Dec. 1, 1959 G. R. DEMPSTER ET AL 2,915,331

CONTAINERS

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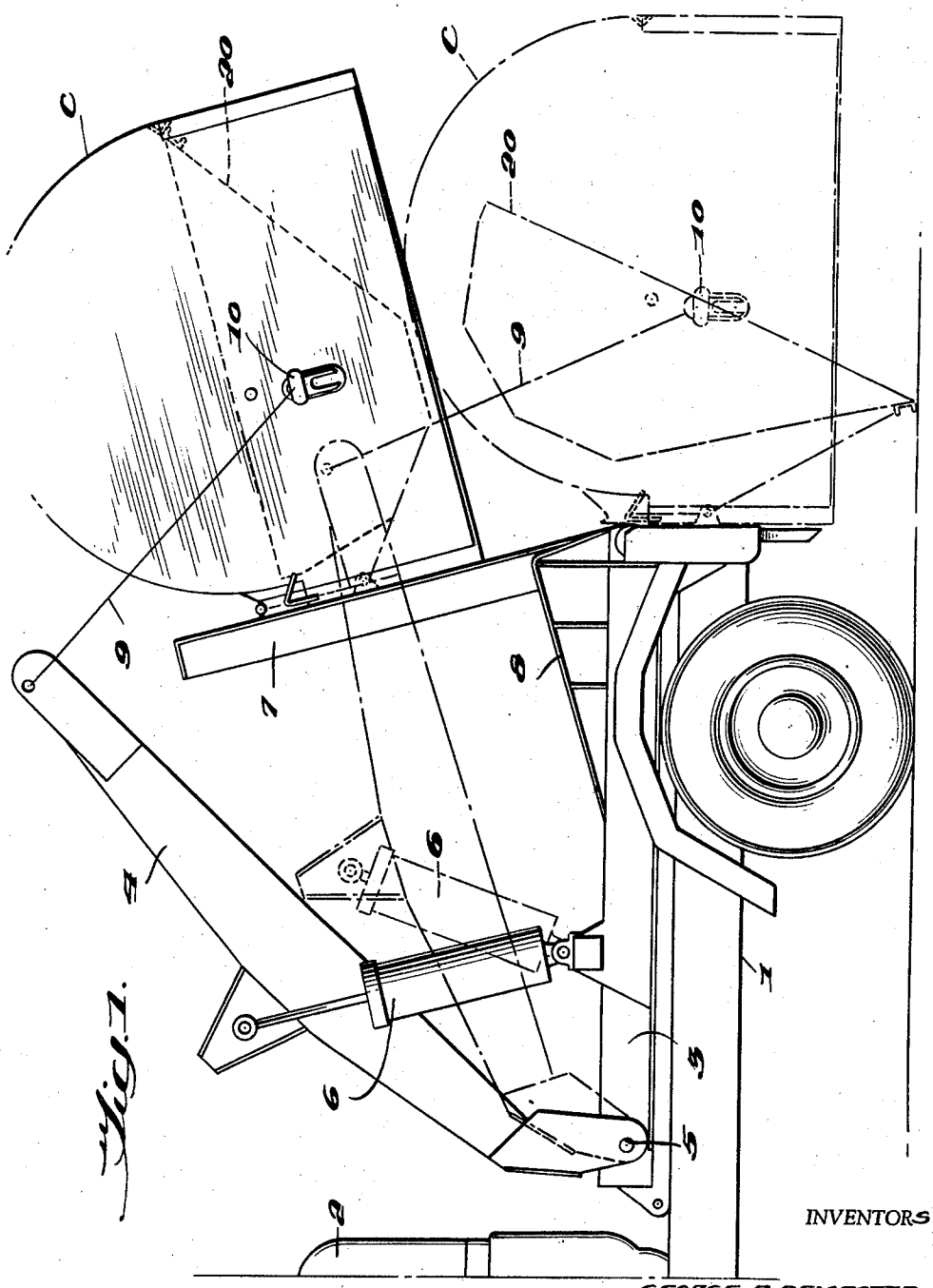


Fig. 1.

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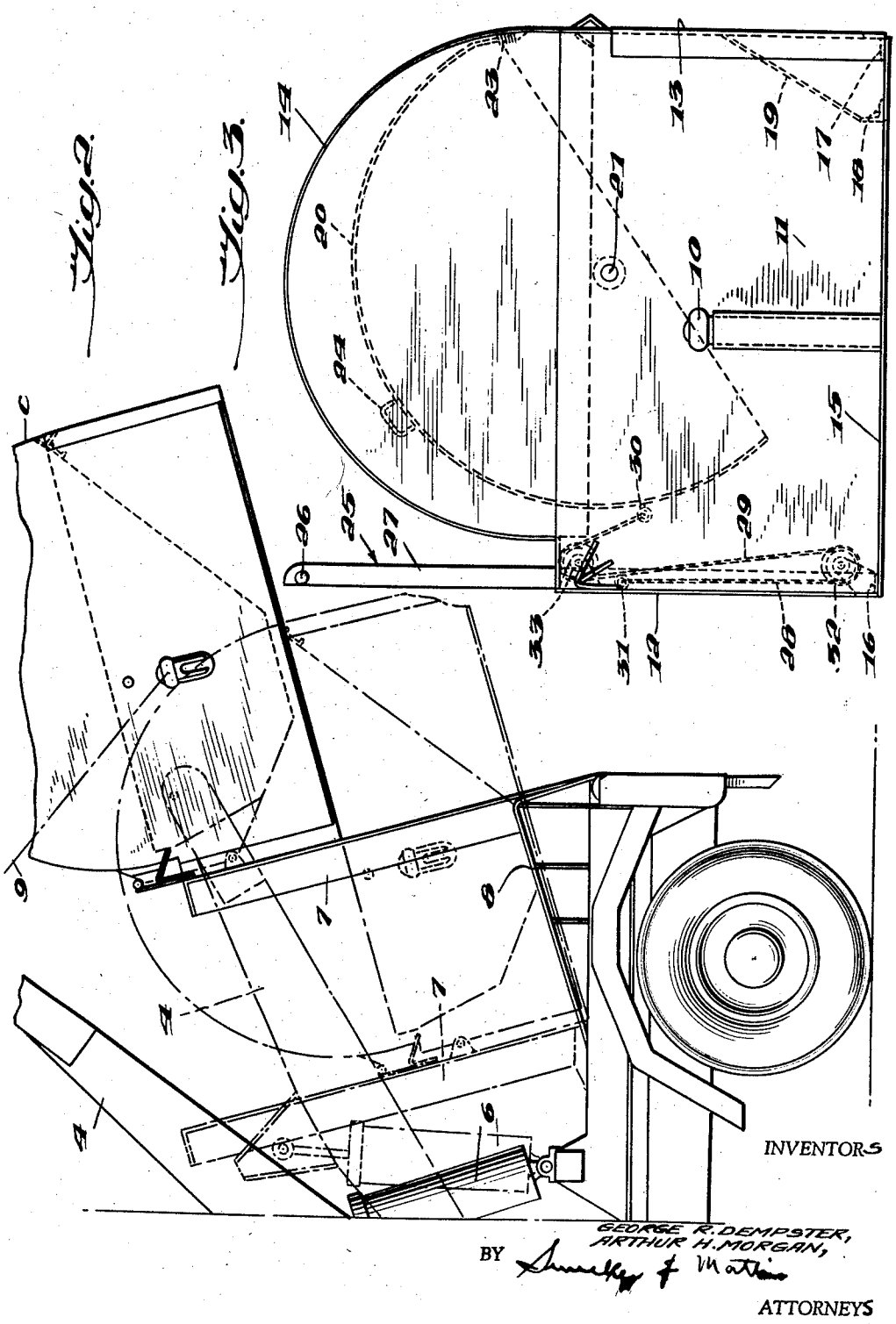
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Fig. 2.

Fig. 3.



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Fig. 5.

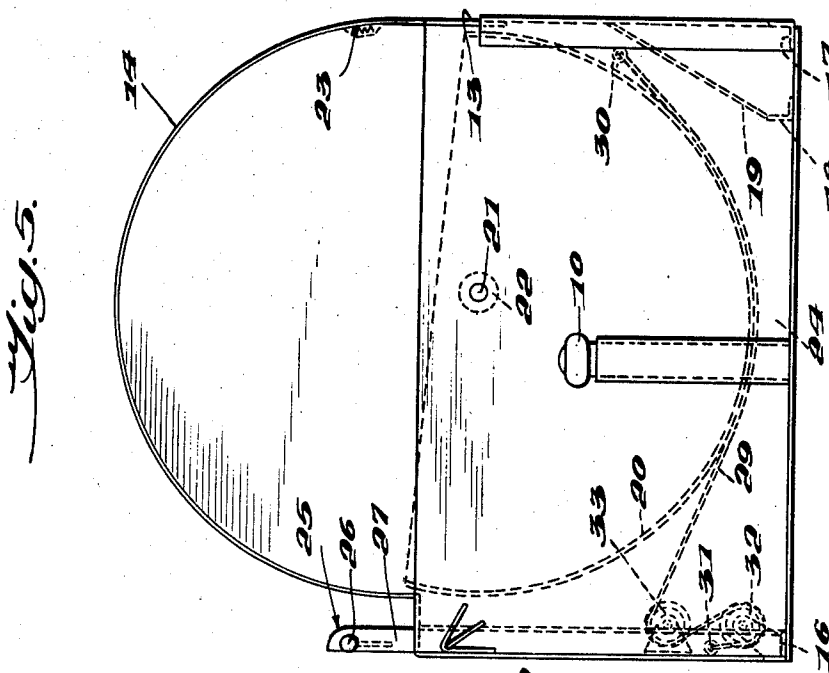
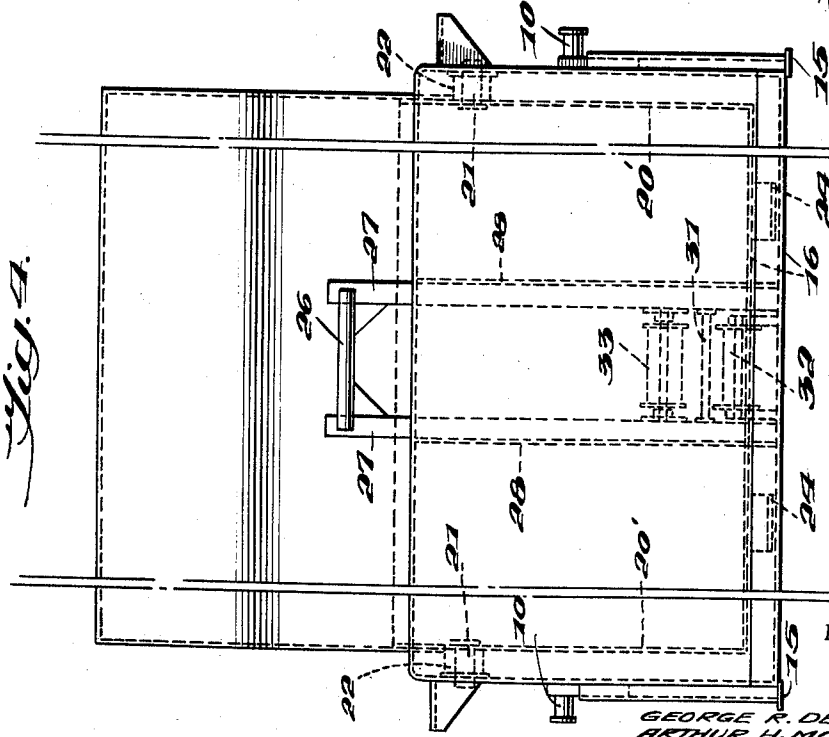


Fig. 4.



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Fig. 7.

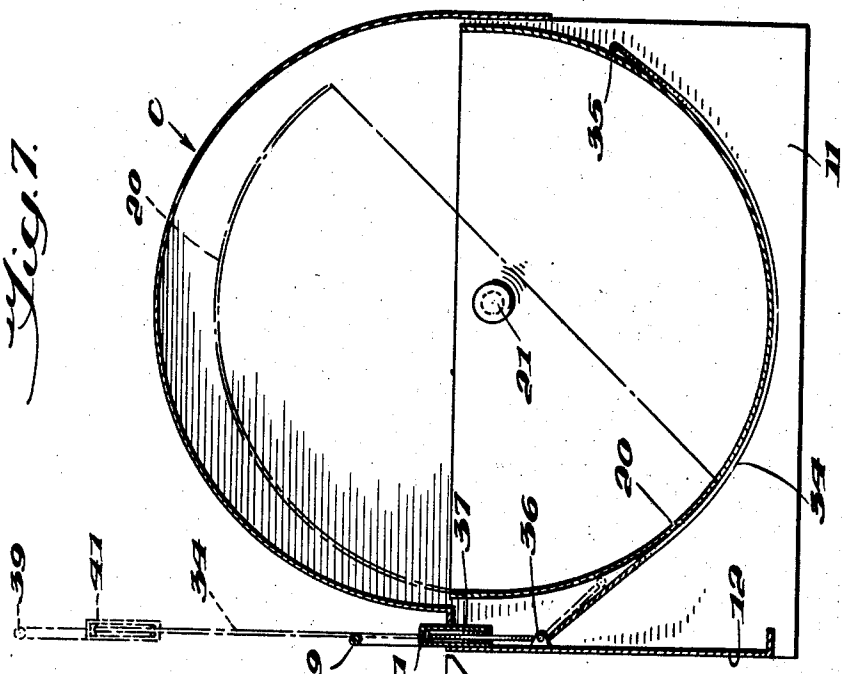
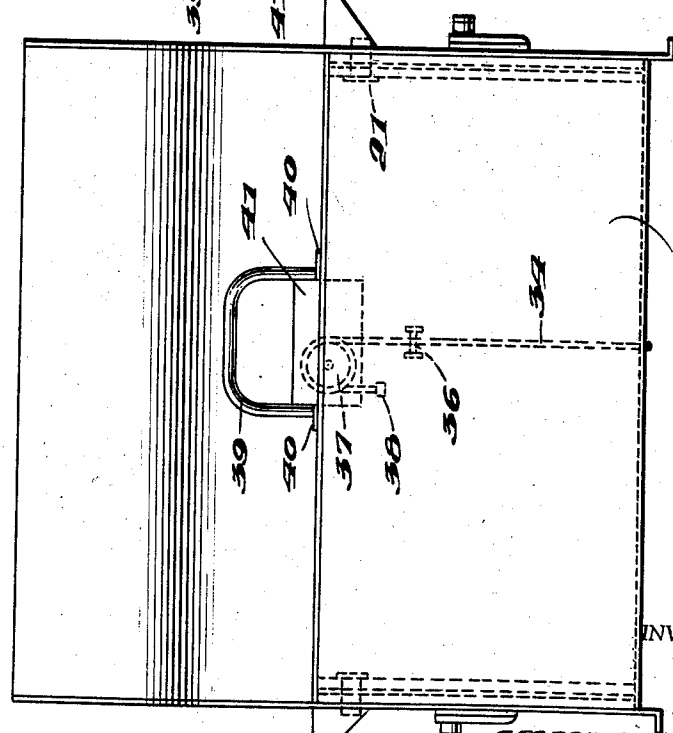


Fig. 6.



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CONTAINERS

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Fig. 9.

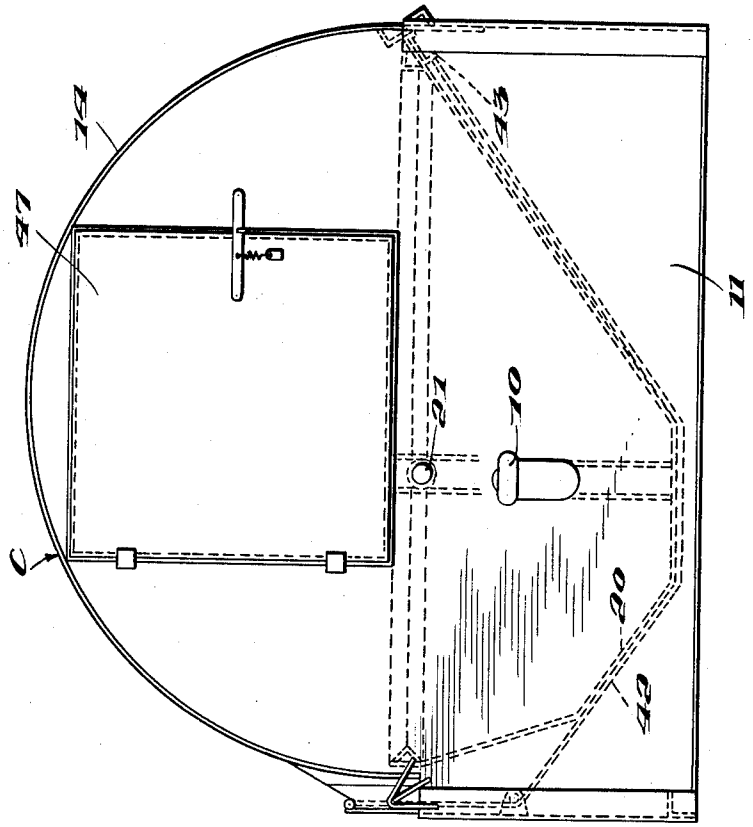
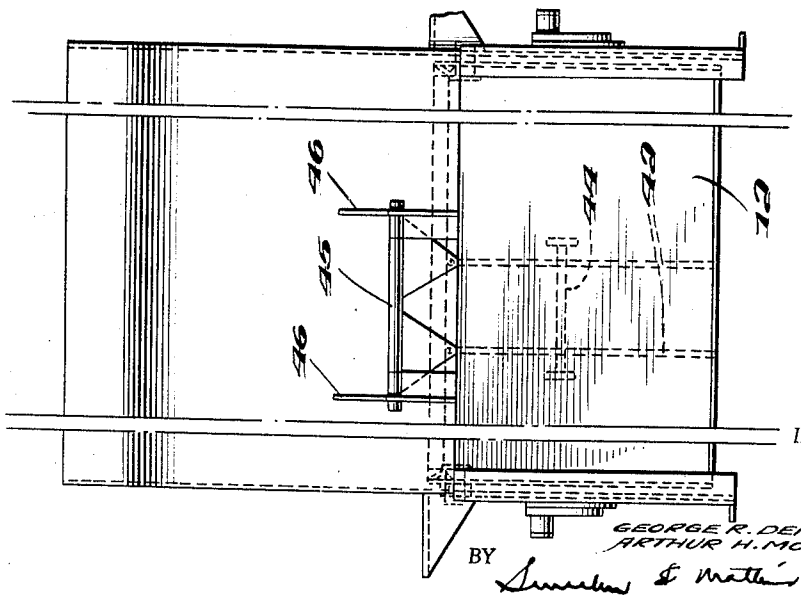


Fig. 6.



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United States Patent Office 2,915,331 Patented Dec. 1, 1959

2,915,331

CONTAINERS

George R. Dempster and Arthur H. Morgan, Knoxville, Tenn.

Application November 15, 1956, Serial No. 622,323

7 Claims. (Cl. 294—69)

This invention relates to improvements in containers of the type used with transporting and dumping equipment for receiving, containing and hauling refuse of different types. An example of such transporting equipment is illustrated in the patent of George R. Dempster, No. 2,281,183, granted April 28, 1942.

It has been the practice heretofore to use, with such transporting equipment, containers of the drop bottom type, having a lower section hinged with respect to the body of the container and capable of opening movement in a downward direction with respect thereto. Such a container has a crack between the drop bottom and the body of the container that allows for leakage of fluids from within the refuse enclosed in the container, which is objectionable for many reasons.

Efforts have been made to increase the liquid holding properties of the container by providing a sump in the bottom thereof, but such a sump is necessarily of limited capacity, and when the container is tilted forward on the hoisting unit for transportation, an objectionable leakage often results therefrom. Efforts have been made to correct this also, but these have required modification of the structure of the container, added expense and often results in an unsatisfactory structure.

One object of this invention is to overcome the objections mentioned above and to improve the construction of containers for this purpose.

Another object of the invention is to provide a bottom dumping container which will enclose and trap effectively a large quantity of liquid in refuse enclosed within the container and will allow complete and effective dumping of the refuse when desired.

Still another object of the invention is to provide in a drop bottom container for a rotary motion of the bottom section thereof, so as to permit of complete and effective discharge of the contents while holding the container in an elevated position, the discharge opening being substantially throughout the entire area of the bottom of the container.

These objects may be accomplished, according to certain embodiments of the invention, by constructing a body portion adapted to receive and contain materials, with means thereon for suspending the body portion on a hoisting unit on which it may be lifted, transported and dumped. A rotary bottom section is mounted on the body of the container, capable of rotary movement to discharge the contents through the open bottom with a complete and effective opening extending substantially throughout the area of the entire container.

This rotary bottom section has means connected therewith for attachment of a dumping member on the hoisting unit, whereby the rotary bottom is dumped automatically as the container is lowered. A bail assembly preferably serves this purpose, being connected with the rotary bottom through a suitable cable or other flexible device, so as to open the bottom automatically by actuation of the hoisting means.

The rotary bottom preferably is mounted off center.

Then, when it is opened by power as described, it will return to its closed position automatically by gravity acting thereon. Means may be provided, if desired, to facilitate the closing movement of the rotary bottom.

These embodiments are illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of a hoisting unit, showing an improved type of container applied thereto, with the container being illustrated in raised and dumping positions thereon;

Fig. 2 is a similar view, showing the container in raised and carrying positions;

Fig. 3 is an end elevation of one form of container, detached, with the parts in dumping position;

Fig. 4 is a side elevation of the container shown in Fig. 3;

Fig. 5 is a view similar to Fig. 3, with the rotary bottom closed;

Fig. 6 is a side elevation showing a modified form of container;

Fig. 7 is a cross section therethrough;

Fig. 8 is a side elevation, showing another modified form of container; and

Fig. 9 is an end elevation thereof.

The invention is shown applied to a hoisting unit of the character illustrated generally in the aforesaid patent of George R. Dempster, No. 2,281,183. As described in said patent, the hoisting unit normally is mounted on a truck chassis, generally indicated by the numeral 1 and provided with the usual cab 2 for enclosing the operator's compartment. A subframe 3 of the hoisting unit has a power device mounted thereon for raising and lowering movement, being preferably in the form of a boom 4. The boom 4 is hinged at 5 at the forward end thereof to the subframe 3 of the hoisting device, being capable of raising and lowering movements by hydraulic power devices 6.

A carriage is indicated generally at 7, being mounted on the subframe 3 for movement forward and backward relative to the chassis frame 1, and having a rearward skid surface adapted to receive a container C thereagainst for raising and lowering movements of the container with respect to the carriage 7. Power means is provided in the hoisting unit for moving the carriage 7 forward and backward with respect thereto, as described more in detail in the aforesaid Patent No. 2,821,183. Bucket rests 8 on the subframe 3 are adapted to support the container C in its carrying position, as illustrated in dotted lines in Fig. 2.

The container C is shown in Figs. 1 and 2 in full lines, in raised positions where the container is supported by the hoisting means 4, a pivoted boom in this embodiment of the invention. Flexible devices 9 are connected with the arms of the boom 4, usually in the form of chains, cables or the like, and extend downwardly therefrom to lifting pins 10 on the respective opposite ends of the body of the container C.

Upon operation of the boom 4 by the hydraulic power devices 6, the container is lifted from the ground to the full-line position shown in Figs. 1 and 2, and then, upon inward movement of the carriage 7, may be set down on the bucket rests 8, as shown in dotted lines in Fig. 2. After transportation to the desired point of use, the container may be moved backward, and upon lowering of the body portion, the container is dumped, as is indicated in dotted lines in Fig. 1.

One embodiment of the container is illustrated in detail in Figs. 3 to 5 of the drawings. This container comprises a body portion with a rotary bottom which normally closes the body portion, but may be rotated with respect thereto for discharging the contents.

The body portion of the container is provided with

opposite end walls **11** on which the lifting pins **10** are mounted for supporting the container, as described above. Front and back walls are shown at **12** and **13**, respectively. These parts **11—13** enclose a substantially rectangular structure which is open at the bottom substantially throughout the area of the container. This body portion may also be open at the top, if desired, although a top enclosure is frequently provided, as indicated generally at **14**. The top enclosure may have suitable access openings thereto, either at the end or in the top, with closure doors therefor, some of which are illustrated in Fig. 9.

The opposite end walls **11** are provided with outturned flanges **15** formed thereon or secured thereto as supporting feet for the body portion of the container, as well as for bracing and reinforcing said end walls at the bottom thereof. Reinforcing angles extending lengthwise of the container are shown at **16** and **17** at the lower edges of the front and rear walls **12** and **13**. An angle bar **18** also extends lengthwise of the container between the opposite end walls **11** thereof, spaced somewhat from the adjacent end wall **13**, as illustrated in Figs. 3 and 5, and has a baffle plate **19** extending upwardly and rearwardly from said angle bar **18** to the rear wall **13**, as shown therein, throughout the length of said rear wall.

The rotary bottom is illustrated at **20** and is shown as semi-circular in cross section, with a diameter extending throughout the major portion of the width of the body portion and substantially throughout the length thereof. The rotary bottom **20** is pivotally mounted or journaled for rotary movement on fulcrum pins **21** journaled in bearings **22** at opposite ends of the container, which bearings are mounted on the end walls **11**. It will be noted, by reference to Figs. 3 and 5, that the axis of the journal pins **21** is eccentric of the arc of curvature of the rotary bottom **20**, toward one lateral side of the bottom. Thus, the rotary bottom may rotate on the axis of the fulcrum pins **21** to the respective positions shown in Figs. 3 and 5. By reason of the eccentric disposition of the pins, the rotary bottom will be returned to the position shown in Fig. 5 by gravity acting thereon, after being moved to the position shown in Fig. 3.

This return movement is facilitated by coiled springs **23** that are mounted within the body portion of the container in positions adjacent opposite ends thereof to engage the upper edge of the rotary bottom **20** when the latter is turned to its extreme position. Then, upon release of the rotary bottom **20**, the springs **23** will start the bottom on its downward swinging movement.

Counterweights may be provided, if desired, on the rotary bottom **20**, as indicated at **24**. These counterweights may be in the form of blocks secured directly to the periphery of the rotary bottom **20** intermediate the length thereof, as indicated in Fig. 4. These counterweights will also aid in returning the bottom to its normal closed position, as illustrated in Fig. 5.

The opening movement of the bottom for discharging the contents of the container may be effected by suitable means attached to the bottom. In this embodiment, the means comprises a bail assembly, generally indicated at **25**, which is movably mounted with respect to the body portion of the container and may be operated by an automatic hook usually provided on the hoisting unit **3—7**.

The bail assembly **25** is shown as provided by a bail rod **26** extending transversely between a pair of upright bars **27** that are mounted for vertical sliding movement through guides **28**. The guides **28** may be in the form of channels secured within the body portion of the container adjacent the front wall **12** thereof. These bars **27** can be moved vertically between the positions shown in Figs. 3 and 5.

One or more cables are shown at **29** connected at one end to an anchor **30** on the rotary bottom **20**, preferably at the opposite side of the container from the bail assembly **25**. One cable **29** is usually sufficient, although more may be provided, if desired. The cable **29** extends from the anchor **30** beneath the lower surface of the rotary bottom **20** to a cable anchor **31** on the bail assembly **25**. This cable anchor **31** is in the form of a rod extending transversely beneath the lower end portions of the bars **27**, as shown in Fig. 4, being fixed rigidly thereto.

Provisions may be made for increasing the extent of travel of the rotary bottom **20** for movement of the bail assembly **25**. This may be accomplished by a 2-to-1 or 3-to-1 travel of the cable **29** with respect to the movement of the bail assembly **25**. In the embodiment illustrated, such increased travel is provided by threading the cable **29** over fixed and traveling spools **32** and **33**, respectively. The fixed spool **32** is mounted on the reinforcing bar **16** by suitable brackets. In like manner, the traveling spool **33** is mounted on the bars **27**.

The container is normally supported on the ground, floor or other surface by the flanged portions **15** on the end walls **11**, alone or with the reinforcing bars **16—18** that extend lengthwise between the end walls. This container is capable of being handled by any standard type of hoisting unit, either that shown in Figs. 1 and 2 or of other suitable or desired form. In the form illustrated, the container is carried on the bucket rests **8** on the hoisting unit, being supported thereon by the angle bar **16** and the counterweights **24** on the rotary bottom. With other types of hoisting units, the container will be supported thereon, either by the portions mentioned or by the angle bars **17** and **18**.

The container is picked up by the hoisting unit by attachment of the lifting chains **9** to the pins **10** on the end walls of the container and is raised along the carriage **7** to a desired elevated position for transportation to the desired point of dumping. As set forth in the aforesaid Patent No. 2,281,183, the hoisting unit is provided usually with a dumping hook pivotally mounted thereon for engagement with the bail assembly **25** when the container is raised to its elevated position. As the container is elevated on the carriage **7**, the bail assembly **25** is engaged with the dumping hook on the hoisting unit, after which the elevating boom **4** is lowered to lower the entire body portion of the container. The bail assembly **25**, being retained by the dumping hook on the hoisting unit, will be withdrawn from the body to the extreme position shown in Fig. 3 and yet will remain attached by the bail bars **27** within the guide channels **28**. This withdrawing of the bail assembly **25** upward from the body of the container will cause the rotary bottom **20** to turn on the axis of the fulcrum pins **21** and thereby spill or dump the entire contents of the body out through the open bottom of the container.

The rotating movement of the rotary bottom **20** by an upward pull relatively on the bail assembly **25** is accomplished by the cable **29** attached to the lower ends of the bars **27** and passing over fixed and movable spools **32** and **33**. No slack is left in the cable, but the latter should be of sufficient length normally to close the entire area of the body portion of the container. The arrangement of the spools **32** and **33** is such as to provide for a 3-to-1 travel of the rotary bottom **20** with respect to the linear movement of the bail bars **27**.

The closing or reverse rotation of the rotary bottom is accomplished by gravity. The location of the fulcrum slightly rearward of the center line of the rotary bottom **20** causes the latter to rotate eccentrically and always have the heaviest side of the bottom forward of the fulcrum. The counterweights **24** also increase the weight on the forward side. When the tension is released on the cable **29** by the bodily raising of the container relative to the carriage **7**, the weight on the rotary bottom causes it to swing in a counterclockwise direction, as viewed in Figs. 3 and 5, to a closed position. The set of compression springs **23** mounted in each corner of the rear side of the container assures start of the reverse rotation instantaneously with the release of tension on the cable **29**. The springs **23** are mounted in positions to

be compressed by the uppermost lip of the bottom when opened by tension on the cable. Release of this tension will cause each spring to expand and thus assist the overbalancing weight of the container to close. Such springs are not essential under normal operation, but may be used if desired.

The rotary bottom **20** is closed at its opposite ends, as indicated at **20'** in Fig. 4. Therefore, it forms a sump of a liquid capacity substantially equal to the volume of the rotary bottom. When turned to its dumping position, the rotary bottom will discharge effectively all the contents of the container, including the liquid contained within the sump. Where the top portion **14** of the container is substantially concentric with the rotary bottom in its elevated position, the latter may serve also to effect a discharge of the contents.

Another embodiment of the invention is illustrated in Figs. 6 and 7, wherein the body portion of the container and the rotary bottom thereof are substantially in accordance with the structure described above and are illustrated by corresponding numerals.

In this embodiment, the rotary bottom **20** is adapted to be turned by a cable **34** which extends from an anchor **35** on the rotary bottom **20** over a suitable guide **36** on the front wall **12**. The cable **34** extends from the guide **36** over a sheave **37** to a fixed anchor **38** on the front wall **12**.

In this embodiment, the bail assembly comprises a bail **39** slidably mounted vertically relative to the front wall **12** and having stops **40** for limiting the downward movement of the bail relative thereto. A housing and mounting plate is shown at **41** fixed to the bail **39** and supporting the sheave **37** so as to raise and lower the sheave relative to the front wall **12** of the container.

This raising and lowering movement of the bail assembly relative to the body portion of the container will cause a 2-to-1 travel of the rotary bottom **20** relative to the movement of the bail assembly between the positions illustrated in full lines and in dotted lines in Fig. 7. In other respects, the construction operates in substantially the same manner as described above.

Still another embodiment is illustrated in Figs. 8 and 9, with a variation in shape of the container. In this form, the rotary sump bottom **20** is of angular shape in cross section, and the fulcrum pins **21** are located directly over the lifting pins **10** on the end walls **11** of the container. Nevertheless, the rotary sump bottom **20** has the weight thereof so disposed as to effect a closing movement of the rotary bottom when it has been moved to an open position by gravity.

In this form, the opening movement is accomplished by a pair of cables **42** connected by anchor members **43** to the rearward edge portion of the rotary bottom and extending beneath the latter and around a guide rod **44** to a bail assembly, generally indicated at **45**, to which these cables are anchored. The bail assembly **45** normally is seated in notches provided in brackets **46** secured to the front portion of the container. This bail assembly may be engaged by the dumping hook on the hoisting unit and thereby raised out of the brackets **46** upon the relative lowering movement of the container, thereby to swing the rotary bottom **20** on the axis of the fulcrum pins **21** and to discharge the contents, as described above.

In this form, the top portion **14** of the container is illustrated as having openings in opposite ends thereof, normally covered by doors **47** which may be opened for gaining access to the interior of the container for filling. As noted above, similar openings with or without doors may be provided in other portions of the container.

It will be apparent from the foregoing explanation that the container herein set forth comprises a rotary bottom hinged to the body portion of the container within the lateral confines of the width of the bottom, and that it provides an enlarged sump for receiving and containing substantially all of the liquids that may be enclosed with the contents. Upon opening movement of the rotary bottom, these liquids and the contents of the container are dumped out and it is possible to open substantially the entire bottom of the container for discharge of the contents. Thus a quick and effective discharge is accomplished and the contents can be dumped at the point desired.

While the invention has been illustrated and described in certain embodiments, it is recognized that variations and changes may be made therein without departing from the invention, as set forth in the claims.

We claim:

1. A container of the character described comprising a body portion having surrounding walls with an opening in the bottom thereof, a rotary bottom within said opening, means journaling said rotary bottom at opposite ends thereof on the body portion, and means operatively connected with the rotary bottom for moving said bottom on the journaling means, said moving means including a flexible cable device connected with said movable bottom and extending at least partially therebeneath approximately midway between said journaling means.

2. A container of the character described comprising a body portion having surrounding walls with an opening in the bottom thereof, a rotary bottom within said opening, means journaling said rotary bottom at opposite ends thereof on the body portion, and means operatively connected with the rotary bottom for moving said bottom on the journaling means, said moving means including a flexible cable device connected with said movable bottom and extending at least partially therebeneath approximately midway between said journaling means, said moving means including a flexible cable device connected with said rotary bottom adjacent one edge thereof and extending beneath the bottom substantially to the opposite side thereof.

3. A container of the character described comprising a body portion having surrounding walls with an opening in the bottom thereof, a rotary bottom within said opening, means journaling said rotary bottom at opposite ends thereof on the body portion, and means operatively connected with the rotary bottom for moving said bottom on the journaling means, said moving means including a flexible cable device connected with said movable bottom and extending at least partialy therebeneath approximately midway between said journaling means, said moving means including a flexible cable device connected with siad rotary bottom adjacent one edge thereof and extending beneath the bottom substantially to the opposite side thereof, and a bail assembly mounted on the body portion at the last-mentioned side of the rotary bottom and connected with the flexible cable device for moving said device to open the rotary bottom.

4. A container of the character described comprising a body portion having surrounding walls with an opening in the bottom thereof, a rotary bottom within said opening, means journaling said rotary bottom at opposite ends thereof on the body portion, and means operatively connected with the rotary bottom for moving said bottom on the journaling means, said moving means including a flexible cable device connected with said movable bottom and extending at least partially therebeneath approximately midway between said journaling means, said moving means including a flexible cable device connected with said rotary bottom adjacent one edge thereof and extending beneath the bottom substantially to the opposite side thereof, and a bail assembly slidably mounted on one of the walls of the body portion at the last-mentioned side of the rotary bottom and connected with the flexible cable device for moving said device to open the rotary bottom.

5. A container of the character described comprising a body portion having surrounding walls with an opening in the bottom thereof, a rotary bottom within said open-

ing, means journaling said rotary bottom at opposite ends thereof on the body portion, and means operatively connected with the rotary bottom for moving said bottom on the journaling means, said moving means including a flexible cable device connected with said movable bottom and extending at least partially therebeneath approximately midway between said journaling means, said moving means including a flexible cable device connected with said rotary bottom adjacent one edge thereof and extending beneath the bottom substantialy to the opposite side thereof, and a cable guide mounted on one wall of the body portion at the last-mentioned side of the rotary bottom and having the cable device bent back upon itself, around said guide for power multiplying effect.

6. A container of the character described comprising a body portion having surrounding walls with an opening in the bottom thereof, a rotary bottom within said opening, means journaling said rotary bottom at opposite ends thereof on the body portion, and means operatively connected with the rotary bottom for moving said bottom on the journaling means, said moving means including a flexible cable device connected with said rotary bottom adjacent one edge thereof and extending beneath the bottom substantially to the opposite side thereof, and a bail assembly mounted on the body portion at the last-mentioned side of the rotary bottom and connected with the flexible cable device for moving said device to open the rotary bottom.

7. A container of the character described comprising a body portion having surrounding walls with an opening in the bottom thereof, a rotary bottom at least partially covering said opening, means journaling said rotary bottom at opposite sides thereof on the body portion, and means operatively connected with the rotary bottom for moving said bottom on the journaling means, said moving means including a flexible cable device connected with said rotary bottom at one side of an upright plane through the axis of rotary movement of the bottom and extending transversely of the bottom to the opposite side of said upright plane, and a bail assembly mounted on the body portion at the last-mentioned side of the rotary bottom and connected with the flexible cable device for moving said device to open the rotary bottom.

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