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3,278,059

LIFT AND DUMP APPARATUS FOR REFUSE CONTAINERS

Filed Nov. 16, 1964

5 Sheets-Sheet 1

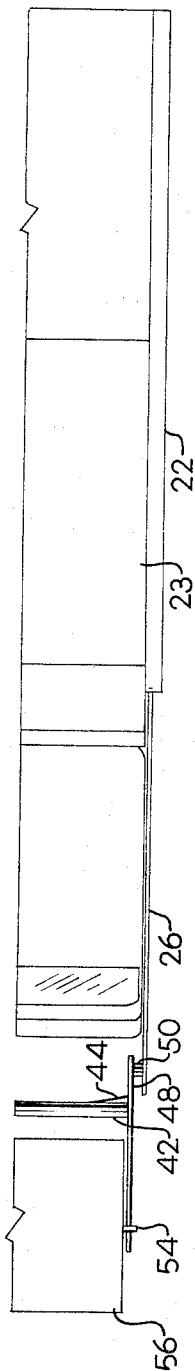


FIG. 2

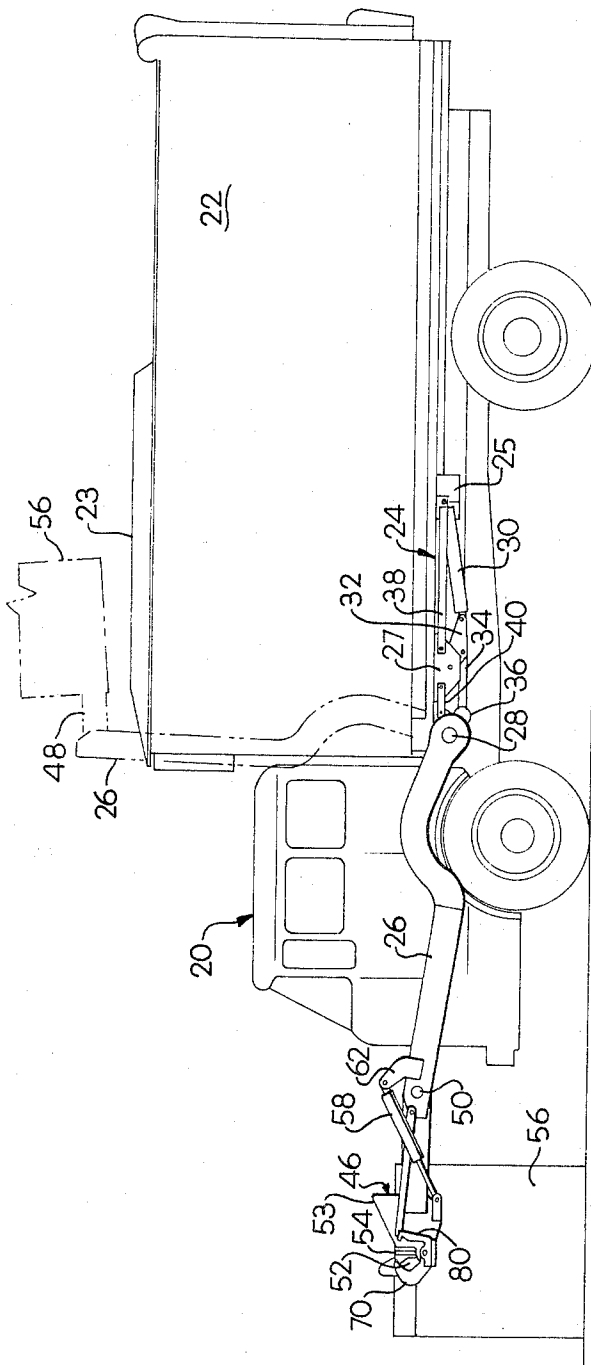


FIG. 1

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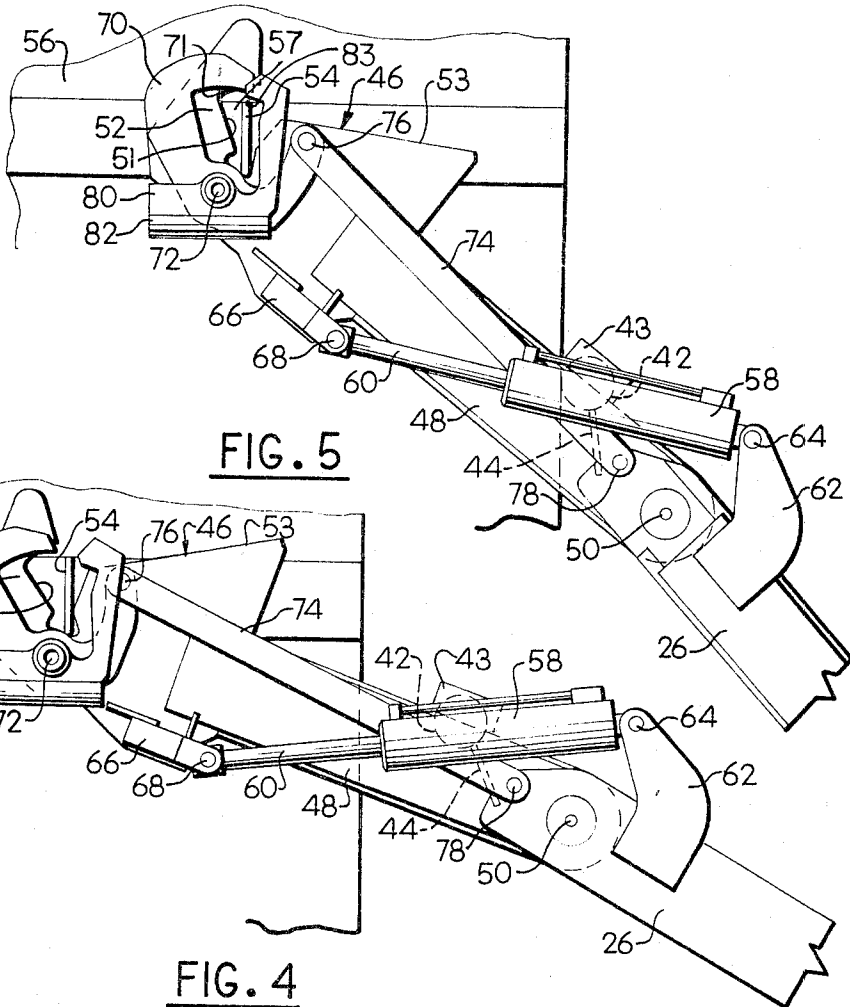


FIG. 5

FIG. 4

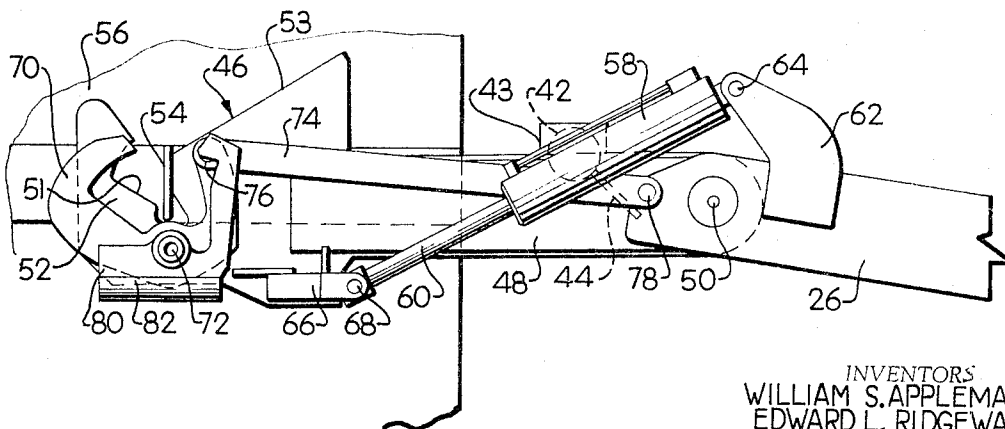


FIG. 3

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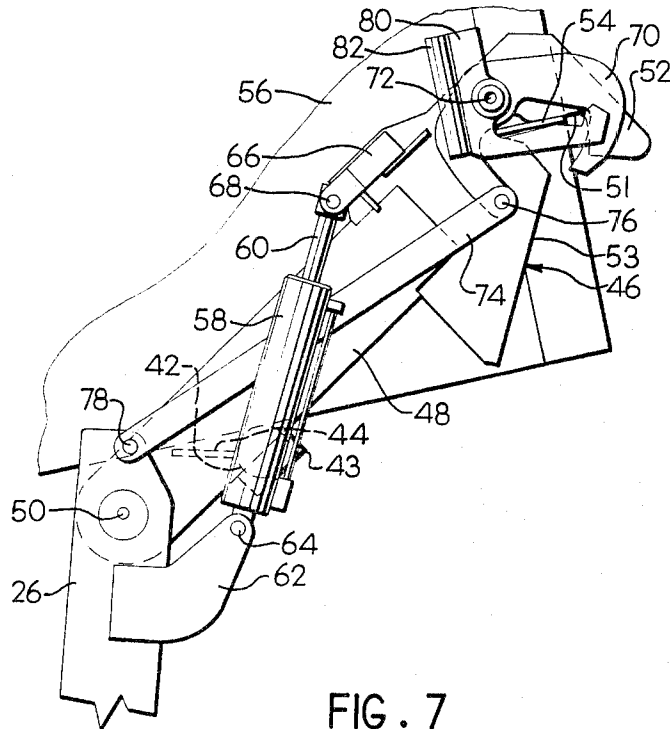


FIG. 7

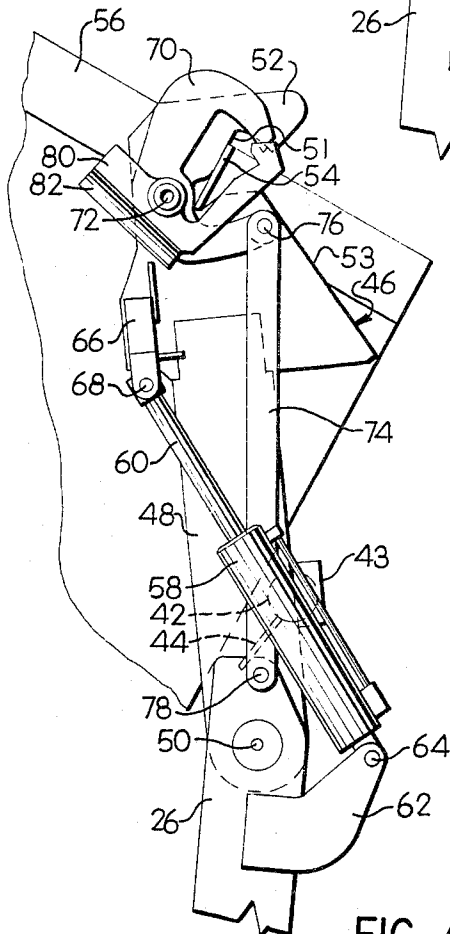


FIG. 6

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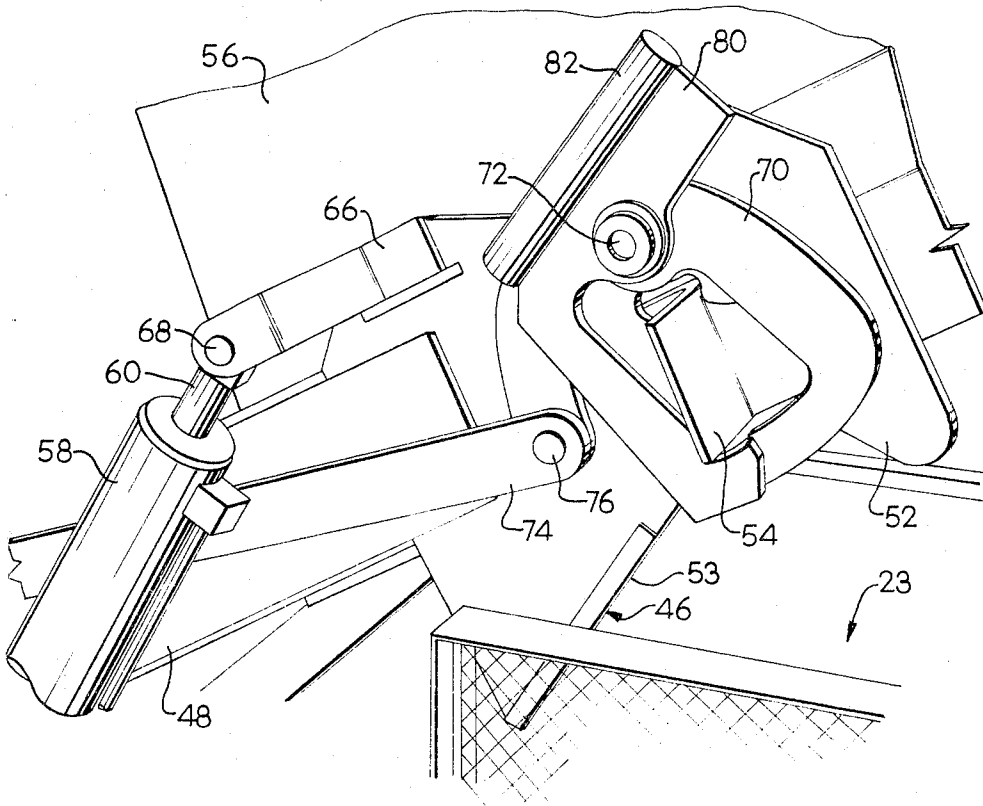


FIG. 9

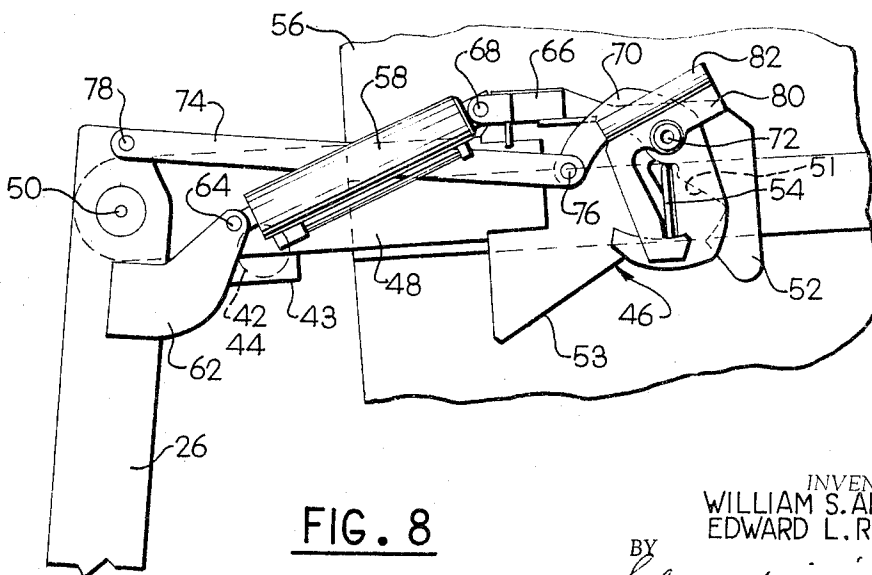


FIG. 8

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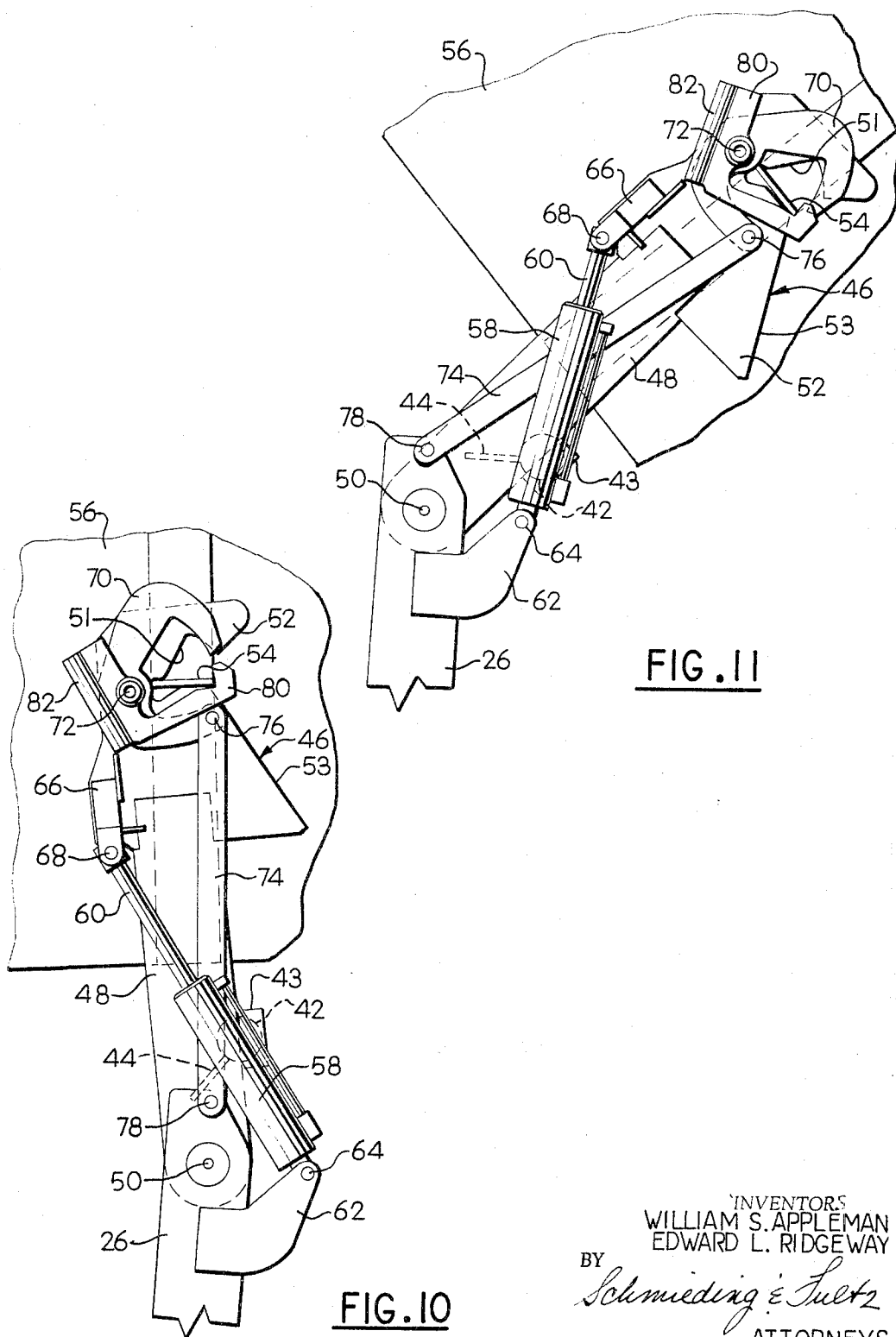


FIG. 11

FIG. 10

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LIFT AND DUMP APPARATUS FOR REFUSE CONTAINERS

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Filed Nov. 16, 1964, Ser. No. 411,244
10 Claims. (Cl. 214-302)

The present invention relates generally to lift and dump apparatus and particularly to an improved front loading apparatus for lifting and dumping waste into a specially adapted vehicle.

The disposal of waste materials presents a constant problem in present day industrial plants, restaurants, and other establishments having a large quantity of waste. Efforts have been made which successfully have incorporated lift and dump apparatus on disposal trucks adapted to lift and dump standardized waste containers. But the efforts made to reduce expense in this area have brought about the use of larger containers which must be handled just as efficiently as smaller containers.

A most serious problem in handling the larger containers is created during the dumping operation by at least two container load conditions. One such condition is created when the container is initially loaded so as to become top-heavy, for example, when the container is partially filled with paper and a much heavier waste material is placed on top. The second troublesome top-heavy condition occurs during the dumping operation when part of the contents of the container fail to fall out and become lodged within the upper portion of the container or entangled with the container lid. In the second instance, when the operator attempts to put the container through another dumping cycle to dislodge the residual refuse, the now top-heavy container prematurely overturns before the main hook is fully closed to lock in the container lift lug. As a result the container falls into the truck hopper causing much delay and expense in removing the same.

In general, the lift and dump apparatus of the present invention comprises a support means adapted to be attached to a suitable vehicle, a pair of lift arms pivotally connected to the supported means, power means to move the lift arms between horizontal and vertical positions, latch means, and a container provided with lug means for engagement with said latch means. A main locking means is provided to secure the container engagement and safety hooks are provided to give added assurance of secure container engagement even under adverse container load conditions.

In accordance with the present invention, an improved lift and dump apparatus has been constructed to eliminate the hazard created by the above mentioned top-heavy container load conditions.

As another aspect of the present invention, a gravity operated, self-latching safety hook construction is utilized to at all times function as a secondary container locking means in the event of failure of the main locking means and which also functions to maintain containers in latched engagement under the previously mentioned unusual top-heavy load conditions.

As another aspect of the present invention, the improved latching means combined with an improved linkage means provides the versatility to efficiently lift and dump waste containers of all standard sizes.

As another aspect of the present invention, the improved construction of the self-catching latch means permits easier

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engagement with the container thereby providing a faster dumping operation which reduces costs.

As another aspect of the present invention, the novel configuration of the slot in the jaw portion of the latch means permits automatic self-leveling of the container during its ascent to the pre-dumping position and thereafter aids the tilting of the container when the latch means is actuated to rotate the container into the overturned dumping position.

As a further aspect of the present invention, the improved relatively simple construction of the latching means lends itself to economical manufacture and fabrication.

It is, therefore, an object of the present invention to provide an apparatus of the type described which utilizes a novel safety hook construction to eliminate the hazard created by the previously mentioned top-heavy container load conditions.

It is another object of the present invention to provide apparatus of the type described which has a safety hook construction which will at all times insure container engagement in the event that the main locking means should mechanically fail.

It is another object of the present invention to provide an apparatus of the type described which has the versatility to lift and dump waste containers of all standardized sizes.

It is another object of the present invention to provide an apparatus of the type described which reduces the time involved in the dumping procedure to minimize operational costs.

It is still another object of the present invention to provide an apparatus of the type described which provides automatic self-leveling engagement of the container while it is being lifted to a position above the vehicle prior to dumping.

It is a further object of the present invention to provide an apparatus of the type described of improved simple construction which minimizes mechanical failure of components and may be economically manufactured and fabricated.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred form of embodiment of the invention is clearly shown.

In the drawings:

FIG. 1 is a side elevational view of a waste disposal truck with lift and dump apparatus constructed in accordance with the present invention attached thereto;

FIG. 2 is a partial top plan view illustrating one side of the lift and dump apparatus of the present invention;

FIG. 3 is a partial side elevational view illustrating the latch means of the present invention at the initial state of engagement with the waste container;

FIG. 4 is a view similar to FIG. 3 but illustrating the container as it is initially raised toward the final dumping position;

FIG. 5 is a view similar to FIG. 3 but illustrating the container in a position further advanced toward the final dumping position;

FIG. 6 is a view similar to FIG. 3 but illustrating the container in a pre-dumping position wherein the lift arms are at their uppermost position;

FIG. 7 is a view similar to FIG. 6 but illustrating the initial position of the container as the latch means begins to rotate at the start of the actual dumping procedure and the position of the safety hook which insures en-

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gement of the container from the latch means at this position;

FIG. 8 is a view similar to FIG. 7 but illustrating the container in the completely overturned dumping position with the latch means fully rotated and the main locking means as well as the safety hook securing the engagement between the latch means and container;

FIG. 9 is a partial perspective view of the latch means and container in the rotated dumping position.

FIG. 10 is a view similar to FIG. 6 but illustrating the position of an unstable top-heavy container when the lift arms are at their uppermost position. The container is shown overturned to a greater degree than the stable container illustrated in FIG. 6; and

FIG. 11 is a view similar to FIG. 10 but illustrating the initial position of the unstable container as the latch means begins to rotate at the start of the actual dumping procedure and the position of the safety hook which insures engagement of the container from the latch means at this position.

Referring in detail to the drawings, a front loading lift and dump apparatus constructed in accordance with the present invention is illustrated in FIG. 1 mounted to a waste disposal truck, indicated generally at 20 provided with a body 22 having an open top 23.

A support frame, indicated generally at 24, is provided on the lower portion of body 22 and includes brackets 25 and 27. An identical pair of lift arms 26 are mounted to opposite ends of a rotatable shaft 28 which is operatively connected to frame 24. Power means, in the form of a hydraulic cylinder and piston 30 are operatively connected to shaft 28 by link 32, lever rod 34 and link 36. Suitable hydraulic controls, not illustrated, are connected to cylinder 30 and disposed in the cab of truck 20 by which shaft 28 and arms 26 may be rotated from the horizontal position to the vertical position shown in FIG. 1. A rear strain rod 38 connected to brackets 25 and 27 and a front strain rod 40 connected to bracket 27 and frame 24 are provided to distribute the load and give added support to the lift assembly.

As best seen in FIG. 2 and FIG. 3, a bar 42 is transversely connected between leg portions 48 and mounting pad 43 and reinforced by a gusset 44.

A latch means, indicated generally at 46, includes the jaw portion 52 and the leg portion 48 which is pivotally mounted to the end of arm 26 by pivot pin 50. Jaw portion 52 is provided with a slot 53 for engaging a lug 54 provided on the side of a waste container 56.

A second power cylinder 58 including piston rod 60 is connected to a bracket 62 on arm 26 by pin 64 and to bracket 66 on latch means 46 by pin 68. Power cylinder 58 is also connected to hydraulic controls disposed in the cab of truck 20 and operates to pivot leg portion 48 from the position shown in FIG. 6 to the position shown in FIGS. 8 and 9 wherein the container is virtually completely overturned into a dumping position.

The lift arm and latch means assembly is identical on the opposite side as that shown and described in FIGS. 1 through 9.

A main hook 70 is pivoted to jaw portion 52 by pivot pin 72 and to a connected link 74 by pin 76, best seen in FIG. 5. Main hook 70 includes a main lug engaging shoulder 71 that is movable across slot 57 for retaining container lug 54 therein. Connecting link 74 is also pivoted to the end of arm 26 by a pivot pin 78. The contraction of piston rod 60 by power cylinder 58 actuates latching means 46 to pivot through the positions shown in FIGS. 7 through 9. Connecting link 74 actuates hook 70 to pivot clockwise to the locking position illustrated in FIG. 8 to lock the engagement between lug 54 and jaw portion 52.

A gravity operated, self-latching safety hook 80 includes a counterweight portion 82 and is pivoted to jaw portion 52 by a pivot pin 72. Safety hook 80 includes

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a safety lug engaging shoulder 83 that is movable across slot 57 for retaining container lug 54 therein. It is important to point out that safety hook 80 performs the function of solely locking the engagement of jaw portion 52 to lug 54 under two circumstances.

The first occurs when unusual load conditions render container 56 top-heavy and causes it to partially overturn before main hook 70 is actuated to pivot to a locking position as illustrated in FIGS. 10 and 11.

Referring specifically to FIGS. 10 and 11, the position of an unstable top-heavy container is illustrated at the same lifting stage as illustrated in FIGS. 6 and 7 for a stable container. However, in FIGS. 10 and 11 the center of gravity of the container is above lugs 54 which causes the container to prematurely tilt.

The second circumstance where safety hook 80 solely performs the locking function occurs when main hook 70 fails mechanically under normal load conditions to perform the locking function.

In operation, the driver of the truck approaches the container to be dumped with lift arms 26 in a position wherein latch means 46 are disposed lower than lugs 54 on container 56. As arms 26 approach the container 56, bar 42 acts as a stop to automatically position the slot in jaw portion 52 or sloped portion 53 under lugs 54. The driver then actuates cylinders 30 to raise arms 26 and cause lugs 54 to slip into the slot of jaw portion 52. Container 56 is then securely engaged to jaw portion 52 and remains in the stable vertical position shown in FIGS. 3 through 5 as arms 26 continue to rise.

It is important to point out that the shape of the slot, particularly the wide bottom, provides automatic self-leveling of the container during its ascent through the position illustrated in FIG. 5. In the position of the stable container as shown in FIGS. 6 and 7, shoulder 51 of jaw portion 52 engages the side of lug 54 and aids in tilting the container as seen in FIGS. 6 and 7.

Under normal load conditions in the container 56, it is stable and relatively upright as seen in FIG. 6 and the driver simply actuates power cylinder 58 to retract piston 60 which pivots latch means 46 clockwise to tilt container 56 to the dumping position illustrated in FIG. 8. Simultaneously to the pivoting of latch means 46, main hook 70 is pivoted by the action of connecting link 74 to hook lug 54 and lock the engagement between lug 54 and jaw portion 52.

Gravity operated safety hook 80, being freely pivoted, also hooks lug 54 to lock the engagement between lug 54 and jaw portion 52 and operates prior to main hook 70 as seen beginning in FIG. 5. If there were a mechanical failure in the operation of main hook 70 at this time, it is understood that safety hook 80 would prevent container 56 from falling into the opening 23 of body 22. It is important to point out that safety hook 80 is always disposed in a self-latching position by counterweight portion 82 so that it acts independently of main hook 70 to engage lug 54.

However, if the previously mentioned top-heavy load conditions occur as illustrated in FIG. 10 and FIG. 11, the lugs 54 roll away from shoulder 51 as the container partially overturns because the center of gravity of the container is above lugs 54. This partial overturning occurs before main hook 70 is actuated and safety hook 80 functions as the sole lock for the engagement between lugs 54 and jaw portion 52 to prevent container 56 from falling into body 22. Then latch means 46 and main hook 70 are actuated as described above to completely overturn container 56 and perform the locking function.

It is important to point out that it is impossible for the driver to always be aware of the conditions which promote the premature overturning of container 56 and without safety hook 80, the container would fall into opening 23 to cause costly salvage and repair problems. The present invention removes the danger of this problem and increases the safety of the operation.

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While the form of embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

We claim:

1. Material lifting and dumping apparatus for a front-loading vehicle provided with an open top receptacle comprising, in combination, support means attached to said vehicle; a pair of lift arms pivotally connected to said support means; latch means pivotally mounted on the ends of said arms including normally vertically disposed slot means; a container provided with outwardly extending lug means on opposite sides thereof for slideable engagement with said slot means; means for moving said arms and said latch means into engagement with said lug means and for lifting said container into an overturned dumping position over said open top receptacle; main hook means mounted on said latch means and including a main lug engaging shoulder movable across said slot means between an open and a closed position for retaining said lug means in said slot means; and safety hook means mounted on said latch means and including a safety lug engaging shoulder movable across said slot means for safety engagement with said lug means during movement of said main lug engaging shoulder between said positions.

2. The apparatus defined in claim 1 wherein said safety hook means includes a counterweighted portion which automatically positions said safety hook for locking engagement with said lugs when said container is overturned.

3. Material lifting and dumping apparatus for a front-loading vehicle provided with an open top receptacle comprising, in combination, support means attached to said vehicle; a pair of lift arms pivotally connected to said support means; latch means pivotally mounted on the ends of said arms including normally vertically disposed slot means; a container provided with outwardly extending lug means on opposite sides thereof for slideable engagement with said slot means; means for moving said arms and said latch means into engagement with said lug means and for lifting said container into an overturned dumping position over said open top receptacle; main hook means pivotally mounted on said latch means and including a main lug engaging shoulder movable in one direction across said slot means between an open and a closed position for retaining said lug means in said slot means; safety hook means pivotally mounted on said latch means and including a safety lug engaging shoulder movable in the other direction across said slot means for safety engagement with said lug means during movement of said main lug engaging shoulder between said positions.

4. Material lifting and dumping apparatus for a front-loading vehicle provided with an open top receptacle comprising, in combination, support means attached to said vehicle, a pair of lift arms pivotally connected to said support means; latch means pivotally mounted on the ends of said arms including normally vertically disposed slot means; a container provided with outwardly extending lug means on opposite sides thereof for slideable engagement with said slot means; power means operatively connected to said arms for moving said arms and said latch means into engagement with said lug means and for lifting said container vertically; means operatively connected to said arms and said latch means to pivot said latch means and said container into an overturned dumping position; main hook means pivotally connected to said latching means and including a main lug engaging shoulder movable across said slot means between an open end and a closed position for retaining said lug means in said slot means; link means pivotally connected to said arms and said main hook means for pivoting said main hook means into locking engagement with said lug means when said latch means is pivoted into said dumping position; safety hook means mounted on said latch means and including a safety lug engaging shoulder movable across said slot means for safety en-

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gagement with said lug means during movement of said main lug engaging shoulder between said portions.

5. Material lifting and dumping apparatus for a front-loading vehicle provided with an open top receptacle comprising, in combination, support means attached to said vehicle, a pair of lift arms pivotally connected to said support means; latch means pivotally mounted on the ends of said arm and including slot means; a container provided with outwardly extending lug means on opposite sides thereof for slideable engagement with said slot means; power means for moving said arms between a horizontal position wherein said latch means engage said lug means and a vertical pre-dumping position wherein said container is partially overturned; safety hook means mounted on said latch means and including a safety lug engaging shoulder movable in one direction on said latch means for engagement with said lug means to prevent disengagement of said lug means from said latch means when said container is lifted to said pre-dumping position; means operatively connected to said arms and said latch means to effect the further pivoting of said container from said pre-dumping position to a virtually completely overturned dumping position; and main hook means mounted on said latch means and including a main lug engaging shoulder movable in one direction on said latch means for locking said engagement between said lug means and said latch means when said container is pivoted from said pre-dumping position to said dumping position.

6. Material lifting and dumping apparatus for a front-loading vehicle provided with an open top receptacle comprising, in combination, support means attached to said vehicle, a pair of lift arms pivotally connected to said support means; latch means pivotally mounted on the ends of said arms including normally vertically disposed engagement means connected on the outer portion of said latch means; a container provided with outwardly extending lug means on opposite sides thereof for secure slideable engagement with said engagement means; power means operatively connected to said arms for moving said arms between a horizontal position wherein said latch means engage said lug means and a vertical pre-dumping position wherein said container is partially overturned; gravity operated self-latching safety hooks pivotally mounted on said latch means and including safety lug engaging shoulders movable across said slot means for engagement with said lug means to prevent the disengagement of said lug means from said latch means when said container is lifted to said pre-dumping position; power cylinders operatively connected to a respective one of said arms and said latch means for further pivoting of said container from said pre-dumping position to a dumping position wherein said container is virtually completely overturned; and main hook means pivotally connected to said latch means and including a main lug engaging shoulder movable across said slot means between an open and a closed position for retaining said lug means in said slot means when said container is pivoted from said pre-dumping position to said dumping position.

7. The apparatus defined in claim 1 wherein said engagement means include an approximately U-shaped slot for receiving said lug means and automatically leveling said container during its ascent toward said dumping position.

8. The apparatus defined in claim 1 wherein said engagement means include an approximately U-shaped slot provided with a pair of shoulders; and said lug means include a lower edge and an upper shoulder spaced such that said lower edge engages the bottom of said U-shaped slot and said upper shoulder extends above said shoulders of said slot.

9. The apparatus defined in claim 3 wherein said engagement means include an approximately U-shaped slot for receiving said lug means and automatically leveling said container during its ascent toward said dumping position.

10. The apparatus defined in claim 3 wherein said engagement means include an approximately U-shaped slot provided with a pair of shoulders; and said lug means include a lower edge and an upper shoulder spaced such that said lower edge engages the bottom of said U-shaped slot and said upper shoulder extends above said shoulders of said slot.

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References Cited by the Examiner
UNITED STATES PATENTS

2,828,032	3/1958	Beasley et al.	214—302
2,885,101	5/1959	Aldredge et al.	214—302
3,085,702	4/1963	Aldredge et al.	214—302
3,217,913	11/1965	Aldredge et al.	214—302

HUGO O. SCHULZ, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,278,059

October 11, 1966

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It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 2, for "portions" read -- positions --.

Signed and sealed this 12th day of November 1968.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents