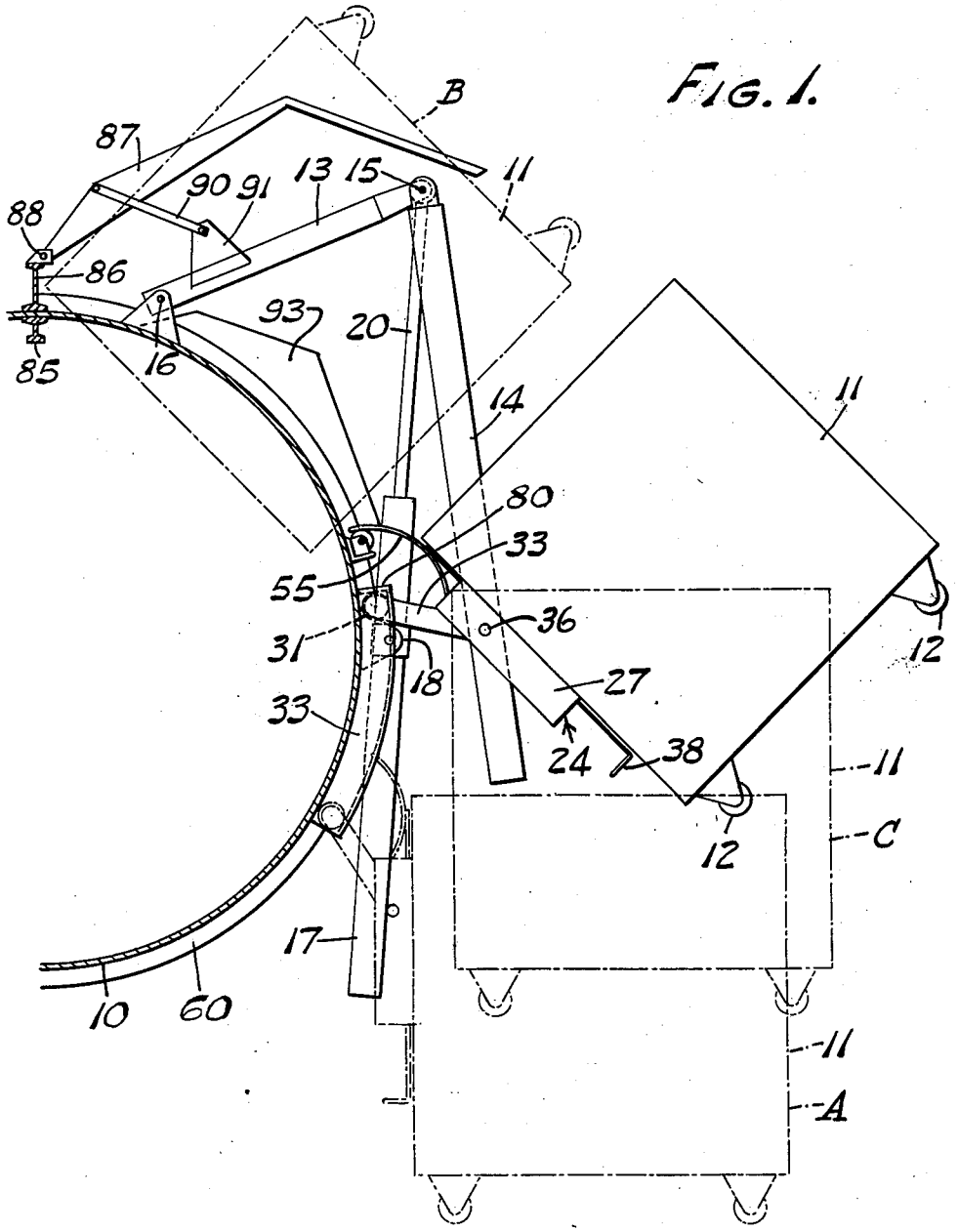
Sept. 15, 1964 R. J. WALTER 3,148,793

SIDE LOADER FOR REFUSE VEHICLE BODIES

Filed July 14, 1961 3 Sheets-Sheet 1

FIG. 1.



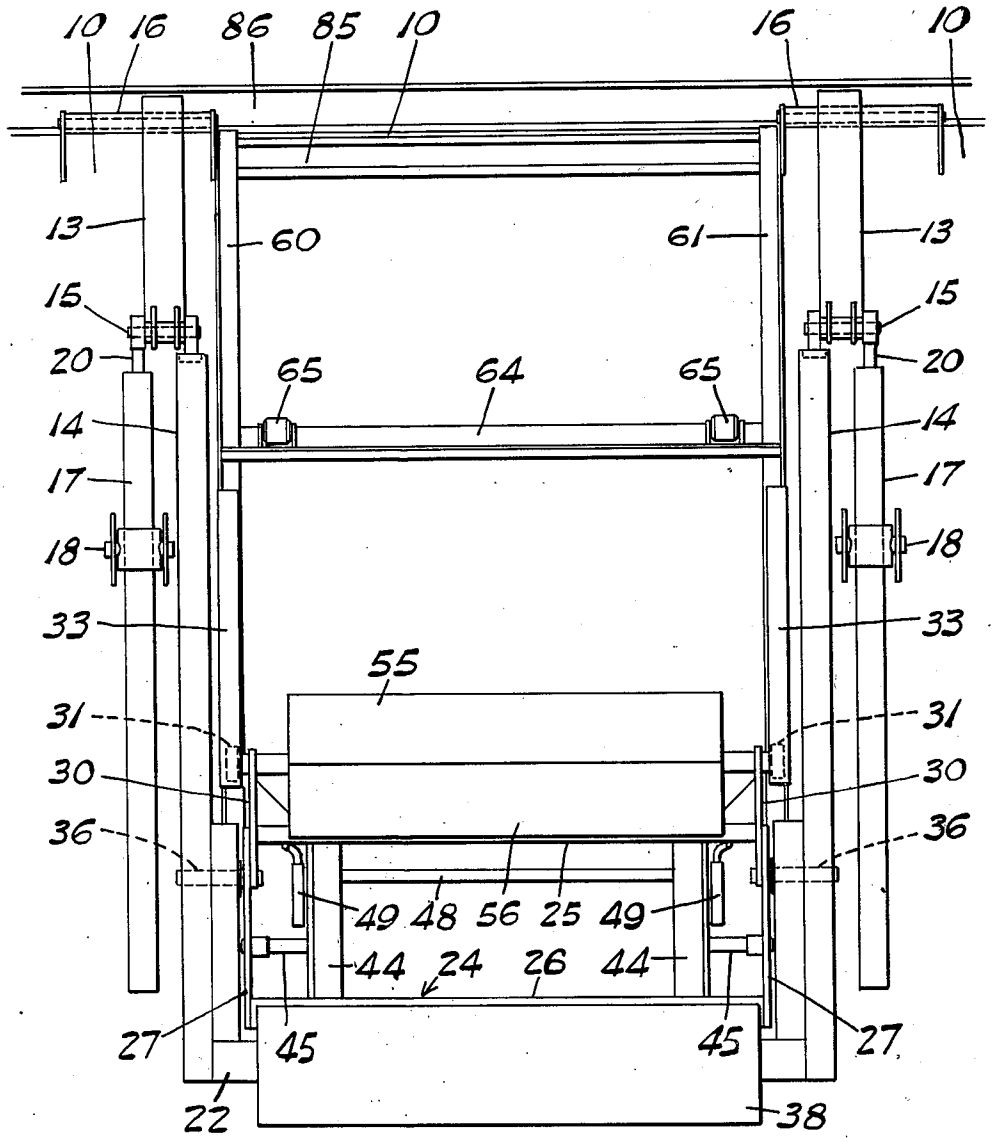
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SIDE LOADER FOR REFUSE VEHICLE BODIES

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FIG. 2.



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SIDE LOADER FOR REFUSE VEHICLE BODIES

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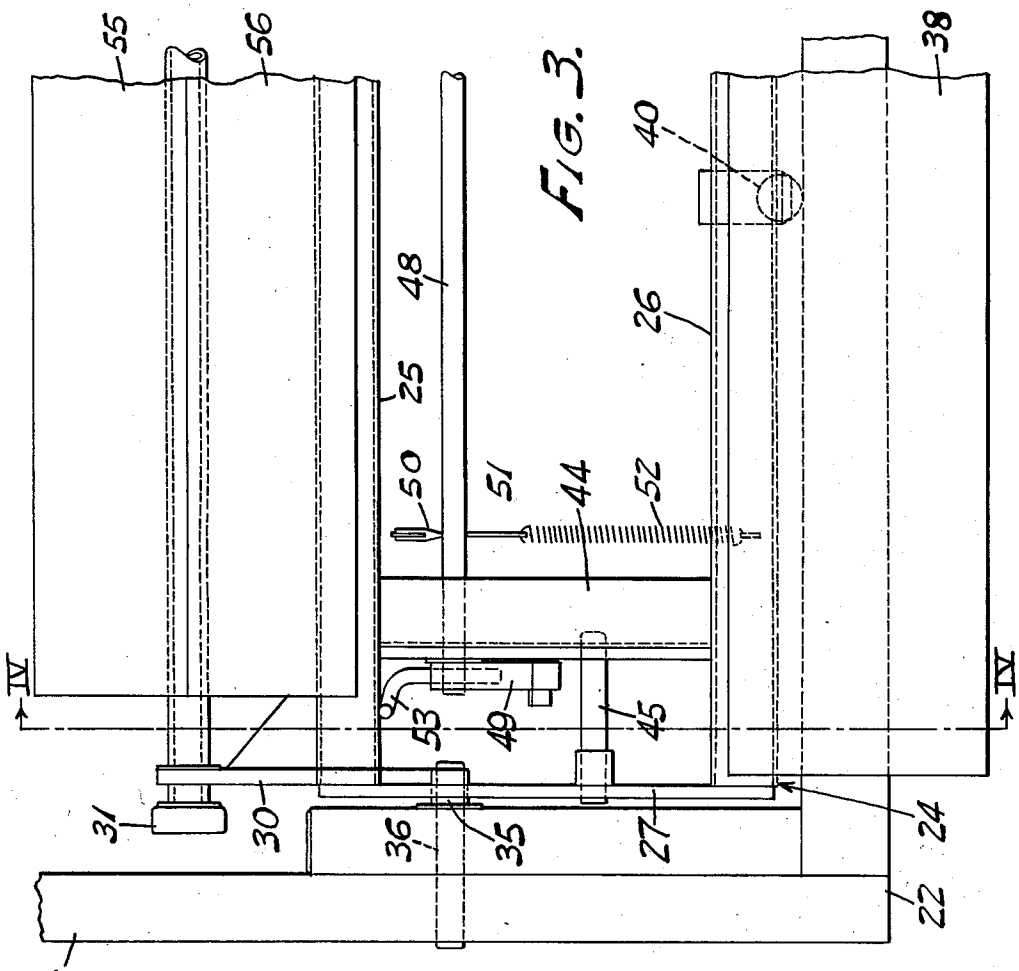


FIG. 3.

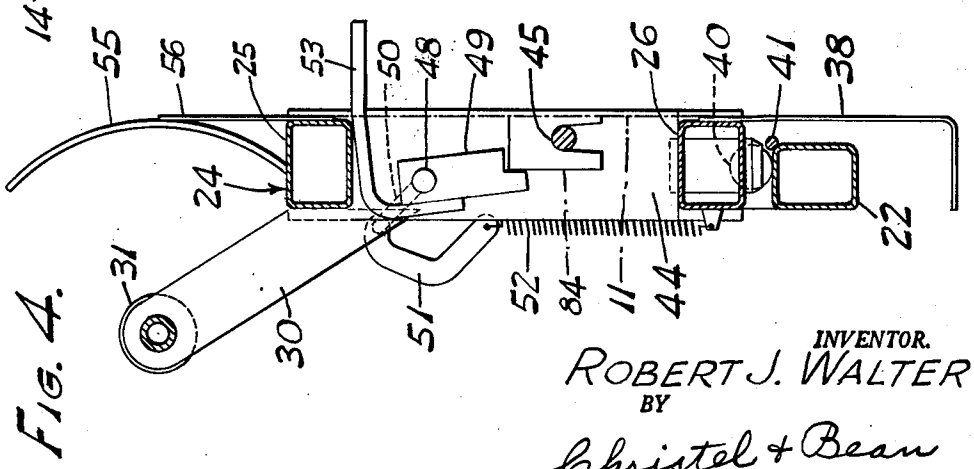


FIG. 4.

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SIDE LOADER FOR REFUSE VEHICLE BODIES

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Filed July 14, 1961, Ser. No. 124,121
10 Claims. (Cl. 214—302)

This invention relates to handling of refuse and particularly to apparatus for picking up refuse containers and emptying the contents thereof into a refuse collecting and transporting vehicle, the container handling and manipulating apparatus being carried by and operated from the collecting vehicle.

Many prior art structures have been proposed for the foregoing general purpose. The present invention provides a container lifting and emptying structure which accomplishes the intended purpose in a more efficient and effective manner than comparable apparatuses of the prior art. While the principles of the present invention may be variously employed, they are illustrated herein by way of example in what is known in the art as a "side loader" arrangement wherein the contents of the container are emptied into a refuse body through a receiving opening at the side thereof.

Further, the specific embodiment of the invention shown in the drawings and described herein by way of example contemplates a generally cylindrical refuse receiving vehicle body. Here again, while the invention is not limited to such use, certain of the advantages thereof are of particular importance in the case of cylindrical refuse bodies.

The linkage means herein provided for lifting a refuse container and turning the same generally upside down to empty the contents thereof into the vehicle body accomplishes the lifting and emptying function in a new and improved manner. The lifting force is utilized and applied in a more efficient and effective manner than heretofore and the containers are raised and emptied in such a way that a minimum of lateral clearance alongside the vehicle is required. The refuse container is moved almost straight up from its initial position at the side of the vehicle until it reaches the elevation at which it is rotated to empty the same.

The linkage arrangement for controlling the lifting and turning movements of containers is such that a single force means acting in a generally straight line automatically produces the desired sequence of body movements of the refuse containers up to the fully emptied position. In a preferred form the force means comprises double acting hydraulic cylinder means which is reversible to return the containers to their initial position alongside the vehicle under full power control.

It is a further object of the present invention to provide a refuse collecting vehicle structure wherein the refuse receiving body is closed excepting when a refuse container is actaully being emptied into the body. To this end cover means are provided which are interconnected with the refuse container lifting and emptying mechanism in such a way that opening movement of the cover occurs automatically in timed relationship with the lifting of a refuse container to the emptying position with respect to the refuse receiving opening in the vehicle body and whereby the cover member closes automatically as soon as the refuse is discharged into the body and the container moves away from the refuse receiving vehicle body opening.

Various other objects and advantages of the refuse packer body construction and arrangement of the present invention will appear to those skilled in this art from a study of the exemplary embodiment depicted in the accompanying drawings and are referred to in the ensuing description.

A single embodiment of the principles of the present invention is illustrated in the accompanying drawings and described in detail in the following specification but it is to be understood that such embodiment is by way of example and illustration only and that the principles of the invention are not limited to this embodiment nor otherwise than as defined in the appended claims.

In the drawings:

FIG. 1 is a somewhat diagrammatic fragmentary front end view of a generally cylindrical refuse receiving vehicle body provided with one form of the refuse container lifting and emptying mechanism of the present invention;

FIG. 2 is a side elevational view of the container engaging lifting and emptying mechanism of FIG. 1 shown in an lowered position;

FIG. 3 is an enlarged fragmentary elevational view taken similarly to FIG. 2 showing the lower left-hand portion of the mechanism of FIG. 2 on an enlarged scale; and

FIG. 4 is a fragmentary cross-sectional view taken approximately on the line IV—IV of FIG. 3.

Referring to FIGS. 1 and 2 of the drawings, the numeral 10 designates a generally cylindrical refuse receiving body which may be of the type shown in a copending application for United States Letters Patent, Serial No. 28,339, filed May 11, 1960 jointly by Ellsworth R. Boeck and myself. The aforesaid application shows a refuse body of the so-called packer type and the refuse loading means of the present invention is particularly applicable thereto, although the principles of the invention may be applied to any kind of refuse vehicle and body structure and arrangement wherein such principles are found to be advantageously usable.

In FIG. 1 a refuse container is designated 11 and in the illustrated instance is provided with casters or wheels 12 so that the same may readily be moved to the side of the refuse receiving vehicle body and properly positioned with respect thereto for lifting and emptying. In FIG. 1 container 11 is shown in dot and dash lines, at A and B respectively, in its two limit positions with respect to the refuse body 10, that is, on the ground adjacent thereto and in a fully raised and rotated position wherein the contents of the container are discharged into the vehicle body.

A mid position of container 11 is shown in full lines in FIG. 1 wherein the container is partially raised to dumping position and partially tilted or rotated. FIG. 1 further illustrates, in dot and dash lines at C, a further intermediate position wherein the container has been raised to the point wherein rotation thereof is ready to commence. In FIG. 1 the mechanism which raises the container and dumps the same by rotation thereof is shown particularly in the position which such mechanism reaches when the container is in the full line midposition illustrated in FIG. 1. In FIG. 2 the same mechanism is shown in its lowermost position when the same is not in use or at the beginning of a container engaging and raising operation. The container itself is not illustrated in FIG. 2.

Speaking in the most general terms, the lifting mechanism comprises a pair of toggle linkages with a pair of hydraulic struts or piston and cylinder means adapted to apply an upward lifting force against the midpoints of the toggle linkages. The upper arms of the aforesaid pairs of toggle linkages are designated 13 and the lower arms are designated 14, each pair of upper and lower arms being pivotally interconnected as at 15.

The other ends of the pair of upper arms 13 are pivoted to upper portions of the cylindrical refuse body of the vehicle as at 16. The pair of hydraulic lifting cylinders are designated 17 and are pivoted to the refuse body 10 as shown at 18 in FIGS. 1 and 2. Piston rods for the

pair of cylinders 17 are designated 20 and extend upwardly to the pivotal connections 15 of the toggle arms 13 and 14 for joint pivotal connection therewith to exert a lifting force against the pivots 15 upon upward projection of the piston rods.

The lower arms 14 of the toggle linkages comprise upright members of a rigid U-shaped frame structure, a lower horizontal connecting member being designated 22 in FIGS. 2 and 3. The arms 14 and connecting member 22 comprise a lift frame for containers and pivotally attached to the lower portion of the lift frame is a swing frame designated generally by the numeral 24 and best shown in FIGS. 3 and 4.

In the form illustrated herein by way of example the swing frame comprises upper and lower horizontal members 25 and 26 connected at their ends by vertical members 27. Fixed rigidly to the side vertical members 27 of swing frame 24 are oblique arms 30 which are provided at their upper ends with rollers 31 which are adapted to be guided in arcuate channels 33 fixed externally to the refuse body 10 at opposite sides of the side door opening thereof as shown in FIGS. 1 and 2.

The side members 27 of swing frame 24 are provided with bearings 35 which receive inwardly extending trunnion pins 36 carried by the lift frame arms 14 for pivotally connecting the swing frame to the lift frame. The lower horizontal member 26 has fixed thereto a depending apron 38 and it will be noted that, in the lowermost rest position of the lift and swing frames, the lower connecting member 22 of the lift frame lies directly beneath the lower member 26 of the swing frame and a spring pressed detent ball 40 carried by the latter retains the parts resiliently in the illustrated position by engagement behind a lip or flange on the lower member 22 of the lift frame, in the present instance in the form of a rod 41 welded to the edge of frame member 22.

The rigid frame portion of swing frame 24 further includes a pair of intermediate upright members 44 which extend between the horizontal members 25 and 26. A pair of pins or stub shafts 45 extend between each side member 27 and the adjacent intermediate upright member 44 for engagement with hook means on the refuse container to be unloaded, as will presently appear.

Swing frame 24 further includes means for insuring that the hook means of the container remains in secure engagement with the pins 45. A rock shaft 48 is journaled adjacent to its ends in the upright members 44 and has fixed to its opposite ends a pair of latch arms 49 which are notched as shown in FIG. 4 to engage over the upper outer corners of the hook members of containers 11.

Rock shaft 48 has a pair of arms 50 fixed thereto and links 51 engage between the outer ends of arms 50 and the upper ends of extension coil springs 52 which are anchored at their lower ends to the horizontal member 26 of swing frame 24. Thus the latch arms 49 are resiliently biased to latching position, manual release thereof being effected by either of a pair of handle members 53 which are fixed to the latch arms 49.

In addition to the foregoing structure swing frame 24 is provided with a horizontally extending plate 55 of arcuate curvature, the center of curvature of plate 55 in the present instance being coincident with the axis of rollers 31. The lower edge of plate 55 is welded to the top of horizontal member 25. A brace and cover plate member 56 is disposed against the outer side of arcuate plate 55 and is welded along its lower edge to the top of horizontal member 25. The manner in which arcuate plate 55 cooperates in unloading containers into refuse body 10 will presently be described.

A side opening in refuse body 10 for receiving material dumped or discharged from container 11 is defined laterally by a pair of circular rings 60 and 61 which are provided primarily to reinforce the weldment which comprises body 10. The side opening may extend downwardly from a top central longitudinal I beam described later herein to a horizontal angle iron 64 which reinforces the body weldment 10 along the lower edge of the door opening. A pair of rollers 65 are mounted along the angle iron 64 for engagement along the arcuate underside of plate 55 in a manner and for a purpose which will presently appear.

A cycle of operation for lifting and emptying a container and returning the same to the ground alongside the vehicle will now be described. At the beginning of such an operation the toggle linkage, hydraulic cylinder and lift frame will be in the lower dot and dash line position of FIG. 1 (the full line position of FIG. 2), the lift frame being in a substantially vertical position and the aforesaid swing frame 24 being retained in a substantially coincident position with respect thereto by ball detent 40 as shown in FIGS. 3 and 4.

A container 11 is moved up to the lifting mechanism whereupon a pair of hook members 84 fixed to container 11 overlie the pins 45 of swing frame 24. A hook member 84 is shown in FIG. 4 in its finally assembled position on shaft or pin 45. As the container is thus moved toward the body 10 the hook members 84 rock the latch arms 49 toward the body 10 against the resistance of springs 52. The hydraulic cylinders 17 are energized to project the piston rods thereof upwardly which raises the lift frame 14, 22 and the swing frame 24 carried thereby.

Thus the pins 45 move up into the notches of the hook members 84 as shown in FIG. 4 and as they reach the ends of the notches the latch arms 49 swing over the top corners of the hook members 84 under the impetus of springs 52, whereupon the container is securely attached to the swing frame 24 with the adjacent exterior wall of the container disposed substantially against the apron 38 of the swing frame.

As the lift frame 14, 22 continues upwardly the swing frame 24 is carried thereby. During this movement the rollers 31 of the arms 30 of swing frame 24 move upwardly in the arcuate channels or tracks 33 of body 10 and the lift frame and swing frame are resiliently retained in alignment by the detent 40. However, when the rollers 31 reach the upper ends of the channels or tracks 33 and strike abutments designated 80 in FIG. 1, since the lift arms 14 continue their upward pull on swing frame 24 by reason of the trunnion pin connection at 36, the swing frame is forcibly pivoted about the rollers 31 in a counterclockwise direction as viewed in FIG. 1. This forcibly disengages the detent 40.

As this pivotal movement of the swing frame 24 and the attached refuse container proceeds the arcuate plate 55 of the former which is concentric with rollers 31, moves inwardly over the rollers 65 at the lower edge of the opening in body 10. Plate 55 thus provides a chute or bridge plate for refuse which may begin to empty from container 11 during the first portion of the rotating movement of the latter.

As upward movement of the lift frame 14, 22 continues the swing frame and container are rotated through an angle of approximately 135 degrees, in the present instance, until the container reaches the upper dot and dash line position designated B in FIG. 1, by which time it completely empties its contents into the body 10 of the vehicle. The container lowering operation is a mere reversal of the foregoing, the opposite ends of the cylinders 17 being selectively connectible with hydraulic pressure fluid by conventional four way valves. During downward movement engagement of plate 55 against rollers 65 insures reverse rotation of container 11 to the right-side-up position.

It is desired that the side opening in refuse body 10 be closed and that the contents of the body be covered at all times excepting when material is actually being emptied thereinto. To this end the present apparatus is provided with a cover or lid arrangement which is normally closed but which opens automatically in timed relation with respect to a container emptying operation.

In FIG. 1 the numerals **85** and **86** designate inner and outer longitudinal I-beam members which extend along the top of the body **10** for reinforcing and rigidifying the same and for other purposes. An angular cover member **87** is hinged to I-beam **86** as at **88** and is arranged to move generally parallel with respect to the upper arms **13** of the container lifting toggle linkages by means of links **90** which are pivoted at their opposite ends to the cover member and to brackets **91** fixed to the arms **13**.

A pair of flange members **93** are fixed to body **10** along the opposite side edges of the side opening in the body **10** and may be rigidly attached to the circular rings **60** and **61** which extend along such side edges. The outer edges of the flange members **93** are of angular formation complementary to that of the cover member **87** which seats on such flanges in the closed position of the cover member.

The manner in which opening and closing movements of the cover member automatically accompany lifting and lowering movements of the toggle linkage is believed to obvious from the foregoing and the arrangement is such that the cover member is raised only when necessary for actual refuse container emptying operations. As the container is raised by operation of the toggle linkages the cover member **87** is raised in advance of the upward and rotary movement of container **11** in such manner that the dumping or emptying movement of the container is not interfered with in any way by the cover member.

I claim:

1. In a refuse receiving vehicle body having a refuse receiving opening in a wall thereof, means for lifting containers from alongside said body comprising a pair of spaced parallel arms pivoted to an upper portion of said body and extending outwardly adjacent to opposite sides of said body opening, a lift arm pivoted to the outer end of each of said parallel arms and extending generally vertically downwardly therefrom, means at the lower ends of said lift arms for detachable engagement with a refuse container, and power means for raising said lift arms while in such pivoted downwardly extending condition to raise an engaged container to said opening, said power means comprising a fluid pressure cylinder attached to said vehicle body and having an upwardly projecting piston rod attached at its upper end to the pivotal connection between one of said parallel arms and one of said lift arms.

2. In a refuse receiving vehicle body having a refuse receiving opening in a wall thereof, means for lifting containers from alongside said body comprising a pair of spaced parallel arms pivoted to an upper portion of said body and extending outwardly adjacent to opposite sides of said body opening, a lift arm pivoted to the outer end of each of said parallel arms and extending generally vertically downwardly therefrom, means at the lower ends of said lift arms for detachable engagement with a refuse container, and power means for raising said lift arms while in such pivoted downwardly extending condition to raise an engaged container to said opening, said power means comprising a fluid pressure cylinder attached to said vehicle body and having an upwardly projecting piston rod attached at its upper end to the pivotal connection between one of said parallel arms and one of said lift arms, said container engagement means being rotatable relative to said lift means on a horizontal axis, track means extending upwardly along said vehicle body and having an upper abutment, arms extending toward said body from said engagement means and having end portions engageable in said track means, said arm end portions being adapted to engage said track means abutments during upward movement of said lift means to rotate said engagement means and empty an engaged container.

3. In a refuse receiving vehicle body having a refuse receiving opening in a wall thereof, means for lifting containers from alongside said body comprising a pair of spaced parallel arms each pivoted to an upper portion of said body and extending outwardly adjacent to opposite sides of said body opening, a lift arm pivoted to the outer end of each of said parallel arms and extending generally vertically downwardly therefrom, means at the lower ends of said lift arms for detachable engagement with a refuse container, power means acting against said parallel arms for raising said lift arms in a freely pivoted downwardly extending suspended condition to raise an engaged container to said opening, said container engagement means being rotatable relative to said lift means on a horizontal axis, track means extending upwardly along said vehicle body and having an upper abutment, arms extending toward said body from said engagement means and having end portions engageable in said track means, said arm end portions being adapted to engage said track means abutments during upward movement of said lift means to rotate said engagement means and empty an engaged container.

4. In apparatus for emptying refuse containers into refuse receiving bodies, a refuse body having a receiving opening in a wall thereof, lift means disposed adjacent to said body opening including a pair of upright arms lying adjacent to the opposite sides of said opening, arm means pivoted to the top of said body inwardly of said receiving opening and extending outwardly for pivotal connection with the upper ends of said upright arms, container engaging means carried by the lower portion of said lift means and having releasable means for attachment to a container disposed alongside said refuse receiving body, said container engaging means having pivotal engagement with said lift means on a horizontal axis generally parallel to said refuse body wall, means operable when said lift means has reached a predetermined elevation for pivoting said container engaging means and attached container to rotate the latter to discharge the contents thereof through said body opening, and force means operative to swing said arm means selectively in opposite directions about the pivotal connection thereof with said body to raise and lower said lift means.

5. In apparatus for emptying refuse containers into refuse receiving bodies, a refuse body having a receiving opening in a wall thereof, lift means disposed adjacent to said body opening including a pair of upright arms lying adjacent to the opposite sides of said opening, arm means pivoted to the top of said body inwardly of said receiving opening and extending outwardly for pivotal connection with the upper ends of said upright arms, container engaging means carried by the lower portion of said lift means and having releasable means for attachment to a container disposed alongside said refuse receiving body, said container engaging means having pivotal engagement with said lift means on a horizontal axis generally parallel to said refuse body wall, yieldable means normally restraining relative pivotal movement of said container engaging means with respect to said lift means, means operable when said lift means has reached a predetermined elevation for pivoting said container engaging means and attached container to rotate the latter to discharge the contents thereof through said body opening, and force means operative to swing said arm means selectively in opposite directions about the pivotal connection thereof with said body to raise and lower said lift means.

6. In apparatus for emptying refuse containers into refuse receiving bodies, a refuse body having a receiving opening in a wall thereof, lift means disposed adjacent to said body opening including a pair of upright arms lying adjacent to the opposite sides of said opening, arm means pivoted to the top of said body inwardly of said receiving opening and extending outwardly for pivotal connection with the upper ends of said upright arms, container engaging means carried by the lower portion of said lift means and having releasable means for attachment to a container disposed alongside said refuse receiving body, said container engaging means having pivotal engage-

ment with said lift means on a horizontal axis generally parallel to said refuse body wall, and means engaging between said container engaging means and said refuse body and operable when said lift means has reached a predetermined elevation for pivoting said container engaging means and attached container to rotate the latter to discharge the contents thereof through said body opening, and force means operative to swing said arm means selectively in opposite directions about the pivotal connection thereof with said body to raise and lower said lift means.

7. In a refuse receiving vehicle, a longitudinally extending generally cylindrical body having a refuse receiving opening in an upper portion of the cylindrical wall thereof, means for lifting containers from alongside said body and emptying the same through said opening, said means comprising a pair of parallel arms each pivoted to an upper portion of said body and extending outwardly adjacent to one side of said body opening, a lift arm pivoted to the outer end of each of said parallel arms and extending generally downwardly therefrom, means at the lower ends of said lift arm for detachable engagement with a refuse container, power means for raising said lift arms to raise an engaged container to said opening, said power means comprising a fluid pressure cylinder attached to said vehicle body and having an upwardly projecting piston rod attached at its upper end to the pivotal connection between one of said parallel arms and one of said lift arms, said container engagement means being rotatable relative to said lift means on a horizontal axis, track means extending arcuately upwardly along the lower portion of said cylindrical body and having an upper abutment, means on said container engagement means adapted to be guided in said track means whereby said parallel arms and said track means provide controlled movement to guide said lift means and container engagement means for maintaining a container in substantially upright position during lifting movement thereof, said track guided means of said container engagement means being adapted to engage said track means abutment during the final upward movement of said lift means to rotate said engagement means and empty an engaged container through said body opening.

8. In a refuse receiving vehicle, a longitudinally extending generally cylindrical body having a refuse receiving opening in an upper portion of the cylindrical wall thereof, means for lifting containers from alongside said body and emptying the same through said opening, said means comprising a pair of parallel arms each pivoted to an upper portion of said body and extending outwardly adjacent to one side of said body opening, a lift arm pivoted to the outer end of each of said parallel arms and extending generally downwardly therefrom, means at the lower ends of said lift arms for detachable engagement with a refuse container, power means for raising said lift arms to raise an engaged container to said opening, said container engagement means being rotatable relative to said lift means on a horizontal axis, track means extending arcuately upwardly along the lower portion of said cylindrical body and having an upper abutment, means on said container engagement means adapted to be guided in said track means whereby said parallel arms and said track means provide controlled movement to guide said lift

means and container engagement means for maintaining a container in substantially upright position during lifting movement thereof, said track guided means of said container engagement means being adapted to engage said track means abutment during the final upward movement of said lift means to rotate said engagement means and empty an engaged container through said body opening.

9. In a refuse receiving vehicle, a longitudinally extending generally cylindrical body having a refuse receiving opening in an upper portion of the cylindrical wall thereof, means for lifting containers from alongside said body and emptying the same through said opening, said means comprising a pair of parallel arms each pivoted to an upper portion of said body and extending outwardly adjacent to one side of said body opening, a lift arm pivoted to the outer end of each of said parallel arms and extending generally downwardly therefrom, means at the lower ends of said lift arms for detachable engagement with a refuse container, power means for raising said lift arms to raise an engaged container to said opening, track means extending arcuately upwardly along the lower portion of said cylindrical body, means at the lower ends of said lift arms adapted to be guided in said track means whereby during upward movement of said lift arms and attached container the upper and lower ends of said lift arms have substantially parallel arcs of movement to maintain the lift arms and container in upright positions, and means operable during the final upward movement of said lift arms for rotating said container to empty the same through said body opening.

10. In a refuse receiving vehicle body having a refuse receiving opening in a wall thereof, means for lifting containers from alongside said body comprising a pair of spaced parallel rigid radius arms each pivoted to an upper portion of said body adjacent to the longitudinal center line thereof and extending outwardly beyond the body to opposite sides of said body opening whereby the outer ends of said arms describe vertically oriented arcs lying alongside said body, a generally vertical lift arm pivoted at its upper end to the outer end of each of said parallel arms whereby the upper ends of said lift arms are guided to move upwardly along said arcs, means at the lower ends of said lift arms for detachable engagement with a refuse container, and force means acting between said vehicle body and the pivotal connection between one of said parallel arms and one of said lift arms for moving the parallel arms pivotally upwardly to raise an engaged container to said opening.

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