

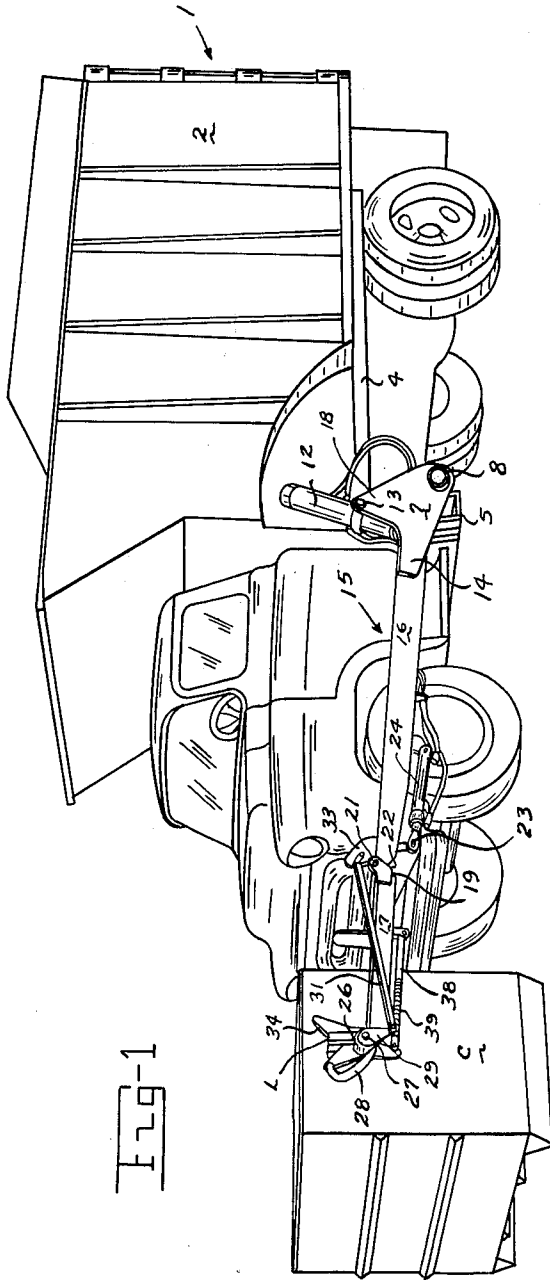
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H. D. ALDREDGE ET AL
MATERIAL HANDLING DEVICE

3,085,702

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3 Sheets-Sheet 1



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3 Sheets-Sheet 2

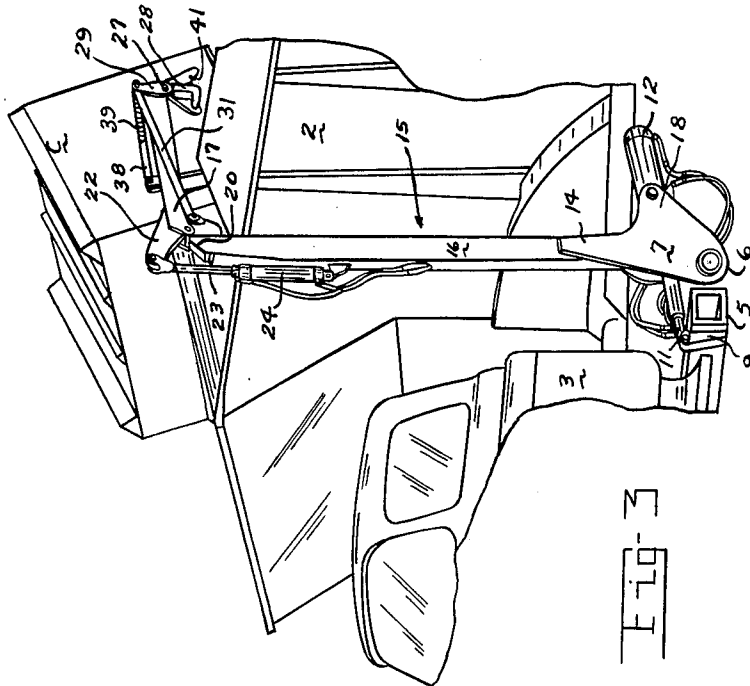


FIG-3

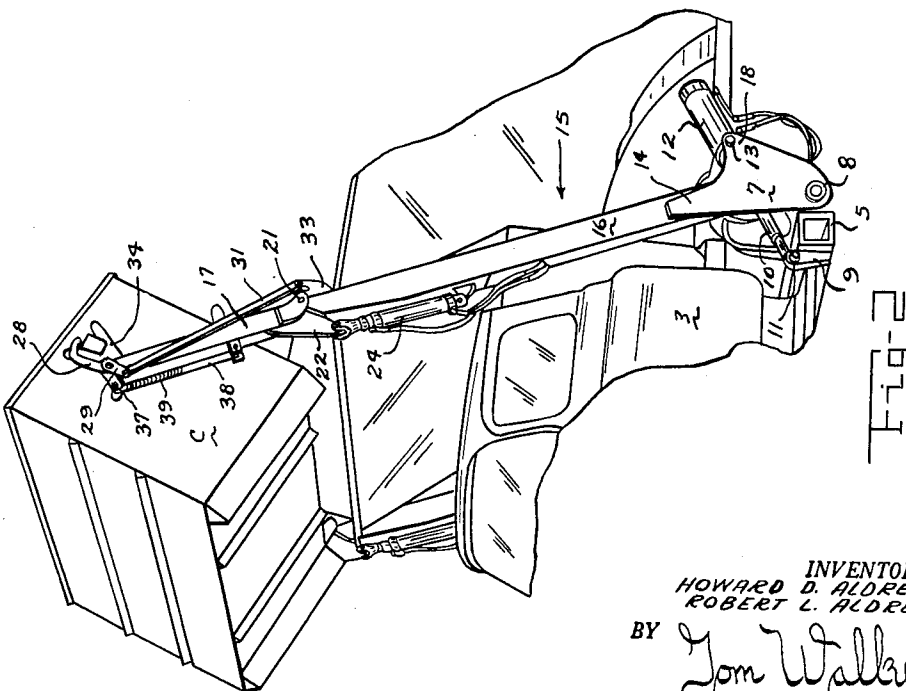


FIG-2

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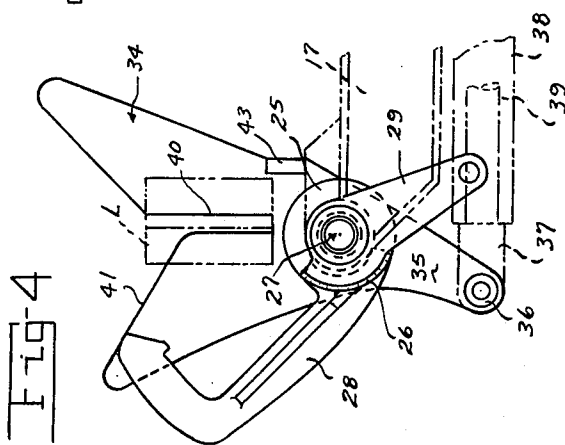
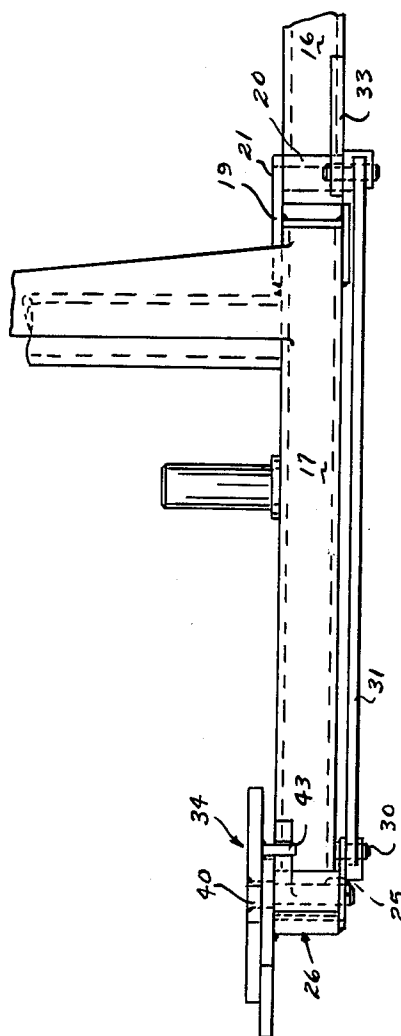
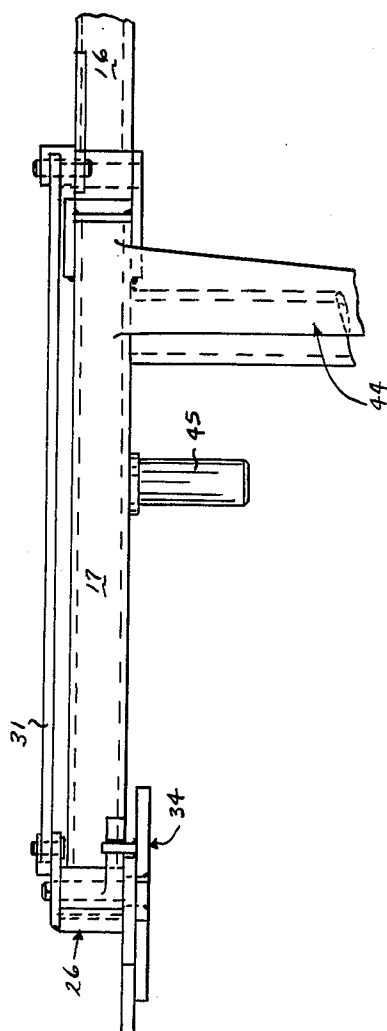
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3,085,702

MATERIAL HANDLING DEVICE

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1 Claim. (Cl. 214-302)

This invention relates to material handling apparatus and more particularly to lifting and dumping equipment.

The invention is particularly applicable to mobile waste disposal units and will be described with reference thereto. However, it will be readily obvious to those versed in the art that its application is not so limited, nor is such specific limitation intended.

The handling of waste and the movement thereof has long been a problem. With the advent of present day trucks which move from place to place to pick up accumulated waste, the efficiency of waste disposal has improved somewhat. However, manual labor is still generally necessary for carrying the waste to and dumping it into the trucks. Present day industrial plants have such large waste problems that manual handling of waste is impractical and highly expensive. In the search for a practical solution to this problem, separate lift equipment has been employed to dump waste into disposal trucks and the like. Due to the equipment expense and inventory involved, however, efforts have been made to effect an efficient inclusion of lift and dump apparatus in the disposal trucks themselves. Improvements have been effected thereby, but practical problems have evidenced themselves in this area indicating further need for simplicity and economy in the fabrication of such apparatus and the elimination of mechanical failures.

A primary object of the present invention is to provide improvements in lift and dump apparatus whereby such apparatus may not only be economically manufactured, but will be more efficient and satisfactory in use, adaptable to a wide variety of applications and be unlikely to get out of repair.

The present invention provides improvements in front loading lift and dump equipment. In its preferred embodiment, it is integrally incorporated in a waste disposal truck. Waste containers are employed at the pick-up sites whereby the truck can be driven to such sites, the lift apparatus lowered to automatically engage the containers and lift and dump the waste into the trucks without lost time or motion. The containers are replaced and no hands touch the waste or containers in the process. The operation involves a matter of seconds. The invention apparatus is directly controllable, positive in operation and simple to maintain. It thereby offers distinct advantages over similarly applied equipment of the prior art.

Another object of the invention is to provide simplified positive acting lift and dump apparatus particularly applicable for integration in waste disposal trucks.

A further object of the invention is to provide front loading apparatus which has improved container engagement means insuring quick, positive and automatic engagement of container and proper disposition of such container in a matter of seconds.

An additional object of the invention is to provide improvements in lift and dump apparatus particularly applicable to waste disposal trucks for automatically engaging and lifting waste containers and providing improved lock means automatically operative to prevent disengagement of the container from the lift apparatus during the dumping operation.

Another object of the invention is to provide mobile loading apparatus having lift arms connected in an improved articulated fashion.

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A further object of the invention is to provide improvements in waste disposal trucks or similarly functioning apparatus whereby waste may be automatically loaded and dumped in one efficient and highly economical operation with no human hand touching the waste or its containers in the process.

An additional object of the invention is to provide lifting and dumping apparatus possessing the advantageous structural features, the inherent meritorious features and the mode of operation herein described.

With the above and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing wherein is shown one but obviously not necessarily the only form of embodiment of the invention,

FIG. 1 is a general perspective view of a disposal truck employing a practical embodiment of the invention in the process of lifting a waste container;

FIG. 2 is a fragmentary perspective view showing the lift and dump apparatus of FIG. 1 in raised position preliminary to dumping;

FIG. 3 is a view similar to FIG. 2 but showing the dumping position of the invention apparatus;

FIG. 4 is a fragmentary detail view of the container engagement device employed in the lift apparatus of FIG. 1; and

FIG. 5 is a top fragmentary view of the lift arms of the invention embodiment showing their relation to a waste container as in FIG. 1.

Like parts are indicated by similar characters of reference throughout the several views.

An illustrative embodiment of the invention as shown in FIG. 1 includes a waste disposal truck 1 mounting a waste container body 2 open at the top.

A support frame 4 is provided for the container 2 and a load beam 5 is connected transversely of and in dependent relation to the frame immediately to the rear of the truck cab 3. A bracket 6 projects from the rear face of the beam 5 to either end thereof, immediately outward of the frame 4. To either side of the truck a pair of plates 7 are oppositely and pivotally connected to a bracket 6 by a pin 8. Each pair of plates 7 has a hydraulic cylinder 12 disposed intermediately thereof and generally parallel thereto. Each cylinder 12 is pivotally mounted to the uppermost extension 18 of confining plates 7 by pivoting pins 13 intermediate its extremities. This may be readily observed with reference to FIG. 1 of the drawing. A bracket plate 9 is fixed to the forward face of the beam 5 intermediate and parallel to each pair of plates 7. Each cylinder 12 has a piston operating therein having a rod 10 connected to extend axially from the cylinder and have its bifurcated extremity pivotally connect to a plate 9 by a pin 11.

Suitable hydraulic controls are connected to the cylinders 12 to control the pistons therein from the truck cab 3 so the connected pairs of plates 7 may be pivoted as required relative the beam 5.

The plates 7, as seen in FIG. 1 of the drawings, include identical forwardly and generally horizontally directed arms 14. A lift arm assembly 15 is supported by each pair of plates 7 to either side of truck 1.

The assembly 15 includes a generally rectangular beam 16 having its inner end disposed between plate arms 14 and welded to form an extension thereof. A short extension arm 17 is pivoted to the outer end of beam 16. The connecting ends of the beam 16 and the arm extension 17 normally abut and are mutually sloped downwardly

and inwardly relative the beam 16. Plates 19, fixed to opposite sides of the extension arm 17 at its inner end, are mutually connected to a boss 20 on the projecting upper extremity of the beam 16 by a transverse pivot pin 21. The mutually sloped and pivotally connected ends of the members 16 and 17 enable the extension arm 17 to pivot in a clock-wise direction only from a normal linear disposition relative the beam 16.

A plate 22 is fixed perpendicularly to the under surface of the extension arm 17 at its inner extremity and angled rearwardly to have its inner-most edge about the sloped extremity of the beam 16. Plate 22 is generally triangular and its apex projects downwardly and rearwardly to pivotally connect to the bifurcated extremity of a piston rod 23 connected to a piston operating in a hydraulic cylinder 24. The cylinder 24 is fixed in parallel spaced relation to the under surface of the beam 16. In the normal position of the arm 17, as a linear extension of the beam 16, the piston rod 23 is substantially housed in the cylinder 24. Suitable controls are provided in the structure of cab 3 and related to the piston in cylinder 24 for positively operating the piston rod 23 and effecting a pivoting of the arm 17 to and from a linear disposition relative the beam 16 as will be described.

The outermost extremity of the extension arm 17 is sloped similarly to the projecting extremity of the beam 16 and is provided with a cylindrical boss 25 transversely thereof at its upper surface. An arcuately formed plate 26 bearing on the peripheral surface of boss 25 has a pair of parallel side plates respectively disposed to either end of the boss. The side plates of member 26 and the boss 25 are transversely apertured to receive a pivot pin 27 therethrough whereby arcuate plate 26 is pivotable thereabout.

The side plate of the arcuately formed member 26 to the inner side of the extension arm 17 is provided with an integral hook element 28 which, as shown in FIGS. 1 and 4 of the drawings, is normally disposed forwardly and inclines slightly upwardly of the arm 17. The side plate of member 26 to the outer side of the arm 17 has an integral link portion 29 normally projecting downwardly and rearwardly of the arm 17 to have its depending extremity pivotally connected by a pin 30 to one end of a link bar 31. The other end of the link 31 is directed rearwardly and upwardly relative the arm 17 to pivotally connect to a bracket 33 fixed to the upper surface of the projecting extremity of the beam 16. The connection of the link 31 between the arcuate plate 26 and the beam 16 is such that when the arm 17 is disposed as a linear extension of the beam 16, the hook 28 on the plate 26 is disposed as shown in FIGS. 1 and 4 of the drawing.

To the inner extremity of the pivot pin 27 is fixedly mounted a generally V-shaped plate 34 having a depending extension 35 pivotally connected by a pin 36 to the outer enlarged end of a rod 37. The rod 37 is mounted concentrically of a tubular housing 38 fixed below and in parallel relation to the undersurface of the arm 17. A spring 39 about rod 37 respectively abuts the enlarged end of rod 37 and the housing 38 to normally bias the V-plate 34 to a position generally vertically of the upper surface of extension arm 17.

The inner extremity of the V-notch in plate 34 has a vertical and generally rectangular recess 40 the entrance to which is defined by the inner sloping surfaces 41 of the plate 34 providing the V-notch therein. The plate 34 has a projecting stud 43 normally abutting the upper surface of extension arm 17 rearwardly of the boss 25, being biased thereto under the influence of the spring 39. As may be readily seen, the hook 28 is normally disposed counterclockwise and clear of the V-notch in the plate 34.

As noted previously, the lift arm assembly 15 to either side of the truck is identical in structural detail. The extension arms 17 are rigidly connected adjacent to their inner pivoted extremities by a transverse rod member 44. Spaced forwardly of the rod 44, studs 45 are provided

parallel thereto and respectively projecting in opposite fashion from the inner sides of the arms 17.

The described embodiment of this invention is particularly applicable for handling and dumping waste containers C having integral T-shaped lugs L oppositely projecting from opposite sides thereof. These containers C are disposed at central locations for accumulation of waste. In the use of the invention embodiment, the trucks 1 are driven to the location of the containers C.

The driver of the truck can dispose the lift arm assemblies 15 generally horizontally and forwardly of the truck by operation of suitable controls in the cab 3 to hydraulically move the pistons in cylinders 12 and thereby pivot the lift arms. The truck is advanced to the container with the lift arm assemblies respectively to either side and in embracing relation to the container. Then arm assemblies 15 are lowered through operation of the pistons in cylinders 12 to dispose the V-shaped plates 34 generally vertically below the T-shaped lugs on the container. The studs 45 projecting inwardly of the extension arms 17 limit the movement of the truck relative the container and insure that the T-shape lugs L will be engaged by the slopped surfaces 41 of the V-notches in the plates 34 as lift arms 15 are pivoted up. This provides that on suitable operation of the pistons in the cylinders 12, the engaged T-shaped lugs will be caused to slide into the rectangular notches 40 in the V-plates 34 and thereby be securely and specifically supported on the lift arm assemblies. As the lift arm assemblies are raised by suitable operation of hydraulic controls, the resilient mounting of the plates 34 maintains the stability of the container relative the lift arms.

As the lift arm assemblies are moved up to approach a vertical position over the truck cab 3, the container influences a counterclockwise pivot of the V-plates 34 to cause compression of springs 39 and dispose lugs L under hooks 28. Controls within the cab 3 are then operated to cause the pistons in the hydraulic cylinders 24 to move and effect an extension of the piston rods 23. The rods 23, acting through the connecting plates 22, pivot the extension arms 17 about pins 21 and relative the beams 16 in a clockwise direction. As this occurs, the rigid links 31 connecting the beams 16 and plates 26 bearing on the bosses 25 of arms 17 positively pivot the plates 26 and the connected hooks 28 to drive the hooks against the lugs L and positively contain them in the rectangular notches in the V-plates 34. Further movement of arms 17 causes links 31 to impose sufficient force through lugs L to pivot V-plates 34 clockwise and incline the container sufficiently to dump its contents in the body 2 of the truck. This operation is positive and direct due to the simple relationship of the linkages involved. The lift arms and their components are fully powered from the truck cab 3 and the support of the arms to their pivots 8 spaced rearwardly of the beam 5 on the truck and the pivotal connection of the hydraulic control cylinders 12 to the lift arms assemblies and through their piston rods to the beam 5 insures a continuously stabilized and substantial balanced relation of the lift arm assemblies to the truck frame. The load, instead of being borne completely by the lift arm assemblies, is efficiently transmitted back to the truck frame due to the effective relationship of this structure described. The container C is returned to the place from which it was lifted merely by reversing the control of the pistons in the cylinders 24 to once more bring the extension arms 17 into linear relation to the beams 16 and the whole assembly replaces the container C by operation of the pistons in the hydraulic cylinders 12.

The invention thus reduces the lift and dump apparatus in its integrated relation to the mobile unit 1 to the barest and simplest of mechanical essentials. The locking of the container C in the dumping movement is positively controlled and not dependent on any gravity op-

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eration. Moreover, the pivoting of the extension arms 17 relative the beam 16 is simple and direct. In addition, the approved lock assembly at the ends of the extension arms 17 for engaging and locking the container to the lift arm assemblies again is highly simplified yet automatic and effective to produce the desired results. The simplicity of the invention structure leaves little room for mechanical failure.

While the lift and dump apparatus of the subject invention is put forth as novel in its embodiment in integrated relation to a waste disposal truck, it will be readily recognized by those versed in the art that the application of the invention is not so limited nor is such intended.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms

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or modifications within the legitimate and valid scope of the appended claim.

Having thus described our invention, we claim:

- Lift and dump apparatus for use on a container having oppositely directed lugs to opposite sides thereof including, a support means, a pair of arms connected to said support means and operable for horizontal projection thereof to the container, means for lowering said arms as opposite sides of the container are approached thereby, resiliently mounted means on the ends of said arms vertically receiving the lugs on the container and including means providing a rotary self-adjustment of the container relative to said arms, and means extending laterally from said arms and engageable with the body of the container defining limit means for advancement of said arms relative to the container and insuring the engagement of the lugs by said self-positioning means at the ends of the said arms.

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