

## A CONTAINER FOR COLLECTING AND DISCHARGING MATERIALS

### Technical field of the invention

- 5 The present invention relates to a container for use on a construction site and more particularly, the present invention relates to a container which is able to collect and discharge materials or waste from the container.

### Background of the invention

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A construction site usually creates significant amounts of waste materials such as excavated dirt, sandstone, soils, rubbles, wood scraps, and lumber. These waste materials usually take up a lot of space in the constructions site and need to be removed and transferred from the construction site from time to time. The waste materials are often stored in a container for the convenience of removal once the waste materials are full. Depending on the disposal method intended and the nature of the construction site, the waste container used may be different.

- 20 Nevertheless, a truck is usually needed to carry the construction waste materials away from the construction sites. Problems may therefore arise when the construction site is not easily accessible by vehicles. An example of such constructions site is a deeply underground excavated site. In this situation, a new road is opened up especially for the passage of wastes transporting vehicles. This will inevitably add up to the workload of the construction and delay the progress of the construction.

One can also use a crane for lifting the waste container to the ground where the vehicles are readily accessible. However, the waste materials in the container need to be transferred to the vehicle. The conventional top opening container does not favor the transfer of waste materials to the vehicle. As such, the transfer of materials may involve scooping thereof from one container to another.

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This is a tedious step which also increases the workload for managing the construction site.

5 Having said that, a number of bottom opening containers for discharging materials have been disclosed. However, the disclosed inventions may not be suited or convenient for use in construction sites.

10 United States Patent No. 8353416 B2 discloses a flexible debris container having bottom flap members joined together by a release mechanism. The bottom flap members are released from each other to form an opening for discharging material in the container. The release mechanism is placed on the exterior surface of the bottom flap members and is comprised of a release hook, a frame, and a link. The release hook enables the disengagement of the link from the bottom flap members, thereby causing release of the bottom flap members from each other. The container, however, requires human manipulation to release the bottom flap panels. This is disadvantageous because it may be dangerous for a person standing adjacent to the container while the materials are being discharged.

20 International Publication No. Wo 2012/064650 A1 discloses a container assembly comprising a bottom wall section and a plurality of side wall sections, wherein the bottom wall section and the side walls sections form a walled enclosure for containing the material within the flexible container. The flexible container has a plurality of loops for lifting by machinery. The bottom of the container is wall sections which can be unfold and opened when the buckles connecting the straps are released. The container is detachably supported by a support frame. However, the container is only suitable for small scale operation as the bottom panels are only fastened by a strap and the loops are suited for use by a forklift only.

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International Publication No. WO 2011/161640 A1 describes a bottom discharge container suitable for being handled by a container handling arrangement. The bottom discharge container includes a pair of opposed end walls, a pair of

opposed side walls connected to the end walls and a partially displaceable floor which is displaceable between a raised, closed position, and a lower, open position in which at least part of the floor is displaced away from the bottom so as to define a discharge opening. The container also includes a floor  
5 displacement arrangement adapted to be automatically engageable by the door actuating mechanism of the container handling arrangement in order to open or close the displaceable floor. The drawback of this container is that it requires another specific handling machine to operate the opening and closing of the container and thus increases the costs involved.

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Accordingly, it can be seen that there is a need to provide a container for facilitating transfer of the container from the construction site and discharge of the waste materials from within the container without human intervention in externally engaging a release mechanism.

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### **Summary of the invention**

It is an objective of the present invention to provide a container for facilitating the transportation of materials from a location to another location.

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It is also an objective of the present invention to provide a container for collecting and discharging materials in a semi-autonomous manner.

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It is yet another objective of the present invention to provide a container which can be opened from the bottom to facilitate discharging of the materials from the container.

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It is further an objective of the present invention to provide a container having at least a panel which can be opened and closed in collaboration with the lifting of the container.

It is also an objective of the present invention to provide a container for discharging materials without requiring human intervention in manually opening or closing the container.

- 5 It is also an objective of the present invention to provide a container suitable to be used in a construction site for collecting and discharging of waste materials, wherein the container can be transported by a lifting device.

10 The present invention relates to a container comprising at least a wall defining a body, and at least a panel rotatably hinged to the wall. The container comprises a plurality of lifting chains attached to the wall of the container for connecting to a lifting device, and at least an engaging chain coupled to the panel for connecting to the lifting device together with the plurality of lifting chains, wherein the lifting of the container tightens the engaging chain so that the panel  
15 is in a closed state.

### **Brief description of the drawings**

Figure 1 illustrates a side view of a container according to the present invention  
20 in which the bottom panels are closed.

Figure 2 illustrates a side view of a container according to the present invention in which the bottom panels are opened.

25 Figure 3 illustrates a perspective view of a container according to the present invention.

Figure 4 illustrates a plan view of a container according to the present invention.

30 Figure 5 illustrates a front view of a container according to the present invention.

### **Detailed Description of the Invention**

The present invention will now be described in more detail with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

The present invention generally relates to a container for collecting and discharging materials, wherein the container is adapted to be transported by a lifting device. The container has a panel which can be opened for releasing the materials contained within the container. The panel is kept in a closed state when the container is being lifted, while the opening of the panel is caused by gravity of the panel in the absence of the lifting force. The container therefore can be used for collecting and discharging materials of a wide variety in different field of industries. The size and shape of the container can also be modified depending on the types and amount of materials to be transported and the place in which the container is to be used. Although the paragraphs below describes the present invention according to an embodiment suitable for use in construction sites, it should be understood that the present invention, without departing from the scope of the appended claims, is not in any way limited for use in construction sites only.

With reference to Figures 1 and 2, the container (10) according to an embodiment of the present invention comprises a wall (20) defining a body and at least a panel (30) rotatably hinged to the wall (20). A plurality of lifting chains (40) is attached to the wall (20) of the container (10) for connecting to a lifting device (not shown). At least an engaging chain (41, 42) is coupled to the panel (30) for connecting to the lifting device together with the plurality of lifting chains (40).

In a preferred embodiment, the panel (30) is rotatably hinged to the bottom of the container. More preferably, the container (10) comprises two bottom panels

(30) hingedly attached to the lower edge of the opposite sides of the wall (20) of the container (10). This enables the bottom panels (30) to be tilted in pivotal of lower edge of the wall (20) to form opened and closed state.

5 The operation of opening and closing of the panels (30) is controlled by the lifting of the container (10). As the bottom panels (30) are connected to the engaging chain (41, 42), the lifting of the container (10) tightens the engaging chain (41, 42), which in turn, urges the bottom panels (30) to a closed state.

10 The engaging chain (41, 42), in a preferred embodiment, comprises a primary chain (41) and a plurality of auxiliary chains (42). The primary chain (41) at one end connects to the lifting device, and at another end, connects to a plurality of auxiliary chains (42) to branch out the engaging chain (41, 42) for connecting to more than one panel (30). The primary chain (41) is preferably retained at a  
15 middle position by extending through a retaining means (45) affixed at the wall (20). Each of the plurality of auxiliary chains (42) is connected to the respective bottom panel (30) via the connecting means (31). The primary chain (41) is connected to the plurality of auxiliary chains (42) via a ring (44) so that the auxiliary chains (42) can be pulled apart when the panels (30) are opened.

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In a preferred embodiment, the bottom panel (30) comprises at least a connecting means (31) adjacent to the edge of the panel (30) for connecting the engaging chain (41, 42) to the panel (30). In a preferred embodiment, the connecting means (31) is disposed adjacent the opening edge opposite of the  
25 attached edge. The connecting means (31) is preferably protruded from the bottom panel (30) such that friction of the plurality of chains (41, 42) with the wall (20) is minimized.

The connecting means (31) is preferably rotatable for facilitating the movement  
30 of the chains (41, 42) in relation to the panel (30) when lifting and lowering of the container (10). In a more preferred embodiment, the connecting means (31) comprises a flange rotatable over a rod affixed to the bottom panel (30), wherein the auxiliary chain (42) is linked to the flange which is rotatable. As such, the

entangling of the auxiliary chain (42) around the connecting means (31) is avoided while the panels (30) are opened and closed.

With reference to Figures 3, 4, and 5, the container (10) according to the present invention preferably comprises the walls (20) formed in a substantially rectangular shape. The walls (20) preferably comprise two opposite long walls and two opposite side walls. The walls (20) are preferably made of tough and durable metals such that it can sustain the heavy load of the waste materials. The container (10) preferably has an opened or non-covered top section to allow placing of the materials into the container (10) from top.

In the embodiment whereby the walls (20) are formed in a rectangular shape, each of the panels (30) are preferably attached to the lower edge of the opposite long walls for the ease of opening and closing of the panels (30). The bottom panels (30) may be attached to the walls (20) via any hinge such that the bottom panels (30) can be tilted in pivotal to the walls (20).

According to a preferred embodiment of the invention, the lower edge of the side walls is downwardly inclined towards the middle such that it forms a V-shaped profile. In a more preferred embodiment, the inclination is approximately 45° from the horizontal plane. The side wall is adapted in this shape to enable the panels (30) to be closed in an oblique angle, and more preferably an acute angle from a horizontal plane. This feature of the invention allows easier opening and closing of the panels (30) such that the panels (30) are only required to be tilted at, for example, 45° to open and close the bottom panels. Thus, the engaging chain (41, 42) can be adapted to a more reasonable length in proportion to the plurality of lifting chains (40) connecting the container (10).

In a preferred embodiment, at least one of the plurality of lifting chains (40) is attached at each corner of the wall (20). Furthermore, the plurality of lifting chains (40), together with the engaging chain (41, 42) is preferably adapted to connect to the lifting device via a beam (43).

The plurality of lifting chains (40) and the engaging chain (41, 42) is preferably divided into two groups, one group being connected to the left end while the other group being connected to the right end of the beam (43), as shown in Figure 5. It will be appreciated that the length of the beam (43) is preferably substantially equal with that of the container (10). The beam (43) is adapted to be hooked by the lifting device at the middle of the beam (43).

The container (10) further comprises a docking handle (50) at the wall (20) for abutting on a supporting structure when discharging the material from the container (10). In a preferred embodiment, two docking handles (50) are disposed at each side wall of the container (10). The docking handles (50) are required as the container (10) cannot be supported from the bottom when the material in the container (10) is required to be discharged. The supporting structure is preferably an elevated elongated platform attached at the two sides of the disposal bin into which the waste materials are poured. The disposal bin may be accommodated on a vehicle for transporting away the materials.

In a further embodiment, the container (10) according to the present invention also comprises four legs (60) at each corner of the container (10). The legs (60) are required for supporting the container (10) and maintaining the container (10) in an upright position when placed on the ground because the bottom of the container (10) is not flat and horizontal.

The method of using the container (10) according to the present invention will now be described. The waste materials are dropped into the container (10) from the top of the container (10). The panels (30) in this state are closed as they are in contact with the floor. When disposal of the waste materials is required, the container (10) is lifted by a crane via the plurality of lifting chains (40), causing the tightening of the engaging chains (41, 42) connecting the panels (30) and keeping the panels (30) closed, as shown in Figure 1. The container (10) is then transferred to above a disposal bin where the waste materials will be placed. The container (10) is then lowered and positioned to abut the docking handles (50) onto the supporting structure. When the container (10) is supported by the

supporting structure on top of the disposal bin, further lowering of the crane will release and loosen the engaging chain (41, 42) thereby causing the panels (30) to open as a result of the gravity of the waste materials. The disposal bin is then moved away by a vehicle.

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Although the present invention has been described in a specific embodiment as in the above description, it is understood that the above description does not limit the invention to the above given details. It will be apparent to those skilled in the art that various changes and modification may be made therein without  
10 departing from the principle of the invention or from the scope of the appended claims.

**Claims**

1. A container (10) comprising at least a wall (20) defining a body, and at least a panel (30) rotatably hinged to the wall (20), characterized in that  
5 the container (10) further comprising:  
a plurality of lifting chains (40) attached to the wall (20) for connecting to a lifting device; and  
at least an engaging chain (41, 42) coupled to the panel (30) for connecting to the lifting device together with the plurality of lifting chains  
10 (40), wherein the lifting of the container (10) tightens the engaging chain (41, 42) so that the panel (30) is in a closed state.
2. A container (10) according to claim 1, wherein the panel (30) is rotatably hinged to the bottom of the container (10).
- 15 3. A container (10) according to claim 1, wherein the container (10) comprises two panels (30) rotatably hinged to the lower edge of the opposite sides of the wall of the container (10).
- 20 4. A container (10) according to claim 3, wherein the engaging chain (41, 42) comprises a primary chain (41) for connecting to the lifting device and a plurality of auxiliary chains (42) for connecting to the two panels (30).
5. A container (10) according to claim 4, wherein the primary chain (41) is  
25 preferably retained at a middle position by extending through a retaining element (45) affixed to the wall (20).
6. A container (10) according to claim 4, wherein the primary chain (41) is connected to the plurality of auxiliary chains (42) via a ring (44).
- 30 7. A container (10) according to claim 1, wherein the panel (30) comprises at least a connecting means (31) adjacent to the edge of the panel (30) for connecting the engaging chain (41, 42) to the panel (30).

8. A container (10) according to claim 7, wherein the connecting means (31) is rotatable for facilitating the movement of the engaging chain (41, 42) in relation to the panel (30).
- 5 9. A container (10) according to claim 1, wherein the wall (20) is formed in a substantially rectangular shape and comprises two opposite long walls and two opposite side walls.
- 10 10. A container (10) according to claims 3 and 9, wherein the panels (30) are attached to the lower edge of the two opposite long walls.
11. A container (10) according to claims 3 and 9, wherein the side walls (20) are adapted such that the panels (30) are closed in an oblique angle relative to a horizontal plane.
- 15 12. A container (10) according to claim 9, wherein at least one of the plurality of lifting chains (40) is attached at each corner of the wall (20).
- 20 13. A container (10) according to claim 1, wherein the plurality of lifting chains (40) and the engaging chain (41, 42) is adapted to connect to the lifting device via a beam (43).
- 25 14. A container (10) according to claim 13, wherein the plurality of lifting chains (40) and the engaging chain (41, 42) are connected on both ends of the beam (43), and the beam (43) is adapted to be hooked by the lifting device.
- 30 15. A container (10) according to claim 1, wherein the container (10) further comprises at least a docking handle (50) at the wall (20) for abutting on a supporting structure when discharging the material from the container (10).

16. A container (10) according to claim 1, wherein the container (10) further comprises a plurality of legs (60) for supporting the container (10) when placed on a surface.