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Nowicky

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(54) **INTERMEDIATE BULK CONTAINER SYSTEMS AND METHODS OF USING SAME**

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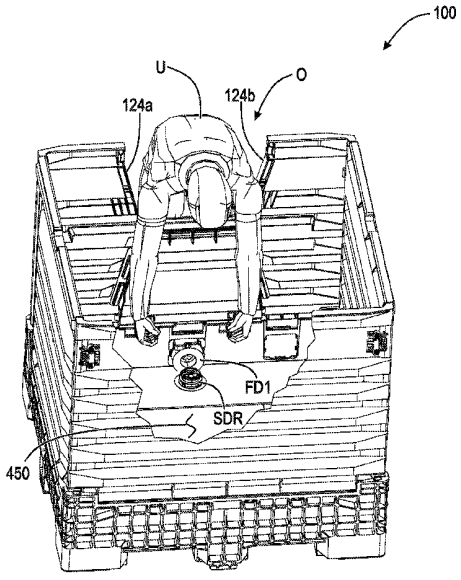
(57) **ABSTRACT**

An intermediate bulk container (IBC) system including a base and walls, and having an interior space. The system comprises a drain in the base or in a wall, a liner bag having a liner bag drain couplable to the drain in the base or in a wall, and a door coupled to the wall by a hinge and shaped to cover an opening in the wall. The opening extends from a top of the wall. The hinge is coupled to the door to allow the door to rotate into the interior space. A stop prevents the door from rotating beyond the wall. The system may be used by rotating the door into the interior space to expose the opening, reaching through the opening and operatively coupling the liner bag drain at the drain in the base or in a wall, and rotating the door to cover the opening.

20 Claims, 10 Drawing Sheets



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B65D 19/18 (2006.01)
B65D 25/00 (2006.01)

(52) **U.S. Cl.**
CPC ***B65D 88/54*** (2013.01); *B65D 25/005* (2013.01); *B65D 2519/009* (2013.01); *B65D 2519/00034* (2013.01); *B65D 2519/00069* (2013.01); *B65D 2519/00174* (2013.01); *B65D 2519/00208* (2013.01); *B65D 2519/00338* (2013.01); *B65D 2519/00422* (2013.01); *B65D 2519/00611* (2013.01); *B65D 2519/00646* (2013.01); *B65D 2519/00711* (2013.01); *B65D 2519/00805* (2013.01); *B65D 2588/125* (2013.01)

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See application file for complete search history.

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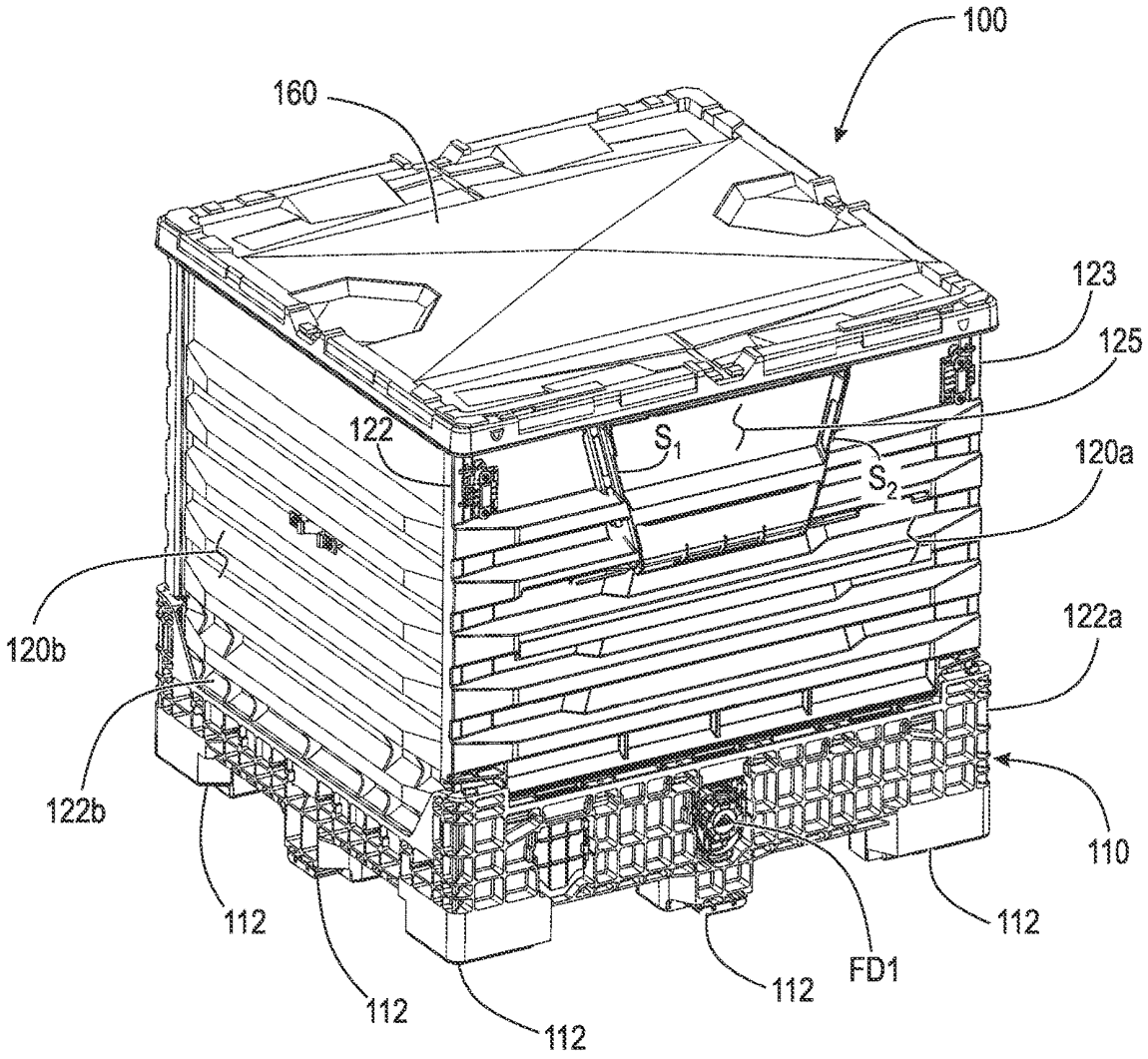
100
160
123
125
122
S_1
S_2
120a
120b
122a
122b
110
112
112
112
112
FD1

Fig. 1

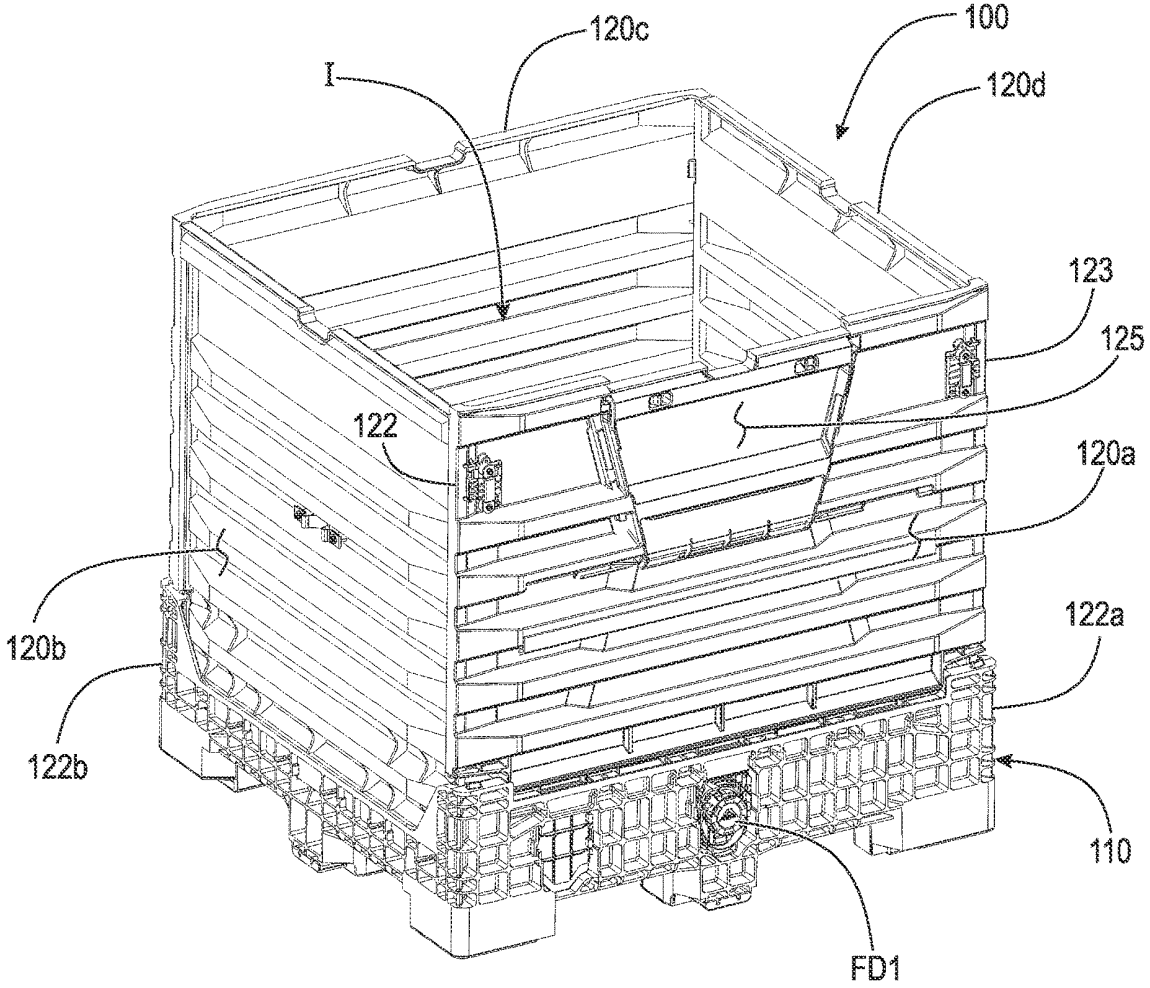

Fig. 2

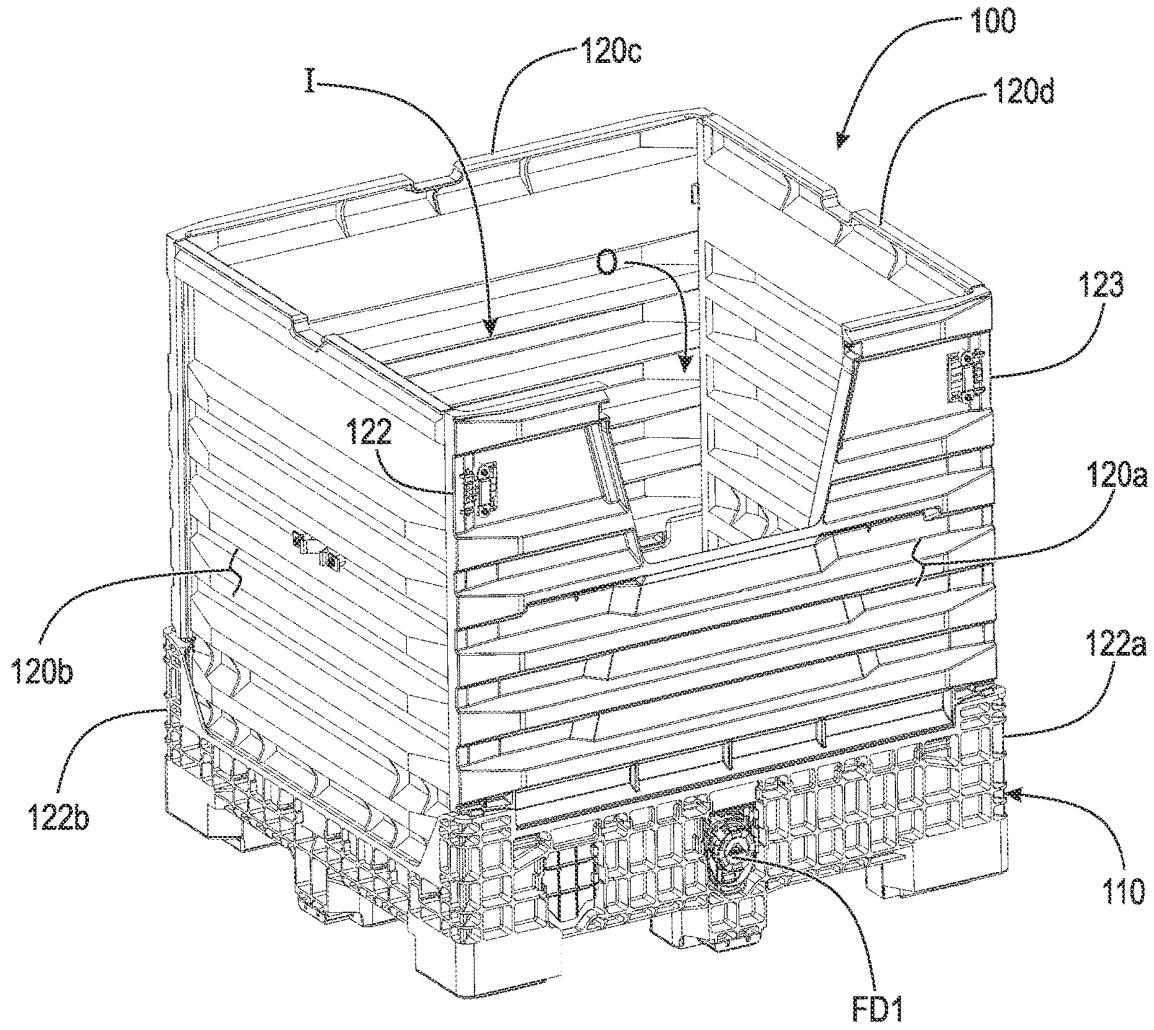

Fig. 3

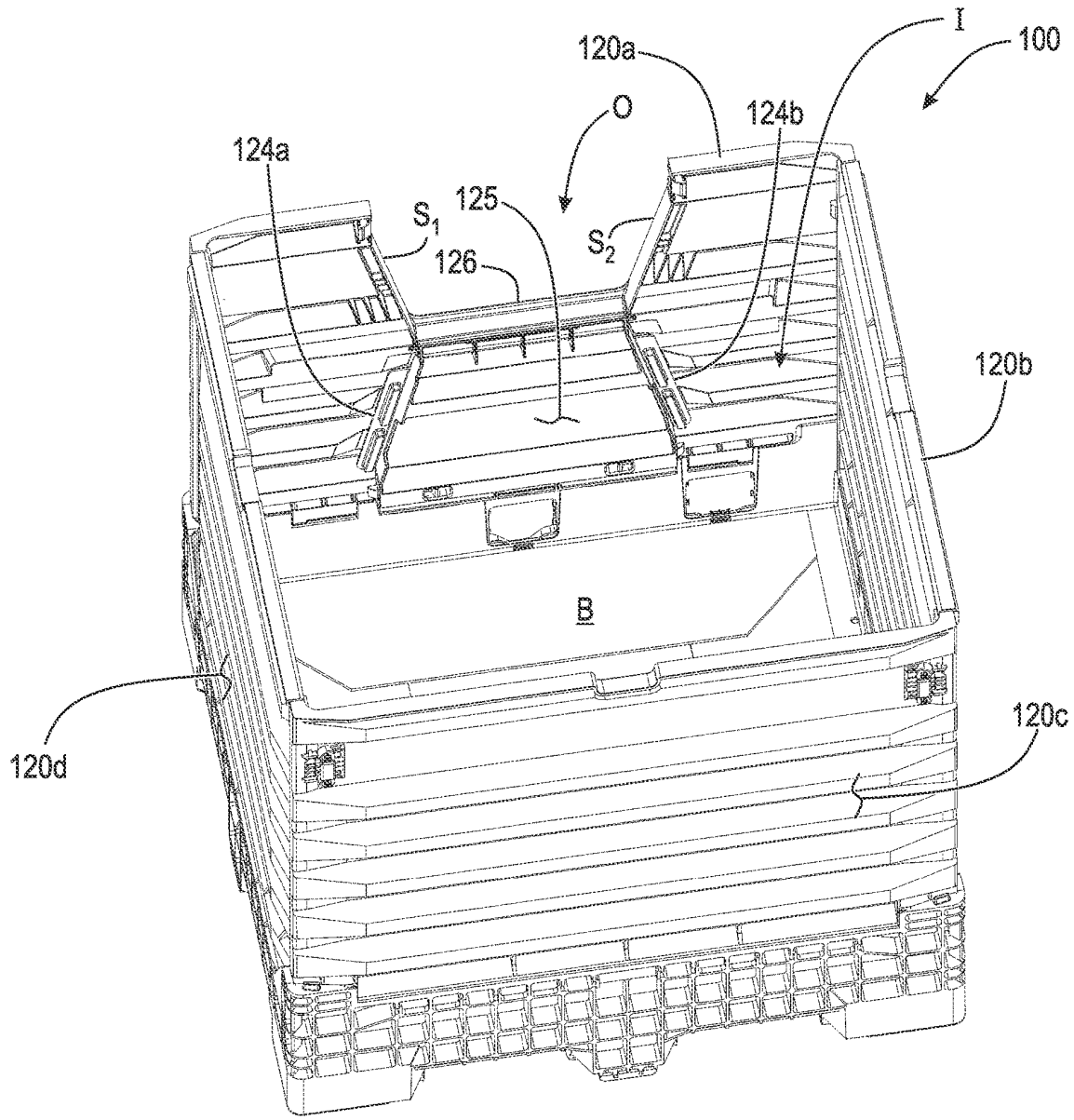

Fig. 4A

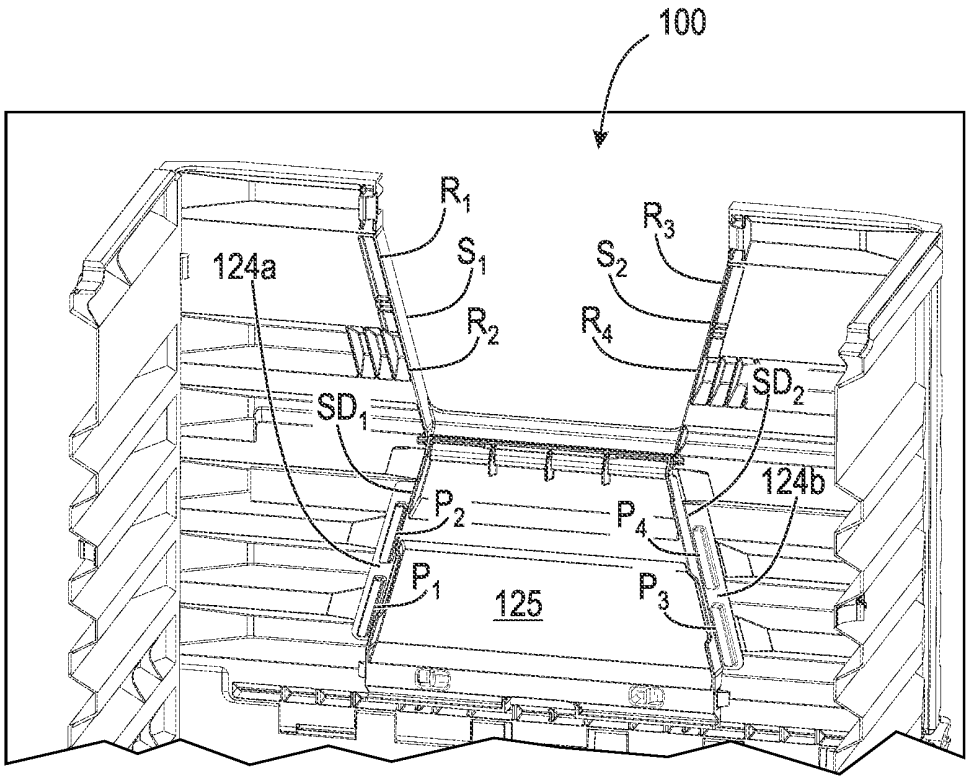

Fig. 4B

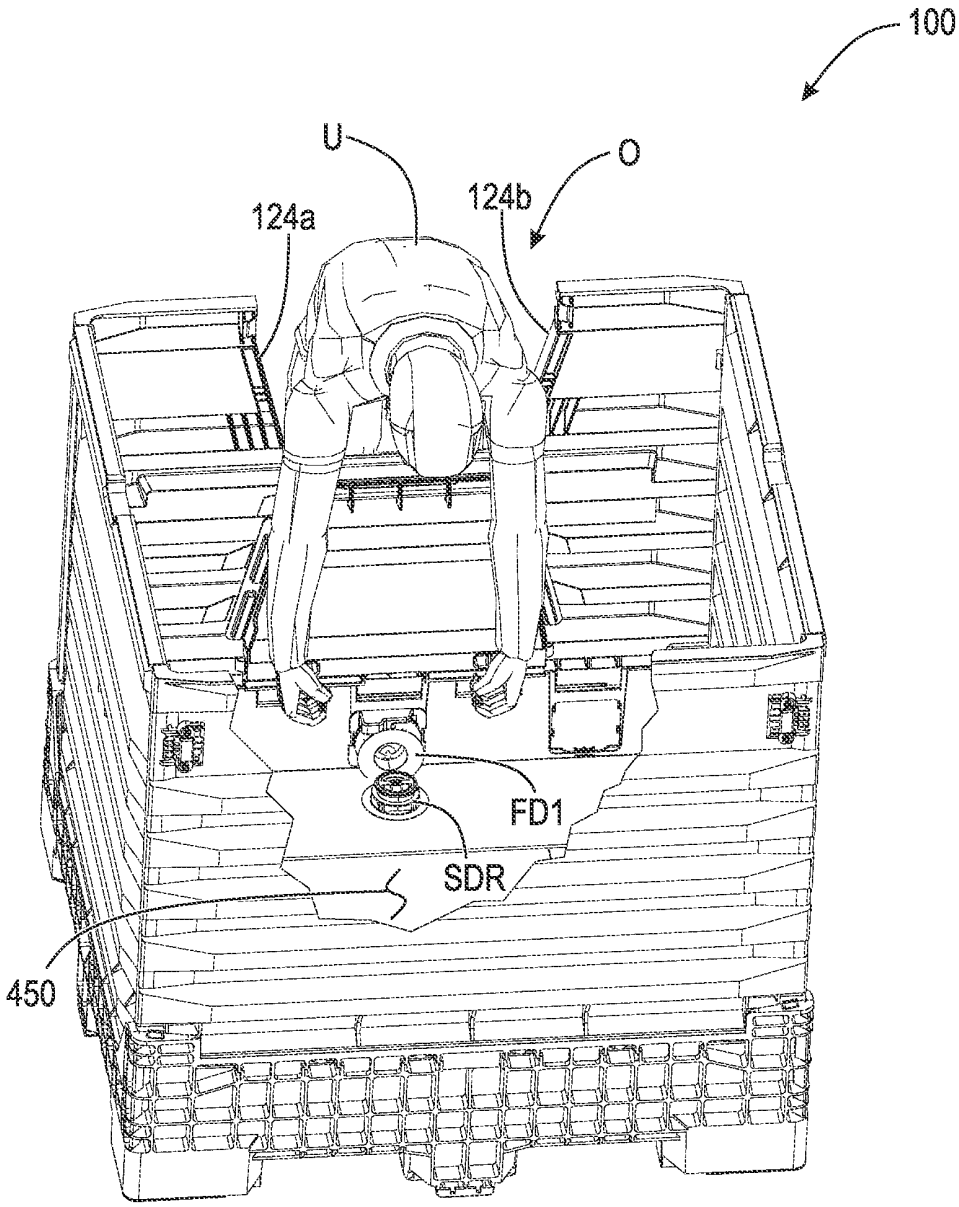

Fig. 4C

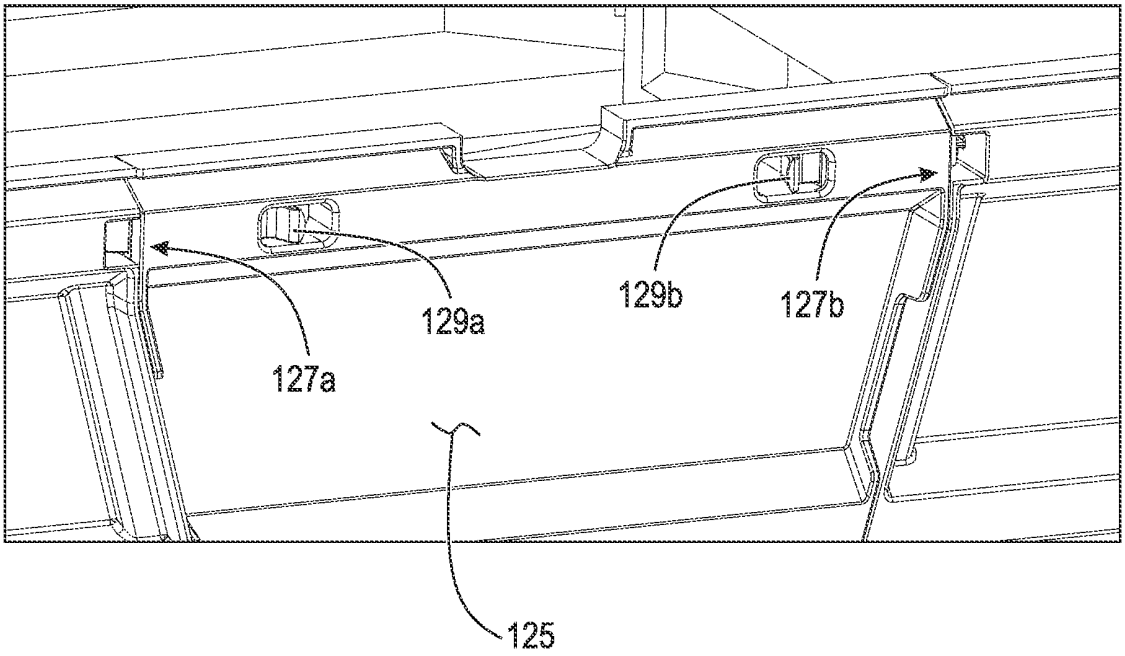

Fig. 5A

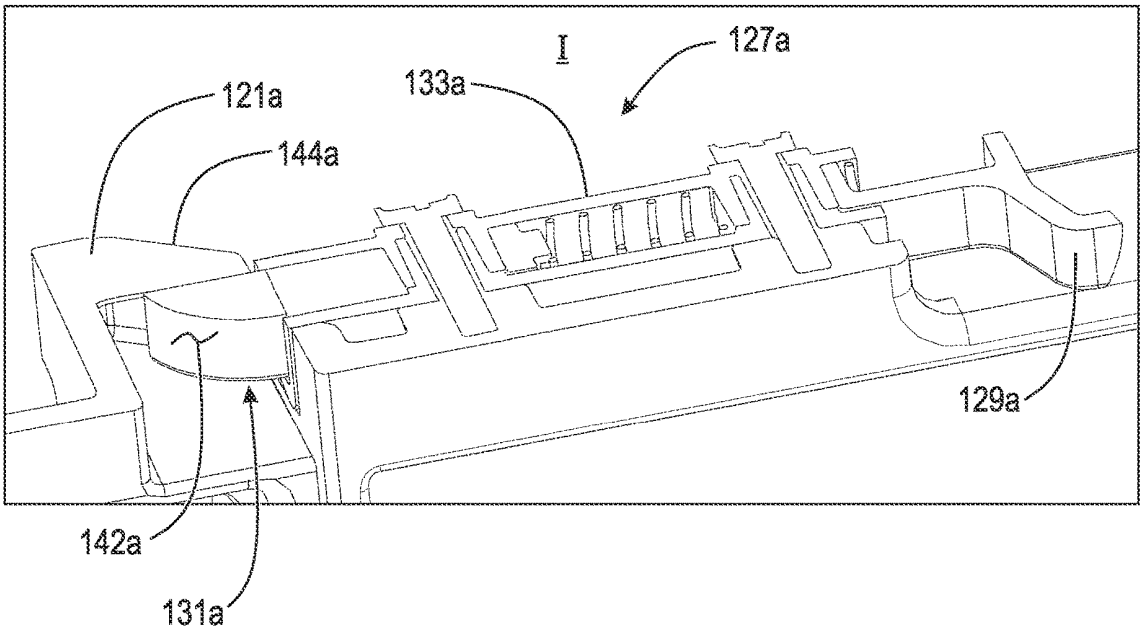

Fig. 5B

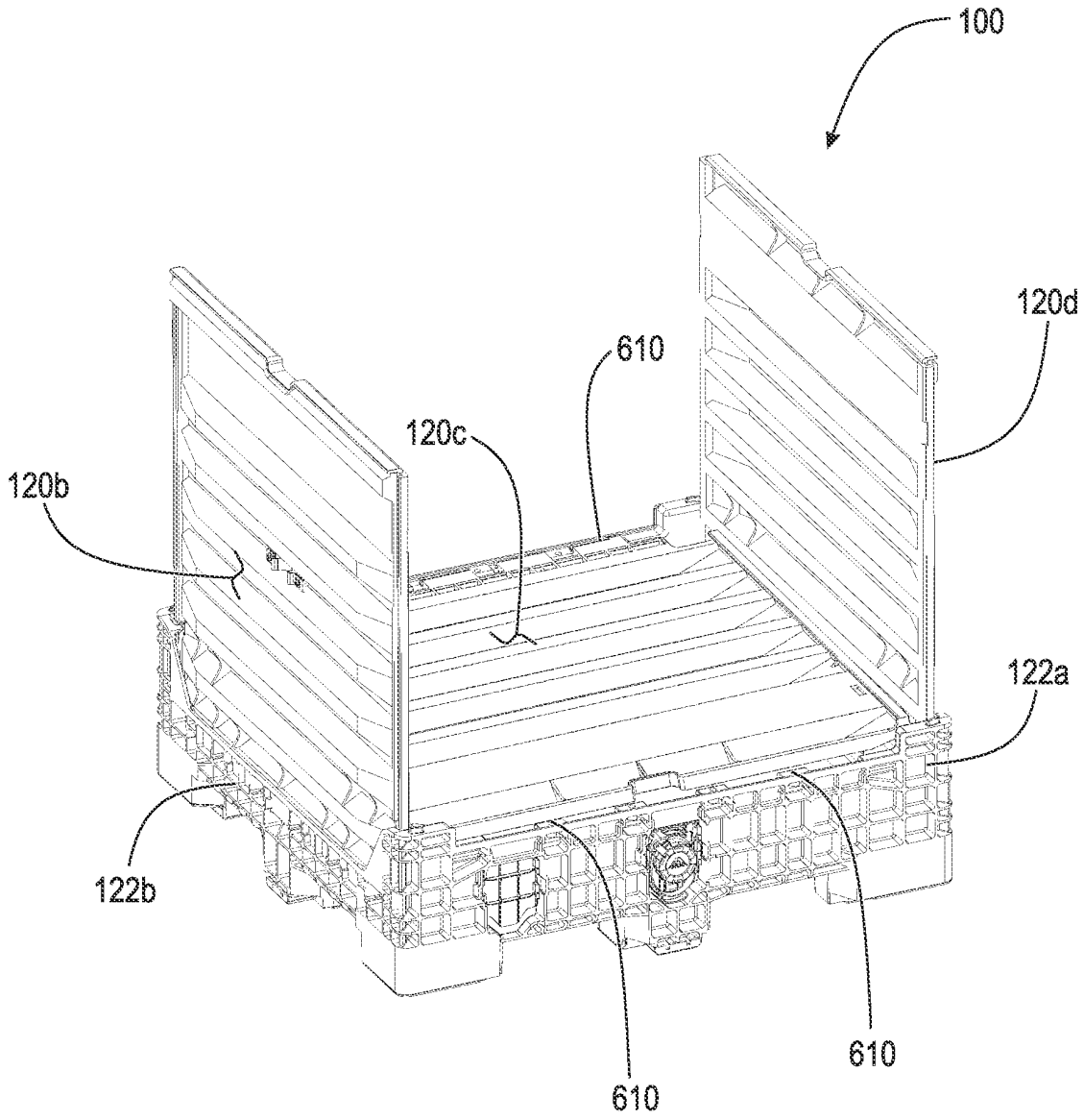

Fig. 6

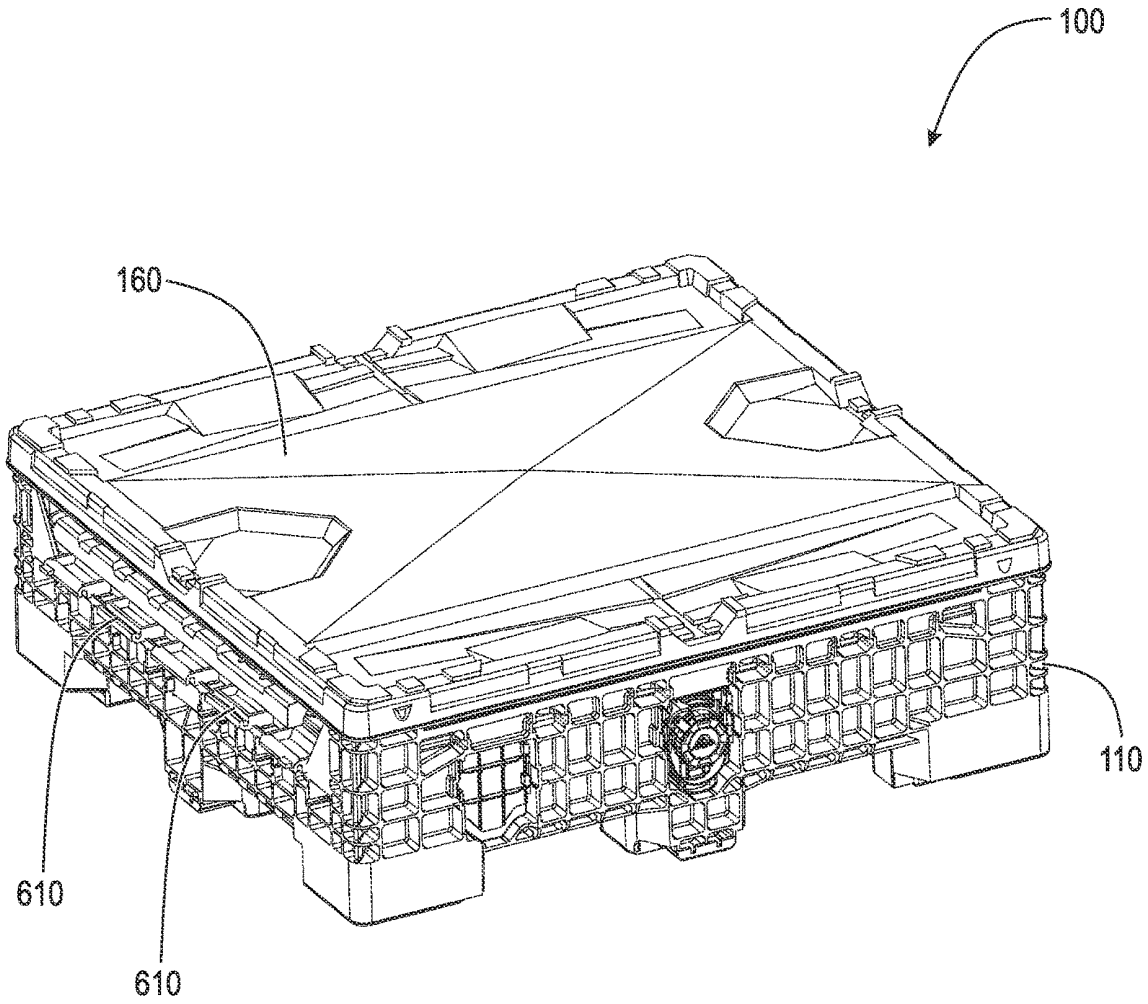

Fig. 7

INTERMEDIATE BULK CONTAINER SYSTEMS AND METHODS OF USING SAME

FIELD

Intermediate bulk container (IBC) systems and methods, and in particular IBC systems including an access door and methods of using same.

BACKGROUND

Shipping containers are available in a large variety of sizes ranging from small (i.e., hand-carriable) to large (e.g., intermodal shipping containers). Intermediate bulk containers (IBCs) are understood to be shipping containers of medium size, typically having a carrying capacity in the range of about 1,000 and 1,500 liters and transportable on a pallet using a forklift.

IBCs have been designed for transporting goods having an assortment of characteristics. For example, goods vary from relatively large and easily grasped, to amorphous (e.g., liquids or pastes).

In some instances, it is advantageous to provide access to goods within an IBC such that direct contact can be made goods within the container; however, dimensions of IBCs are typically such that reaching over the top of the container into the interior (also referred to herein as the interior space) of the container is not convenient or possible. For such instances, access doors (also referred to herein simply as doors) have been added to IBC designs. For example, U.S. Pat. No. 10,583,963 describes a door providing access to goods within a container.

In other instances, direct contact with the goods is not desirable or even practicable, for example when the goods are flowable material, such as liquids, pastes or flowable solids (e.g., grains). In such instances, intermediate bulk containers are commonly used in conjunction with a liner bag to form a container system capable of transporting and dispensing goods.

In addition to providing requisite containment of various types of goods, IBCs of differing wall constructions have been designed to address various logistical demands associated with shipping and manufacturing cost constraints. While some applications allow for IBC constructions providing robustness of construction (e.g., multiply walls), other applications demand a lightweight construction including a single-ply wall construction.

Given the different wall constructions, door designs to provide access to the interior of a container of a given wall construction may be unsuitable for use in some applications.

SUMMARY

Given the height of IBCs, installation of a liner bag into an IBC prior to filling of the bag with a flowable material has proven challenging and often requires the use of a specialized tool or improvisation to properly install and align the liner bag within the container. The inventor has determined that an improved door design for use in an IBC system is needed to facilitate installation and alignment of a liner bags in an IBC, in particular within IBCs of single-ply wall construction.

An aspect of the invention is directed to an intermediate bulk container system for shipping of goods. The system comprises a base and four walls extending from the base. The four walls together with the base define an interior space. A first drain is formed in the base or in a first of the walls proximate the base. The system also includes a liner bag having a second drain operatively couplable to the first drain, and a door coupled to one of the walls by a door hinge. The door is shaped to cover an opening in the one of the walls. The opening extends from a top of the one of the walls. The door hinge is coupled to the door at the bottom of the opening and configured to allow the door to rotate into the interior space. The door and the one of the walls is sized and shaped to prevent the door from rotating beyond the one of the walls.

In some embodiments, the lateral sides of the opening are sloped such that the opening is larger at the top of the opening than at the bottom of the opening.

In some embodiments, the walls of the container are of single-ply construction.

The walls may be coupled to the base by one or more wall hinges.

In some embodiments, the base comprises four partial walls to which the walls are coupled. In some embodiments, the first drain is located within a lower quarter of the vertical extent of the container as measured from a bottom surface of the interior space.

In some embodiments, at least one of the first drain and second drain comprises a valve to selectively control flow of the goods therethrough.

The first drain and the second drain may be coupled together. In some embodiments, the first drain and the second drain are connected together using at least one of a rotatable connection or a snap connection.

In some embodiments, the container comprises stops formed on lateral sides of the door to prevent the door from rotating beyond the one of the walls. For example, the stop comprises two portions extending along lateral sides of the opening. In some embodiments, the two portions are integrally formed with the one of the walls.

In some embodiments, the first of the walls and the one of the walls are a same wall.

Another aspect of the invention is directed to a method of using an intermediate bulk container comprising a base and four walls extending from the base, in which the four walls together with the base define an interior space, a first drain is formed in the base or in one of the walls proximate the base, a door is coupled to one of the walls by a hinge, the door is shaped to cover an opening in the one of the walls, the opening extends from a top of the one of the walls, the hinge is coupled to the door at the bottom of the opening, and hinge is configured to allow the door to rotate into the interior space, and the door and the one of the walls are sized and shaped to prevent the door from rotating beyond the one of the walls. The method comprises (i) rotating the door into the interior space to expose the opening, (ii) reaching through the opening to introduce a liner bag having a second drain into the interior space and to operatively couple the second drain at the first drain, and (3) rotating the door to cover the opening.

In some instances, the step of rotating the door to cover the opening comprises rotating the door until contact occurs between a stop formed on the door and the one of the walls, or between the door and a stop extending along sides of the opening.

In some instances, the walls of the container are of single-ply construction.

The first drain may be located within a lower quarter of the vertical extent of the container as measured from a bottom surface of the interior space.

In some instances, operatively coupling comprises connecting the first drain and the second drain together using at least one of a rotatable connection or a snap connection.

These and other aspects of the present invention will become apparent upon a review of the following detailed description and the claims appended thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an example of a container according to aspects of the present invention including an access door;

FIG. **2** is a perspective view of the container of FIG. **1**, with the cover removed;

FIG. **3** is a perspective view of the container of FIG. **1** with the cover removed and the access door in an open position;

FIG. **4**A is a perspective view of the container of FIG. **1**, showing the bottom of the interior of the container, and the access door in an open position;

FIG. **4**B is an expanded, partial, perspective view of the container of FIG. **1**, with the access door in an open position, and showing further details of features to prevent the door from rotating beyond a wall of the container;

FIG. **4**C is a perspective, partial view of the container of FIG. **1**, showing the access door in an open position and a user installing a liner bag within the container;

FIGS. **5**A and **5**B are partial views of the container of FIG. **1**, showing one example of an access door latching mechanism in greater detail;

FIG. **6** is a perspective view of the container of FIG. **1** in a partially-collapsed state; and

FIG. **7** is a perspective view of the container of FIG. **1** in a fully-collapsed state and with the cover disposed on top.

DETAILED DESCRIPTION

The invention will be further discussed with reference to the following specific examples. It is understood that these examples are given by way of illustration and are not meant to limit the claimed inventions beyond the text of the claims.

FIGS. **1-3** are perspective views of an example of an intermediate bulk container system comprising a container **100** and a liner bag **400** (shown in FIG. **4**C) according to aspects of the present invention. Container **100** includes an access door **125** to facilitate installation and alignment of liner bag **400** within container **100**.

Container **100** comprises a base **110** and four walls **120***a*-**120***d* extending from the base. Four walls **120***a*-**120***d* together with base **110** define an interior space I. Base **110** supports walls **120***a*-**120***d*. In the illustrated embodiment, walls **120***a*-**120***d* are coupled to the base via hinges (shown in FIG. **6** as representative hinges **610**) in a conventional manner; however, in other embodiments, the walls may be rigidly attached to the base or integrally formed with the base.

In the illustrated embodiment, the base includes partial walls **122***a*-**122***d* (i.e., a vertical portion extending up from bottom surface B (shown in FIG. **4**A) of the interior space I) to which walls **120***a*-**120***d* are attached; however, the partial walls may not be present in some embodiments such that the base substantially extends only in a horizontal direction. In the illustrated embodiment, the base is supported off the ground by feet **112**.

In the illustrated embodiment, the four walls couple together to maintain the walls upright. The coupling mechanism may include any suitable mechanism for providing suitable integrity of the resulting structure. In the illustrated embodiment, the coupling mechanisms are illustrated as wall latches **123**; however, any suitable coupling mechanism may be used. Although, in the illustrated embodiment, the walls are coupled together, in other embodiments the walls may be integrally formed with one another.

In the illustrated embodiment, a first drain FD**1** is formed in base **110**; however, in other embodiments, first drain FD**1** is formed in one of walls **120***a*-**120***d* proximate the base. First drain FD**1** is an opening through the container and is the structure through which contents of the liner bag exit the container. In the illustrated embodiment, drain FD**1** is formed in the center of a side of the container; however drain FD**1** may be located in a corner of a container. The drain is typically located proximate the bottom of the container to permit the contents of the container to be substantially completely emptied by gravity. For example, drain FD**1** may be located within a lower quarter of the vertical extent of the container as measured from bottom B or drain FD**1** may be located within a lower fifth of the vertical extent of the container as measured from bottom B or drain FD**1** may be located within a lower tenth of the vertical extent of the container as measured from bottom B. Drain FD**1** and door **125** may be formed in a same wall or different walls.

FIGS. **4**A and **4**B are perspective views of the container of FIG. **1**, showing the interior space I of container **100** and access door **125** in an open position. Door **125** is coupled to one of the walls **120***a* by one or more hinges **126** and rotatable into the interior space I. Wall **120***a* has an opening O through which interior space I is accessible to a user U outside of the container. Door **125** is shaped to cover opening O. Opening O extends from a top of wall **120***a* to allow user U to extend his/her body into the container (shown in FIG. **4**B). The one or more hinges are coupled to door **125** at the bottom of opening O and configured to allow the door to rotate into interior space I.

In the illustrated embodiment, lateral sides S_1 and S_2 of opening O are sloped such that the opening is larger at the top of the opening (i.e., at the top of wall **120***a*) than at the bottom of the opening. In some instances, such a configuration limits the impact on the shape of the opening during cooling of the plastic after molding of the walls, and allows the sides S_1 and S_2 of opening O to interface with and conform to lateral sides SD_1 and SD_2 of the door in a progressive manner as the door is closed, thereby facilitating closing of the door.

Door **125** and wall **120***a* are sized and shaped to prevent the door from rotating beyond wall **120***a* (i.e., a portion of the door interferes with a portion of wall **120***a*). In the embodiment shown in FIG. **4**A, stop **124** (comprised of portions **124***a* and **124***b*) is formed on sides of door **125** to prevent door **125** from rotating beyond wall **120***a*. When door **125** is in a closed position, portion **124***a* of stop **124** extends laterally outward relative to opening O from the location of the interface of side S_1 and SD_1, at a given height from surface B; and when door **125** is in a closed position, portion **124***b* of stop **124** extends laterally outward relative to opening O from the location of interface of side S_2 and SD_2, at a given height from surface B. In the illustrated embodiment, stop **124** is shown as two portions **124***a* and **124***b* integrally formed with the remainder of door **125** (one on each lateral side of door **125**) such that wall **120***a* is located in the path of door **125** as the door is rotated about hinge **126**.

Although, in the illustrated embodiment, stop **124** is shown as disposed on door **125**, it is to be understood that a stop may be alternatively formed on wall **120***a* at the

perimeter of the opening. A stop on a wall would extend laterally inward relative to opening O from the locations of interface of side S_1, S_2 and/or S, SD_2, at a given height from surface B. Such a configuration may interfere with a user reading into the container. Additionally, a stop on a wall may comprise one or more portions (possibly extending along the bottom of opening O). A stop may or may not be integrally formed with wall **120***a* or door **125**. Because the door and stop designs set forth above prevent rotation beyond the walls, the design is particularly effective at preventing inadvertent opening of the door during shipment, when the container is full. In some embodiments, a stop and door are provided with relief features to further secure door **125** against inadvertent opening. For example, in the illustrated embodiment, wall **120***a* has receptacles R_1-R_4 and door **125** has projections (also commonly referred to as bosses) P_1-P_4 that fit into the receptacles when the door is closed.

The wall, base and door designs set forth herein allow for use in a single-ply wall construction, and may be manufactured, for example using a compression molding technique, although other molding techniques may be used.

FIG. **4**C is a perspective, partial view of the container **100** of FIG. **1**, showing access door **125** in an open position and a user U installing liner bag **450** (having a second drain SDR) within container **100**. During the installation, the liner bag is introduced into the interior space. As illustrated, user U is able to extend his/her body into the container to install and align liner bag **450** within the container. Drains FD**1** and SDR may be simple openings or may include a valve (not shown) to selectively control the flow of contents therethrough.

As shown in FIG. **4**C, second drain SDR is sized and shaped to be operatively coupled at the first drain FD**1** such that contents of the liner bag flow through drains FD**1** and SDR and out of the container. For example, drains FD**1** and SDR may be simply positioned such that second drain SDR extends through first drain FD**1**. In some embodiments, drains FD**1** and SDR may be connected together. For example, drains FD**1** and SDR may be threaded so that they can be rotatably connected together, although other types of connections (e.g., a snap connection) can also be used.

FIGS. **5**A and **5**B are partial views of the container **100** of FIG. **1**, showing one example of an access door latching mechanism **127** (comprising portions **127***a* and **127***b*) in greater detail. Each portion **127***a* and **127***b* comprises a corresponding thumb press **129***a*, **129***b*. FIG. **5**B shows portion **127***a* of the latching mechanism in greater detail. Only portion **127***a* is shown and discussed in detail; however, portion **127***b* is a mirror image of portion **127***a*.

Portion **127***a* includes a latch **131***a* that is biased by a spring **133***a* to a locked position. Thumb presses **129***a* and **129***b* are nested within door **125**. Because stop **124** (shown in FIG. **4**A) only allows door **125** to rotate into internal space I, when latch **131***a* is disposed on the outer side of catch **121***a* formed in wall **120***a* (as shown in FIG. **5**B), door **125** is maintained in a closed position by catch **121***a* and stop **124**. An additional feature of latching mechanism **127***a* results from latch having a sloped outer surface **142***a* and catch **121***a* having a sloped inner surface **144***a*, which allows latching mechanism **127***a* to operate automatically (i.e., without actuation of latch **131***a* using thumb press **129***a*) as door **125** is moved to the closed position. It will be appreciated that such a configuration allows latching mechanism **127** to operate as what is commonly known as a slam latch.

Although one example of a latching mechanism is shown in FIGS. **5**A and **5**B which has certain advantages, the basic purpose of the latching mechanism is maintain the door in an upright and secure position (e.g., locked position), and to allow selective opening of the door. It will be understood that any mechanism fulfilling this basic purpose may be used with aspects of the present invention. For example, the mechanism may be a slide bolt, a turn latch, a door knob or a hook-and-loop connector.

FIG. **6** is a perspective view of container **100** of FIG. **1** in a partially-collapsed state. In some embodiments, it is desirable that walls **120***a*-**120***d* be able to attain collapsed positions by rotation about hinges (only representative hinges **610** are shown). In a collapsed position, a wall is substantially parallel to the bottom B (shown in FIG. **4**A) of container **100**. In FIGS. **6**, walls **120***a* and **120***c* have been collapsed, while walls **120***b* and **120***d* remain upright.

FIG. **7** is a perspective view of the container **100** of FIG. **1** in a fully-collapsed state. In FIG. **7**, all walls **120***a*-**120***d* are in a collapsed position, for example, to obtain a compacted configuration as may be used when the container is to be shipped when empty. In some embodiments, it is advantageous that the collapsed container be shipped with a cover **160** attached thereto. Cover **160** may be shaped to be snapped onto collapsed container (e.g., using molded features (not shown) of the cover and a wall) without the need of additional attachment components or the cover **160** may attached to the collapsed container walls using an attachment mechanism such as a band (not shown).

Although various embodiments have been depicted and described in detail herein, it will be apparent to those skilled in the relevant art that various modifications, additions, substitutions, and the like can be made without departing from the spirit of the invention and these are therefore considered to be within the scope of the invention as defined in the claims which follow.

What is claimed:

1. An intermediate bulk container system for shipping of goods, comprising:

a base and four walls extending from the base, the four walls together with the base defining an interior space;

a first drain formed in the base or in a first of the walls proximate the base;

a liner bag having a second drain operatively couplable to the first drain; and

a door coupled to one of the walls by a door hinge and shaped to cover an opening in the one of the walls, the opening extending from a top of the one of the walls, the door hinge coupled to the door at the bottom of the opening and configured to allow the door to rotate into the interior space, and the door and the one of the walls sized and shaped to prevent the door from rotating beyond the one of the walls.

2. The system of claim **1**, wherein lateral sides of the opening are sloped such that the opening is larger at the top of the opening than at the bottom of the opening.

3. The system of claim **1**, wherein the walls of the container are of single-ply construction.

4. The system of claim **1**, wherein each of the walls is coupled to the base by one or more wall hinges.

5. The system of claim **1**, wherein the base comprises four partial walls each of the four walls coupled to a corresponding one of the partial walls.

6. The system of claim **1**, wherein the first drain is located within a lower quarter of the vertical extent of the container system as measured from a bottom surface of the interior space.

7. The system of claim **1**, wherein at least one of the first drain and second drain comprises a valve to selectively control flow of the goods therethrough.

8. The system of claim 1, wherein the first drain and the second drain are coupled together.

9. The system of claim 8, wherein the first drain and the second drain are connected together using at least one of a rotatable connection or a snap connection.

10. The system of claim 1, wherein the container system comprises a stop comprised of portions, each portion formed on a corresponding lateral side of the door to prevent the door from rotating beyond the one of the walls.

11. The system of claim 1, wherein the container system comprises a stop, the stop comprised of portions, each portions extending along a corresponding lateral side of the opening.

12. The system of claim 11, wherein the portions are integrally formed with the one of the walls.

13. The system of claim 1, wherein the first drain is formed in the first of the walls, and

wherein the first of the walls and the one of the walls are a same wall.

14. A method of using an intermediate bulk container comprising a base and four walls extending from the base, the four walls together with the base defining an interior space, a first drain formed in the base or in a first of the walls proximate the base, and a door coupled to one of the walls by a hinge and shaped to cover an opening in the one of the walls, the opening extending from a top of the one of the walls, the hinge coupled to the door at the bottom of the opening configured to allow the door to rotate into the interior space and the door and the one of the walls sized and shaped to prevent the door from rotating beyond the one of the walls, the method comprising:

rotating the door into the interior space to expose the opening;

reaching through the opening to introduce a liner bag having a second drain into the interior space and to operatively couple the second drain at the first drain; and

rotating the door to cover the opening.

15. The method of claim 14, wherein the step of rotating the door to cover the opening comprises rotating the door until contact occurs between a stop formed on the door and the one of the walls, or between the door and a stop extending along sides of the opening.

16. The method of claim 14, wherein the walls of the container are of single-ply construction.

17. The method of claim 14, wherein the first drain is located within a lower quarter of the vertical extent of the container as measured from a bottom surface of the interior space.

18. The method of claim 14, wherein operatively coupling comprises connecting the first drain and the second drain together using at least one of a rotatable connection or a snap connection.

19. The method of claim 14, wherein the first drain is formed in the first of the walls, and

wherein the first of the walls and the one of the walls are a same wall.

20. An intermediate bulk container system for shipping of goods, comprising:

a base and four walls extending from the base, the four walls together with the base defining an interior space;

a first drain formed in the base or in a first of the walls proximate the base;

a liner bag having a second drain operatively couplable to the first drain; and

a door coupled to one of the walls by a door hinge and shaped to cover an opening in the one of the walls, the opening extending from a top of the one of the walls, the door hinge coupled to the door at the bottom of the opening and configured to allow the door to rotate into the interior space, and the door and the one of the walls sized and shaped to prevent the door from rotating beyond the one of the walls,

wherein the walls of the container system are of single-ply construction,

wherein the first drain is located within a lower quarter of the vertical extent of the container system as measured from a bottom surface of the interior space.

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