United States Patent [19]

Updike, Jr.

[11] **3,762,586**

[45] **Oct. 2, 1973**

[54] **REFUSE COLLECTION VEHICLE**

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[52] **U.S. Cl.** ..... **214/302,** 214/518, 214/147 G

[51] **Int. Cl.** **B65f 3/02**

[58] **Field of Search** 214/152, 302, 303, 214/314, 315, 518

[56] **References Cited**

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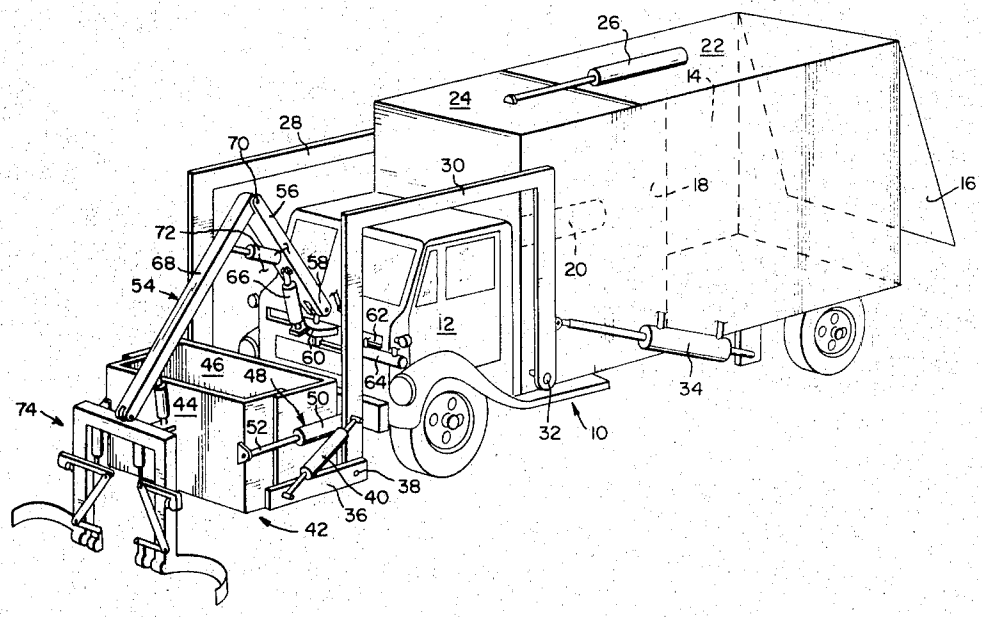
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Primary Examiner—Gerald M. Forlenza
Assistant Examiner—Lawrence J. Oresky
Attorney—Edward J. Brenner et al.

[57] **ABSTRACT**

An improved refuse collection vehicle is disclosed which a single operater can both steer and load without dismounting from the driver's seat. The present vehicle has a boom assembly mounted on the vehicle at a position where it can be observed by the driver and is arranged to grasp either bags or containers and deposit the bags or the contents of the containers into a front loading bin. The front loading bin is adapted to be contracted to initially compact the collected refuse and then dump the compacted refuse into the main body of the vehicle for subsequent final compaction.

14 Claims, 4 Drawing Figures



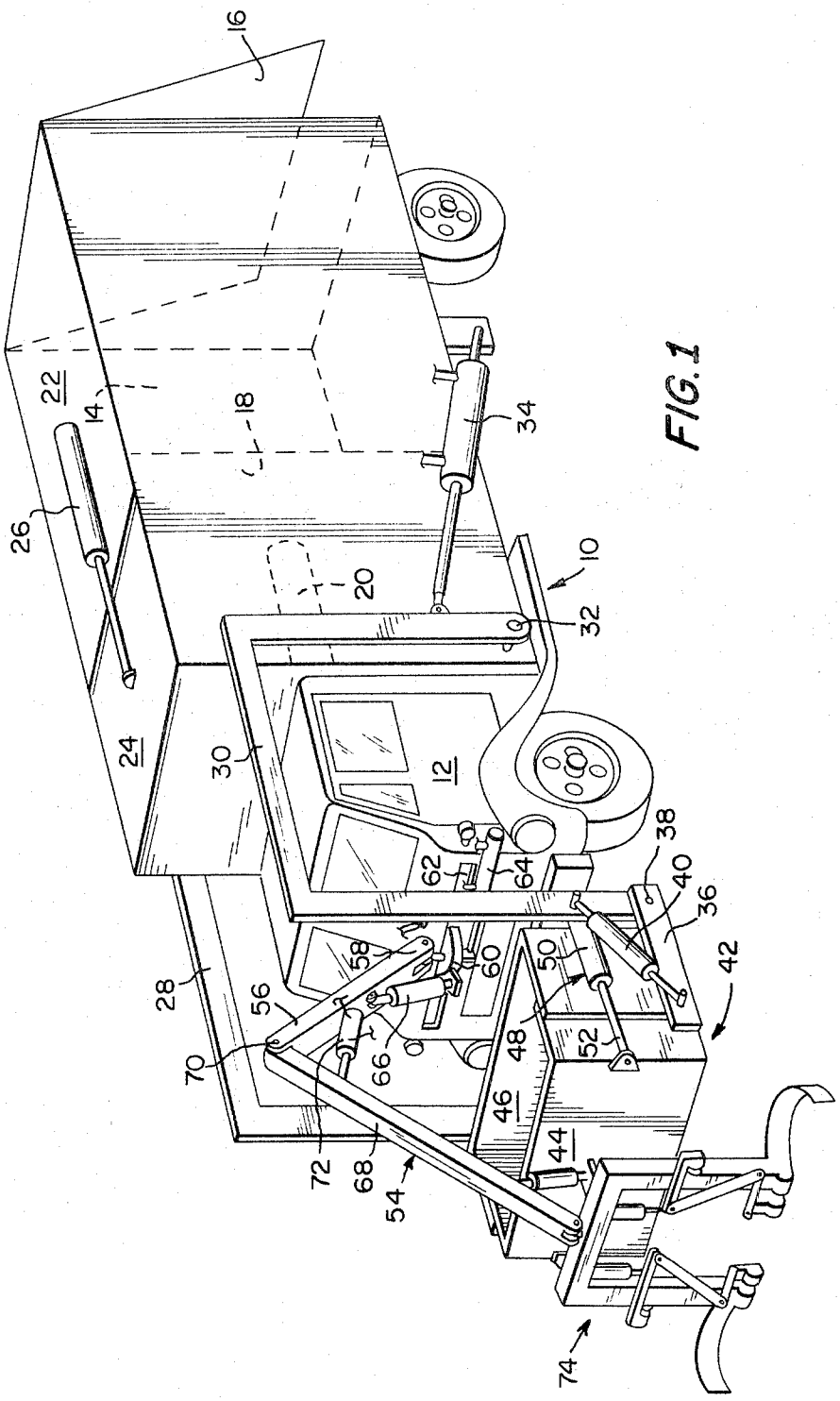

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FIG. 1

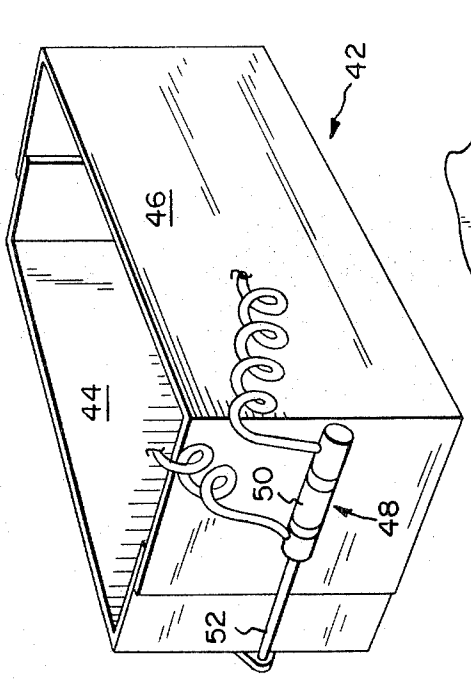


FIG. 2

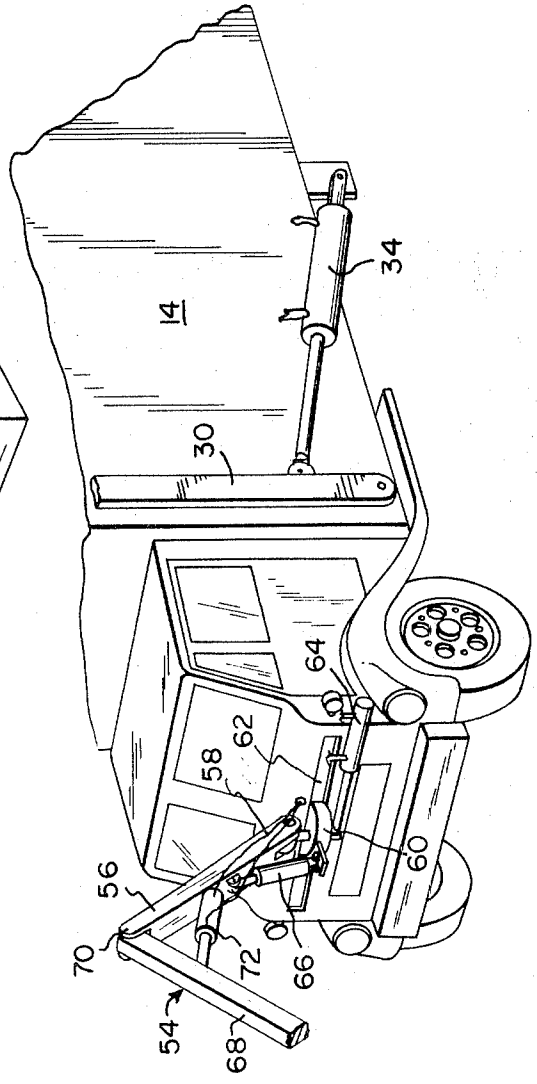


FIG. 3

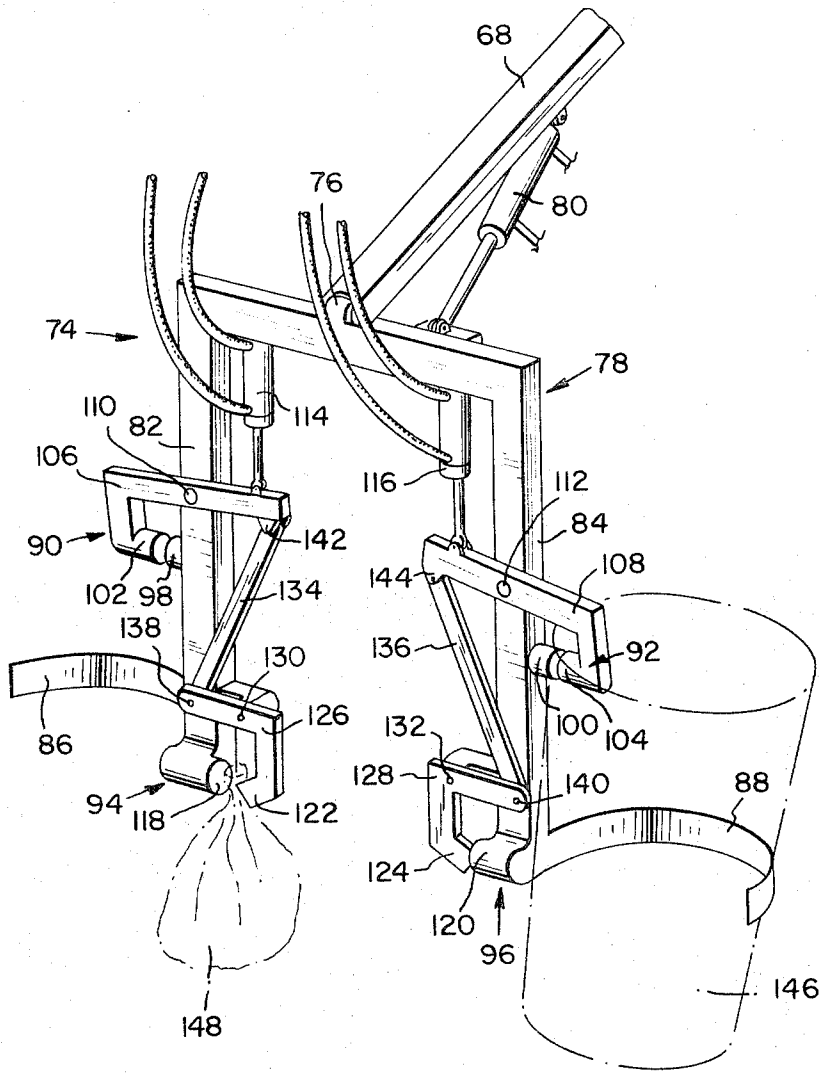

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FIG. 4

REFUSE COLLECTION VEHICLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a refuse collection vehicle and in particular to a refuse collection vehicle which substantially eliminates the need for help of personnel outside the vehicle to accomplish the loading thereof.

2. Description of the Prior Art

The collection of refuse throughout cities and towns has long been a problem that has recently received much attention. The present increased interest in ecology has tended to accelerate the interest in this field. Also the present unfortunate tendency to avoid many endeavors involving manual labor, and in particular one which may be associated with disagreeable odors, as with refuse collection, has prompted much investigation into the area of mechanizing refuse collection.

Some early attempts were made to ease the burden of refuse collection workers such as U. S. Pat. No. 1,492,675 which disclosed a mechanized device for raising trash cans and dumping their contents into a collection truck. U.S. Pat. Nos. 1,763,499 and 1,763,560 represented somewhat of an advance in that they allowed for the simultaneous elevating and dumping of a plurality of containers from either or both sides of the vehicle. Operation of all of the above discussed devices required that the vehicle have a driver and a several outside assistants to load the containers onto the hoisting device and then actuate the machinary. Other examples of similar devices are found in U. S. Pat. Nos. 2,592,085 and 2,592,324 which used more efficient means for loading but still required the outside helper to position the individual containers on the hoisting means.

The advent of the series of trash collection vehicles such as disclosed by U. S. Pat. No. 2,900,096 was a further advancement in the art of trash collection but required that special load boxes or refuse containers be used at the initial collection point. Other examples of collection vehicles of this sort are found in U. S. Pat. Nos. 3,012,684; 3,147,870; 3,282,453; 3,324,866; and 3,325,024. While these vehicles have proved to be a significant boon to the collection of great quantities of refuse, such as might be found at commercial enterprises, they have done little or no good for the collection of refuse from private dwellings or small commercial units which still use a plurality of individual small trash containers of the 55 gallon and smaller sizes.

U.S. Pat. No. 3,446,377 disclosed a loading device having a boom extending from the truck and a refuse receptacle on the free end of the boom which is capable of receiving either an individual container, such as a 55 gallon drum, or the refuse poured from a plurality of such containers. The loaded boom is operated to dump the refuse into vehicle. However, this device still requires a worker outside the vehicle.

SUMMARY OF THE PRESENT INVENTION

As mentioned above, none of the prior art devices were designed so that the number of personnel could be reduced or that the entire loading operation and in particular the loading of the individual containers could be accomplished by a single operator acting from within the vehicle.

It is therefore an object of the present invention to provide an improved trash or refuse collection vehicle which may be used to collect refuse from individual containers of 55 gallon and smaller sizes with the containers being emptied into a load box by remote control means.

It is a further object of the present invention to provide an improved refuse collection vehicle which can remotely load both individual containers and bags of refuse into a load box which subsequently empties into a main cargo hold of the vehicle.

It is yet another object of the present invention to provide an improved refuse collection vehicle having load box which is capable of contraction to initially compact the collected material.

It is a still further object of the present invention to provide an improved refuse collection vehicle in which individual containers and/or bags are remotely brought to and dumped into a load box, the refuse is initially compacted in the load box and subsequently deposited in a main cargo hold where it is further compacted before being discharged at a central dump.

It is also an object of the present invention to provide a refuse collection truck in which a single operater seated in the vehicle can gather refuse from both individual containers and bags and deposit same in a load box.

It is still another object of the present invention to provide an improved refuse collection vehicle which initially compacts the refuse as it is collected in a load box and subsequentially compacts the entire load in the cargo hold of the vehicle thus making it possible to gather larger amounts of refuse in the vehicle.

Yet another object of the present invention is to provide an improved boom assembly which is remotely operated and has the capability of either engaging at least one container at an upper rim portion or engaging the closed neck of at least one bag of refuse material.

The present invention is characterized by a refuse collection truck having a load box including means to compress the collected material in said box, arm means to move the load box to a position to dump into the main cargo hold portion of the vehicle, and a remotely controlled boom assembly adapted to gather individual containers from either side of the vehicle and deposit the contents thereof into said load box. The boom assembly is also arranged to gasp the neck of trash bags and deposit them in the load box and is operated by a person seated inside the vehicle. The main cargo hold portion of the vehicle is covered by a remotely opened cover, has a main compacting ram therein, and a releasable tailgate which allows emptying of the vehicle through actuation of the main compacting ram.

BRIEF DESCRIPTION OF THE DRAWINGS

The means for accomplishing the foregoing objects and other advantages of the present invention will become clear from the following detailed description of a preferred embodiment taken in connection with the accompanying drawings in which;

FIG. 1 is a perspective view of the refuse collection vehicle of the present invention;

FIG. 2 is a perspective view of the load box only of the refuse collection vehicle of FIG. 1;

FIG. 3 is a detailed perspective view, partially broken away, of the front of the refuse collection vehicle shown in FIG. 1;

FIG. 4 is a perspective view, on an enlarged scale, showing the details of the free end of the boom assembly of the vehicle shown in FIG. 1.

The chassis and body portions of the present refuse collection vehicle are quite similar to a number of known front loading refuse collection vehicles. Therefor these known portions will only be briefly discussed. The vehicle 10 has a cab 12 and a main cargo body or hold 14 which includes a releasable tail gate 16 pivoted at the top of the main body 14, a compacting plate 18 driven rearwardly by main fluid actuated ram 20, and an openable roof 22 including a sliding cover member 22 operated by fluid actuated cover ram 26 in a manner similar to U. S. Pat. No. 3,338,623. A pair of inverted U shaped front loading arms 28 and 30 are pivotally mounted on the chassis at 32 and are drived by fluid actuated loading rams 34. The front loading arms could be straight, as shown for example by U. S. Pat. No. 3,012,684, instead of the inverted U shape as long as they do not bar entrance to the cab 12. The free end of each load arm is provided with a tilt arm 36 pivotally connected to the load arm at 38 and controlled by fluid actuated tilting ram 40.

The present inventive refuse collection vehicle is distinguished from the known vehicles by the load box 42 and boom assembly 54, which will be discussed in detail with particular reference to FIGS. 2 to 4.

A generally rectangular load box 42, shown in detail in FIG. 2, is mounted on the tilt arms 36 and includes interfitting portions 44, 46 controlled for relative movement by fluid actuated compacting rams 48. The compacting rams include a piston-cylinder portion 50 fixed to load box portion 46 and piston rod 52 connected to load box portion 44. The boom assembly 54, see FIGS. 1 and 3, includes a first arm 56 having a first end 58 rotatably and pivotally mounted on control unit 60. The control unit 60 is mounted in slot means 62 for transverse movement of the vehicle, which movement is controlled by fluid actuated transverse ram 64. The control unit includes means (not shown) for rotating the first arm 56 about a vertical axis and a fluid actuated elevating ram 66 for rotating the first arm 56 about a horizontal axis. A second arm 68 has one end pivotally connected to first arm 56 at 70. A fluid actuated draw ram 72 is connected between first arm 56 and second arm 68. A grab assembly 74, see FIG. 4, is mounted on the free end of second arm 68 by pivot 76 and includes a frame member 78 rotated about the pivot 76 by a fluid actuated dump ram 80 connected between the frame member 78 and second arm 68. The frame member 78 includes two parallel depending arm portions 82 and 84 each terminating in an outwardly directed arcuate guide member 86, 88 and having upper clamping means 90, 92 and lower clamping means 94, 96 mounted thereon. The upper clamping means 90, 92 each include a fixed jaw 98, 100 mounted on arm portions 82, 84 respectively, and a movable jaw 102, 104 formed by one end of clamp arms 106, 108 pivotally mounted on arm portions 82, 84 at 110, 112. Fluid actuated clamping rams 114, 116 are connected between the frame member 78 and clamp arms 106, 108, respectively. The lower clamping means 94, 96 each include a fixed jaw 118, 120 and a movable jaw 122, 124 formed on the end of crank arm 126, 128 pivoted at 130, 132 to the free ends of arm portions 82, 84, respectively. Drive arms 134, 136 are each pivotally connected at one end 138, 140 to crank arms 126, 128, respectively and at the other end 142, 144 to clamp arms 106, 108, respectively.

A cylindrical trash receptacle of 55 gallon or smaller size is shown in phantom at 146 held by upper clamp 92 and a trash bag is shown in phantom at 148 held by lower clamp 94.

The complete fluid lines for the several rams have not been illustrated for the sake of simplicity of the drawings. The connection of the lines shown to a control, pressurized fluid source and fluid reservoir is considered to be well within the skills of an ordinary automotive mechanic.

The present refuse collection vehicle is operated in the following manner. The vehicle is driven down the street where collections are to be made and stopped adjacent a depot of refuse receptacles, e.g., a number of containers of 55 gallon and smaller sizes and trash bags placed near the curb of a residental street. The boom assembly 54 is then positioned by control unit 60 and rams 64, 66 and 72 until the upper clamping means 90, 92 engage an upper rim portion of refuse receptacles 136. When the clamping means are properly positioned, the clamping rams 114, 116 are actuated to close the clamping means. The boom assembly is then withdrawn to a position above the load box and dump ram 80 actuated to invert the receptacles until the contents thereof pour into the load box. During this inverting movement the receptacles are guided by the arcuate arm portions 86, 88. The process is reversed when the containers are emptied so that they are returned to their original and righted position at curbside.

Trash bags are gathered in a similar manner. The necks of the bags are engaged by the lower clamps 94, 96 and the boom assembly returned over the load box where the clamps 94, 96 would be released to drop the bags into the load box. No inversion of the frame member 78 would, of course, be necessary when trash bags are being loaded.

When a sufficient amount of refuse is collected in load box 42, or after each collection if so desired, the compacting rams 48 are actuated to initially compact the collected refuse. The load box can then either be reopened to receive more refuse or the front loading arms 28, 30 actuated by loading rams 34 to move the load box up over the cab to the opening in roof 22. Simultaneous with this movement of the loading arms would be an opening of the slidable roof plate under the control of ram 26, a retraction of compacting plate 18 under the control of ram 20, and a rotation of the load box 42 under the control of tilting arms 36 and rams 40. This latter movement keeps the load box 42 upright until it is over the opening in roof 22 at which time the load box would be both inverted by tilt rams 40 and opened by compacting rams 48 thereby allowing the contents thereof to fall into the main cargo hold of the vehicle. While the load box is being returned to its loading position, the roof plate 24 is moved to its closed position and the compacting plate 18 moved toward the rear of the vehicle to further compact the collected refuse.

It should be pointed out that before the above mentioned emptying of the load box can take place, the boom assembly must be withdrawn to a point closely adjacent the cab of the vehicle in order to provide ample clearance for the load box.

When the vehicle is fully loaded, or the collection route completed, it is driven to a dump where it is un-

loaded by releasing the locks holding the tail gate closed and actuating the main ram **20** to drive plate **18** completely to the rear of the vehicle.

There are many foreseeable alternatives to the above described preferred embodiment. For example, a boom assembly **54** could be positioned on either side of the vehicle or anywhere along the side of the vehicle and empty into a centrally located load box. The load box could also be located at the rear of the vehicle and loaded by a boom assembly on either side of the vehicle controlled by the driver, through the use of mirrors, or by an operator in a special cab at the rear of the vehicle. Also either or both arms of the boom assembly could be made to telescope thereby providing additional reach.

It is also foreseen that the boom assembly could be provided with means to remove lids from the individual refuse containers. Such lid removing means could include electromagnetic devices suitable for removing metallic lids or plastic lids fitted with a metal plate, vacuum or suction devices suitable for lids of any fairly smooth material, and fluid actuated fork means suitable for engaging lid handles and removing the lids.

In as much as the present invention may be subject to many variations, modifications and changes in detail, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A loading apparatus for loading refuse from a plurality of individual containers into a main cargo hold of a refuse collection vehicle comprising:
- a loading bin;
- at least one loading arm means connected between said vehicle and said bin and including means to move said bin from a first loading position near the ground to a second unloading position over said hold; and
- a boom assembly having one end mounted on said vehicle adjacent said bin and clamping means on the opposite end, said assembly being adapted to grasp individual refuse containers, move them to an empty position over said loading bin, and return empty containers to their original position.

2. A loading apparatus according to claim **1** wherein said loading bin comprises:
- a substantially rectangular box formed by a pair of interfitting members movable relative to each other, and
- at least one fluid actuated ram means adapted to effect said relative movement of said members.

3. A loading apparatus according to claim **1** wherein said boom assembly comprises:
- articulated arm means connected to and extending from said vehicle, and
- said clamping means comprises at least one clamping means adapted to engage said individual containers.

4. A loading apparatus according to claim **3** wherein said at least one clamping means comprises:
- at least one upper clamping means adapted to engage an upper rim portion of said refuse containers, and
- at least one lower clamping means spaced below said upper clamping means and adapted to engage closed neck portions of flexible containers.

5. A loading apparatus according to claim **1** wherein said boom assembly comprises:
- articulated arm means one end of which is attached to said vehicle,
- an element on the free end of said arm means upon which said clamping means are mounted, and means to rotate said element about a substantially horizontal axis to effect emptying of said containers.

6. A loading apparatus according to claim **5** wherein said articulated arm means is attached to said vehicle by means adapted to move horizontally along the vehicle and to move said arm means about both a horizontal axis and a vertical axis.

7. A refuse collection vehicle comprising
- a motor vehicle chassis having a cab and a refuse cargo hold mounted on said chassis;
- a loading bin;
- at least one arm means having one end pivotally attached to said chassis and the other end attached to said bin and adapted to move said bin from a loading position near the ground to an unloading position over said cargo hold; and
- a boom assembly including a grab arm with one end attached to said vehicle and clamping means on the other end, said assembly being adapted to engage and empty individual refuse containers into said loading bin.

8. A refuse collection vehicle according to claim **7** wherein said loading bin comprises;
- first and second interfitting members assembled in relatively movable fashion to form a substantially rectangular box and
- means to move said members relative to each other whereby at least one dimension of said box is varied.

9. A refuse collection vehicle according to claim **7** wherein the loading position of said loading bin is adjacent the front of the vehicle,
- said boom assembly being attached to a front portion of said vehicle by means adapted to move transversely across the front of said vehicle as well as to impart motion to said boom assembly about both a horizontal axis and a vertical axis.

10. A refuse collection vehicle according to claim **7** wherein the loading position of said loading bin is adjacent the front of the vehicle,
- said boom assembly being mounted on one side of said vehicle within reach of said loading bin, and further comprising
- a second boom assembly mounted on the other side of said vehicle also within reach of said loading bin.

11. A refuse collection vehicle according to claim **7** wherein said clamping means comprises;
- an element mounted on the free end of said grab arm for movement about a horizontal axis;
- at least one upper clamp and at least one lower clamp mounted on said element;
- means to actuate said clamping means; and
- means to rotate said element about said horizontal axis.

12. A refuse collection vehicle according to claim **11** further comprising;
- guide means on said element spaced below said at least one upper clamp for guiding containers gripped by said at least one upper clamp as said element is rotated.

13. A refuse collection vehicle having improved loading means, said vehicle comprising

a motor vehicle chassis including a frame having a cab and a refuse cargo hold mounted thereon;

a pair of load arms rotatably mounted on said chassis extending toward the front of said vehicle;

loading bin means mounted on the free end of said load arms and adapted to be moved by said arms between an upright loading position near the ground to an inverted unloading position above said cargo hold; and

a boom assembly mounted of the front of said vehicle for movement transversly across the front of the vehicle as well as about both horizontal and vertical axes;

said boom assembly including articulated arm means having a clamping device on the free end thereof;

said clamping device including an element mounted on said arm means for rotation about a horizontal axis and means to effect said rotation, upper clamping means and lower clamping means on said element, and means for actuating said clamping means,

whereby individual refuse containers are grasped by said boom assembly, transported to and emptied into said loading bin, the refuse intially compacted in said bin, and then emptied into said cargo hold.

14. A refuse collection vehicle according to claim 13 wherein said cargo hold includes an openable roof portion to receive refuse, and main compacting means within said hold.

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