United States Patent [19]

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[45] **Jan. 9, 1973**

[54] **REFUSE CONTAINER**

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[52] **U.S. Cl.** **214/82**, 214/302

[51] **Int. Cl.** **B65f 1/12**

[58] **Field of Search** ....214/82, 83.3, 302; 100/229 R, 100/233

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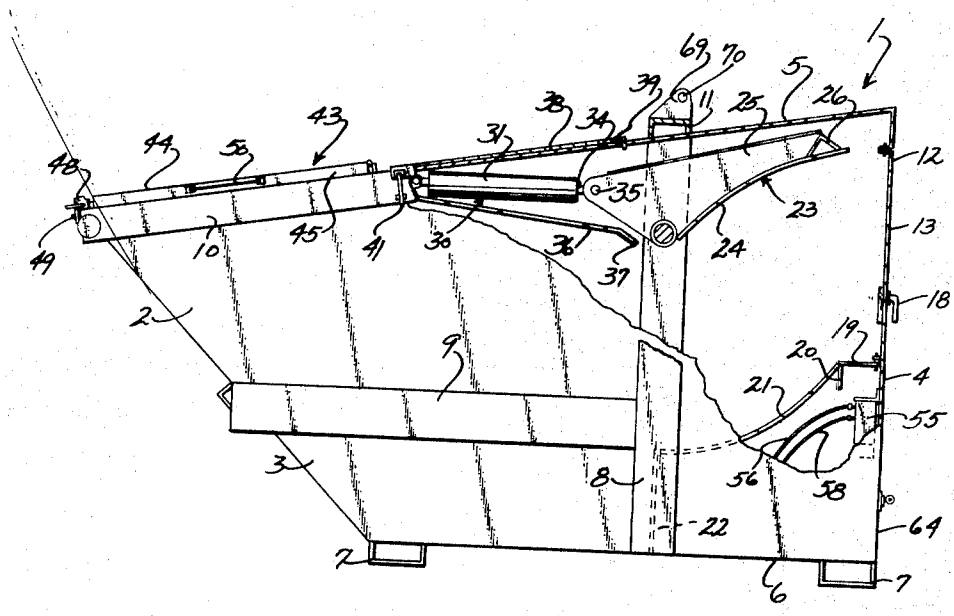
[57] **ABSTRACT**

A refuse container for collecting refuse and adapted to be periodically upended to discharge the refuse into the body of a truck or other carrier for removal from the site. The refuse container is a closed bin having a charging opening in one end to receive the refuse and having a discharge opening in the opposite end. Both openings are enclosed by doors. The refuse is compacted within the container by a compactor mounted to sweep past the charging opening and move the refuse toward the discharge end of the container. The operating mechanism for the compactor is tied in with a switch at the charging opening and arranged so that the compactor cannot be operated unless the charging door is closed. The container is unloaded by a truck which acts to upend the container and discharge the refuse through the discharge opening into the body of the truck. A remote control unit is incorporated with the operating mechanism for the compactor enabling the compactor to be operated when the container is in the upended position to aid in discharging the refuse from the container into the truck body.

5 Claims, 9 Drawing Figures



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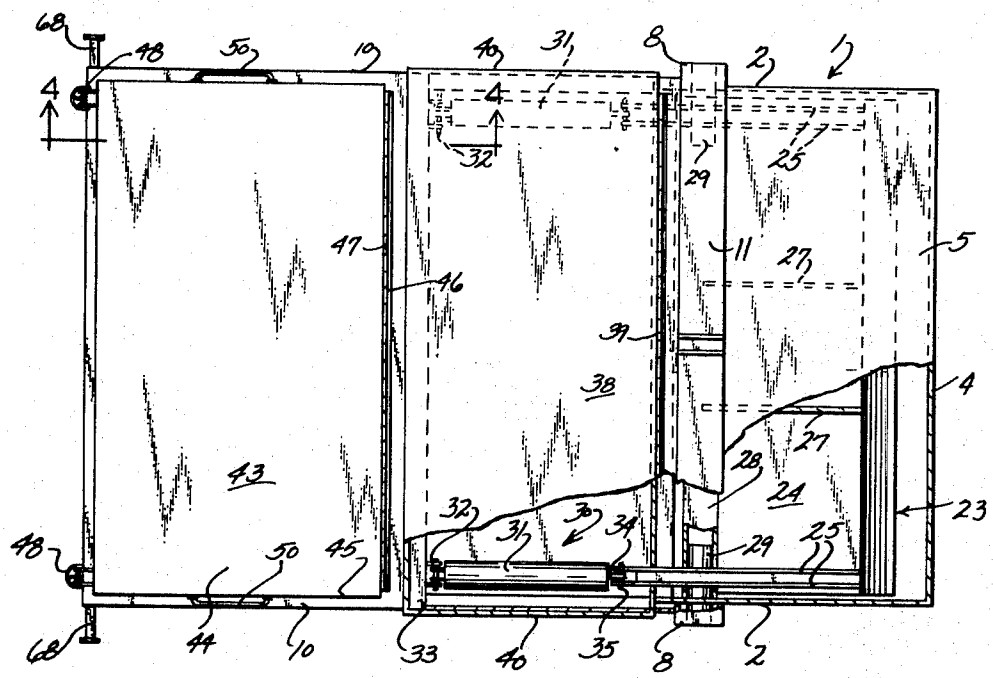

Fig. 1

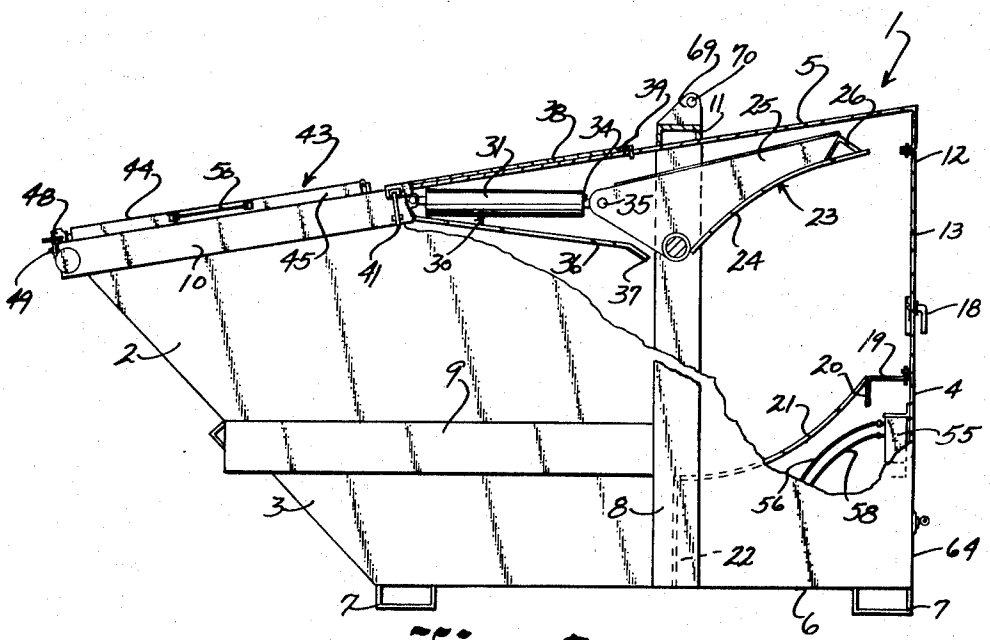

Fig. 2

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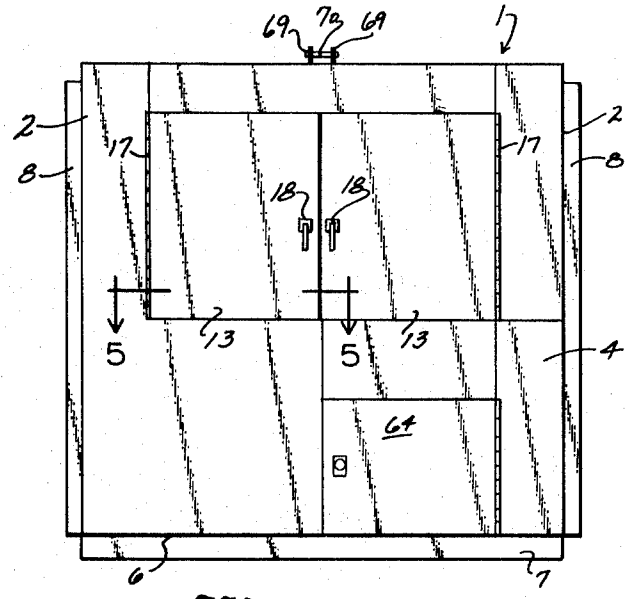

Fig. 3

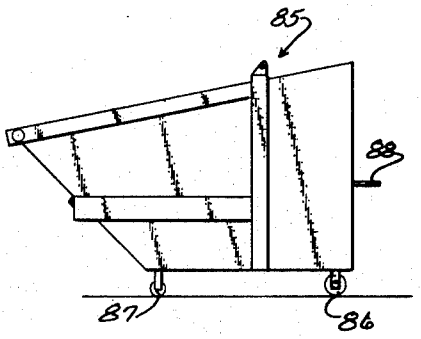

Fig. 9

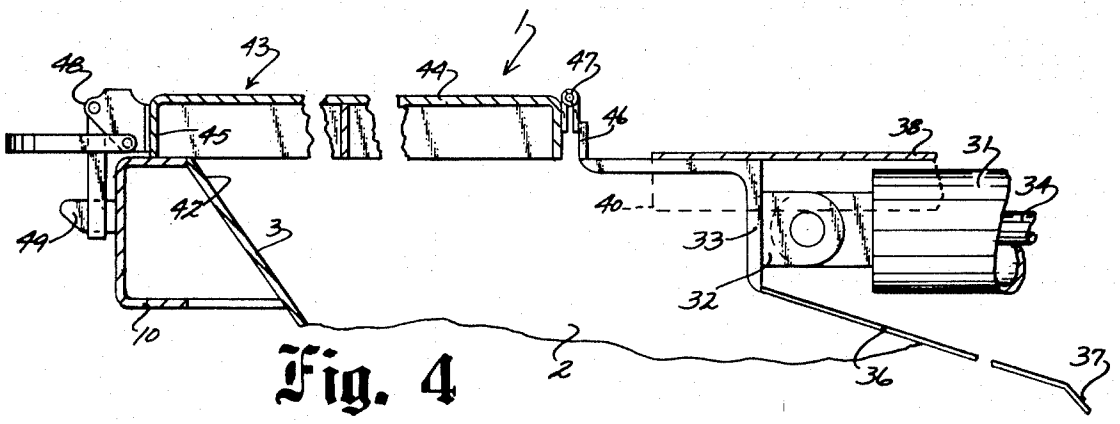

Fig. 4

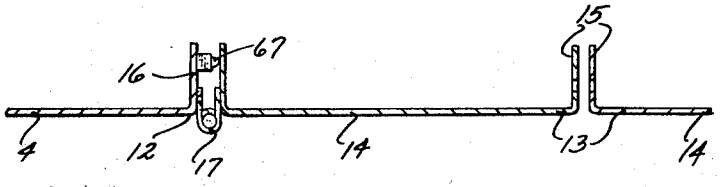

Fig. 5

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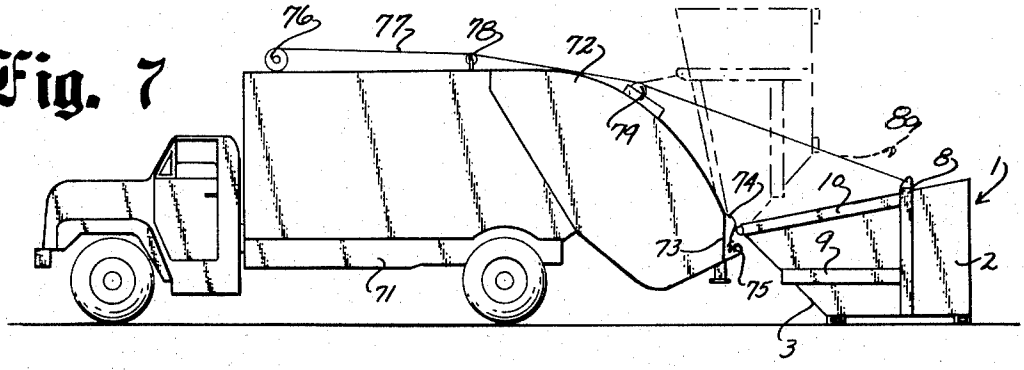
Fig. 7



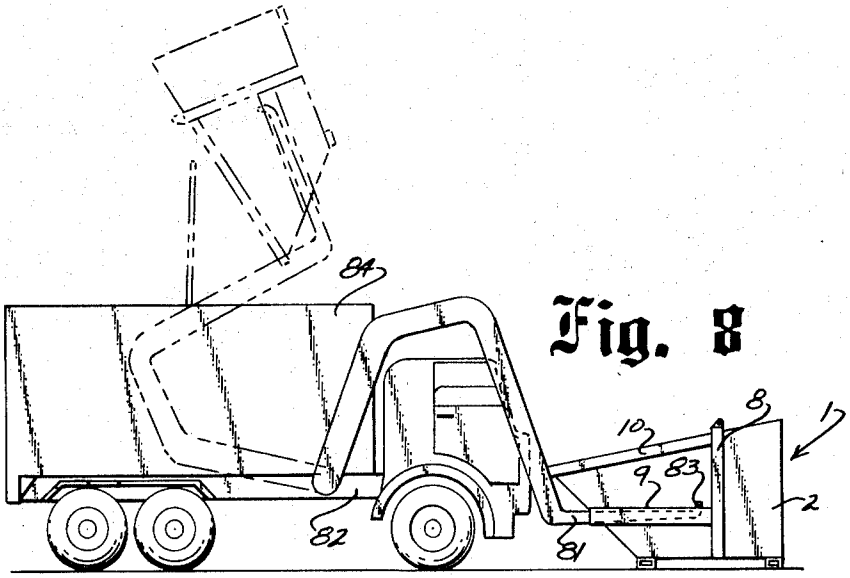


Fig. 8

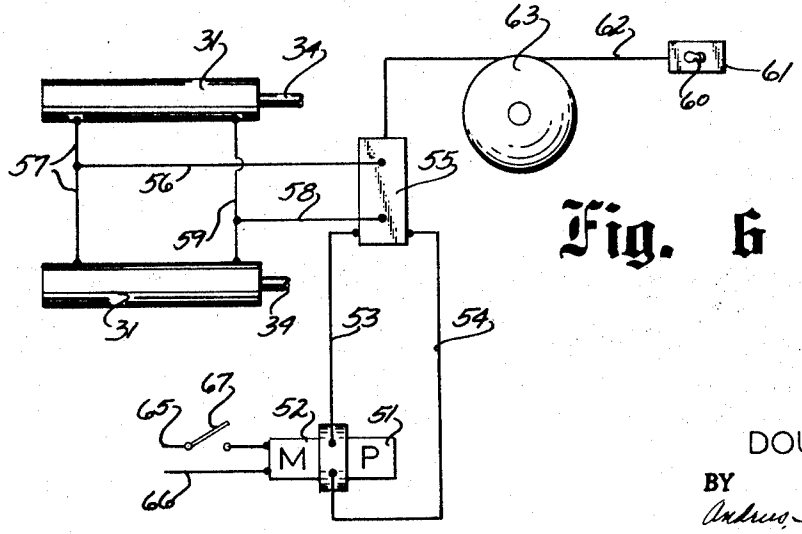


Fig. 6

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REFUSE CONTAINER

BACKGROUND OF THE INVENTION

This invention relates to a refuse container or bin, and more particularly to a commercial or industrial refuse collecting container adapted to be periodically unloaded into a truck or other carrier for removal from the site.

In the case of commercial and industrial establishments such as super markets, department stores, schools, apartment buildings, hospitals, and the like, it has been the practice to collect the refuse in confined areas, or containers for periodic pick-up. With most collection systems, the refuse is exposed to the elements, such as wind, rain and snow, which makes it difficult to maintain the refuse in an orderly fashion. To further complicate the problem, prior collection systems have often required the manual transfer of the refuse from the collection containers to a truck body for removal from the site, and during the transfer portions of the refuse invariably are blown away or dropped. As a result the collection areas in the past have been unsightly and have often presented a health hazard.

To eliminate these problems, resort has been made to use of closed refuse bins or containers. These closed bins have a substantial volume and are generally weather-tight so that the refuse is not exposed to the elements. To facilitate the transfer of the refuse from the container to the truck, the containers have been constructed so that they can be engaged by an unloading mechanism associated with the truck and upended to automatically discharge the refuse into the truck without the necessity of manual transfer. Refuse containers of this type generally are constructed with a single opening through which the refuse is charged into the container and subsequently discharged into the truck. The use of single opening has disadvantages in that the opening must be located so that the truck can move toward the opening to engage the container and upend it. If the charging opening is not in an accessible location for engagement by the truck, as for example, if the charging opening is in registry with a delivery chute in a building, the entire container must be reversed in position before it can be engaged by the truck and upended.

SUMMARY OF THE INVENTION

The invention is directed to an improved refuse collecting container which is adapted to be periodically upended by a truck or other carrier to discharge the refuse into the truck body. According to the invention, the refuse container is a closed bin having a charging opening in one end to receive refuse and have a discharge opening in the opposite end. Both the charging opening and the discharge opening are closed by doors so that the container is weather-tight.

The refuse is compacted within the container by a compactor which is mounted for swinging movement on a transverse axis and is adapted to sweep past the charging opening and move the refuse toward the discharge end of the container.

To remove the refuse, the unloading mechanism associated with a truck engages the container and acts to upend or invert the container to discharge the refuse through the discharge opening into the body of the truck. A remote control unit is associated with the operating mechanism for the compactor so that the compactor can be operated when the container is in the inverted or upended position to thereby aid in discharging the refuse through the discharge opening into the truck body.

The use of a separate charging opening and discharge opening has distinct advantages for it enables the charging opening to be located in close proximity to a building, as for example, the charging opening can be positioned in registry or adjacent a delivery chute in the building, and yet the truck can readily engage the discharge end of the container to upend the container and discharge the contents into the truck body.

As both the charging opening and the discharge opening are enclosed by weather-tight doors, a completely closed unit is provided which protects the refuse from insects and rodents and prevents scattering of the refuse by the wind.

The refuse container has improved safety characteristics in that the operating mechanism for the compactor is tied in with a switch associated with the charging door. This arrangement requires that the charging door be completely closed before the compactor can be operated. This feature eliminates the possibility of injury to workmen by virtue of their extending their hands or arms into the container when the compactor is operated.

The refuse container also employs an improved hydraulic cylinder system for actuating the compactor in which the ram of the hydraulic cylinder is connected directly to an arm welded to the compactor, thereby providing a more effective application of force of the compactor.

The refuse container can be fabricated in a wide variety of sizes, varying from a large 8 yard capacity unit to a small portable unit for indoor collection of refuse.

Other objects and advantages will appear in the course of the following description.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

FIG. 1 is a top view of the refuse container with parts broken away in section;

FIG. 2 is a side elevation of the refuse container with parts broken away in section;

FIG. 3 is an end view of the chargin end of the refuse container;

FIG. 4 is a section taken along line 4—4 of FIG. 1;

FIG. 5 is a section taken along line 5—5 of FIG. 3;

FIG. 6 is a schematic view of the hydraulic system for operating the compactor;

FIG. 7 is a side elevation of a rear loading truck engaged with the container prior to unloading the refuse into the truck body;

FIG. 8 is a view similar to FIG. 7 showing a front-loading truck engaged with the container; and

FIG. 9 is a side elevation of a smaller portable refuse container made in accordance with the invention.

The drawings illustrate an enclosed refuse container or bin 1 which includes a pair of spaced side walls 2, which are connected at one end by diagonal end walls 3 and at the opposite end by vertical end wall 4. The top edges of the side walls 2 are joined by a top wall 5,

while the bottom edges are joined by a bottom wall 6. To space the container 1 above the ground, a series of beams or supports 7 are secured to the bottom wall 6 and extend transversely of the container.

Reinforcement for the container is provided by a pair of vertical channels 8 which are welded to the respective side walls 2. In addition, the central portion of the container is reinforced by channel-shaped reinforcing members 9 that extend horizontally along the side walls 2 and diagonel end wall 3 and are connected to the vertical channels 8, while the upper edge of the container is reinforced by a channel 10 which similarly extends along the side walls 2 and end wall 3 and is connected to the upper end of the vertical channels 8. A transverse reinforcing member 11 is secured to the top wall 5 between the upper ends of the vertical channels 8.

The refuse is adapted to be introduced or charged into the container 1 through an opening 12 in the end wall 4 which is enclosed by a pair of charging doors 13. As best illustrated in FIG. 5, each of the doors 13 is formed of a generally flat vertical panel 14 bordered by inwardly extending flanges 15. One of the vertical flanges 15 of each of the doors 13 is hinged to flange 16 on wall 4 by a hinge 17. The doors 13 can be locked in the closed position by standard locking handles 18.

Located within the container 1 and in alignment with the lower edge of the charging 12, is a horizontal wall 19 which extends transversely between the side walls 2 and terminates in a downwardly extending flange 20. A curved wall 21 extends downwardly from the inner edge of wall 19 and terminates in a vertical wall 22 which is secured to the bottom wall 6. The horizontal wall 19, in combination with the curved wall 21, serves as a chute for the refuse being introduced within the charging opening 12 in the end wall 4.

The refuse is adapted to be compated within the container 1 by a pivotable compactor 23. In its retracted position, the compactor 23 is located adjacent the top wall 5 and can be swung downwardly with the tip of the compactor moving in close proximity to the curved wall 21 to move the refuse toward the discharge end of the container and to compact the same. The compactor is best illustrated in FIGS. 1 and 2 and comprises a generally curved plate 24 which is supported by two pairs of spaced vertical plates 25. The outer edged of the curved plate 24 is reinforced by an angle 26 and additional rigidity is provided by a pair of plates 27 having their lower edges welded to the curved plate 24 and their outer ends welded to the angle 26.

To mount the compactor 23 for pivoting or swinging movement, the plates 24, as well as the stiffeners 27 are welded to a sleeve 28 which extends transversely of the container 1. Stub shafts 29 are secured within the ends of the sleeve 28. The projecting ends of the stub shafts 29 are journalled within bearings in the respective vertical channels 8. With this construction the compactor can be pivoted about the axis of shafts 29 to thereby sweep the refuse along the curved plate 21 toward the discharge end of the container.

The compactor 23 is adapted to be pivoted by a pair of hydraulic cylinder units 30 mounted within the upper portion of the container 1 beneath the top wall 5. Each cylinder unit 30 includes a hydraulic cylinder 31 which is pivotally connected to a lug 32 extending outwardly from an angle 33 that extends transversely across the container 1 beneath the top plate 5. See FIG. 4. A piston rod or ram 34 is mounted for sliding movement within each cylinder 31 and the outer end of each am is connected by a pin 35 between the ends of the corresponding spaced plates 25. By introducing hydraulic fluid into the left hand end of the cylinders 31, as viewed in FIG. 1, the rams 34 will be extended to thereby pivot the compactor 23 clockwise around the axis of shafts 29 and sweep the refuse along the curved wall 21 toward the discharge end of the container. By introducing hydraulic fluid into the opposite ends of the cylinders 31, the rams 34 will be retracted to thereby return the compactor 23 to its original position, as shown in FIG. 1, wherein it is located adjacent the top wall 5 in a position where it will not interfere with the charging of refuse through the doors 13.

To protect the hydraulic cylinder units 30 from the pressure exerted through the compacted refuse, a plate 36 is located beneath the cylinder units 30 and extends between the side walls 2. The forward edge of the plate 36 is provided with a diagonal or bent end 37.

To provide access to the cylinder units 30, the top wall 5 is provided with an opening located in alignment with the cylinder units and which is normally closed by an access door 38. The forward edge of door 38 is hinged to the top wall 5 by hinges 39 and the free end of the door rests on the angle 33, as best illustrated in FIG. 4. Door 38 is provided with downwardly extending side flanges 40 and when the door is in the closed position, the side flanges 40 are located outwardly of the top edge channels 10. Door 38 is locked in the closed position by a pair of toggle clamps 41.

The refuse is adapted to be discharged from the container through a discharge opening 42 in the rear end of top wall 5 which is normally closed by a hinged cover 43. The cover 43 includes a generally flat panel 44 which is bordered by a downwardly extending flange 45. The forward portion of flange 45 is hinged to an upstanding lip 46 secured to the angle 33 by hinge 47.

To lock the cover 43 in the closed position, a series of standard toggle clamps 48 are mounted on the rear portion of the flange 45 and are adapted to engage lugs 49 secured to the channel 10. To aid in moving the cover 43 to the open position, a pair of handles 50 are located on each side of the cover. When in the open position, the cover 43 will rest flatwise against the access door 38 and can be latched by a mechanism not shown, in the fully open position.

The hydraulic system for operating the cylinder units 30 is illustrated diagramatically in FIG. 6. The hydraulic system includes a pump 51 driven by an electric motor 52 and a pressure or discharge line 53 and a return line 54 extends between the pump 51 and a solenoid-operated, three-way valve 55. A suitable hydraulic reservoir, not shown, can be connected in line 54. From separate outlets, the control valve 55 is connected to both ends of the cylinders 31 through line 56 and its corresponding branch lines 57, and through line 58 and its corresponding branch lines 59.

The solenoid valve 55 is operated by a three-position switch 60 on a remote control panel 61. The switch 60 is connected by an electrical cable 62 to the valve 55 and the cable 62 has a substantial length and is coiled around a retractable reel 63 that is mounted within the container 1 beneath the plate 21. The switch 60,

preferably has three positions, including a neutral position, wherein the solenoid valve **55** places the pressure line **53** in communication with the return line **54** to form a closed circuit through the pump **51**. In this neutral position of the valve **55**, the lines **56** and **58** are closed, to hydraulically lock the cylinder assemblies **30** and thereby lock the compactor **23** in the corresponding position. Thus, with the switch **60** in the closed circuit formed by the lines **53** and **54** through the pump.

To extend the cylinder assemblies **30** and move the compactor **23** clockwise, as viewed in FIG. **1**, the switch **60** is moved to the "compaction" position which actuates the valve **55** to place the pressure line **53** in communication with the line **56** so that fluid is introduced into the rear ends of the cylinders **31** to extend the rams **34** and thereby move the compactor **23** in a downward compacting stroke.

To retract the cylinder units **30** and move the compactor **23** to its retracted upward position, the switch **60** is moved to the "return" position which actuates the valve **55** to place the pressure line **53** in communication with the line **57** to thereby introduce fluid into the forward ends of the cylinders **31** and retract the rams **34** to thereby move the compactor **23** to the upper or return position. When not in use, the switch panel **61** can be stored within the container **1** beneath plate **21** and access can be had to the switch panel through door **64**.

While the above description has referred to a three-position switch **60**, it is contemplated that a single pole "on-off" switch can be utilized in which the "on" position will act to place pressure line **53** in communication with line **56** to move the compactor **23** in a compacting stroke and the "off" position will return the compactor to the upper or return position.

As the switch **60** is connected to the solenoid valve **55** by means of the extendible cable **62**, the compactor **23** can be operated when the container **1** is upended during the unloading to aid in the discharge of the refuse as will be described hereinafter.

A safety feature is incorporated in the control system for the compactor **23** which prevents the compactor from being operated unless the doors **13** are in the fully closed position. As illustrated in FIG. **6**, the motor **52** is connected to a suitable source of power, not shown, by lines **65** and **66** and a switch **67** is connected in line **65**. The switch **67** is mounted in the flange or frame bordering opening **12**, and as the door **13** is moved to the closed position, the switch **67** will be actuated to thereby close the circuit between the motor to the source of power. Conversely, by opening the door **13**, the switch **67** will be opened to thereby open the circuit between the motor **52** and the source of power and prevent the cylinder units **30** from being operated. This insures that the compactor will not be operated when the doors **13** are open and eliminates the possibility of the operator's had or arm being located in the container when the compactor is utilized. A key actuated "on-off" switch, not shown, can also be connected in line **65** to prevent tampering.

To charge or load refuse into the container, one or both of the doors **13** in the end **4** are opened and the refuse is manually deposited within the container. After closing the door the on-off switch is moved to the "on position" and the operator can then remove the switch panel **61** from the container **1** and move the switch **60** to the "compaction" position which will operate the compactor to sweep the refuse toward the discharge end of the container.

Depending upon the particular application, it may be desirable in some instances to remove the charging doors **13** and mount the end wall **4** adjacent the wall of the building so that the charging opening **12** will be in registry with the terminal end of a chute in the building wall. In this application the refuse falling through the chute will be delivered directly through the charging opening into the container **1**. In this situation with the removal of the doors, the safety switch **67** would not be incorporated in the control mechanism for the compactor.

When it is desired to unload the refuse from the container **1**, the container is engaged and upended by a refuse truck so that the refuse will be discharged through the discharge opening **42** into the body of the truck In preparation for unloading, the toggle clamps **48** are loosened and the cover **43** is pivoted to the open position and latched in the open position to thereby expose the discharge opening **42**.

In one method of unloading as illustrated in FIG. **7**, the container **1** is provided with opposed journals **68** which extend outwardly from the top edge channels **10** on opposite sides of the container. The container is also provided with a mechanism to receive a hook or the like to lift the container. The hook receiving mechanism includes a pair of spaced lugs **69** which straddle the longitudinal center line of the container and extend upwardly from the channel **11**. A pin **70** extends between the lugs in spaced relation above the channel **11**.

The refuse truck **71**, as illustrated diagramatically in FIG. **7**, includes a refuse receiving body **72** having an opening which is preferably wider than the container **1** so that the end wall **3** of the container may project therethrough during the unloading. Immediately adjacent the side edges of the opening in the body **72** are a pair of rearwardly projecting vertical plates **73**, and each plate is provided with a vertically extending cam surface **74** which terminates at its lower end in a bearing cavity **75**. The height of the plates **73** relative to the ground level should provide for engagement of the cam surfaces **74** with the journals **68** when the container **1** is resting on the ground. The refuse truck **71** carries a winch **76** located on the forward portion of the truck which may be driven by the truck engine. The cable **77** of the winch **76** is located above the center line of the truck and is guided in movement along the center line of the truck by a pair of pulleys **78** and **79**. The end of the cable **77** is provided with a hook **80** for engagement with the pin **70** of the container as shown in FIG. **7**.

When the container is to be unloaded or discharged of its contents, the truck **71** is back toward the container **1** until the cam surfaces **74** on plates **73** make contact with the journals **68** on the container. The hook **80** on the hoisting cable **77** is engaged with the pin **70** and the winch **76** is then driven to wind up the cable **77** which initially lifts the rear portion of the container **1** and simultaneously cams the journals **68** downwardly on the cam surfaces **73** into the bearing cavities **75** of the plates to pivotally connect the container **1** and the truck body **72**. As the winch **76** con-

tinues to operate and wind up the cable **77**, the container **1** pivots about the axis of the journals **68** to upend the container to a position where the end wall **3** projects through the opening in the truck body **72** so that the refuse can fall by gravity through the discharge opening **42** into the truck body, thereby eliminating the possibility of ground spillage in the unloading area.

In some instances, depending upon the nature of the refuse, the refuse may jam within the container and will not fall by gravity into the refuse body **72** of the truck, In the past when a situation such as this occurred it was necessary for the operator to either climb on the truck body and attempt to dislodge the refuse with some implement, or alternately, to lower the container back to ground level and then attempt to relieve the jammed situation. However, with the present invention and the use of the remote control switch panel **61**, it is possible to operate the compactor **23** when the container is in the upended position, to thereby partially sweep the contents of the container downwardly into the truck body **72** and eliminate the possibility of jamming and expidite the unloading process. In order to operate the compactor when the container is in the upended position, the operator, prior to upending of the container, will move the control panel **61** from its storage space within the access door **64** in the end wall **4**. As the container is pivoted upwardly, the cable **62** will unwind from the reel **63** and when the container is in the fully inverted or upended position the operator can then actuate the compactor and aid in discharging the contents from the container into the truck body.

After the container has been emptied of its contents, the winch cable **77** is let out and the container will pivot by gravity back to its original position. As the container is returned to its position of rest, the journals **68** are cammed out of the bearing cavities **75** so that after the cable **77** is disconnected from the container, the truck is free to leave the area.

Similarly, as the container **1** is being returned to its position of rest, the rewind reel **63** will automatically take up the electrical cable **62** which is connected to the panel **61** so that the operator can replace the panel **61** in its storage location within the access door **64**.

FIG. **8** illustrates a modified type of unloading mechanism which can be used to discharge the refuse from the container **1**. To accommodate the type of unloading mechanism shown in FIG. **8**, the ends of the channels **9** adjacent the diagonal wall **3**, are open and receive the free ends of supporting arms **81** which are pivotally connected to the chassis of the refuse truck **82**. The outer end of each arm **81** is provided with an upstanding projection **83** which is adapted to be received within an opening in the upper surface of the respective channel **9**.

With operation of the unit shown in FIG. **8**, the truck **82** moves forwardly toward the discharge end of the container **1** and the arms **81** are moved into the open ends of the respective channels **9** until the projections **83** are located beneath the openings in the channels **9**. The arms **81** are then elevated to bring the projections **83** into registry with the opening and continued upward pivotal movement of the arms will cause the container **1** to be upended to the phantom position shown in FIG. **8** to thereby discharge the contents from the container into the body **84** of the truck. During the unloading operation, the compactor **23** can be operated by use of the remote control panel **61** in the manner previously described with respect to the unloading mechanism shown in FIG. **7**.

While FIGS. **1** to **8** have illustrated a large capacity refuse container, it is contemplated that the refuse container can also be utilized as a small capacity portable unit to be used in hospitals, department stores and the like. As shown in FIG. **9**, the refuse container **85**, similar in construction to container **1**, but smaller in size, is a portable or mobile unit and is provided with a pair of rear wheels **86** and a pair of front casters **87**. To aid in moving the container **85**, a push bar **88** is mounted on the rear end wall of the container, beneath the charging opening. The unit shown in FIG. **9** can be manually pushed along the hall or aisle of a hospital, school, factory or the like and can be used to receive small quantities of refuse and waste.

The refuse container of the invention is a completely enclosed unit with both the charging opening and the discharge opening being normally closed by locked doors. The closed condition of the container not only makes it weather-tight, but also protects the refuse from insects and rodents and minimizes obnoxious odors which may eminate from the refuse. By completely confining the refuse, the possibility of the refuse being scattered by the wind is also minimized.

The compaction of the refuse reduces the volume for a given mass of refuse and thus offers more efficient handling. Moreover, the unit provides a safety feature in that the circuitry for the compactor is tied in with a switch on the charging door which requires that the door be completely closed before the compactor can be operated. This feature prevents the possibility of the operator's hand or arm being in the container at the time the compactor is actuated.

By use of the remote control unit it is possible to operate the compactor when the container is upended or inverted and this aids in the discharge of the refuse from the container.

By utilizing a pair of openings at opposite ends of the container, the charging opening can be located in close proximity to a building, or other waste deliver mechanism, and yet the container can be readily engaged and upended by the refuse truck. This feature increases the versatility of the refuse container and enables it to be used in locations where prior container could not be employed.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. A refuse collecting unit, comprising a container including a pair of spaced side walls, a first end wall, a second inclined end wall, a bottom wall connecting the lower edges of the side walls and end walls, and a top wall connecting the upper edges of the side walls and end walls, said container having a charging opening in said first end wall and having a discharge opening in said top wall adjacent said inclined second end wall; a first door to removably close the discharge opening, compacting means located within the container and disposed to move generally from the charging opening toward the discharge opening to sweep refuse toward

the discharge opening and compact the same; and means connected to the exterior of the container and disposed to be engaged by a movable carrier for elevating the container and discharging refuse through the discharge opening into a collection area on said carrier.

2. The unit of claim 1, wherein said compacting means includes a compacting member pivotally mounted to the container about a transverse pivot axis and located adjacent the top wall, and said compacting means includes a fluid cylinder unit operably connected to the compacting member at a second pivot spaced from said pivot axis, said fluid cylinder unit being disposed within the container adjacent said top wall.

3. The unit of claim 2, and including a protective baffle member disposed within the container and located beneath said fluid cylinder unit.

4. The unit of claim 2, wherein said compaction member comprises a curved plate and a series of reinforcing members secured to the upper surface of said plate, said fluid cylinder unit being pivotally connected to said reinforcing members.

5. The unit of claim 4, and including a stiffening member secured to the upper surface of the curved plated adjacent the outer edge thereof and extending transversely of the container.

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