt where the liner has been carefully juggled into position in the container before filling starts. This is not practical, however, when packaging large quantities of materials, so that perforations or other means permitting air to escape therethrough should be provided in the skirt. Skirts made of resilient, elastic material are most readily adapted to holding the liner in position in the container, although non-elastic material may be employed, particularly where the length of the skirt is such that it alone provides sufficient frictional resistance to the movement of the liner downwardly toward the bottom of the container.

Emptying the liner by squeezing the same may be done in a variety of ways with or without the use of straps, as indicated in Fig. 11. The straps, however, are believed to be advantageous in that they provide means for lifting the liner out of the container when it is empty.

In the production of liners of the type embodying the present invention, heat-sealable plastic materials, generally thermoplastic materials, are preferable because of their ease of fabrication. Heat-sealed seams may be readily produced which are fluid-tight. Adhesive bonding of non-heat-sealable resins may be employed, so that a wide variety of plastic materials may be used in making up liners embodying this invention. The thickness of the liners may vary from .002" up to .020", and may be greater or less than these thicknesses depending upon the particular use of the liner. Resins which may be satisfactorily employed are, for example, polyvinyl chloride, vinyl chloride acetate copolymers, vinylidene chloride copolymers, polyethylene, rubber hydrochloride, regenerated cellulose, mixtures of polyvinyl chloride and nitrile rubber, and the like.

These liners are adapted to be used in combination with rigid containers, which may be made of any solid material, but which are preferably made of paper or other fibrous materials. Particular advantage has been found in employing such liners in combination with pressed paper drums of the type now employed for shipping large volumes of chemicals.

One of the most important advantages of the plastic liner embodying the present invention, when in combination with a rigid, solid container, is that it permits the use of liquid-pervious containers for the transportation of large amounts of liquids, such as acids, bases, oils, foods, flavoring extracts and the like. Furthermore, the use of these liners makes possible reuse of the containers without cleaning, since the containers are in no way contacted with the liquids or other materials contained within the liner. If the container is damaged during transportation, the liner, which is made over-sized, partially fills in the break and is placed under no strain during the subsequent transportation and handling. The skirt which is attached to the upper portion of the liner at a predetermined point holds the liner in place during the filling operation and insures against the stretching of the liner walls. The pouring nozzle permits directed discharge and, in combination with straps or similar emptying means, provides for discharging the contents from the container in an upright position without the necessity of tipping the same. This is advantageous with regard to thirty gallon drums and the like. By coupling a metal strip closure with the nozzle, partial discharge of the contents may be effected with subsequent resealing, which is essential when deliquescent chemicals are packaged.

What I claim is:

1. In combination with a rigid container, a preformed moisture-proof plastic liner adapted to fit within the container, a nozzle in open connection with the container to provide means for filling and emptying said liner, means for closing said nozzle, means for holding the nozzle in a predetermined position during the shipping thereof, and an annular skirt positioned about the periphery of the liner for supporting the liner upon the top of the container during the filling operation, said skirt being attached to the liner at a distance from the bottom of the liner greater than the height of the side of the container.

2. In combination with a rigid container, a preformed moisture-proof plastic liner adapted to fit within the container and having horizontal and vertical dimensions just slightly larger than those of the container, means for charging and discharging material into and from said liner, and a vertical annular perforate skirt of resilient material attached to the liner at a distance from the bottom thereof greater than the height of the side wall of the container, said skirt being slightly smaller across its diameter at its free edge than the periphery of the container so as to frictionally engage the container when folded downwardly thereover during the filling operation for the purpose of supporting the liner upon the top edge of the container.

3. In combination with a rigid, solid-walled container, a preformed moisture-proof plastic liner for the container having horizontal and vertical dimensions slightly greater than those of the container, a nozzle in open connection with the liner for filling and emptying the same, means for closing the nozzle, means for retaining the nozzle in a predetermined folded position, and an annular perforate skirt positioned about the periphery of the liner near the top thereof in a vertical direction and adapted to fold downwardly over the upper edge of the container to hold the skirt in a predetermined position during the filling operation, said skirt being attached to

the liner at a distance from the bottom of the liner greater than the height of the side of the container.

4. In combination with a rigid container, a liner comprising a liquid-tight, preformed plastic bag, said bag corresponding in the preformed state to the inside configuration of the container but having slightly greater horizontal and vertical dimensions than those of the container, a nozzle in open connection with the bag and attached to the top thereof, means for releasably closing the nozzle, means for retaining the nozzle in a predetermined folded position, and an annular perforate skirt of resilient material positioned vertically and attached to the bag at a distance from the bottom thereof greater than the height of the container wall, said skirt having a smaller periphery at its free edge than the periphery of the top of the container so as to provide frictional engagement between the skirt and the container when the skirt is folded downwardly thereover.

5. In combination with a rigid paper drum, a preformed moisture-proof liner for the container of plastic, heat sealable material so constructed as to correspond to the configurations of the inside of the drum but having vertical and horizontal dimensions slightly larger than those of the drum, said liner including a top, bottom and side wall attached to one another by heat-sealed seams to provide a fluid-tight enclosure, a nozzle in open connection with the liner for filling

and emptying the same and attached to the top of the liner by a heat-sealed seam, a strip of flexible material attached to the nozzle and adapted to be folded about the nozzle to releasably close the same, an annular flap attached to the top of the liner about the base of the nozzle to provide an annular pocket for the nozzle so as to hold it in a predetermined folded position during transportation of the container, and an annular perforate skirt of resilient material vertically positioned about the upper periphery of the side wall of the liner and having a slightly smaller diameter across its free edge than the diameter of the top of the container so as to frictionally engage the container when folded downwardly thereover for the purpose of maintaining the liner in a predetermined position during the filling operation, said skirt being attached to the liner at a distance from the bottom of the liner greater than the height of the side of the container.

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