

[54] **PLASTIC BAG**
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 [22] Filed: **June 24, 1971**
 [21] Appl. No.: **156,430**
 [52] U.S. Cl. **229/57, 150/.5**
 [51] Int. Cl. **B65d 33/00**
 [58] Field of Search. **229/53, 56, 57;**
 150/.5

3,263,901 8/1966 Hoelzer 229/53
 3,349,991 10/1967 Kessler 229/56
 2,969,101 1/1961 White 229/57 X

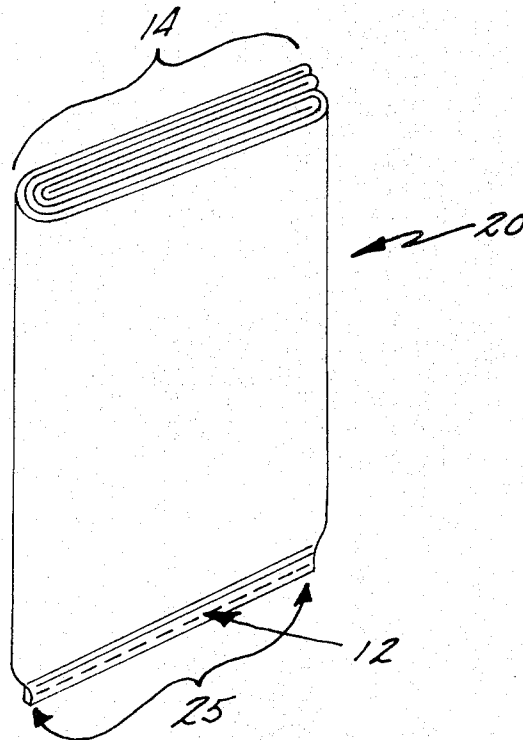
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[57] **ABSTRACT**

A flexible plastic container or trash can liner is manufactured by flattening tubular-shaped plastic material, folding the flattened material in half, and refolding the previously folded material in half a second time. The resulting eight-ply material is then simultaneously cut and heat-sealed to provide a bottom seam for the flexible container. The resulting flexible liner or container, when opened, has a very flat bottom portion circular in shape which includes three relatively large overlap fold portions when opened. The shape of the flexible container therefore will substantially conform to the shape of a conventional rigid, cylindrical container employed for the storage of refuse. The liner has excellent stress characteristics around the seam since the bottom is flat and the stresses thereby have less tendency to concentrate at the seam where the plies are sealed together.

[56] **References Cited**
UNITED STATES PATENTS
 3,670,953 6/1972 Leventhal 229/57
 3,670,954 6/1972 Leventhal 229/57
 1,624,626 4/1927 Robinson 229/57 X
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 1,909,102 5/1933 Greene 229/53
 2,819,834 1/1958 Brady 229/53
 2,915,698 12/1959 McKay, Jr. et al. 150/.5

4 Claims, 8 Drawing Figures



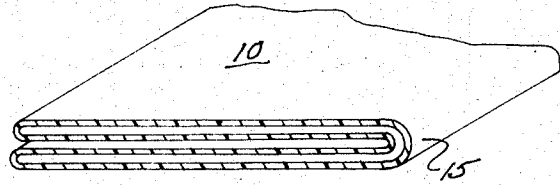


FIG. 1.

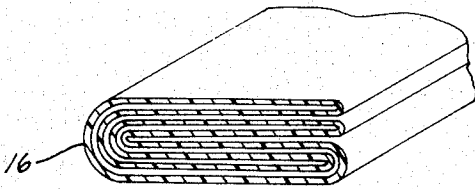


FIG. 2.

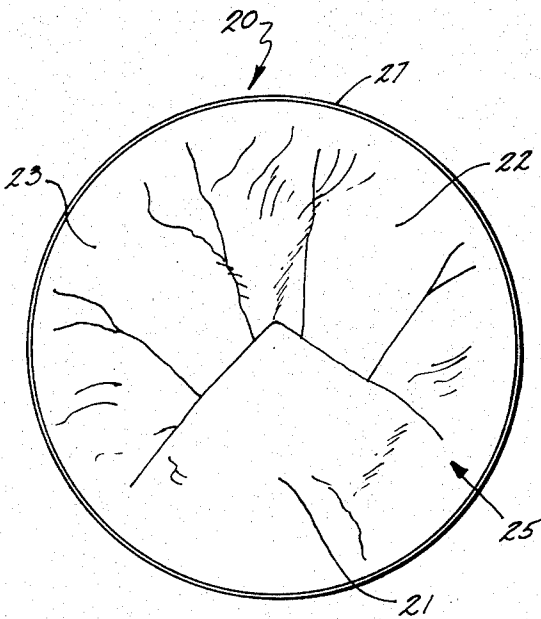


FIG. 4.

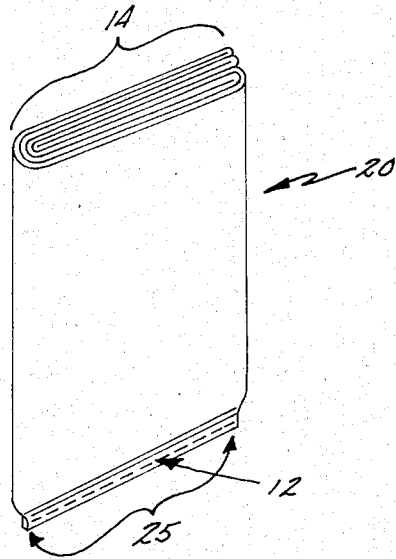


FIG. 3.

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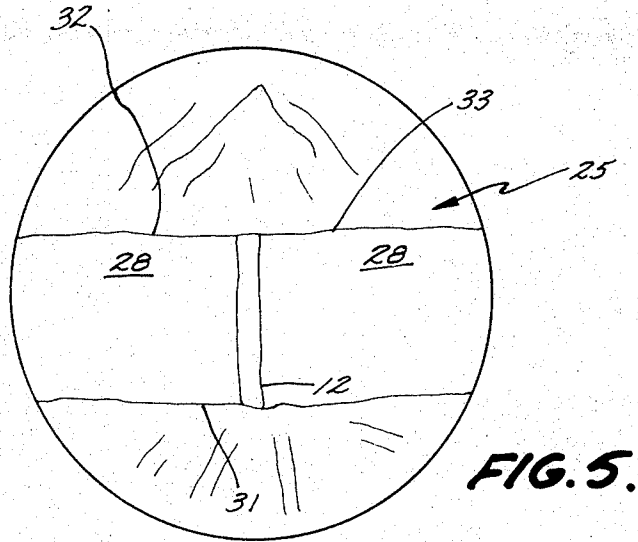


FIG. 5.

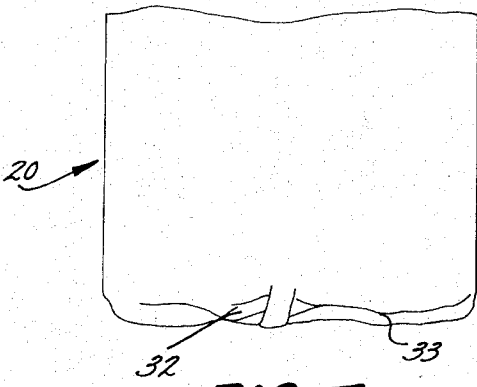


FIG. 7.

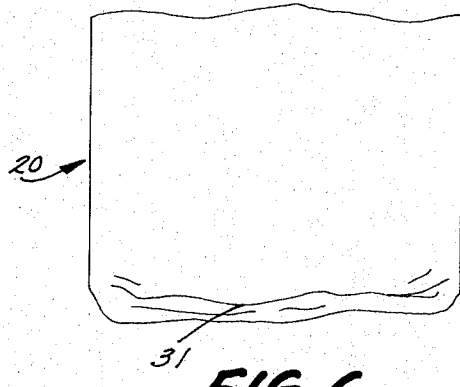


FIG. 6.

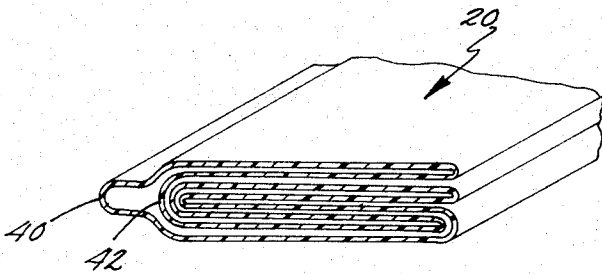


FIG. 8

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PLASTIC BAG

BACKGROUND OF THE INVENTION

The present invention relates to flexible containers having a sealed end which forms a bottom portion and an open end which forms the top portion, and particularly to such containers suitable for use as liners for refuse containers.

Many different schemes for manufacturing flexible bags have in the past been only partially successful in providing a strong plastic liner for refuse containers. Apparently, the only scheme which has achieved any significant commercial success involves merely effecting a lateral seal across the bottom of the tube of plastic. The most common difficulty with this bag is that it has a bottom portion which is not sufficiently flat to be supported by the flat bottom of the refuse container in which the plastic insert is used. Thus, during use, the weight of the refuse on the bag may either puncture the bag or tear open the sealed bottom portion. Further, the bag will not stand straight upright as readily as would be desirable when it is removed from the rigid container for pick up.

Another problem with this bag is created by the substantial length of the bottom seam. Since the seam represents a weak link, a longer seam increases the possibility that a portion of the seam will be weak or include a flaw. Some proposed manufacturing schemes attempt to overcome this difficulty by increasing the number of plies which are sealed together at the bottom of the bag. This shortens the length of the seam. However, increasing the number of plies adds to the cost of the liners since more folding steps are necessary during manufacture. Additionally, proper sealing of the seam becomes increasingly difficult as the number of plies is increased, such that one ultimately reaches a point where his purpose has been defeated.

In an attempt to overcome some of the above drawbacks, there are several methods presently disclosed in patents which provide plastic liners which are manufactured from tubular material and which are formed by folding the material in a predetermined fashion and sealing one end to provide a bottom portion of the liner. U. S. Pat. Nos. 2,819,834; 2,915,098; 3,263,901; and 3,349,991 describe four methods of manufacturing such flexible plastic bags. It will be noted that all suffer drawbacks such as complicated folding, difficulty in opening, weakness due to gusseting and subjectivity to seam imperfections.

In U.S. Pat. No. 2,819,834, the container is fabricated by first flattening the tubular plastic material and then providing three folds, two of which are quarter folds and then a half-fold as shown in FIG. 2 of that patent. An alternative folding method is shown in FIG. 5 of that patent whereby the flattened tubular material is folded in three quarter folds. As will be described hereinafter, the number of folds not only increases the cost of manufacture of the bag but yields a greater possibility for inaccuracies which affect the strength of the seal formed at the edge of the fold portions due to improper folding. This may be particularly true when folds of different widths are employed.

The container formed by the folding method as shown in FIG. 4 of the patent has a multiplicity of small pocket portions at the bottom of the container and tends to form a knot at the seal indicated at 21 in FIG. 4. This bag, therefore, may tend to tilt about the knot-

ted seal when the bag is free-standing and does not provide a substantially flat bottom portion as does the container of the present invention.

U. S. Pat. No. 2,915,098 likewise describes the use of a tubular plastic material to form a liner. The construction, however, employs a single fold which, although being economical to manufacture, does not provide the desirable stress handling capabilities about the seam as does the multiple-fold method used in the present application. Additionally, the bottom of the container formed therein is rectangular rather than being round to conform to the shape of a round receptacle.

The container formed as described in U. S. Pat. No. 3,263,901 has five folds at the bottom. The manufacture of this container, although providing relatively good stress distribution along the bottom seam, may make it difficult to provide a good seal due to the thickness of the plies of the seam and increases the manufacturing cost of the liner since it requires five folds. Containers formed by that process, therefore, require a multiplicity of folds which increases the thickness of the seam and therefore makes it somewhat more difficult to properly seal the bottom portion.

U. S. Pat. No. 3,349,991 describes the manufacture of a container which involves a relatively complex folding scheme as indicated in FIG. 2 requiring that the tubular material be gusseted and then folded as shown in FIG. 3. This complicated folding results in added manufacturing expense. Further, the cone-shaped bottom of this bag causes the weight of trash to concentrate at a focal point, i.e. the tip of the cone. This causes breakage and inhibits the ability of the bag to be free-standing. Gusseting of the bag creates more permanent hard creases which dangerously weaken the bag along those creases.

SUMMARY OF THE INVENTION

In the present invention, we have found a simple, uncomplicated way of folding the plastic tube to minimize seam length, which surprisingly results in a bag which has a strong, flat bottom of round circumference and which is not weakened by gusseting.

The container of the present invention is manufactured by flattening a tubular piece of material and folding it in half to form a four-ply structure, and folding it in half once again to form an eight-ply structure, the width of each ply being substantially the same. One end of the material is then sealed to form a closed portion which, when opened, provides a relatively flat bottom portion of the container, circular in circumferential shape, which has three distinct overlapped folded portions for providing uniform stress distribution around the seam. Also quite surprisingly, a girdle appears on the exterior of the container, at the bottom thereof, extending laterally from the bottom seam of the bag and up the sides thereof.

It is an object of the present invention, therefore, to provide a container which has a substantially flat, circular bottom, and a cylindrical side wall portion by folding a tubular piece of material first in half, and then folding the resultant four-ply material in half once again to form an eight-ply structure which is sealed at one end to provide the sealed bottom portion of the container.

It is a further object of the present invention to provide a method for manufacturing a flexible container having a closed bottom portion and an open top por-

tion whereby the container is fabricated by folding a flattened tubular material in half and folding the resulting structure in half once again to form an eight-ply structure which is sealed at one end to provide the sealed bottom portion of the container.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view showing the flattened tubular material which has been folded in half to form a four-ply structure;

FIG. 2 is a front elevational view showing the second fold which forms an eight-ply structure;

FIG. 3 is a side elevational view of the folded tubular material with one end sealed to form the bottom of the container;

FIG. 4 is a plan view looking inside the resulting container in its opened position;

FIG. 5 is an outside view of the bottom of the container showing the seam;

FIG. 6 is a side view of the container;

FIG. 7 is an opposite side view of the container; and

FIG. 8 is an edge view of material which has been improperly folded.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1, 2 and 3, it is seen that a tubular-shaped plastic material 10 such as polyethylene is flattened and folded a first time at 15, as shown in FIG. 1, to form four plies of substantially the same width. The material is then folded a second time at 16, as shown in FIG. 2, to form an eight-ply structure wherein the width of each ply is substantially the same and approximately equal to one-eighth the circumference of the tubular material. The resultant doubly folded material is then sealed at one edge 12 shown in FIG. 3 by a suitable heat sealing means to provide a container 20 having a sealed bottom portion 25 and an unsealed top portion 14. The thickness of the wall portion 27 is shown in somewhat exaggerated form in the figures to more clearly illustrate the folding of the material.

In production, the tubular plastic stock is extruded in flattened condition. The folding operations are then performed. When a proper length is reached, the material is simultaneously cut and heat sealed by conventional means.

When the container 20 is opened and viewed from the top looking down inside the container (FIG. 4), it is seen that there are three overlapping fold portions 21, 22 and 23. These relatively large folds result in a flat, circular bottom for the container when opened such that it will conform in shape to cylindrical refuse containers or the like which have flat bottom portions to provide a plastic liner therefor. It should be noted that fold 21 specifically overlies seam 12, thereby tending to protect seam 12 from exposure to objects placed inside container 20.

In FIG. 5 the seam 12, as viewed from the outside on the bottom, is located in the center portion of the bottom 25 and therefore will rest directly on the rigid container in which the liner or flexible container 20 is inserted or on the surface on which a free-standing container is placed thereby minimizing vertical stresses on the seam which may tend to separate the plies. A girdle portion 28 shown in FIG. 5 extends transversely across the exterior surface of the bottom, laterally from either side of seam 12. The fact that the left and right portions

of girdle 28 tend to pull at an angle perpendicular to seam 12; minimizes the type of peeling pull which would occur if the girdle portions pulled at an angle askew to seam 12. Peeling tends to occur when the stress applied to a seam is localized, rather than being distributed evenly along its length.

Viewing the exterior of container 20 from one side, as shown in FIG. 6, it can be seen that a single, long pocket 31 is formed by girdle 28. As the container 20 is viewed from the opposite side, (FIG. 7) two pockets 32 and 33 are formed by girdle 28. These pockets correspond to the overlapping fold portions 21, 22 and 23, respectively. The overlapping fold portions 21, 22 and 23 and girdle 28 cooperate to provide container 20 with its generally flat bottom 25 of generally circular circumference.

In addition to providing a flexible container with a minimum number of folds, the folding method which divides the flattened tubular material into equal portions during each fold provides a relatively accurate means for folding the material. Thus, in the event a fold is made improperly, as for example as shown in FIG. 8, a tail portion 40 will extend outwardly and will not fit snugly against the inner fold at 42, thereby resulting in a poor heat seal at that point due to the uneven application of pressure by the sealing means. This tail portion 40 is readily apparent by inspection during manufacture and the particular bag can be removed from the production line. Indeed, the fact that the folding is achieved so simply tends to minimize the chances of such tail portions 40 ever being formed in the first place.

Thus, the container formed by the process of folding the flattened plastic material in half two times provides a flat bottomed, circular-shaped container having a seam which is centrally located in the bottom of the container and which has three relatively large fold portions to provide excellent stress distribution and support across the seam of the container. Additionally, by folding the flattened material in half twice, it is easier to make a perfect division of the multiple plies of the container than is possible when irregular folds of the type described in the prior art are made. Additionally, the tail portion which will be visible when an improper fold accidentally occurs, provides a readily apparent defect during the inspection stage of the manufacture of the containers.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. A flexible container comprising: a flexible plastic, tubular shaped member forming the sidewalls thereof, said member having an open end at one extremity thereof, and a bottom at an end remote from said open end, said bottom being formed by sealing said tubular member at said remote end after it has been flattened, folded in half a first time along a longitudinal axis, and folded in half a second time along a longitudinal axis, to define an eight-ply structure at said seal.

2. A container as defined in claim 1 wherein said plastic material comprises polyethylene.

3. A container as defined in claim 1 wherein said bottom portion formed by said seal is substantially flat and includes three major folded portions extending outwardly from said seal to said sidewalls.

4. A container as defined in claim 2 wherein said seal is formed by applying a line of heat laterally across said folded, eight-ply structure at a point corresponding to said bottom of said container.

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