Jan. 3, 1967 T. P. E. KEUCHENIUS ETAL 3,295,738

SEMI-BULK SHIPPING BAG

Filed March 23, 1965 2 Sheets-Sheet 1

Fig. 1

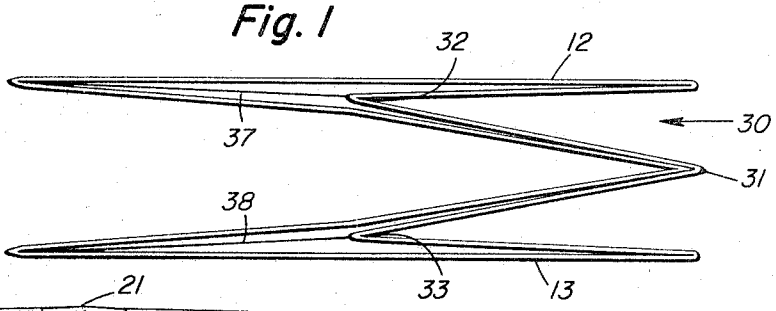


Fig. 2

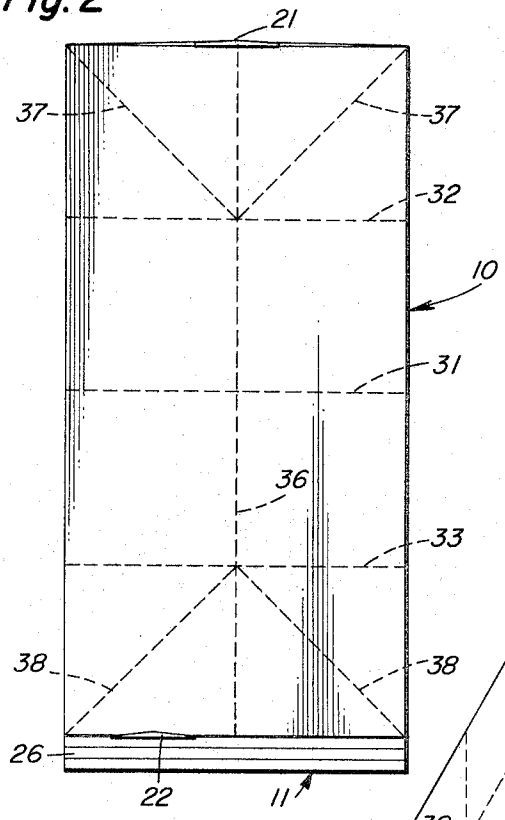
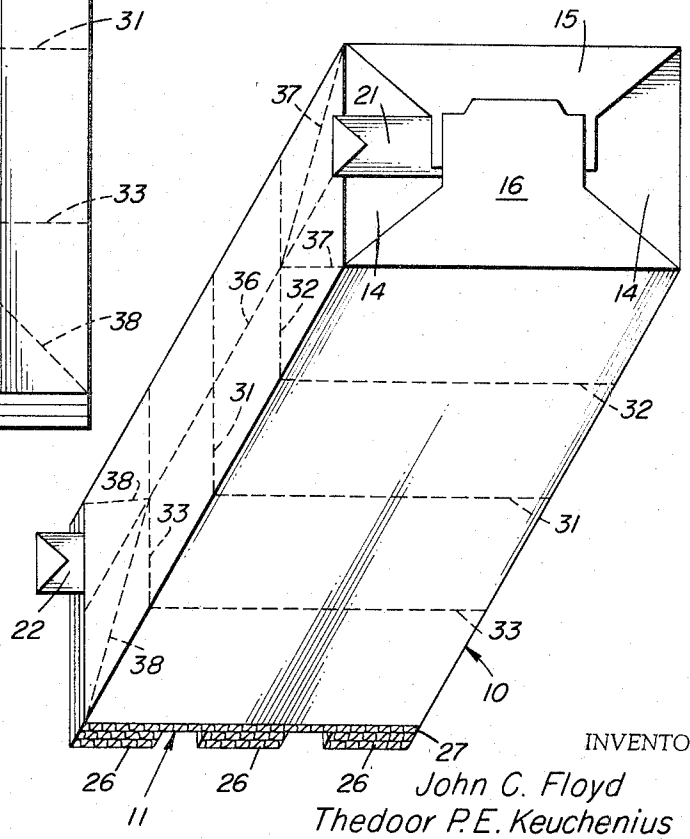


Fig. 3



INVENTORS

John C. Floyd

Thedoor P.E. Keuchenius

BY

Marvin P. Lehmann

AGENT

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Fig. 4

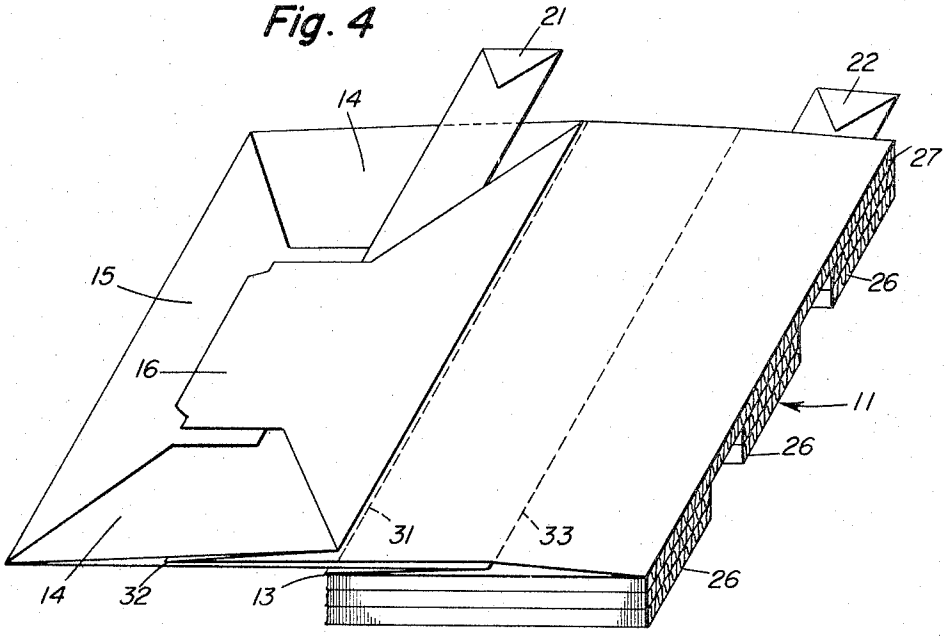
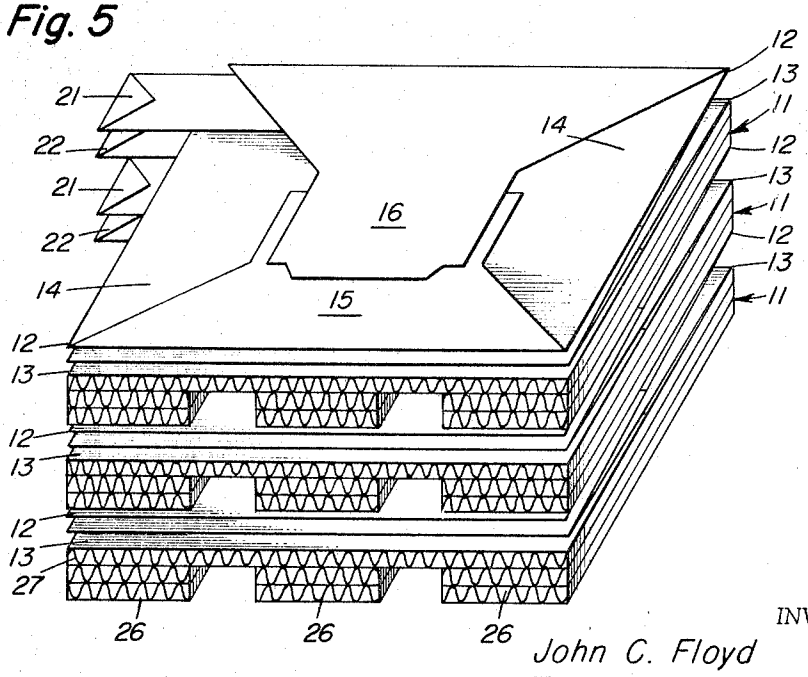


Fig. 5



INVENTORS
John C. Floyd
Thedoor P.E. Keuchenius

BY Marion P. Lelong
AGENT

United States Patent Office

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SEMI-BULK SHIPPING BAG

Thedoor P. E. Keuchenius, Ridgewood, and John C. Floyd, Scarsdale, N.J., assignors to West Virginia Pulp and Paper Company, New York, N.Y., a corporation of Delaware

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3 Claims. (Cl. 229—6)

This invention relates to semi-bulk containers. The invention particularly relates to re-usable lightweight containers, having exceptional utility for shipping and storing bulky particulate materials, which are collapsible when empty. More specifically, the invention relates to large closed bags of flexible material which have flat bottoms, which are protected on their bottoms with relatively non-flexible platforms adherent thereto, which have one or more valves for filling and unloading, and which can be collapsed when empty into relatively thin packages having the same length and width as their supporting platforms.

The bottom platforms attached to these bags can be constructed as individual pallets thus permitting them to be handled with mechanized equipment when filled. The filled bags can also be readily stacked in vertical tiers, particularly if their tops are also flat. Furthermore, if stacking conditions are exceptionally rigorous for filled bags, as because of density of contents, their stacking capabilities can be improved by adhering a relatively non-flexible platform to their flat tops.

The platform attached to the bottom may be a single relatively rigid sheet of wood, flakeboard, plywood, hardboard, honeycomb, multiply corrugated board, or other similarly rigid material. If a highly useful pallet construction is desired, elongated legs of the same material or of a different material may be attached beneath and parallel to the bottom of this platform.

When empty, these bags can be readily folded into a plat pack whereby empty bags can be stacked, strapped into a single package of about ten units, and economically stored and shipped. After use, they can again be folded, stacked and strapped, and shipped back as a single package for re-use five or more times.

Ordinary bags of paper or cloth lack necessary rigidity and strength in larger sizes, yet rigid containers, such as corrugated cartons, are difficult to dispose of and waste much storage space when empty. Cartons also require additional closing operations after filling. The semi-bulk shipping bag of the instant invention retains most advantageous features of a paper bag, particularly as to collapsing into a flat package when empty. Nevertheless, it retains the rigid bottom, mechanical handleability, and stacking qualities of a carton. It may be used as a bulk container for smaller packages when manufactured with an open top; alternatively, it may be used as a quickly-fillable container for particulate solids, slurries, or even liquids in semi-bulk quantity when manufactured with a flatly-sealed top and valve-type filling spout.

For many materials, a single valve-type spout is sufficient; for other materials, it is particularly useful to add a bottom valve whereby the semi-bulk bag may be filled through its top valve and emptied through its bottom valve.

In the prior art, Broderick 1,767,274 shows a carrying container having a secondary bottom which supports the main bottom **18** and protects it from wear and moisture. This secondary bottom comprises a flat sheet **30** glued beneath the main bottom **18** and corrugated sheet **31** attached thereto.

Gelbcke 2,729,150 shows a multi-wall, non-gussetted bag having a flat bottom and flat top, in one corner of

which a valve may be formed, with both diamond and rectangular folding as alternate methods.

Reich 1,714,277 shows a carrying bag having a bottom which is reinforced on the inside with a hexagonal member C of "any suitable fibrous material such as cardboard, preferably considerably thicker than the material of which the bag is made."

Kindseth et al. 3,074,617 is concerned with a container structure made of paperboard sheets and paper in edge-to-edge relationship rather than in parallel support thereof as in the instant invention. In one embodiment, the paperboard can be used as a foldable bottom in a non-gussetted container.

Long's Canadian Patent No. 692,877 describes a "collapsible folded bag structure with spaced intermediate folds" which uses a folding pattern similar in part to that of the instant invention.

None of the known bag-type container inventions in the prior art uses a pallet-type platform attached to the bottom of a bag which has a flat bottom and a flat top (also capable of receiving an attached platform), filling and unloading valves, and a folding pattern which enables the empty bag to be collapsed into a package compactly aligned with the pallet-type platform.

It is the general object of this invention to supply a collapsible and re-usable bag for semi-bulk shipments which is readily filled, is adapted for mechanical handling, and is readily stacked in upright position.

It is a specific object of this invention to provide a re-usable bag with flat top and bottom, a filling valve, an unloading valve, a pallet attached to the bottom, and a folding pattern which enables the bag to be readily collapsed into a substantially flat configuration.

The invention may be unedrstood more fully by referring to the drawings in which the same numbers are used to designate identical parts, as follows:

FIGURE 1 shows a simple closed bag, with flat top and bottom but without a platform or valves, which is partially folded whereby the V-fold, which is used to achieve compactness for an empty bag in the instant invention, is illustrated.

FIGURE 2 shows an upright filled bag supported on a three-layer platform of corrugated board and having both top and bottom valves.

FIGURE 3 is an isometric view of the filled bag of FIGURE 2.

FIGURE 4 is an isometric view of an empty bag on its attached platform with top and bottom in side-by-side relationship.

FIGURE 5 is an isometric view of three empty bags with palletized bottom platforms which have been flattended and stacked vertically for storage or shipment.

Referring particularly to FIGURES 2 and 3, a gussetted bag, designated generally by the numeral **10**, rests upon a bottom platform in the shape of a pallet, designated generally by the numeral **11**. This bag **10** has a flat top **12** and a flat bottom **13**, as can be seen in FIGURE 1. Both top **12** and bottom **13** are formed alike in conventional manner by inwardly folding and adhesively securing end flaps **14**, inner side flap **15** and outer side flap **16**. Inserted laterally into top **12**, between an end flap **14** and inner side flap **15** or outer side flap **16**, is a top valve **21** which penetrates into the interior of the bag **10**. This valve **21** can be fitted with an inserted lining of polyethylene or other heat-sealable material so that the bag may be sealed and opened again several times.

Inserted laterally, between an end flap **14** and the inner side flap **15** or the outer side flap **16** of the flat bottom **13**, a resealable bottom valve **22** which penetrates into the interior of the bag **10** so that all or a portion of the bag contents can be unloaded as desired. A suitable un-

loading method is to insert an air slide probe (not shown) into the bottom valve 22. By re-sealing bottom valve 22 after partial unloading, the contents of the filled bag 10 may be kept fresh, and thus the filled bag 10 can function as a storage bin.

Attached to the flat bottom 13 of the bag 10 is the rectangular bottom platform 11 which may be constructed, as shown in FIGURES 2–5, in the form of a pallet by adding legs 26 to the bottom panel 27. If the semi-bulk shipping bag of this invention is used to contain materials of relatively high density, the bottom pallet may be made of wood, hardboard, flakeboard or other suitable rigid and strong material.

An important feature of this invention is the folding pattern used to compress the empty semi-bulk bags into a small shipping space while allowing them to be opened readily when needed. As shown in FIGURES 1, 2, and 3, the body of the bag 10, after flat top 12 and flat bottom 13 are formed, is flattened by inwardly moving the longitudinal gusset folds 36, the diagonal top folds 37, and the diagonal bottom folds 38 and is shortened into the shape of the letter I by inwardly folding along horizontal folds 32 and 33.

It may then be folded along transverse bottom fold line 33 and transverse top fold line 32 so that the top 12 and bottom 13 lie side by side as in FIGURE 4.

As shown in FIGURE 1, a transverse V-shaped folding pattern 30 can be used to bring top 12 and bottom 13 into juxtaposition. The body of the bag is folded in one direction along the pre-scored transverse middle fold line 31 while the body is folded in the opposite direction near top 12 and bottom 13 along pre-scored lines 32, 33 respectively. When the distance between line 32 and 33 equals the bag width as measured across flat top 12 or flat bottom 13, the V-fold 30 for an empty bag becomes equal in length to the width of the bag 10 or of the platform 11; the distance between line 32 and line 33 may also be equal to another integral multiple of the bag width, such as zero or twice or thrice the bag width, with equally satisfactory folding performance. When the distance between lines 32 and 33 is zero so that they coincide with line 31, there is no V-fold.

For a filled bag, the distance between the folding line 32 and top 12 is equal to one-half the bag width and the distance between line 33 and bottom 13 is similarly equal to one-half the bag width; thus, the sum of these distances equals the bag width. Because the distance between lines 32 and 33 equals the bag width for the bag 10 shown in the drawings and the sum of the distances between these folding lines 32, 33 and their respective top 12 and bottom 13 is also equal to the bag width, the filled bag equals twice the bag width in height. When the length of V-fold 30 between lines 32 and 33 is a multiple integer, n, of the bag width, as is the preferred embodiment of this invention, the total height becomes $(n+1)$ times bag width.

These large pre-palletized bags may be of multiwall construction and have a barrier sheet as any ply or as each ply. In cooperation with one or more barrier plies or as an alternate construction, a release-coated sheet may form the innermost layer. Silicone-coated paper forms a satisfactory release ply, as described in Canadian Patent No. 653,699 by Frederick A. Smith and Thomas H. Welch.

If a moisture-resistant platform and a water-resistant outer ply are combined to form an outdoor storage bag, the bag of this invention can be stored and shipped without special weather protection, thus greatly enhancing its usefulness. This type of packaging, particularly in combination with an innermost release ply, is well suitable for shipping and storing normally solid thermoplastic materials, such as asphalt, wax, and rosin, which are normally melted and poured into drums. After these materials are poured into the bag of this invention through a top valve 21 and have solidfied into a solid lump, mechanical handling is simple. The flexible materials forming the outdoor storage bag can be stripped from the cast lump solidified therein before use.

An important use for the instant invention is the packaging of finely-divided particulate materials of low bulk density which are entrainable by air and consequently form flowable suspensions. A typical product of this type is water-grade activated carbon having a bulk density of 8 to 10 pounds per cubic foot. A bag made according to this invention and suitable for this material usually has a volume of forty to fifty cubic feet.

Valves 21, 22 may be pasted into SOS-type ends or into block bottoms as shown in the drawings. Valves 21, 22 are advantageously made of polyethylene or other thermoplastic sheet material and should be fashioned with sufficient length to permit tying.

By forcing a flowable material into the top valve of a collapsed bag, such as the topmost bag in FIGURE 5 or the bag in FIGURE 4, the flattened bag can be filled and simultaneously erected without the flowable material being entrained by escaping air. Furthermore, by inserting an air slide probe (not shown in the drawings) into the bottom valve 22, as shown in FIGURES 2 and 3, the contents of the semi-bulk bag 10 of this invention can be unloaded piece-meal while the bag serves as a storage bin between unloadings.

The walls of this semi-bulk bag can be of a variety of materials. Depending upon the bulk density, stickiness, susceptibility to moisture, flowability, etc., one or more plies can be selectel for strength, moisture resistance, release properties, barrier properties, perviousness, etc. Burlap, Clupak extensible paper, and scrim-reinforced asphalt-laminated paper are examples of plies chosen for high strength properties. Polyethylene, polypropylene, or glassine are examples of plies chosen for barrier properties and release properties. Silicone-coated paper is an example chosen for excellent release properties and unimpaired perviousness.

We claim:

1. A semi-bulk gusseted shipping container comprising a bag made of flexible sheet material having a flat top and a flat bottom, a pallet-type platform adhered to the flat bottom exteriorly thereof, and a relatively non-flexible platform attached to the flat top exteriorly thereof, said bag having a valve and a transverse V-fold whereby the bag is collapsible, when empty, into a flat package in proximity with the platforms.

2. A semi-bulk shipping container comprising:

(a) a rigid bottom platform in the shape of a pallet, and

(b) a bag made of flexible sheet material that is supported by said platform and is collapsible when empty into a relatively thin package having substantially the same length and width as the bottom platform, comprising:

(1) a flat bottom that is attached to the top of said bottom platform,

(2) a flat top,

(3) a body having four sides that is attached to said flat top and said flat bottom along the edges thereof, comprising:

(a) two opposite gusset sides, each having a longitudinal gusset fold, top diagonal folds that extend from adajacent corners of said flat top to a mutual intersection with the gusset fold, and bottom diagonal folds that extend from adjacent corners of said flat bottom to a mutual intersection with the gusset fold,

(b) two opposite flat sides that are spaced apart by the bag width, and

(c) a folding pattern, comprising:

(1) a transverse top fold line that is one-half of the bag width from, and parallel to, said flat top and that passes through the mutual inter-

sections of said top diagonal folds with the gusset folds,

(2) a transverse bottom fold line that is one-half of the bag width, from and parallel to, said flat bottom and an integral multiple of the bag width from said transverse top fold line and that passes through the mutual intersections of said bottom diagonal folds with the gusset folds,

(3) a transverse middle fold line that is midway between, and folded in opposite directions to, said transverse top fold line and said transverse bottom fold line, whereby the semi-bulk gusseted shipping bag may be folded in a V-shaped pattern into a relatively thin package that is compactly aligned with the rigid bottom platform, and

(4) a valve that is attached to the bag and penetrates into the interior thereof, whereby flowable material can be selectively introduced into the bag.

3. The semi-bulk shipping container of claim 2 wherein a relatively non-flexible platform is attached to said flat top.

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GEORGE O. RALSTON, *Primary Examiner.*