United States Patent [19]

Overton

[11] **3,761,988**

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[54] **REAR DUMP MECHANISMS FOR ROAD SWEEPERS**

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[73] Assignee: **Wayne Manufacturing Company,** Pomona, Calif.

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[52] **U.S. Cl.** **15/83,** 214/502

[51] **Int. Cl.** **E01h 1/04**

[58] **Field of Search** 15/83–86, 340; 214/502

[56] **References Cited**

UNITED STATES PATENTS

2,614,279	10/1952	Mott	15/83
3,186,015	6/1965	Beyerstedt	15/83
3,312,992	4/1967	Schmidt et al.	15/83
3,461,474	8/1969	McCandless	15/83
3,540,070	11/1970	Brown	15/83
3,672,724	6/1972	Neuzil, Sr.	214/502

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Attorney—H. Clavin White et al.

[57] **ABSTRACT**

A container positioned at the rear of a road sweeper vehicle to receive debris displaced rearwardly of the vehicle, is mounted in normal overlying relation to the vehicle rear wheel axle and is carrier-supported for rear dump door opening and tilted elevation by hydraulic cylinders through two lift stages, the carrier being pivoted to the vehicle and having bell crank characteristics permitting extended container elevation by hydraulic actuation.

6 Claims, 5 Drawing Figures

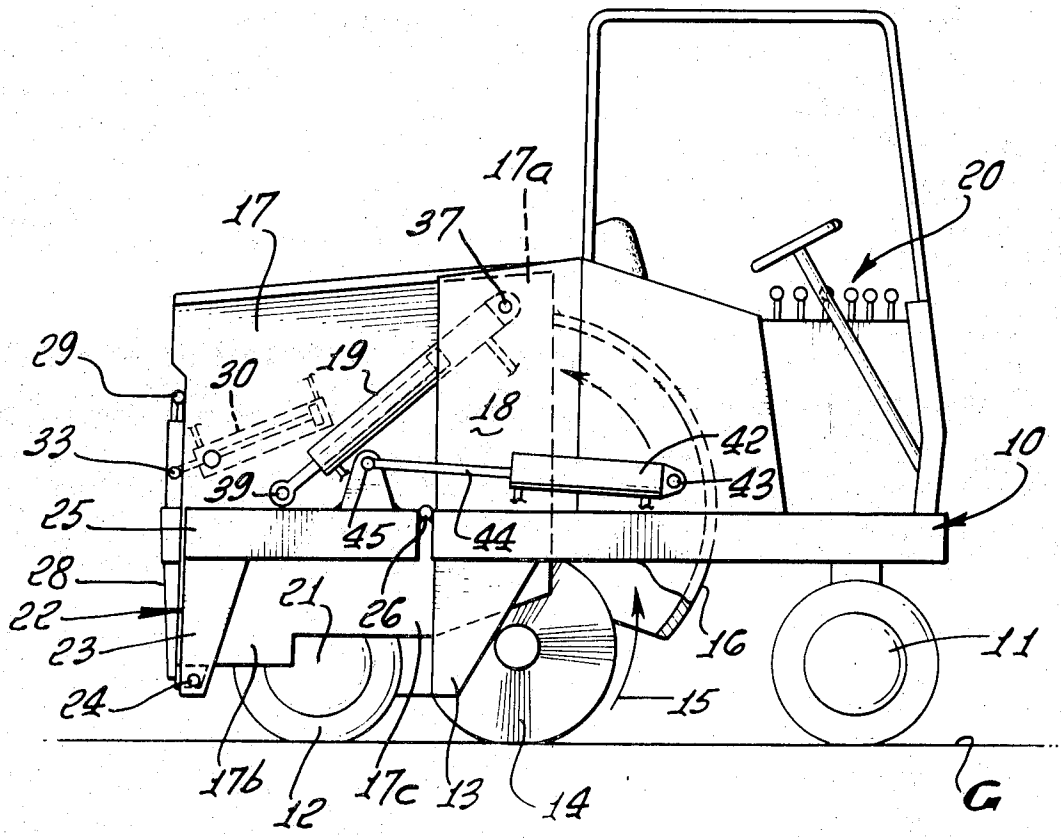

FIG. 1.

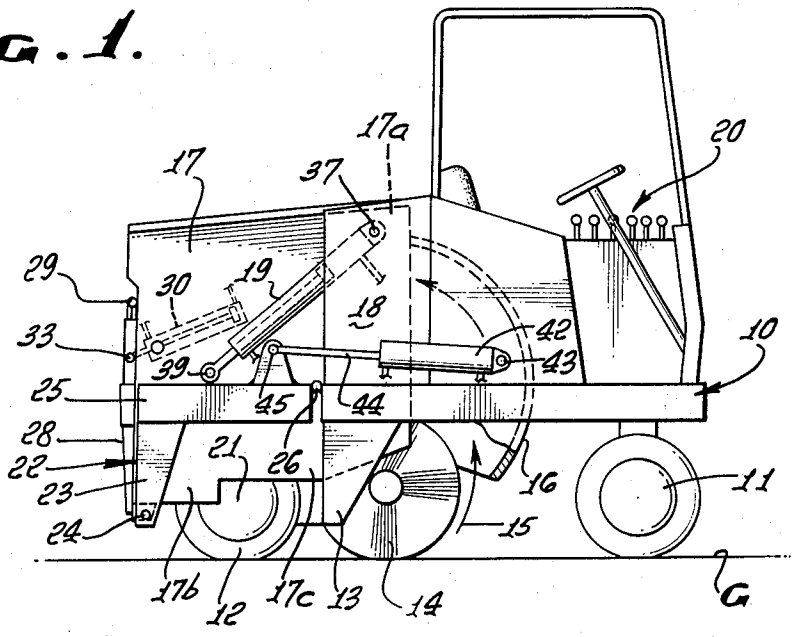
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FIG. 2.

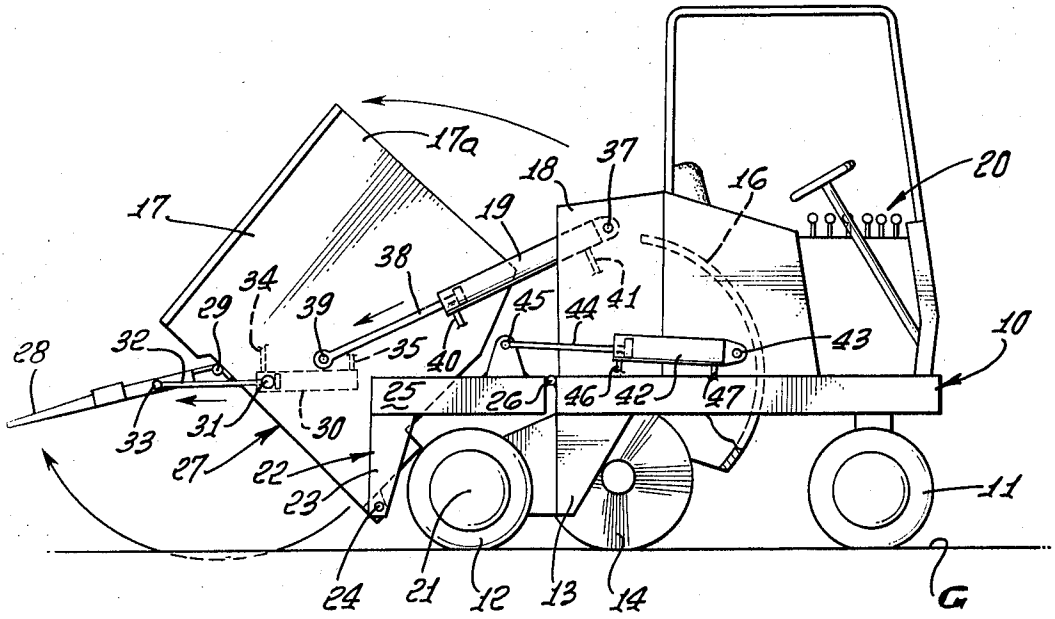
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FIG. 3.

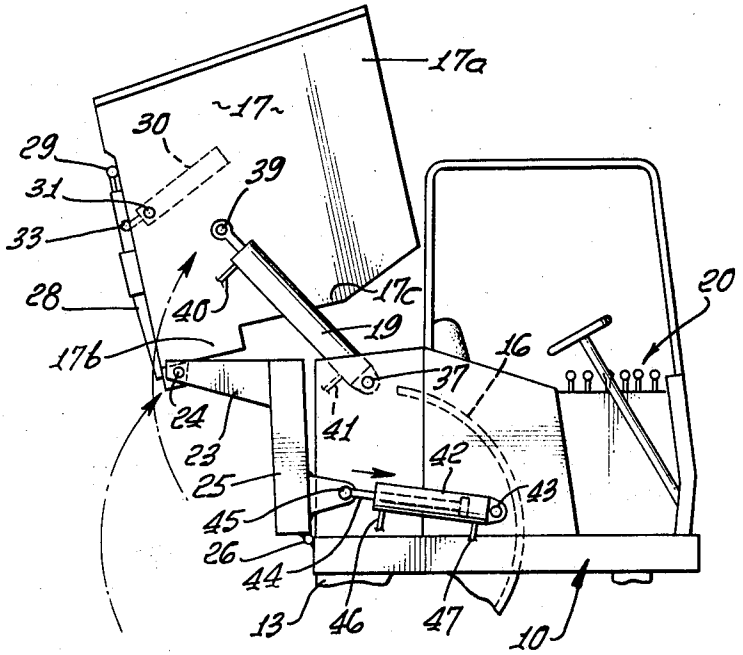
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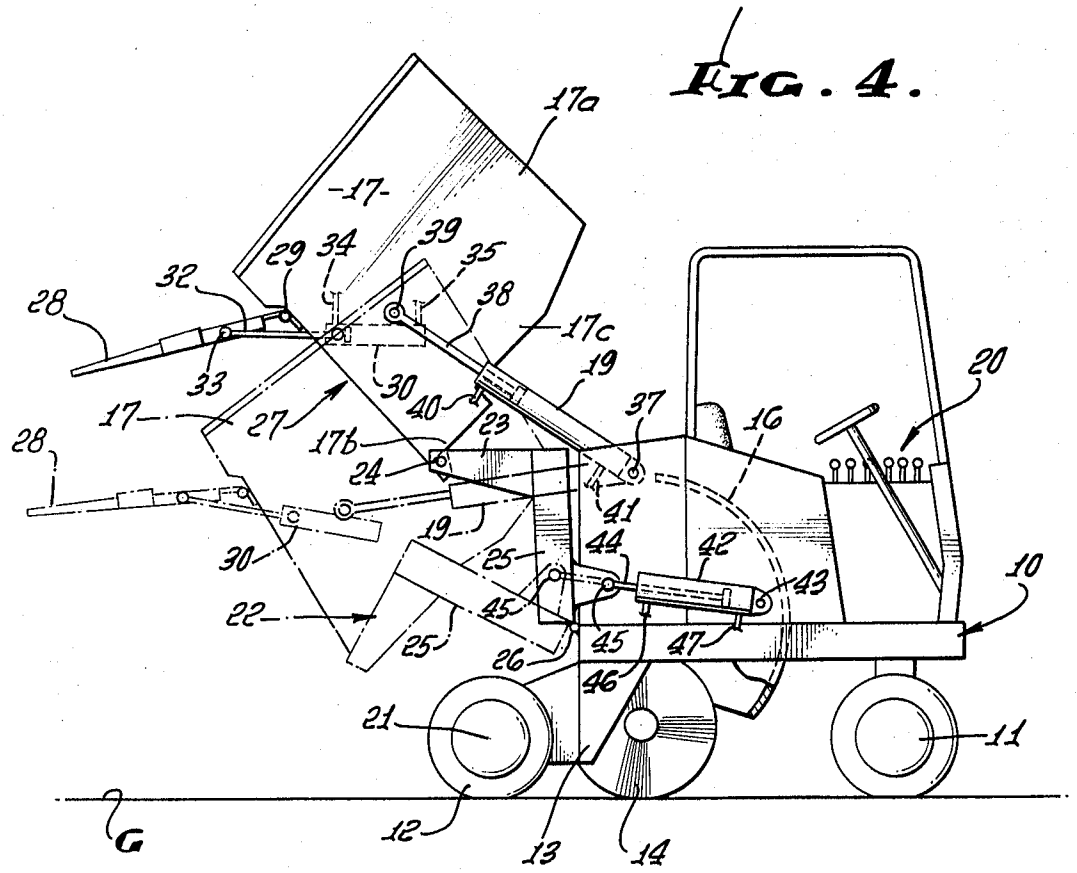
FIG. 4.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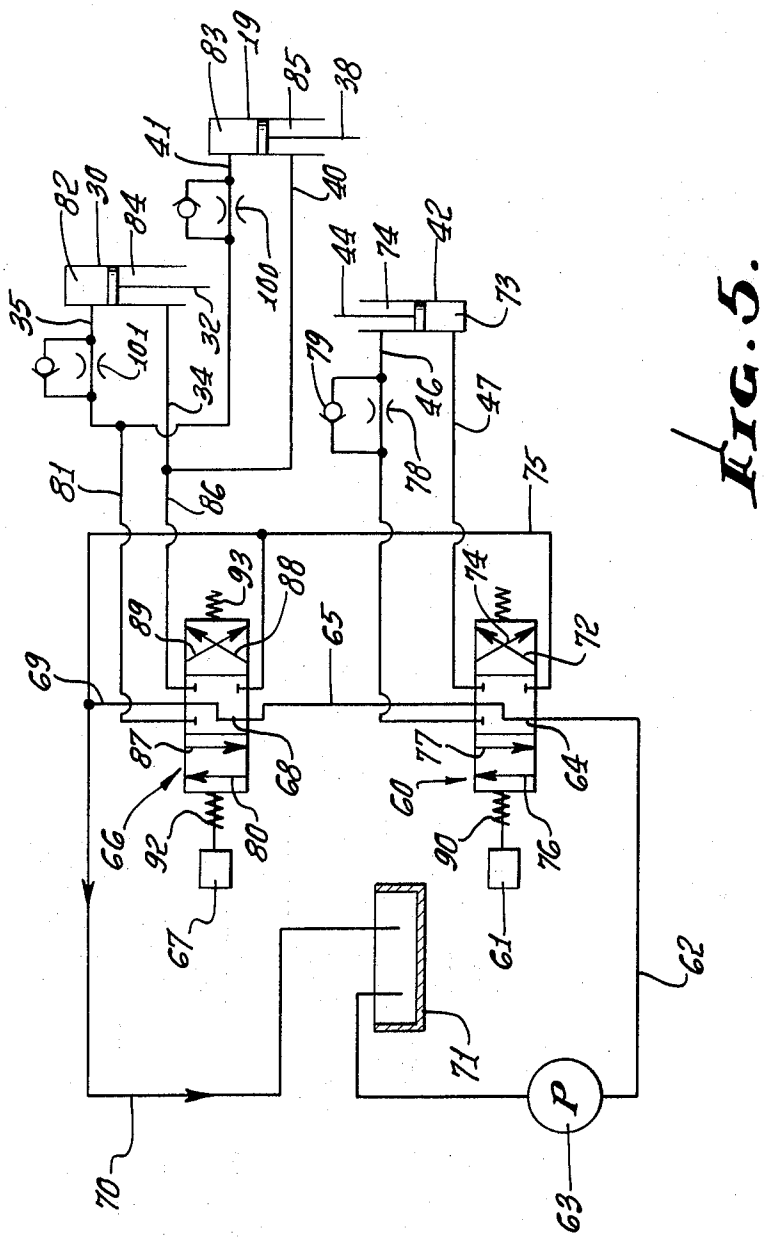
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FIG. 5.

REAR DUMP MECHANISMS FOR ROAD SWEEPERS

SUMMARY OF THE INVENTION

The present invention is directed to improvements in the mounting and control of a debris container at the rear of a road sweeper vehicle of the type operating to sweep and displace debris rearwardly of the vehicle into the normally positioned container.

More particularly the invention is directed to novel features of the container structure, mode of elevation and control from the vehicle operator station, all in a manner such that the container may have a range of elevation from close to the ground surface upwardly to the highest elevation that might be required for dumping into raised receptacles. Such operations and movements of the container are hydraulically controlled by a system operating initially to open the container dump door and thereafter to so tilt and elevate the container that its movements may be arrested at any location within its total tilt and elevation range.

The invention achieves these general objectives by unique mounting and association of the contianer with a hydraulically actuated carrier essentially in the form of a pair of bell cranks at opposite sides of the container, the bell cranks being terminally pivoted to the vehicle frame and container and operable to tilt and elevate the container from a position initially overlying the rear wheel axle of the vehicle, to whatever extent desired depending upon the dump elevations in particular instances.

The control system employs three selectively operable actuator means responsive to hydraulic pressure and functioning respectively to control the container dump door, and successive tiltings and elevations of the container within its lift range.

According to preferred structures and arrangements a first hydraulic cylinder carried by the container is used to control the container door opening, second cylinders at opposite sides of the container operate to effect first stage tilting and elevation of the container, and third hydraulic cylinders operate to pivot the carrier components upwardly and elevate the container within its uppermost range of travel.

The invention also contemplates provision of a hydraulic system remotely controlled from the sweeper operator station to selectively and sequentially actuate the first, second and third hydraulic cylinders in the course of full range tilt elevation and lowering of the container back to its normal or starting position.

These as well as additional features and objects of the invention will be understood more fully from the following detailed description of an illustrative embodiment of the invention shown by the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows in side elevation a sweeper vehicle carrying at its rear the debris container and its actuating and control mechanisms referred to in the foregoing, the container being in normal overlying relation to the rear wheel axis for the reception of debris in normal sweeping operation of the vehicle.

FIG. 2 is a view similar to FIG. 1 showing the container displaced and tilted rearwardly to dump at its lowermost elevation.

FIG. 3 shows the container raised to dump at an intermediate elevation;

FIG. 4 shows in solid lines the container raised to dump at an uppermost elevation, with the container and its carrier appearing in broken lines at an intermediate raised position; and

FIG. 5 is a diagrammatic showing of the hydraulic control system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 to 4 show somewhat diagrammatically the sweeper vehicle to comprise a body structure and frame **10** carried by a forward steered wheel **11** and a pair of rear power driven wheels **12** mounted to the frame by suitable supports **13.** The sweeper has a usual cylindrical pickup broom **14** power driven from the vehicle engine to rotate in the direction of the arrow **15** to sweep and displace debris from the road surface upwardly and rearwardly of the vehicle, the debris so displaced being directed by suitable hood or baffle means **16** into the debris container **17** in the normal travelling condition of the sweeper as it appears in FIG. **1.** The forward open end **17***a* of the container is received within the sweeper body between its sides **18** which serve also as frame-supported members for mounting the later described container actuating cylinders **19.** The container actuation is controlled from the operator station generally indicated at **20** by selectively pressurizing and depressurizing the various hydraulic cylinders in the control system as will later be described in particular reference to FIG. **5.**

The container bottom is shown to have a stepped configuration with its rear extent **17***b* below the forward extent **17***c* to permit the container to closely overlie and clear the rear wheel axis or axle **21,** thus positioning the container for lowermost dumping as in FIG. **2,** close to ground surface G. Associated with the container is its carrier, generally indicated at **22,** shaped essentially as a pair of bell cranks at opposite sides of the container, each bell crank having a depending arm **23** pivoted to the container at **24,** and an upper extent **25** pivoted at **26** to the frame **10.**

The container has a dump opening **27** normally closed by door **28** pivoted at **29** to the container to swing open from near the top of the opening.

The container operation is accomplished by selective actuation of first, second and third hydraulic cylinders, the first being a cylinder **30** pivoted at **31** to one side of the container and having its piston rod **32** pivoted at **33** to the door so that the latter is opened or closed by cylinder fluid pressure delivery or release through lines **34** and **35.** The second hydraulic control means comprises a pair of cylinders **19** positioned at opposite sides of the container and pivoted at **37** to the body or support **18.** The piston rods **38** are pivoted at **39** to the sides of the container so that the latter is tiltable as in FIGS. **2, 3** and **4** in conjunction with hydraulic actuation of the carrier **22,** by fluid pressure delivery to and from the cylinders **19** through lines **40** and **41.**

The third hydraulic control mechanisms comprise cylinders **42** positioned at opposite sides of the vehicle body and pivoted thereto at **43.** The piston rods **44** are pivoted at **45** to the upper carrier arms **25** so that by pressure delivery to and release from the cylinders **42** through lines **46** and **47** the carrier **22** may be swung

upwardly within the ranges of movement illustrated in FIGS. 1 through 4.

In considering the operation of the container and control system and starting with the normal container loading position shown in FIG. 1, if it is desired to dump the container close to the ground, the door 28 is opened by actuation of cylinder 30 accompanied or followed by actuation of cylinders 19 to tilt dump the container as in FIG. 2.

Assuming the container is to be dumped at an intermediate elevation, for example as depicted by the broken lines in FIG. 4, the cylinders 42 are pressurized to swing the carrier 22 to the broken line position and door 28 is opened by actuation of cylinder 30 accompanied or followed by actuation of cylinders 19 to tilt the container rearwardly to dumping condition.

Assuming the container is to be dumped at approximately its highest elevation represented by the solid lines in FIG. 4, cylinders 42 are actuated to swing the carrier 22 to its uppermost position and cylinders 30 and 19 are actuated as before to control the dump door opening and container tilt.

In FIG. 5, the hopper lift control 60 is actuated at 61 between three positions. In the neutral position shown, fluid pressure delivered at 62 by pump 63 passes through the valve via port 64 to line 65. A hopper dump control valve 66 is similarly actuated at 67 between three positions, and in neutral position as shown fluid pressure passes from line 65 through that valve via port 68 to line 69. From the latter, fluid is returned via line 70 to the reservoir 71, from which the pump 63 takes suction.

When part 61 (manual or automatic) is operated to displace the spool of valve 60 to the left, fluid pressure is supplied via port 72 and line 47 to chamber 73 of the actuator to extend rod 44; and fluid in chamber 74 of the actuator returns via line 46, port 74 to line 75, and line 70 to the reservoir. Orifice 78 in line 46 restricts fluid discharge from chamber 74 to prevent gravity induced collapse of carrier 22. Similarly, when part 61 is operated to displace the spool of valve 60 to the right, chamber 74 is pressurized via port 76, and exhaust fluid in chamber 73 returns to the reservoir via port 77. Check valve 79 bypasses orifice 78 to pass fluid to chamber 74.

Similarly, when part 67 is operated to displace the spool of valve 66 to the right, fluid pressure in line 65 is supplied via port 80 and lines 81 and 35 to chamber 82 to extend rod 32, and via lines 81 and 41 to chamber 83 of cylinder 19 to extend rod 38. Orifice restriction 100 in line 41 delays flow to chamber 83 to insure opening of the door 28 prior to lowering of container 17 by extension of rod 38. Return flow from chambers 84 and 85 is conducted to the reservoir via lines 34, 40 and 86, port 87 and lines 75 and 70. Conversely, when part 67 is operated to displace the spool of valve 66 to the right, chambers 84 and 85 are pressurized via port 88, and exhaust fluid returns to the reservoir via port 89. Orifice restriction 101 in line 35 delays flow from chamber 82 to ensure closure of the door 28 until after elevation of container 17 by restriction of rod 38.

Note that springs 90–93 tend to return the spools to neutral position for closing off the lines to the actuator chambers 73, 74, 82, 84, 83 and 85. As a result, the actuator rods may be held in selected position; further, fluid pressure is supplied to valve 66 only when the spool of valve 60 is in neutral position.

I claim:

1. In a sweeper vehicle having front and rear wheels beneath a frame supporting a driver and control station, a sweeper broom and means for directing swept debris rearwardly of the vehicle; the combination comprising a debris container at the rear of the vehicle and positioned to receive the swept debris, carrier means for said container pivotally connected to the frame for up and down swing movements, means connecting the container to the carrier means for relative dumping movements of the container, a downwardly opening dump door mounted to the container to swing outwardly from the top of a rear dump opening, first hydraulic actuator means for opening the door, second hydraulic actuator means operable to tilt and lift the container about its said connection with the carrier means to dump the container contents through said opening, and third hydraulic actuator means operable to elevate the container above the lift range of said second hydraulic actuator means.

2. A sweeper vehicle according to claim 1 in which said third actuator hydraulic means is connected to the carrier means and is operable to increase the upward swing range of the carrier means about its connection with the frame.

3. A sweeper vehicle according to claim 2 in which said third hydraulic actuator means includes hydraulic cylinders at opposite sides of the carrier and having pivotal connections with the carrier means and vehicle.

4. A sweeper vehicle according to claim 3 in which said carrier means includes terminally pivoted bell cranks at opposite sides of the container and normally extending horizontally above the rear wheel elevation and continuing downwardly to their connections with the container.

5. A sweeper vehicle according to claim 1 including remote control means operable at a control station to selectively actuate said first, second and third hydraulic actuator means.

6. A sweeper vehicle according to claim 5 in which said control means includes also means operable to insure opening of said dump door from closed position before elevation movement of the container.

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