United States Patent [19]

Long

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[54] **COMPACTOR BAG AND METHOD OF MANUFACTURE**

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[73] Assignee: **The Dalpak Corporation,** Dallas, Tex.

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[21] Appl. No.: **226,087**

[52] **U.S. Cl.**..... **229/53,** 229/14 BE, 229/48 R, 229/48 T, 229/55

[51] **Int. Cl.**..... **B65d 33/02,** B65d 31/04

[58] **Field of Search**..... 229/53, 55, 48 T, 14 BL, 229/14 BE, 48 R; 150/1; 206/46 R

[56] **References Cited**

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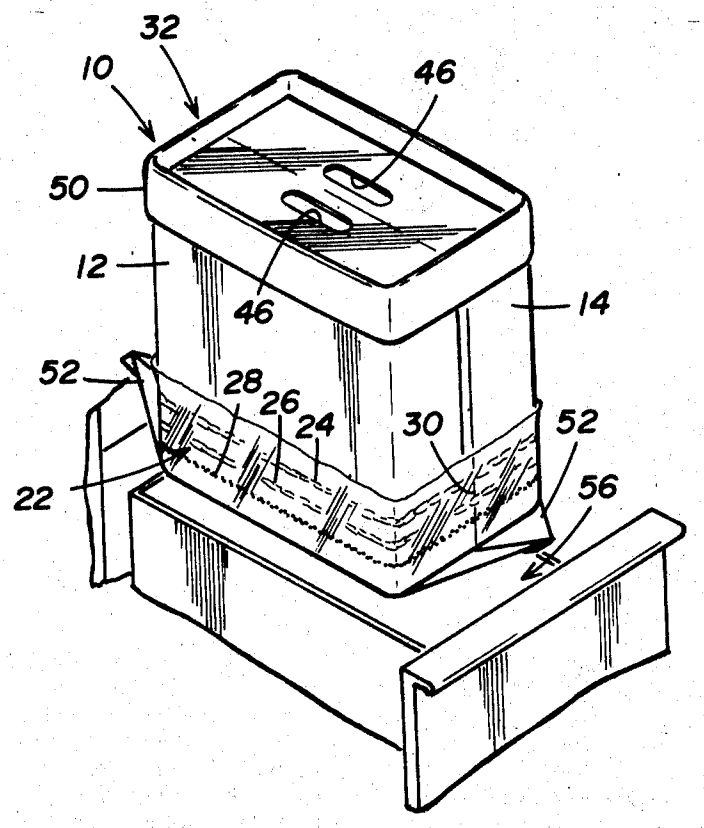
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Primary Examiner—William I. Price
Assistant Examiner—Stephen P. Garbe
Attorney, Agent, or Firm—Richards, Harris & Medlock

[57] **ABSTRACT**

A compactor bag includes opposed paper sheets which are joined at the edges and at one end in the manner of a "flat" bag. A liquid impervious casing extends over the joined ends of the sheets and comprises a length of low density polyethylene which is folded and then heat sealed along the edges. The liquid impervious casing is secured to the paper sheets by separate and distinct joining systems each resistant to attack by a different substance. By this means the liquid impervious casing retains liquid in the compactor bag even though refuse containing substantial amounts of moisture and/or other deleterious materials is deposited in the bag.

5 Claims, 9 Drawing Figures



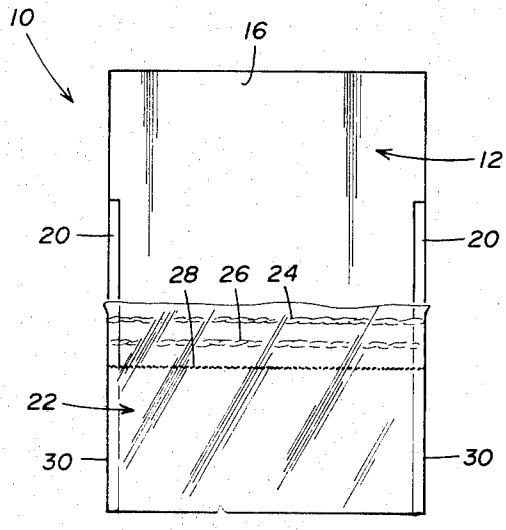


FIG. 1

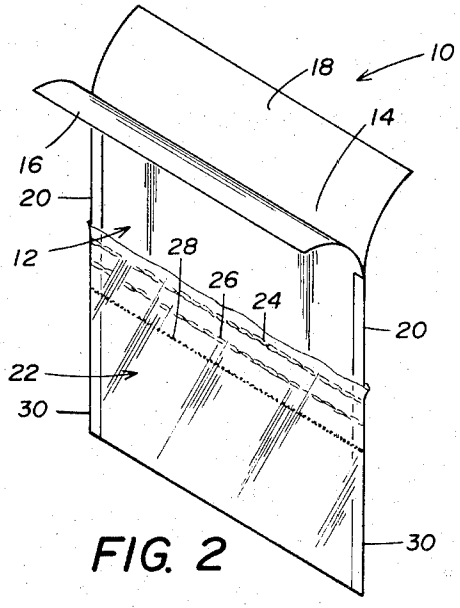


FIG. 2

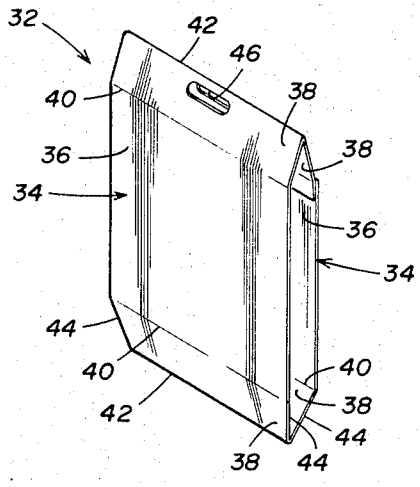


FIG. 3

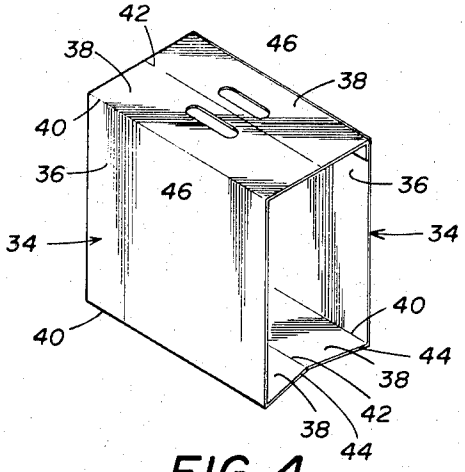


FIG. 4

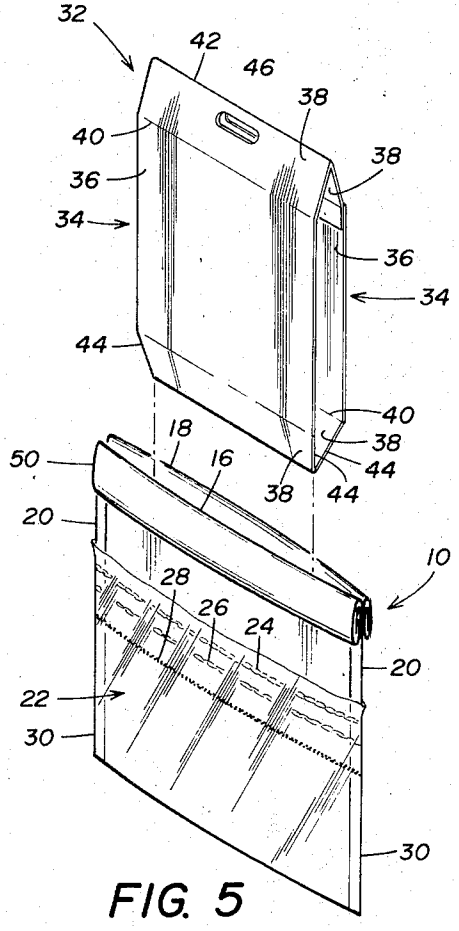


FIG. 5

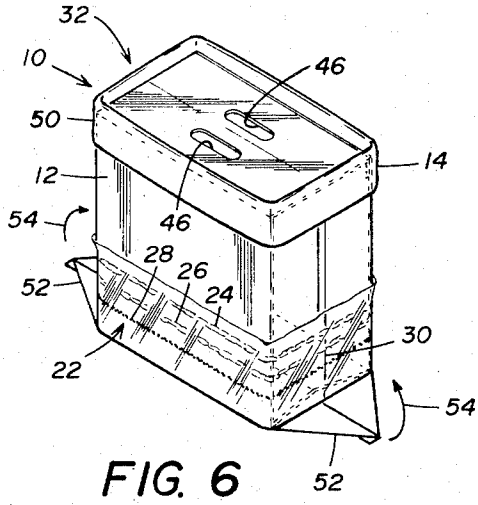


FIG. 6

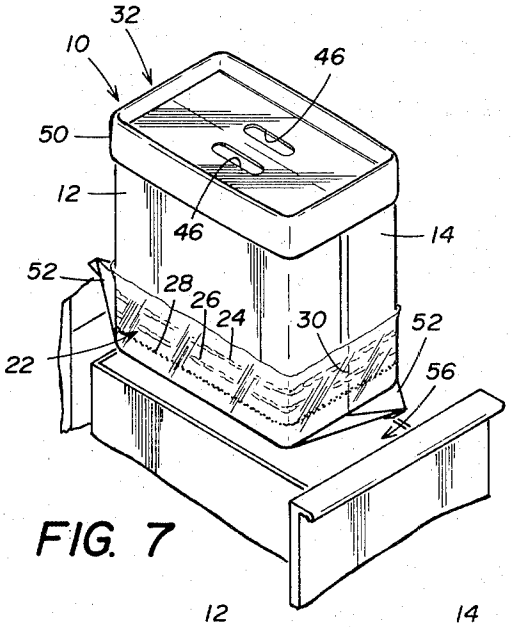


FIG. 7

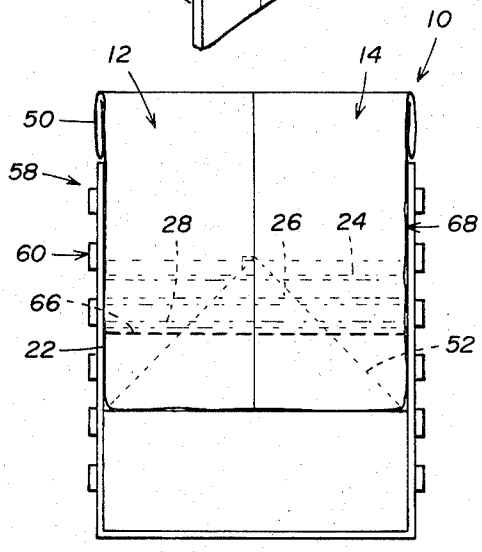


FIG. 9

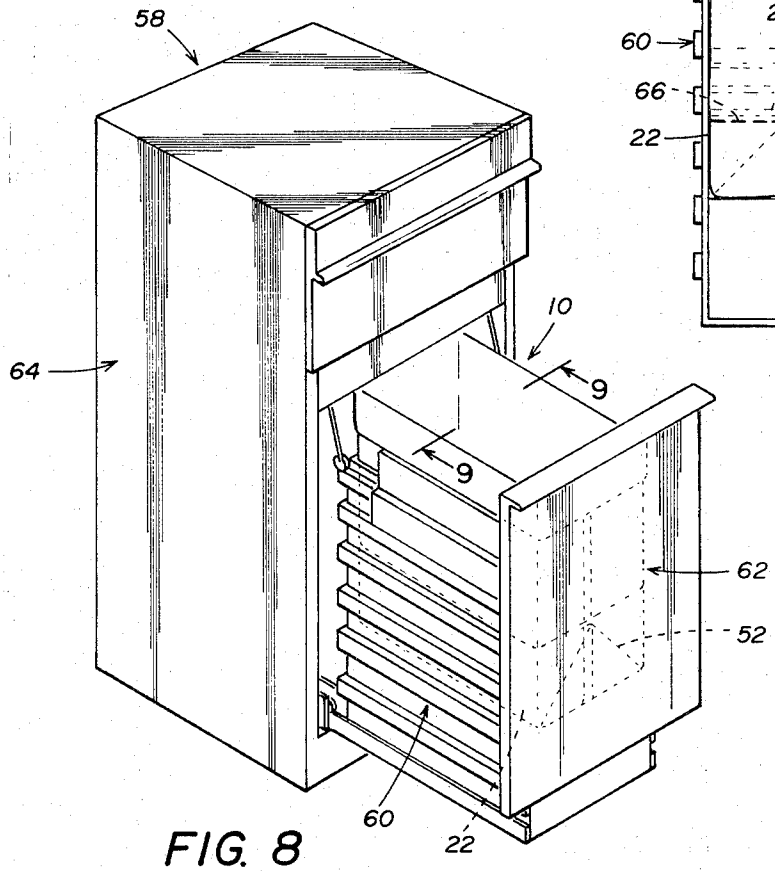


FIG. 8

COMPACTOR BAG AND METHOD OF MANUFACTURE

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to an improved compactor bag and method of manufacture, and more particularly to a bag that is especially useful in refuse compacting operations in which liquids are likely to accumulate and to a method of manufacturing the bag.

As is well known, refuse compactors suitable for home use comprise a relatively new appliance that is currently gaining increased popularity. These devices typically include a refuse receiving bin mounted for movement between a refuse receiving position and a refuse compacting position and a ram adapted for reciprocation into and out of the bin when the bin is in the compacting position. In the use of such a compactor, a bag is positioned in the bin and refuse is periodically deposited into the bag. From time to time thereafter the ram is actuated to compress the refuse. When the bag is full, it is removed and is discarded with the contents of compacted refuse intact.

It was originally thought that refuse compactors would be used to compress trash of the type that cannot be handled by garbage disposers, i.e., paper and paperboard products, empty cans and bottles, bones, and similar substantially dry materials. However, it has been found that refuse compactors are often used to compress garbage and other materials which may contain liquids. This is especially true in the older urban areas which often do not have sewer systems which are adequate to permit the use of garbage disposers.

The use of refuse compactors to compress materials containing substantial amounts of liquids presents problems which were not contemplated when refuse compactors were first introduced. For example, accumulated liquids are often caused to stand in the bottom of a refuse receiving bin of a refuse compactor for as long as several days. Also, garbage may contain deleterious substances of the type commonly used in and around the home, for example, vinegar, bleach, etc. Finally, the very nature of garbage is often condusive to the growth of bacteria, mildew, and other microorganisms.

The co-pending application of Donald V. Long and Norwin Cedric Derby filed July 19th, 1971, Ser. No. 163,870, relates to a Bag Insertion Device and Method which is especially adapted for use in conjunction with refuse compactors. In accordance with the Long and Derby invention, a bag is formed from approximately 100 pound basis weight paper and is of the type known in the industry as a "flat" bag. That is, the bag comprises two sheets which are secured along the edges and along the bottom to form an envelope type structure. The bag is opened to a rectangular configuration by means of a bag insertion device which is inserted into the bag in a folded condition and then expanded to force the bag into the rectangular configuration. Thereafter, the bag insertion device is employed to install the bag in the refuse receiving bin of a refuse compactor.

It has been found that bags of the type disclosed in the prior Long and Derby application are well suited for use in refuse compacting operations of the type in which the material to be compacted is substantially dry.

On the other hand, the bags are not entirely satisfactory for use in compacting operations of the type in which substantial amounts of liquid are likely to accumulate. This is because exposure of such a bag to standing liquid for an extended period of time weakens the bag to such an extent that it cannot properly be removed from the refuse compacting bin. Also, such a bag is subject to attach by the acids, etc. and by bacteria, mildew, and other microorganisms which are apt to grow in any wet or damp environment.

The present invention relates to a bag which is especially adapted for use in compacting operations in which liquids are likely to accumulate. In accordance with the broader aspects of the invention, a bag comprises opposed paper sheets which are joined along the edges and along the bottom, and a casing formed from a liquid impervious material and mounted on the outside of the lower ends of the paper sheets. The casing is preferably formed from a single sheet which is folded at the bottom and joined along the sides and is secured to the paper sheets by at least two separate and distinct joining systems each resistant to attack by a different substance.

In use, the bag is installed in the refuse receiving bin in a refuse compactor by means of the bag insertion device disclosed and claimed in the above-identified Long and Derby application. Thereafter refuse, which may comprise substantial amounts of liquid, is deposited in the bag and is compacted by actuation of the ram of the compactor. Any liquid which accumulates in the bottom of the bag is retained by the liquid impervious casing even though the paper portion of the bag may be weakened due to extended contact with the liquid or otherwise. On the other hand, if liquid should escape at a point above the upper end of the casing, it is simply accumulated in the bottom of the bin and does not damage the bag due to the impervious nature of the case.

It should be noted that in some instances compactor bags have been provided with inner plastic liners. Compactor bags fabricated in accordance with the present invention are superior to lined bags in several respects. First, it has been found that it is difficult to securely join a plastic liner to a bag. Second, because bags are made linearly, a plastic liner must extend to the full height of the bag. Quite to the contrary, the liquid impervious casing of a compactor bag incorporating the present invention need extend only a few inches upwardly from the bottom of the bag. By this means a considerable cost savings is effected when the present invention is used.

DESCRIPTION OF THE DRAWINGS

A more complete understanding of the invention may be had by referring to the following Detailed Description when taken in conjunction with the accompanying Drawings, wherein:

FIG. **1** is a front view of a compactor bag incorporating the invention;

FIG. **2** is an enlarged perspective view of the bag shown in FIG. **1**;

FIGS. **3** and **4** are perspective views of a bag insertion device useful in the practice of the invention and showing the device in its folded and extended configurations, respectively;

FIGS. **5, 6, 7,** and **8** are perspective views illustrating progressive steps of a method of inserting the bag

shown in FIGS. 1 and 2 into a refuse receiving bin; and

FIG. 9 is a sectional view taken generally along the line 9—9 in FIG. 8 in the direction of the arrows.

DETAILED DESCRIPTION

Referring now to the Drawings, and particularly to FIGS. 1 and 2 thereof, there is shown a compactor bag **10** incorporating the present invention. The bag **10** comprises opposed, flat sheets **12** and **14** which may be formed from relatively heavy paper, for example, 100 pound basis weight paper, or from other materials. If paper is used, the bag **10** is preferably rendered substantially liquid-tight by coating the surfaces of the sheets **12** and **14** with a polyethylene wax of the type commonly utilized in meat packaging. The sheets **12** and **14** may also be treated with a fungicide, an animal repellant, a deodorant, or other materials, if desired.

The sheets **12** and **14** comprising the bag **10** are equal in length and are substantially equal in width. However, the lower portion of the sheet **14** is somewhat wider than the sheet **12** to provide a pair of lips **16** and **18** at the upper end of the bag **10** and a pair of flaps **20.** The flaps **20** are folded over the edges of the sheet **12** and are secured to the outer edges of the sheet **12** by means of a conventional adhesive, such as a hot melt adhesive, or the like. Similarly, the lower edges of the sheets **12** and **14** are joined by means of one of the various adhesive materials commonly employed in bag manufacture. The bag **10** is therefore of the type known in the industry as a "flat" bag in that it comprises opposed, flat panels which are joined into an envelope type structure.

The compactor bag **10** further comprises an outer liquid impervious casing **22.** The casing **22** extends over the lower ends of the paper sheets **12** and **14** and is secured to the sheets **12** and **14** by three separate and distinct joining systems **24, 26,** and **28.** This feature comprises a very important aspect of the present invention in that the joining systems which are employed to secure the liquid impervious casing **22** to the paper sheets **12** and **14** are purposely chosen so that each system is impervious to a substance that might tend to destroy one of the other systems. For example, the joining system **24** can comprise a laxtex adhesive of the type commonly employed in bag manufacture, the joining system **26** can comprise one of the various resin adhesives, and the joining system **28** can comprise a heat seal formed by passing the bag **10** between heated rollers and thereby partially melting the material of the liquid impervious casing **22** to join the casing **22** to the sheets **12** and **14.** By this means the casing **22** is secured to the sheets **12** and **14** comprising the bag notwithstanding the nature of refuse that is ultimately deposited in the bag.

The liquid impervious casing **22** is preferably formed from one of the various low cost thermoplastic materials, for example, a low density polyethylene. It will be understood, however, that the casing **22** may be formed from other polyolefin materials as well as from various materials not strictly classified as polyolefins. An important consideration in the selection of the material for the casing **22** is that it must be completely harmless to both humans and animals prior to, during, and after use and that it not deteriorate into a substance which is dangerous to animals or plants. The casing **22** is preferably formed by folding a single sheet of the selected material over the lower ends of the sheets **12** and **14** to form opposed edges **30.** The edges **30** are then heat sealed to form a liquid impervious casing around the lower ends of the sheets **12** and **14** comprising the compactor bag **10.** If any of the joining systems **24, 26,** or **28** comprises an adhesive, a strip of the adhesive is preferably applied to the sheets before the liquid impervious material is folded over the ends of the sheets. On the other hand, if one of the systems **24, 26,** or **28** comprises a heat seal, the seal is preferably formed after the liquid impervious material is in place and the edges **30** are joined.

Referring now to FIGS. **3** and **4,** there is shown a bag insertion device **32** which is utilized in the practice of the invention to open a compactor bag of the type shown in FIGS. **1** and **2** to a configuration characterized by predetermined length, width, and depth dimensions. As is most clearly shown in FIG. **3,** the bag insertion device **32** comprises a pair of opposed panels **34** each including a central portion **36** which is substantially equal in breadth to the predetermined length dimension and which is substantially equal in height to the predetermined depth dimension. Each panel **34** further includes a pair of end portions **38** which are hingedly connected to the central portion **36** along lines **40.** The end portions **38** of the panels **34** are substantially equal in breadth to the predetermined length dimension and are substantially equal in height to one-half the predetermined width dimension.

The upper and lower ends of the opposed panels **34** of the bag insertion device **32** are hingedly interconnected along lines **42.** The lower end portions **38** of the panels **34** are provided with outer edges **44** which taper inwardly from the line **40** to the line **42,** and the upper end portions **38** are provided with hand holes **46** which are formed through the end portions **38** on opposite sides of the line **42.** The bag insertion device **32** is actuated by gripping the hand holes **46** and then applying opposed, inwardly directed forces to the opposite ends of the panels **34.** This action pivots the end portions **38** relative to the central portions **36** of the panels **34,** and is continued until the end portions **38** extend perpendicularly to the central portions **36,** that is, until the component parts of the bag insertion device **32** are oriented as shown in FIG. **4.** At this point the bag insertion device **32** comprises a rectangular structure having length, width, and depth dimensions substantially equal to the predetermined length, width, and depth dimensions.

The bag insertion device **32** may also be considered as comprising a pair of opposed side walls which are substantially equal in size to the predetermined length and depth dimensions, and normally folded top and bottom walls which are substantially equal in size to the predetermined length and width dimensions. The top and bottom walls and hingedly connected to the upper and lower ends of the opposed side walls and are extended upon the application of opposed, endwise directed forces thereto. By this means the bag insertion device **32** is extended from the folded condition shown in FIG. **3** wherein the bag insertion device is substantially flat to the open condition shown in FIG. **4** when the bag insertion device is substantially equal in size to the predetermined length, width, and depth dimensions.

The bag insertion device **32** may be formed from a unitary length of cardboard or similar material and may

be fabricated by joining the ends of the length of material with staples, etc. In such a case the hinged connections between the central portion **36** and the end portions **38** of the panels **34** and between the opposite ends of the panels **34** comprise folds formed in the material. Those skilled in the art will realize that a more permanent type of bag insertion device may be constructed using stiff wire, metal panels, plastic sheets, or the like. In the case of a wire bag insertion device, the central and end portions of the opposed panels will comprise the outline of the central and end portions of the bag insertion device shown in the Drawings.

In the practice of the invention, the bag insertion device **32** is employed in the manner illustrated in FIGS. **5, 6, 7,** and **8** to open a compactor bag **10** of the type shown in FIGS. **1** and **2** to the predetermined length, width, and depth dimensions, and to install the bag **10** in a rectangular container, such as the refuse receiving bin of a refuse compactor. Referring first to FIG. **5,** the lips **16** and **18** of the bag **10** are initially folded to provide cuffs **50.** The bag insertion device **32** is then inserted into the bag **10.** This step is preferably carried out with the bag insertion device in the folded condition shown in FIG. **3,** whereby the bag insertion device **32** is simply slid between the sheets **12** and **14** comprising the bag **10.**

After the bag insertion device **32** has been inserted into the bag **10,** the bottom of the bag **10** is placed on a surface and an endwise directed force is applied to the bag insertion device **32.** This action extends the bag insertion device **32** to the opened condition shown in FIG. **4** and simultaneously opens the bag **10** to the condition shown in FIG. **6.** At this point the bag **10** is opened to substantially the predetermined length, width, and depth dimensions. It should be noted that since the liquid impervious casing **22** encloses and is secured to the lower ends of the sheets **12** and **14,** the opening of the bag **10** under the action of the bag insertion device **32** also opens the liquid impervious casing **22** to the predetermined length and width dimensions.

Because the compactor bag **10** is a "flat" bag, the opening of the bag **10** to a rectangular configuration precludes flaps **52** at the bottom of the bag. The flaps **52** are pivoted upwardly in the manner illustrated by the arrows **54.** Thereafter, the bag insertion device **32** is employed in the manner illustrated in FIG. **7** to install the bag **10** in a rectangular container **56.** The container **56** has interior length, width, and depth dimensions which are substantially equal to but larger than the predetermined dimensions. Thus, the bag insertion device **32** functions as a ram to fully seat the bag **10** within the container **56.**

When the bag **10** has been fully seated in the container **56,** the bag insertion device **32** is removed from the container **56** and the opened bag therein by grasping the hand holes **46** and pulling upwardly. This action returns the bag insertion device **32** to the folded condition illustrated in FIG. **3** and simultaneously withdraws the bag insertion device **32** from the container **56** and the bag **10** positioned therein. The bag insertion device **32** immediately returns to the folded condition upon the application of an upwardly directed force thereto and, accordingly, the bag insertion device **32** is withdrawn from the bag **10** without danger of dislodging the bag **10** from the container **56.** Withdrawal of the bag insertion device **32** is further facilitated by the tapered outer edges **44** of the lower end portions **38** whereby the bag insertion device **32** is fully separated from the bag **10** at the start of the folding action.

Referring now to FIG. **8,** there is shown a typical refuse compactor **58** including a refuse receiving bin **60** supported on a drawer **62** for sliding movement into and out of the housing **64.** FIG. **8** further illustrates a compactor bag **10** of the type shown in FIGS. **1** and **2** installed in the refuse receiving bin **60.** It will be noted that the flaps **52** of the bag **10** extend upwardly along the inner walls of the refuse receiving bin. This is highly advantageous since as is well known in the industry, bags tend to leak at the corners. Since the corners of the flaps **52** of the bag **10** are positioned substantially above the floor of the refuse receiving bin **60,** the bag **10** is capable of retaining a substantial amount of liquid without danger of leakage.

In the use of the compactor **58,** refuse is deposited into the bag **10** in the refuse receiving bin **60.** From time to time, the drawer **62** is moved into the housing **64** and a ram (not shown) in the housing is reciprocated downwardly into the bin **50** to compress the refuse material therein. When the bag **10** is full, it is removed from the bin **60** and is discarded with its contents of compacted refuse intact. Thereafter, the bag insertion device **32** is employed to install another bag **10** in the bin **60** in the manner illustrated in FIGS. **5, 6, 7,** and **8.**

Refuse compactors of the type shown in FIG. **8** were originally designed for use in compacting substantially dry trash, such as paper, paperboard, empty bottles, empty cans, bones, and the like. That is, the original concept of a trash compactor was as an appliance for use in conjunction with a garbage disposer which was thought to be capable of handling food scraps and other refuse having a substantial moisture content. To this end, the bags that have heretofore been supplied for use in refuse compactors were formed almost entirely from paper.

Paper compactor bags function satisfactorily in situations in which little if any liquid bearing material is deposited into the compactor bag for compaction. It has been found, however, that if a substantial amount of moisture bearing material is introduced into the bag, liquid will tend to accumulate in the bottom of the bag. Since the bag of a refuse compactor is typically changed infrequently, perhaps once a week, any liquid which is introduced into the bag may remain in the bottom of the bag for an extended period of time.

As is well known, almost any paper material which is allowed to remain in contact with liquid for an extended period of time will tend to weaken. If this occurs in a compactor bag, it is frequently impossible to remove the bag since any attempt to do so simply causes the bottom of the bag to tear away and to remain in the bottom of the bin. This permits the upper portion of the bag to slide out of the compactor bin while leaving the compacted refuse in the bin.

The use of a compactor bag incorporating the present invention overcomes this difficulty and therefore permits the use of a refuse compactor to compress garbage and other moisture bearing materials. As is best shown in FIG. **9,** liquid accumulating in a refuse compactor will tend to collect in the bottom of the bin below a point indicated generally by the line **66.** If liquid remains in the bag long enough to deteriorate the paper sheets **12** and **14,** or if a leak occurs, the liquid

is retained by the liquid impervious casing. When the bag is completely full of compacted refuse, it is simply lifted out of the bin with its contents intact. The liquid and the other contents of the bag are retained by the liquid impervious casing and therefore no danger of leakage is encountered.

Another situation that can develop in the use of a refuse compactor is that a leak will develop in an upper portion of the bag. Compactor bags incorporating the present invention are also useful in such circumstances because liquid from the leak will tend to flow down the interior walls of the compactor bin and accumulate in the bottom of the bin. The liquid impervious casing thus prevents the liquid from the leak from attacking and deteriorating the paper sheets comprising the compactor bag. The presence of the opening in the upper portion of the bag does not present a problem since it will rapidly dry and therefore will not be deteriorated by extended contact with standing moisture.

As will be apparent from the foregoing, it is necessary that the liquid impervious casing **22** remain attached to the paper sheets **12** and **14** in order for the compactor bag **10** to function properly. To this end, the joining systems **24, 26,** and **28** which secure the casing **22** to the paper sheets **12** and **14** are located above a point corresponding to the maximum depth of liquid that is expected during use of the bag. It has been found that a compactor bag equipped with a liquid impervious casing having a height of about six inches when the bag is opened and secured to the paper sheets by joining systems located adjacent its upper edges will serve adequately in almost all circumstances.

As is also well known, garbage and similar refuse often contain various deleterious substances. For example, garbage may contain acidic and/or basic substances of the type commonly used in and around the home, i.e., vinegar, bleach, etc. Garbage may also contain material which tends to promote the growth of bacteria, mildew, and other microorganisms. Finally, substances having unknown chemical properties may result from the intermixing of various materials in the refuse receiving bin of a trash compactor.

Due to these circumstances, the liquid impervious casing **22** of a compactor bag **10** incorporating the present invention is preferably secured to the sheets **12** and **14** of the bag by at least two separate and distinct joining systems. Each of these systems is adequate to secure the casing to the paper sheets without regard to the condition of the other system. More importantly, each joining system is preferably impervious to a substance which might deteriorate the cooperating system. In this way the interconnection of the casing and the paper sheets is maintained notwithstanding the nature of the material that is deposited into the bag.

In accordance with the embodiment of the invention illustrated in the Drawings, the liquid impervious casing is secured to the bag by three separate and distinct joining systems **24, 26,** and **28.** These comprise a strip of latex adhesive positioned between the casing and the sheets, a strip of resin adhesive positioned between the casing and the sheets, and a heat seal between the casing and the sheets. As has been indicated, each of these systems is designed to secure the casing to the paper sheets notwithstanding the condition of the other two systems. Finally, each of these systems is impervious to substances which might damage the other two systems, whereby the connection between the casing and the sheets is maintained regardless of the nature of the refuse which may be deposited into the bag.

It has been found that under normal circumstances the liquid impervious casing of a compactor bag incorporating the present invention need only extend upwardly from the bottom of the bag to the extend indicated in the Drawings, i.e., about six inches. This is advantageous in that by limiting the height of the liquid impervious casing, a cost savings is effected. However, in certain instances, it may be desirable to extend the liquid impervious casing further upwardly on the paper sheets. In any event it is unnecessary to extend the casing above the lower ends of the lips **16** and **18.** Even this arrangement comprises a cost savings over bags incorporating an interior plastic liner in that in the latter structure it is necessary to extend the liner to the entire height of the bag.

From the foregoing, it will be understood that the use of the present invention results in numerous advantages over the prior art. First, compactor bags incorporating the invention are adapted for use in refuse compactors notwithstanding the nature of the refuse that is compacted in the compactor. Bags incorporating the invention are therefore readily adapted for use in urban regions and other areas where the use of garbage disposers is not permitted or is otherwise impractical. Second, compactor bags incorporating the invention are extremely economical to manufacture. This is true because the liquid impervious casing does not add materially to the cost of the bags. Finally, as is more fully disclosed in the above-identified co-pending application of Long and Derby, bags incorporating the present invention are readily adapted to improve merchandising techniques in that they may be incorporated into a heat sealed package comprising a plurality of folded bags and a bag insertion device.

Although preferred embodiments of the invention have been illustrated in the Drawings and described in the foregoing Detailed Description, it will be understood that the invention is not limited to the embodiments disclosed but is capable of rearrangement, modification, and substitution of parts and elements without departing from the spirit of the invention.

What is claimed is:

1. A bag for use in refuse compactors which comprises:

opposed, flat paper sheets joined along opposite edges and at one end to provide a bag having a closed bottom end and an open top end;

a liquid impervious casing surrounding the closed end of the bag and extending along the sheets to a point substantially displaced from the open top end of the bag; and

dual means securing the liquid impervious casing to the paper sheets for insertion therewith into a refuse receiving bin;

said securing means each being substantially impervious to attack by a substance that would weaken the other securing means and each having sufficient strength to secure the liquid impervious casing to the paper sheets notwithstanding the condition of the other securing means.

2. The bag according to claim **1** wherein the joining means are located adjacent the upper end of the liquid impervious casing.

3. The bag according to claim **1** wherein the liquid impervious casing comprises a single length of a plastic

film which is folded adjacent said one end of the sheets and is joined along the edges of the sheets to form the casing and wherein the sheets comprising the bag are formed from paper.

4. The bag according to claim **3** wherein the plastic film comprises a thermoplastic film and wherein the edges of the sheets are heat sealed.

5. The bag according to claim **4** wherein the liquid impervious casing is formed from low density polyethylene.

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