Nov. 5, 1968 H. L. CARPENTER, JR 3,409,201

PLASTIC LINED DRUMS

Filed Dec. 28, 1966 2 Sheets-Sheet 1

FIG. 1

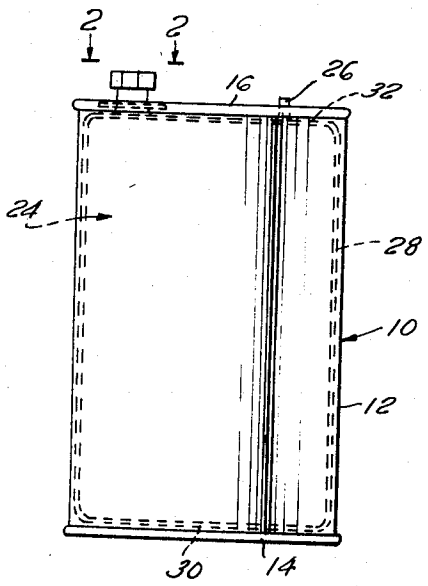
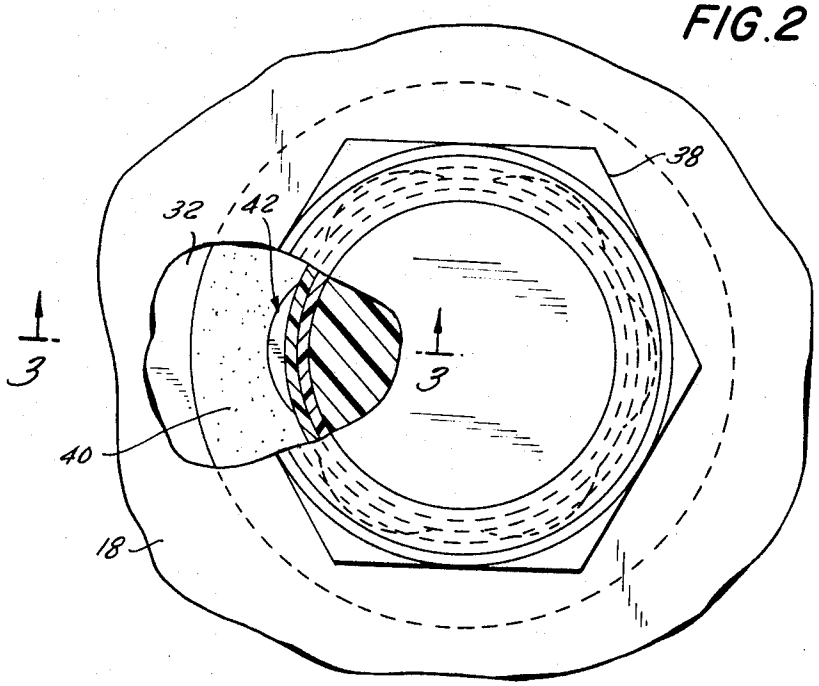


FIG. 2



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FIG. 3

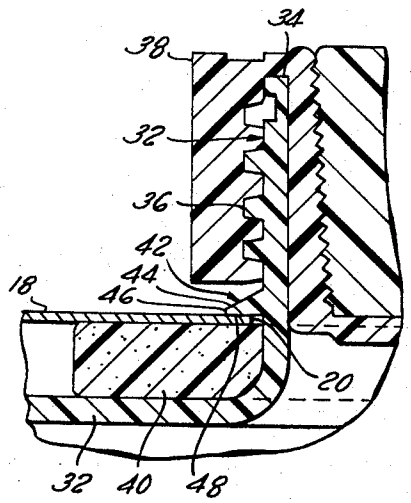
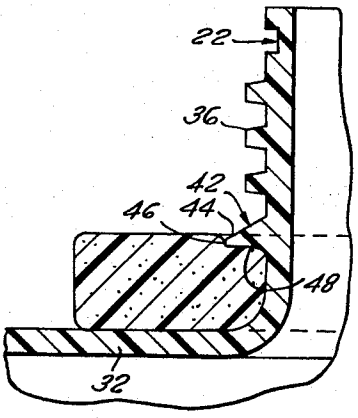


FIG. 4



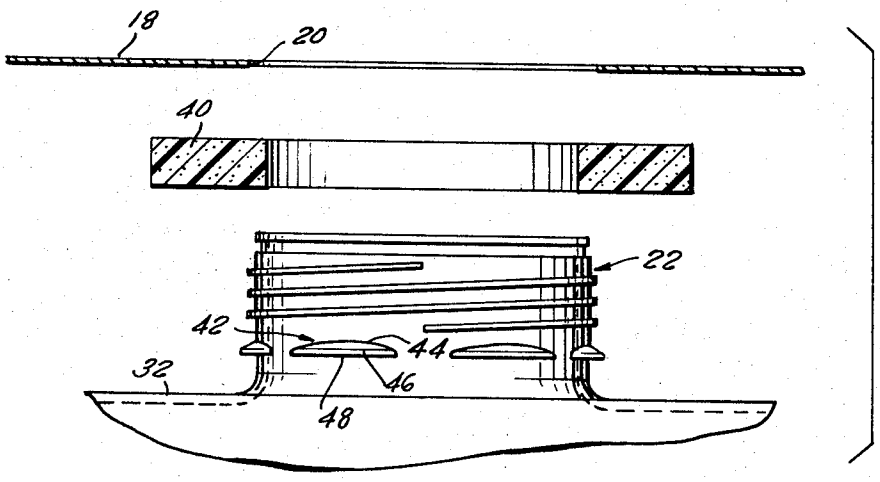


FIG. 5

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PLASTIC LINED DRUMS

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4 Claims. (Cl. 229—14)

ABSTRACT OF THE DISCLOSURE

A plastic liner having a neck projecting outwardly through an opening in the top of a drum. The neck has a series of circumferentially disposed lugs about the neck for engaging the top of the drum. The lugs have a top camming surface arcuate in both the horizontal and vertical planes to permit progressive flexing of the lugs during assembly when the neck is inserted through the drum opening.

Background of the invention

In the typical drum whether it be fiber or metal in which a plastic liner is incorporated, the neck of the plastic liner extends outwardly through an opening at the top of the drum. As a result of this arrangement, leakage of liquid during filling or emptying the drum will often occur with the liquid flowing along the neck to the opening in the top of the drum downwardly to the space between the drum and liner. Depending upon the nature of the liquid, serious effects may result on the drum walls such as weakening, corrosion and the like which may seriously affect the strength and general utility of the drum. Thus, the problem exists in the liquid containing drum art in which plastic liners are employed; and the present invention offers an improved and effective solution to this problem.

In addition, a number of various constructions have been proposed for permitting the insertion of the neck of the liner through the top opening of the drum during assembly of the drum and liner and subsequent retention or anchorage of the projecting neck in place relative to the top of the drum. For one reason or another, these proposals have not proven satisfactory to the extent that either or both insertion of the neck through the top opening is not facilitated or the retention of the projecting neck in place is not assured. The present invention provides an effective solution to both of these problems.

Summary of the invention

The objects and advantages of the invention are most effectively attained by providing a closed cell plastic foam gasket on the upper surface of the plastic liner immediately surrounding the liner neck and beneath the top of the drum. Retaining lugs project outwardly around the periphery of the neck and are spaced relative to one another in such a manner to permit them to flex downwardly as the neck is pulled through the top drum opening. This spacing permits each lug to be snapped into place by individual flexing without damage to any one individual lug.

The insertion of the neck and particularly the lugs through the top opening is also facilitated by the construction and shape of the individual lugs. Thus, the upper surface of each lug is provided with a cam shape to thereby provide the proper camming movement during assembly of the neck relative to the drum top. In addition, the outer periphery of each lug is arcuately shaped so that each lug flexes progressively from the center outwardly towards either end as the neck is being inserted through the top opening. The lower surface of each lug is at substantially right angles relative to the axis of the neck to thereby firmly retain the neck in place on the drum top with the top of the liner spaced a predetermined amount from the drum top to thereby hold the foam collar in partially compressed condition and in sealed relationship about the liner neck between the liner top and the drum top.

Brief description of the drawing

In the drawings:

FIG. 1 is an elevational view of a drum having an inner liner for containing liquid material and the like with the liner neck and vent projecting through the drum top and sealed by means of suitable closures;

FIG. 2 is an enlarged fragmentary plan view showing the closed neck taken along the line 2—2 of FIG. 1 with certain parts broken away, removed and sectioned for clarity;

FIG. 3 is a fragmentary longitudinal sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a similar longitudinal sectional view with the closure removed; and

FIG. 5 is a fragmentary exploded elevational view of the liner neck, foam gasket and drum top prior to assembly of these parts.

Description of the preferred embodiments

A drum **10** is illustrated and may assume one of a number of configurations and structure well known in the art. In this connection, the drum **10** may be formed with a substantially cylindrical shell or side wall **12** of convolutely wound adhesively secured laminated layers of fibrous material such as kraft paper. The bottom of the shell **12** is closed by a conventional bottom closure **14** and the top is closed by a conventional top closure **16**. Inasmuch as the present invention is primarily concerned with the handling of liquids, semi-solids, liquified material and the like, the top closure preferably includes a metal cover **18** of suitable material such as steel and the like. This cover is provided with a larger opening **20** through which projects the neck **22** of a plastic liner **24** and a relatively reduced opening for receiving the projected vent **26** of the liner.

The liner **24** may be formed of any one of a number of suitable resin materials known to the trade such as polyethylene and is generally preformed either by blow-molding or other manufacturing techniques also well known to the trade. The liner **24** is placed within the drum **10** prior to the assembly of either or both the bottom closure **14** and top closure **16**. As was true with the drum **14**, the liner **24** will possess corresponding side wall **28**, sealed or integral bottom **30** and top **32**.

Referring now to the top **32** of the liner **24**, it will be noted that a neck **34** is provided together with the vent **26**. Of course, the vent when opened permits air to escape when the drum and particularly the liner **24** is filled with the selected liquid and conversely permits entrance of air when the drum contents are poured or otherwise removed. The neck **34**, on the other hand, is somewhat larger in diameter and is utilized primarily to permit filling and emptying of the drum liner. It should be understood that for purposes of this invention the construction and seal about the vent **26** and the details thereof may be taken to be essentially the same as that of the neck **34**.

Thus, the neck **34** extends upwardly and outwardly of the liner top **32** and may either be integrally formed therewith as, for example, by means of a typical blow-molding operation or may be separately applied and fused or otherwise adhered thereto. External threads **36** are adapted to receive the mating threads of a closure **38** the details of which may be varied and, for purposes of this invention, are not considered of significance.

In accordance with the present invention, a seal is provided between the drum cover **18** and liner top **32** at the

neck **34** to prevent entry of liquids therebetween particularly various kinds of acids, corrosive chemicals, food products, and the like that are ordinarily shipped in bulk. This seal takes the form of a closed cell foam gasket doughnut or ring **40**. This doughnut is compressed between the cover **18** and liner top **32** and, at the same time, tightly embraces the base of the neck **34**. In this connection, the ring **40** has an inside diameter preferably slightly smaller than the outside diameter of the neck **34**. The closed cell foam gasket doughnut **40** is preferably made of material with sufficient resiliency and compressibility to act as a spring which may be compressed as each of the lugs **42**, to be described in detail shortly, is brought into position. Compression of gasket doughnut **40** holds each of the lugs **42** tightly against the outer surface of the cover **18** and maintains the neck **34** in a true right angle relationship with the cover **18**. In this manner, the closed cell foam gasket doughnut **40** provides a leak tight seal to prevent the intrusion of liquid products between the neck **34** and the opening **20** in the cover **18**. This opening **20**, incidentally, is preferably of a diameter larger than the neck **34** but not as large as the outside dimension across the extremities of opposed lugs **42**. The closed cell foam gasket doughnut **40** may be manufactured from one of a number of well known and commercially available materials including closed cell foam rubber, polyethylene, silicon rubber, polyurethane and the like commercially available foam material.

In order to retain the foam gasket doughnut **40** in the desired compressed condition and, at the same time, maintain the neck **34** in the desired upstanding and projected position relative to the cover **18**, the present invention has provided an improved construction and arrangement of lugs **42**. This arrangement of lugs **42** are distributed around the circumference of the neck in spaced relationship and are integrally formed therewith. The spacing of the lugs permits the lugs to flex downwardly as the neck **34** is pulled through the opening **20** of the cover **18**. The neck **34** can be pulled through the opening **20** in any one of a number of ways including the manipulation of tools designed for such purposes but which do not necessarily form part of the present invention. Each of the lugs **42** is provided with a cam shaped upper surface **44** which coupled with the inherent resiliency of the material of the neck **34** provides the proper movement of the neck and particularly the retaining lugs during the insertion of the neck **34** through the opening **20** and the assembly of the neck on the cover **18**. To facilitate the assembly of the neck **34** on the cover **18** and particularly the execution of the proper association of the retaining lugs **42** relative to the cover **18**, each of the lugs **42** are provided with an arcuate outer peripheral edge **46**. This construction permits the flexing action of the lugs **42** to progress from the center portion of the lug outwardly towards either end as the neck **34** is being inserted through opening **20**. It is preferred that a plurality of lugs **42** be provided with a space between each lug rather than a single circumferential rib which might be described as one continuous lug. The employment of spaced lugs permits each lug to be snapped into place by individual flexing without damage to any one individual lug. A single continuous lug, on the other hand, could very readily become cut or ruptured or cracked as it is drawn or forced through the opening **20** of the cover **18**. The lugs **42** are also provided with a substantially flat surface **48** extending substantially perpendicular to the axis of the neck **34** for bearing directly on the adjacent outer surfaces of the cover **18**.

It should now be apparent that the combination of the cam shaped lugs **42** molded integrally with the flexible plastic neck **34** together with the tension supplied by the foam gasket doughnut **40** provides a superior leak-tight closure system for plastic lined drums. As mentioned in the above, the lug arrangement and foam gasket doughnut for purposes of providing this leak-tight closure system is equally applicable to the vent **26**.

Thus, the several aforenoted objects and advantages are most effectively attained.

I claim:

1. A plastic liner for a drum having sidewalls and a top and bottom connected thereto, said liner including a top portion having a neck extending outwardly therefrom defining an opening into the liner interior; means on said neck for receiving a closure for said opening; and, a series of spaced, outwardly extending integral lugs circumferentially disposed about said neck, said lugs being adapted to engage with surfaces of the drum with which said liner is to be ultimately associated and each of said lugs including a top camming surface arcuate in both the vertical and horizontal planes so as to permit the progressive flexing of said lugs due to the sloping of said camming surface to thereby facilitate insertion of the neck through an appropriate opening in the drum and a bottom surface substantially normal to the neck for securely engaging surfaces on said drum adjacent said appropriate opening so as to prevent said liner from falling into the drum interior.

2. A composite lined drum comprising: an outer drum having side walls and a top and bottom closure connected thereto, the top closure having at least one neck receiving opening therein; a plastic liner in the drum having side walls extending adjacent the side walls of the drum, a bottom extending adjacent the bottom closure of the drum, and a top extending adjacent the top closure of the drum and spaced inwardly therefrom, the top of the liner having a neck extending outwardly therefrom through the neck opening of the top closure of the drum and defining an opening into the liner interior, means on the neck for receiving a closure; a series of spaced outwardly extending integral lugs circumferentially disposed about said neck, said lugs each including a top camming surface arcuate in both the horizontal and vertical planes so as to thereby permit the progressive flexing of said lugs due to the sloping of said camming surface to thereby facilitate insertion of the neck through the opening of the drum and a bottom surface substantially normal to the neck for engaging surfaces of the outer drum, the bottom of said lugs being spaced from the liner top a distance substantially equal to the height of a sealing ring which is to be used with said drum so that said ring is retained in sealing position on the assembled drum between the liner top and top closure by said lugs; and a sealing ring of substantially impervious material disposed about the neck between the liner top and the drum top closure for sealing the juncture therebetween in a substantially liquid tight manner.

3. The invention in accordance with claim **2** wherein the sealing ring is formed of a closed cell compressible foam material.

4. The invention in accordance with claim **2** wherein the neck is substantially cylindrical and the inner diameter of the ring prior to assembly on the neck is slightly less than the diameter of the neck.

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