FLEXIBLE BULK STORAGE CONTAINER HAVING A DISCHARGE CHUTE

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Appl. No.: 13/511,612
PCT Filed: Dec. 2, 2010
PCT No.: PCT/US10/58762
§ 371 (c)(1), (2), (4) Date: Jul. 19, 2012

Related U.S. Application Data
Provisional application No. 61/266,066, filed on Dec. 2, 2009.

Publication Classification
Int. Cl.
B65D 33/14
(2006.01)

U.S. Cl. 383/22
(57)

ABSTRACT
The present disclosure relates to a flexible bulk storage container having a selectively openable discharge chute for improved emptying. When loaded, the bulk storage container has substantially flat top and bottom surfaces to facilitate stacking.
FLEXIBLE BULK STORAGE CONTAINER HAVING A DISCHARGE CHUTE

CROSS REFERENCE TO RELATED APPLICATION

[0001] The present application cross-references U.S. Provisional Application Ser. No. 61/266,066, filed Dec. 2, 2009, entitled “Flexible Bulk Storage Bag with Discharge Chute”, which is incorporated in its entirety herein.

FIELD OF THE INVENTION

[0002] The present invention relates to a bulk storage container, more particularly to a bulk storage container having a discharge chute for emptying the bulk storage container.

BACKGROUND

[0003] Typically, a bulk storage container is used to store materials, such as, grains, chemicals, powdered substances or other materials. Bulk storage containers are generally loaded with a fill material prior to transporting and/or storing the loaded bulk storage container. Unfortunately, conventional bulk storage containers are typically hard to stack and susceptible to damage. Additionally, conventional bulk storage containers are often awkward to empty and/or typically have slow discharge rates. Moreover, conventional bulk storage containers, such as bins, are typically emptied by cutting the bottom of the bulk storage container or by inverting and dumping out the fill material. Such discharge methods are inefficient and dangerous. For example, the operator must be at least partially under the loaded bag to cut the bottom of the bag. Moreover, controlling discharge direction and rate are difficult, if not impossible, when the bottom of the bulk storage container is cut to discharge the fill material. Furthermore, if the container is to be inverted, special equipment is necessary.

[0004] Thus, it would be advantageous to provide a bulk storage container that is strong, durable and stackable but also capable of being quickly, easily and safely emptied. Thus, there is a long felt and unsolved need for a strong, durable and stackable bulk storage container having an improved discharge chute.

SUMMARY OF THE INVENTION

[0005] These and other needs are met by present invention. One aspect of the present invention is a light-weight, flexible, non-metallic bulk storage container. The bulk storage container has a storage volume defined by opposing top and bottom portions and lateral side walls extending between the top and bottom portion. The bulk storage container is empty when the storage volume is substantially devoid of filler material and is loaded when the storage volume substantially comprises filler material.

[0006] Another aspect of the present invention is a discharge chute positioned about the bottom portion of the bulk storage container. In one embodiment, the discharge chute is configured to control one or both of direction and rate of fill material discharge. Furthermore, the discharge chute is configured to direct the fill material to process equipment with minimal, if any, fill material spilling out of the process equipment and/or being released to the environment. Preferably, the discharge chute is configured to direct the discharge of the filler material in pre-determined direction. In another embodiment, the discharge chute is configured to form a substantially flat bottom surface when the bulk storage container is loaded with fill material. A substantially flat bottom surface is preferred for stacking of loaded bulk storage containers one on top of another. The discharge chute is configured with at least one hopper seam forming an angle from about 0 to about 90 degrees with respect to a lateral wall. Preferably, the discharge chute has a shape substantially resembling a funnel shape. The discharge chute has selectively opened and closed discharge chute positions.

[0007] In an aspect of the present invention, the discharge chute has with a pull strap interconnected to first and second ends of the discharge chute. The discharge chute is in the closed position when the first and second ends are interconnected to the pull strap and the discharge chute in the opened position when the interconnection between the pull strap and the first and second ends has been removed. The pull strap and/or the interconnection are adapted to selectively open the discharge chute. Preferably, the pull strap is interconnected to the first and second ends by one of stitches, clips, clamps, rods, rings or combinations thereof. In one embodiment, pulling the pull strip selectively opens the discharge chute by removing the interconnection holding the first and second ends in the closed position.

[0008] Yet another aspect of the present invention is a selectively closable duffle or spout top positioned about and interconnected to the top portion of the bulk storage container. Preferably the spout top is configured to adaptively interconnect to a filter feed hopper.

[0009] Still yet another aspect of the present invention is a cover interconnected to the bottom portion. Preferably, the cover is reversibly interconnected to the bottom portion. Furthermore, the cover is adapted to protect one or both of the discharge chute and the at least one hopper seam.

[0010] Another aspect of the present invention is a liner positioned between the filler material and the bulk storage container. The liner is one of permanently or reversibly interconnected to the bulk storage container. The liner is one of a polymeric material, a fibrous material, a metallic material or a combination thereof. The liner protects the filler contained within the bulk storage container against one or more of moisture, residue, odor, sunlight, static charge, and bulk storage container damage due to punchers, tears and abrasions.

[0011] Still yet another aspect of the present invention is one or more lifting straps interconnected to the storage container, preferably the top portion. In one embodiment, the bulk storage container has lifting straps interconnected at about four positions about the top portion. One or more of stitching, adhesive bonding, molding, mechanical fastening and welding interconnects the lifting straps to the storage container. In a preferred embodiment, the lifting straps have one or more reinforcing panels positioned about the lifting straps. The lifting straps facilitate the loading, transporting and emptying of the bulk storage container by convention equipment and/or machinery, such as, hoists, fork lifts, and cranes.

[0012] Another aspect of the present invention is a flexible, non-metallic bulk storage container, comprising a storage volume defined by opposing top and bottom portions and lateral side walls extending between said top and bottom portions, a closure means interconnected to at least one of said top portion and said lateral side walls, said closure means adapted to selectively open and close said top portion, a discharge chute positioned proximate to said bottom portion.
and having selectively opened and closed discharge chute positions, and at least one hopper seam forming an angle from about 0 to about 90 degrees with respect to said lateral wall to direct the discharge of a bulk material in a pre-determined direction, and at least one lifting strap interconnected to said bulk storage container, wherein when said bulk storage container is loaded said top and bottom portions, respectively, have substantially flat top and bottom surfaces to accommodate stacking of multiple flexible bulk storage containers.

The Summary of the Invention is neither intended nor should it be construed as being representative of the full extent and scope of the present invention. The present invention is set forth in various levels of detail in the Summary of the Invention as well as in the detailed drawings and the Detailed Description of the Invention and no limitation as to the scope of the present invention is intended by either the inclusion or non-inclusion of elements, components, etc. in this Summary of the Invention. Additional aspects of the present invention will become more readily apparent from the Detailed Description, particularly when taken together with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and together with the general description of the invention given above and the detailed description given below, serve to explain the principles of these inventions.

FIG. 1 is a perspective view of the bulk storage container of one embodiment of the present invention having a cylindrical geometric shape;

FIG. 2 is a side perspective view of the bulk storage container of another embodiment of the present invention;

FIG. 3 is a side plan view of the bulk storage container of one embodiment of the present invention;

FIG. 4 is a perspective view of the bulk storage container of one embodiment of the present invention shown in a folded position;

FIG. 5 is a perspective view of the bulk storage container of one embodiment of the present invention shown loaded and with a cover positioned over the discharge chute;

FIG. 6 is a perspective view of the bulk storage container of one embodiment of the present invention shown loaded and the discharge chute in a closed position;

FIG. 7 is a perspective view of the bulk storage container of one embodiment of the present invention shown with the discharge chute in a closed position;

FIG. 8 is a perspective view of the bulk storage container of one embodiment of the present invention shown with the cover positioned over the discharge chute;

FIG. 9 is a perspective view of the bulk storage container of one embodiment of the present invention shown loaded and with a spout top;

FIG. 10 is a perspective view of the bulk storage container of one embodiment of the present invention with the cover positioned over the discharge chute;

FIG. 11 is a perspective view of the bulk storage container of one embodiment of the present invention and

FIG. 12 is a perspective view of the bulk storage container of one embodiment of the present invention with a spout top.

It should be understood that the drawings are not necessarily to scale. In certain instances, details that are not necessary for an understanding of the invention or that render other details difficult to perceive may have been omitted. It should be understood, of course, that the invention is not necessarily limited to the particular embodiments illustrated herein.

DETAILED DESCRIPTION

A preferred embodiment of the present invention is a bulk storage container requiring a strong, durable and flexible storage container capable of storing, shipping, transporting and/or dispensing large quantities of fill material. Preferably, the bulk storage container comprises a flexible, non-metallic container. The fill material may comprise, without limitation, materials such as, chemicals, minerals (for example, talc and talc byproducts), stone, grains, food products, and other similar products.

The bulk storage container may have any shape. When loaded with the fill material, the bulk storage container preferably resembles, but is not limited, to one of a cylinder, cube, or rectangular box. In a preferred embodiment, the loaded bulk storage container is stackable, one loaded bulk storage container on top of another. Furthermore, the loaded bulk storage container can be stored adjacent to other loaded bulk storage containers with a minimum void volume between the loaded bulk storage container and the other nearest neighbor loaded bulk storage containers.

The bulk storage container has a storage volume. Preferably, the storage volume is from about 10 ft³ to about 100 ft³, is from about 20 ft³ to about 75 ft³, or is from about 35 ft³ to about 40 ft³. More preferably, the storage volume is about 37 ft³.

Furthermore, the bulk storage container has a storage capacity, which can be expressed as a storage mass. The storage mass can vary depending on the density of the fill material. The storage mass can be at least about 100 pounds, the storage mass can be at least about 500 pounds, the storage mass can be at least about 1,000 pounds, the storage mass can be at least about 1,000 pounds, the storage mass can be at least about 2,000 pounds, the storage mass can be at least about 2,500 pounds, or the storage mass can be at least about 3,000 pounds.

In a preferred embodiment, the storage mass is from about 2,000 pounds to about 3,000 pounds.

It can be appreciated that the shape and storage volume and/or capacity of the bulk storage container can vary. Preferably, the shape and the storage capacity and/or volume of the bulk storage container are substantially sufficient that the loaded bulk storage container may be loaded, stacked, transported and emptied using conventional loading, warehousing, transporting and emptying equipment.

The bulk storage container may be made from any suitable natural and/or synthetic fabric. Preferably, the fabric is strong, durable, flexible and/or resilient. The fabric may comprise a woven fabric, a non-woven fabric, an interlocking fabric (such as a mesh) or a combination thereof. The bulk storage container may comprise a single layer of fabric or a combination of two or more layers of fabric, such as, two, three, four or more layers of fabric. The fabric may comprise one or more of jute, nylon, carbon fiber, polyethylene, polypropylene, polyamide, polyester, aramid and para-aramid. The fabric can have any fabric weight. Preferably, the fabric weight is from about 2 oz. to about 8 oz., the fabric weight is from about 3 oz. to about 7 oz., the fabric weight is from about 4 oz. to about 6 oz., or the fabric weight is about 5 oz. More preferably, the fabric weight is from about 5 oz. to about 5.6 oz., the fabric weight is from about 5.1 oz. to
about 5.5 oz., or the fabric weight is from about 5.2 oz. to about 5.5 oz. Even more preferably, the fabric weight is about 5.3 oz.

[0034] The fabric may be coated with a thermoplastic and/or or thermosetting polymeric coating. Preferably, the fabric is coated with a thermoplastic polyolefin. The coating provides the bulk storage container with static control, UV-resistance, water-resistance, chemical-resistance, abrasion-resistance, contamination resistance and/or other desired chemical and/or physical properties. For example, the bulk storage container may include an ethylene-vinyl acetate (EVA) coating. The EVA coating can increase the bulk storage container flexibility and resiliency.

[0035] In one preferred embodiment, the bulk storage container 100 has a substantially cylindrical shape comprising one or more lateral walls 102 having opposing upper 104 and lower 106 portions, the one or more lateral walls 102 are positioned between opposing top 108 and bottom 110 portions, as depicted in FIG. 1.

[0036] In another preferred embodiment, the bulk storage container 100 has a substantially cubic or rectangular-box shape comprising four lateral walls 102a-d positioned between the top 108 and bottom 110 portions, as depicted in FIG. 2. Preferably, the top 108 and bottom 110 portions respectively have flat top 154 and bottom 152 surfaces. More preferably, the top 108 and bottom 110 portions have substantially flat surfaces when the bulk storage container 100 is loaded with fill material. The top 108 and bottom 110 portions have substantially flat surfaces to provide improved stacking of the loaded bulk storage containers.

[0037] In a preferred embodiment, the bulk storage container 100 has a discharge chute 112, depicted in FIGS. 3, 4, 5, and 7-11. The discharge chute 112 has opened (depicted in FIG. 7) and closed (depicted in FIG. 8) positions. The discharge chute 112 is wider at discharge chute top 122 than opposing discharge chute bottom 124. It can be appreciated that in the opened position, the discharge chute 112 substantially has a funnel-like shape, with the discharge chute bottom 124 being smaller than the discharge chute top 122. The discharge chute 112 in the closed position forms a flat bottom surface 152 and in the opened position this discharge chute bottom 124 forms a discharge void opening.

[0038] The discharge opening 114 can have any shape and be of any size. Preferably, the discharge opening 114 substantially resembles a square shape and/or a rounded square shape. More preferably, the discharge void opening size is at least about 6 inches by about 6 inches, the discharge void opening size is at least about 12 inches by about 12 inches, the discharge void opening size is at least about 18 inches by about 18 inches, the discharge void opening size is at least about 24 inches by about 24 inches, the discharge void opening size is at least about 28 inches by about 28 inches, the discharge void opening size is at least about 30 inches by about 30 inches, the discharge void opening size is at least about 42 inches by about 42 inches.

[0039] Preferably, the discharge chute 112 is in the closed position during loading of the bulk storage container 100. Furthermore, the discharge chute 112 is preferably closed when the loaded bulk storage container is transported and/or stored. In the closed position, the discharge chute 112 forms a substantially flat bottom surface 152 to facilitate stacking of one loaded bulk storage container on top of another.

[0040] Preferably, the discharge chute 112 and bottom surface 152 are formed by interconnected the lower portion 106 of the one or more lateral walls 102 by one or more hopper seams 116, as depicted in FIGS. 3A and 3B. The one or more hopper seams 116 are interconnected to the lower portion 106 by one or more of stitching, adhesively bonding, molding, mechanical fastening, and/or welding. When the hopper seams 116 comprise stitching, the stitching preferably comprises any strong thread and/or yarn, such as a polyamide or polyester thread and/or yarn. Nylon is an example of a polyamide.

[0041] More preferably, four hopper seams 116 form the discharge chute 112 and the bottom surface 152. The four hopper seams 116 interconnect the lower portion 106 of the cylindrical lateral wall 102. Preferably, the four hopper seams 116 define circumferential points of two bisecting diameters of the circular bulk storage container 100. More specifically, FIG. 3 depicts the cylindrical storage container 100 laid flat showing two of the four hopper seams 116 defining the circumferential points 138 of a bisecting diameter 140 of the circular bulk storage container 100.

[0042] FIG. 9 depicts a preferred embodiment for forming the discharge chute 112 by interconnecting first 148 and second 150 ends of the discharge chute 112 with one or more pull-strips 120. FIG. 9 depicts a preferred embodiment were the first 148 and second 150 ends folded back onto each other and interconnected to a single pull-strip 120 by stitching 114. Preferably, the stitching 114 comprises one or more rows of stitching, more preferably two rows of stitching. The stitching 114 may comprise chain stitching, loop stitching, clip stitching or any combination thereof. For example, the stitching may comprise two rows of loop and/or two rows of clip stitching. The number of rows of stitching can depend on the weight and/or volume of the fill material and/or application and/or use of the bulk storage container 100. Preferably, the discharge chute 112, the pull-strip 120, and first 148 and second 150 ends are interconnected by at least two rows of single loop stitching. In another embodiment, the first 148 and second 150 ends are reversibly interconnected to the pull strip 120 by clamps, clamps, rods, rings or combinations thereof. That is, pulling the pull strip 120 or a member substantially resembling a pull strip selectively removes the clip (s), clamp(s), rod(s), ring(s) or combination thereof interconnected the first 148 and second 148 ends comprising the closed position of the discharge chute. In yet another embodiment, the first 148 and second 150 ends comprising closure device, such as, hook and loop material, mechanical interlocking, a tongue in groove, adhesive bond to backing material, or combination thereof. Taking hook and loop as a non-limiting example, the hook material can be permanently joined to the first end 148 and the pile material can be permanently joined to second end 150 prior to interlocking the hook and pile material followed by reversibly interconnecting the hook and pile material, the 148 first and second 150 ends and the pull strip 120. The discharge chute can be opened by removing the reversible interconnection between the first and second ends by pulling on the pull strip, the weight of the fill material within the bulk storage container is sufficient for the interlocking of the hook and pile material to be disrupted and the discharge chute to open and loaded bulk container to empty.

[0043] The pull strip(s) 120 may comprise any sufficiently flexible, stiff and durable material adapted to facilitate discharge chute deployment to the open position. In a less pre-
ferred, optional embodiment, interconnecting the lower portion 106 as described above but without the pull-strip 120 to form the discharge chute 112.

[0044] It is preferred that the discharge chute 112 and the first 148 and second 150 ends of the bulk storage container 100 are sufficiently interconnected such that the fill material does not discharge unexpectedly from the loaded bulk storage container 100, as for example, during loading, storing, and/or transporting. Moreover, it is more preferred that an operator be able to easily and safely open the discharge chute 112 at an appropriate time for emptying the loaded storage container 100. That is, an operator may selectively open the bulk storage container discharge chute 112.

[0045] Preferably, the one or more hopper seams 116 are positioned at an angle 118 relative to least one of the one or more lateral walls 102. The least one hopper seam of the one or more hopper seams 116 may be positioned at a hopper seam angle 118 from about 0 to about 90 degrees with respect to at least one of the one or more lateral walls 102. More preferably, the one or more hopper seams 116 are positioned at a hopper seam angle 118 from about 10 to about 80 degrees with respect to at least one of the one or more lateral walls 102. More preferably, the one or more hopper seams 116 are positioned at a hopper seam angle 118 from about 20 to about 70 degrees with respect to at least one of the one or more lateral walls 102, the one or more hopper seams 116 are positioned at a hopper seam angle 118 from about 30 to about 60 degrees with respect to at least one of the one or more lateral walls 102, or the one or more hopper seams 116 are positioned at a hopper seam angle 118 from about 40 to about 50 degrees with respect to at least one of the one or more lateral walls 102.

[0046] The hopper seam angle 118 may vary depending on desired discharge chute geometry. Moreover, the hopper seam angle 118 may vary depending on one or both of material and method of loading, storing, transporting and/or emptying of the bulk storage container 100. For example, the greater the hopper seam angle 118 the smaller the discharge void opening and the lesser the angle the greater the discharge void opening. It can be appreciated that the hopper seam angle 118 can be varied to control rate of emptying of the loaded bulk storage container 100. For example, for similar bulk storage bags with similar fill contents, smaller discharge void openings would be expected to have greater (that is, longer) emptying times than larger discharge void openings. Furthermore, the discharge chute 112 can be configured to substantially match a hopper receiving the discharged contents of the loaded bulk storage container 100 with minimal, if any, loss of the discharged contents.

[0047] FIG. 11 depicts the bulk storage container 100 with the discharge chute 112 in the closed position. Preferably, pulling the pull-strip 120 opens the discharge chute 112. Moreover, pulling the pull-strip 120 disengages the chain loop stitching 114 interconnecting the pull strip 120 with the lower portion 106. Furthermore, opening the discharge chute 112 by pulling the pull strip 120 substantially reduces and/or eliminates contamination of the fill material, typically associated with cutting into typical bulk storage containers. By eliminating the positioning of operator underneath loaded container during discharging of the fill material substantially reduces and/or eliminates operator contact with the fill material.

[0048] In another embodiment, the discharge chute 112 may be opened remotely. One of skill in the art will appreciate that it is advantageous to open the discharge chute 112 remotely, substantially eliminates positioning of the operator beneath the loaded bulk storage container to discharge the contents thereof. The remotely operable bulk storage container may include a pull-rod or other device capable of being remotely pulled and/or grasped.

[0049] Moreover, the discharge chute 112 of the present invention eliminates typical container closing straps that hang below the bottom of bulk storage container. One of skill in the art will appreciate that it is advantageous to eliminate the typically container closing straps that hang below the container because the closing straps can be easily caught in feed augers or other process machinery. Furthermore, typical bulk containers commonly require vibrating and/or shaking to discharge the filler material from the typical bulk container. The discharge chute 112 of the present invention substantially reduces and or eliminates the need to vibrate and/or shake the bulk storage container 100 to substantially discharge the filler material.

[0050] The fill material empties from the loaded bulk storage container 100 when the discharge chute 112 is the opened position. In a preferred embodiment, the discharge chute 112 is angled and/or has sloped, that is, the one or more hopper seams 116 are positioned at an angle 118. The angled and/or sloped discharge chute 112 has a greater discharge rate than conventional bulk storage containers. Furthermore, the discharge chute 112 having one or more hopper seams 116 at the angle 118 empties the bulk storage container 100 more efficiently, effectively, and/or safely. For example, a conventional bulk storage container takes more than about 360 seconds to discharge about 2,350 pounds of tule pellets, while the angled and/or sloped discharge chute 112 of the present invention takes about six seconds to discharge about 2,350 pounds of tule pellets.

[0051] The bulk storage container 100 may optionally have one or more lifting strips 130, as depicted in FIGS. 11 and 12. The one or more lifting strips 130 facilitate filling, storing, transporting, lifting, and discharging of the loaded bulk storage container. Preferably, the bulk storage container 100 has one, two, three, four, five, six, seven, eight, or more lifting strips 130. More preferably, the lifting strips 130 are attached at or adjacent to the upper portion 104 about four or more positions. The lifting strips 130 may be interconnected to the bulk storage container 100 by stitching, adhesively bonding, molding, mechanical fastening, welding, or a combination thereof. The bulk storage container 100 may include any type of lifting strip 130. For example, depending on the lifting method, the lifting strip may also include a stevodore strap, a cargo strap, a sleeve-hemmed strap, or a spread strap. In a preferred embodiment, the bulk storage container 100 comprises one or more of bridging stevodore straps 130a. Preferably, the one or more bridging stevodore straps comprise a pair of stevodore straps.

[0052] Depending on the method utilized to lift the loaded bulk storage container 100, the type and number of lifting strips 130 may vary. For example, a short lifting strap 130 may be used in conjunction with a forklift and a long lifting strap 130 may be used in conjunction with one-point pickups (i.e., a crane or chain). In a preferred embodiment, the lifting strap 130 comprises polypropylene or polyethylene. However, one of skill in the art will appreciate that the lifting straps
130 may comprise any number of flexible, strong and durable materials such as wire rope, fiberglass, rope material, etc. [0053] Preferably, the bulk storage container 100 comprises one or more reinforcing panels 132 and/or one or more reinforcing straps 133. The reinforcing panels 132 and/or the one or more reinforcing straps 133 are positioned on the bulk storage container 100 about the one or more lifting straps 130. The one or more reinforcing panels 132 and the one or more reinforcing straps 133 substantially fortify and increase the strength and/or durability of the interconnection of the one or more lifting straps 130 with the bulk storage container 100. [0054] The top portion 108 may include a plurality of upper closure means 134 adapted to selectively open and close the top portion 108. The upper closure means 134 may be interconnected to one or both of the top portion 108 and the upper portion 104 by stitches, adhesive bonds, molded bonds, mechanical fasteners, welds, ties, straps, buckles, snaps, zippers, and/or hook and loop materials. The upper closure means 134 may comprise tie strings, drawstrings, plastic ties, web ties, tamper resistant ties, wire ties, straps, snaps, cordlock, or hook and loop closure devices. Preferably, the upper closure means 134 comprises tie strings that may be interconnected to operatively open and close the top portion 108. The tie strings may be seen about one or both of the top portion 108 and the upper portion 104 and may be configured to secure the top portion 108 in a closed position. It can be appreciated that, the top portion 108 can comprise the top surface 154 as described above. [0055] Preferably, the top portion 108 is sufficiently large to facilitate loading of the bulk storage container 100. For example, the top portion 108 may be configured to facilitate bulk storage container 100 loading at a feed rate of from about 1 ton/hour to about 60 tons/hour. In a preferred embodiment, the top portion 108 is configured to facilitate a loading feed rate from about 50 tons/hour to about 70 tons/hour. In a more preferred embodiment, the top portion 108 is configured to facilitate a loading feed rate of about 60 tons/hour. The top portion 108 of the bulk storage container 100 may be configured for any bulk loading process and/or method, such as, a cone top, a cone shaped hopper with a tube in the center, and/or a fill spout top method. [0056] The top portion 108 may comprise any fabric material as described above the bulk storage container 100. Furthermore, composition and physical construction of the fabrics comprising the one or more lateral walls 102, the opposing upper 104 and lower 106 portions, and the bottom surface 152. The fabric weight of top portion 108 is from about 0.2 oz. to about 5 oz., the fabric weight of the top portion 108 is from about 0.5 oz. to about 4 oz., the fabric weight of the top portion 108 is from about 1 oz. to about 3 oz., the fabric weight of the top portion 108 is from about 1.4 oz. to about 2.6 oz., the fabric weight of the top portion 108 is from about 1.6 oz. to about 2.4 oz., the fabric weight of the top portion 108 is from about 1.8 oz. to about 2.2 oz., or the fabric weight of the top portion 108 is about 2 oz. [0057] The top portion 108 may be configured to resemble a duffle top, as depicted in FIG. 10 or a spout top, as depicted in FIG. 12. Preferably, the spout top is configured to adaptively interconnect to feed chute. The adaptive interconnection of the spout top and feed chute minimizes loss of filler material and any associated dust. The spout top may or may not extend from the upper portion 104. In one embodiment, interconnecting the upper portion 104 to a spout top that does not extend beyond the upper portion 104 forms the top surface 154 (not depicted in Figs.). In another embodiment, interconnecting the upper portion 104 to a spout top that extends beyond the upper portion 104 forms the top surface 154 (as depicted in FIGS. 10 and 12). [0058] The bulk storage container 100 may include a bottom cover 126 positioned over the discharge chute 112, as depicted in FIG. 5. The bottom cover 126 may protect one or both of the discharge chute 112 and the hopper seams 116. Furthermore, the bottom cover 126 may protect the bottom surface 110 from being damaged, punctured, ripped and/or torn. Preferably, the bottom cover 126 comprises the same material as the bulk storage container 100. The bottom cover 126 can protect the pull strip(s) 120 from being damaged, torn or caught on an object. The bottom cover 126 may be reversibly interconnected to the bulk storage container 100 by a plurality of bottom cover fasteners 128. Non-limiting examples of the bottom cover fastener means may comprise ties, straps, buckles, snaps, zippers, or hook and loop materials. Preferably, a plurality of ties reversibly interconnected the bottom cover 126 to the bulk storage container 100. While not wanting to be limited by example, each corner of the bottom cover 126 has a bottom cover tie string reversibly interconnected with a corresponding bulk storage container tie. The plurality of ties may be positioned at various positions about the lower portion 106 of the bulk storage container 100. [0059] Furthermore, the bulk storage container 100 may comprise a liner (not depicted in Figs.) positioned between the filler material and the bulk storage container 100. The optional liner may be desirable to protect against moisture, residue, odor, sunlight, static charge, filler material loss, filler material contamination, and bulk storage container damage due to puncters, tears, and, abrasions. The liner may comprise any material. The liner may comprise without limitation, a polymeric material, a fibrous material, a metallic material, or a combination thereof. Moreover, the liner may comprise a film, a woven, a non-woven, an interlocking or a combination thereof. The liner may or may not be interconnected to the bulk storage container 100. The bulk storage container 100 may be permanently or reversibly interconnected to the liner by stitching, adhesive bonding, welding, molding, coating, and/or mechanic joining. One of skill in the art will appreciate that any number of liners may be used in conjunction with the bulk storage container 100 of the present invention, such as tubular liners, tapered tube liners, cube liners, form fitted liners, static control liners, or foil liners. Furthermore, the liner may comprise one or more layers of material. [0060] FIGS. 5, 10 and 11 depict a folded, emptied bulk storage container 100. The empty bulk storage container 100 is easily folded. The folded, emptied bulk storage container 100 is efficiently shipped, stored and transported to a facility where the bulk storage container 100 is to be loaded. In a preferred embodiment, a patch 142 is positioned about each fold edge 144. The patch 142 preferably comprises the same material as the bulk storage container 100 and is interconnected to the bulk storage container 100 by one or more of stitching, adhesively bonding, molding, mechanical fastening, and/or welding. In a more preferred embodiment, the patch 142 is positioned about the fold edge hem 146, at least interconnected to the bulk storage container 100 by the edge hem 146 and optionally extends beyond the hem 146.
FIGS. 6 and 7 depict the bulk storage container 100 loaded with fill material (not depicted). FIG. 7 depicts the loaded bulk storage container 100 having a closed discharge chute 112 and a substantially flat bottom surface 152. The substantially flat bottom surface 152 can provide for a more easily stacked, stored and transported loaded bulk storage container 100. Moreover, the more easily stacked, stored and transported loaded bulk storage container 100 can provide cost savings associated therewith. For example, freight and warehouse storage costs can be substantially less for loaded bulk storage containers 100 that can be stacked and stored more efficiently and take up less space. Moreover, the substantially flat bottom surface 152 can provide increased stability and safety when the loaded bulk storage containers 100 are positioned on a flat surface such as a floor and/or stacked one loaded bulk storage container on another. Furthermore, the substantially flat bottom surface 110 provides for improved stacking efficiency.

In addition, one of skill in the art will appreciate that the bulk storage container 100 of the present invention may optionally comprise one or more of additional features, such as an identification/document pouch adapted to hold product inserts and/or literature, such as the filler material, manufacturer, customer, order number, tracking number and/or other information related to the shipment. The identification/document pouch may be sewn onto the bulk storage container 100.

In an alternative embodiment, the bulk storage container 100 is constructed using a plurality of panels sewn together (not depicted in Figs.). The bulk storage container 100 may include four side panels, a top panel and a bottom panel that are interconnected to form a bulk storage container. One of skill in the art will appreciate that the alternative embodiment may include any of the aforementioned features and embodiments.

While various embodiments of the present invention have been described in detail, it is apparent that modifications and alterations of those embodiments will occur to those skilled in the art. Moreover, references made herein to “the present invention” or aspects thereof should be understood to mean certain embodiments of the present invention and should not necessarily be construed as limiting all embodiments to a particular description. However, it is to be expressly understood that such modifications and alterations are within the scope and spirit of the present invention, as set forth in the following claims.

What is claimed is:

1. A flexible, non-metallic bulk storage container, comprising:
   a storage volume defined by opposing top and bottom portions and lateral side walls extending between said top and bottom portions;
   a closure means interconnected to at least one of said top and said lateral side walls, said closure means adapted to selectively open and close said top portion;
   a discharge chute positioned proximate to said bottom portion and having selectively opened and closed discharge chute positions, and at least one hopper seam forming an angle from about 0 to about 90 degrees with respect to said lateral wall to direct the discharge of a bulk material in a pre-determined direction; and
   at least one lifting strap interconnected to said bulk storage container, wherein said bulk storage container is loaded said top and bottom portions, respectively, have substantially flat top and bottom surfaces to accommodate stacking of multiple flexible bulk storage containers.

2. The bulk storage container of claim 1, further comprising a cover selectively interconnected to said bottom portion, wherein said cover is adapted to protect said discharge chute.

3. The bulk storage container of claim 1, further comprising a liner positioned between said bulk material and said bulk storage container, and comprises one of a polymeric material, a fibrous material, a metallic material or a combination thereof.

4. The bulk storage container of claim 1, wherein said bulk storage container is comprised at least one of a woven fabric, a non-woven fabric, a circular woven fabric, an interlocking fabric or a combination thereof.

5. The bulk storage container of claim 1, wherein the top portion is comprised of a selecting closeable duffle top or a spout top.

6. The bulk storage container of claim 1, wherein said bulk storage container comprises one or more layers of a jute, a polyamide, a polyester, a carbon fiber, a polyethylene, a polypropylene, an aramid, and a para-aramid.

7. The bulk storage container of claim 1, wherein said bulk storage container is coated with at least one of a static control coating, a UV coating, a water-resistant coating, a puncture-resistant coating, and a chemical-resistant coating.

8. The bulk storage container of claim 1, said discharge chute further comprises first and second ends and a pull strip interconnected to said first and second ends wherein when a transient force is applied to said pull strip said discharging chute is opened.

9. The bulk storage container of claim 8, wherein said first and second ends are folded back onto one another and interconnected by one or more rows of chain loop stitches.

10. The bulk storage container of claim 1, wherein said discharge chute has a substantially funnel shape.

11. The bulk storage container of claim 1, further comprising one or more reinforcing panels positioned about said at least one lifting strap.

12. The bulk storage container of claim 1, wherein said at least one lifting strap is interconnected permanent to said top portion by one or more of a stitching, an adhesive bonding, a molding, a mechanical fastening, a welding, or a combination thereof.

13. A flexible, non-metallic bulk storage container, comprising:
   a top portion, bottom portion, and one or more lateral sides positioned between said top portion and said bottom portion, said bottom portion comprises a discharge chute having a plurality of hopper seams and first and second ends folded back onto each other and interconnected to a pull strip, each of said plurality of hopper seams have an angle from about 0 to about 90 degrees with respect to one or more lateral sides and interconnected said one or more lateral sides, wherein said discharge chute is selectively openable when a predetermined force is applied to said pull strip;
   a closure means interconnected to said top portion, said closure means adapted to selectively open and close said top portion;
   a cover selectively interconnected to said bottom portion;
at least one lifting strap interconnected to said bulk storage container; and
wherein when said bulk storage container is loaded, said bottom portion has a substantial, flat bottom surface and said top portion has a substantially, flat top surface.

14. The bulk storage container of claim 13, further comprising a liner positioned between said bulk material and said bulk storage container, wherein said liner comprises one of a polymeric material, a fibrous material, a metallic material or a combination.

15. The bulk storage container of claim 13, wherein said bulk storage container comprises at least one of a woven fabric, a non-woven fabric, a circularly woven fabric, an interlocking fabric or a combination thereof.

16. The bulk storage container of claim 13, wherein said bulk storage container comprises at least one of a jute, a polyamide, a polyester, a carbon fiber, a polyethylene, a polypropylene, an aramid, and a para-aramid.

17. The bulk storage container of claim 16, wherein said bulk storage container is coated with at least one of a static control coating, a UV coating, a water-resistant coating, a puncture-resistant coating, and a chemical-resistant coating.

18. The bulk storage container of claim 13, wherein said first and second ends are interconnected to a pull strip by one or more rows of chain loop stitching.

19. The bulk storage container of claim 13, wherein said at least one lifting strap comprises one of two or four lifting straps, wherein said lifting straps are interconnected to said storage container by one or more of stitching, adhesive bonding, molding, mechanical fastening and welding, and wherein said at least one lifting strap is interconnected to said top portion.

20. The bulk storage container of claim 19, wherein said at least one lifting strap comprises a stevedore strap, a cargo strap, a sleeve-hemmed strap, or a spread strap.

21. The bulk storage container of claim 13, wherein said bulk storage container has a shape substantially resembling one of a cylinder, a cube, or a rectangular box.

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