

[54] **CURB TRAVELLING SWEEPER
VEHICLE**

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Calif.
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[52] U.S. Cl.15/83, 180/21, 180/24.02,
280/5.2, 280/43.23
[51] Int. Cl.B60s 9/14, B62d 61/12
[58] Field of Search15/78, 82, 83; 180/24.02, 41;
280/5.2

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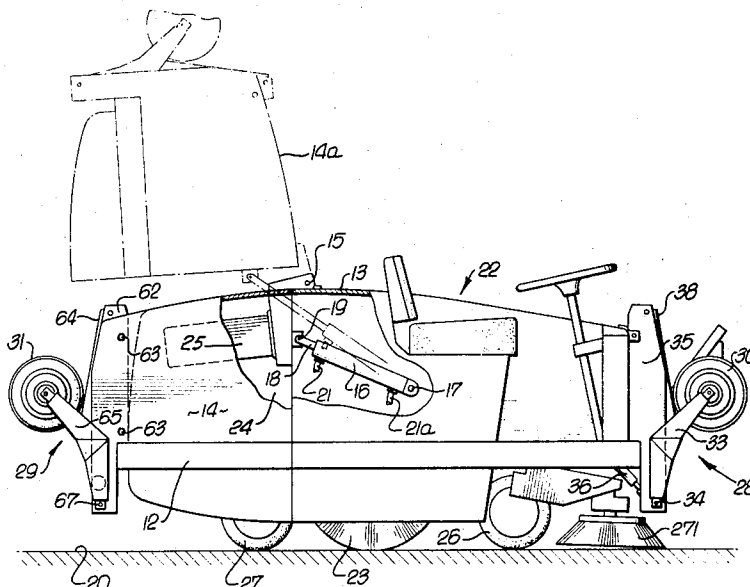
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Primary Examiner—Richard J. Johnson
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[57] **ABSTRACT**

A road sweeper of the three wheel type having forward and rear traveling wheels is adapted for the climbing of curbs or dividers onto raised surfaces by the provision of lifter wheels bodily movable between raised and lowered positions to elevate the vehicle and its traveling wheels for movement onto and off the raised surface.

17 Claims, 16 Drawing Figures



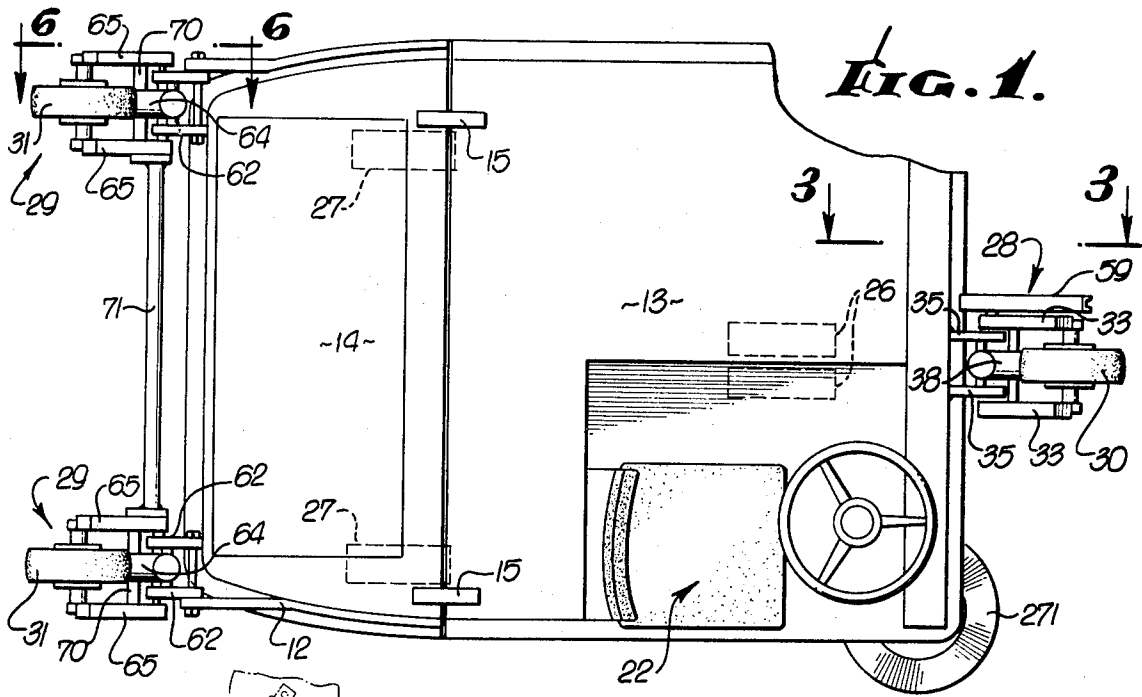


FIG. 1.

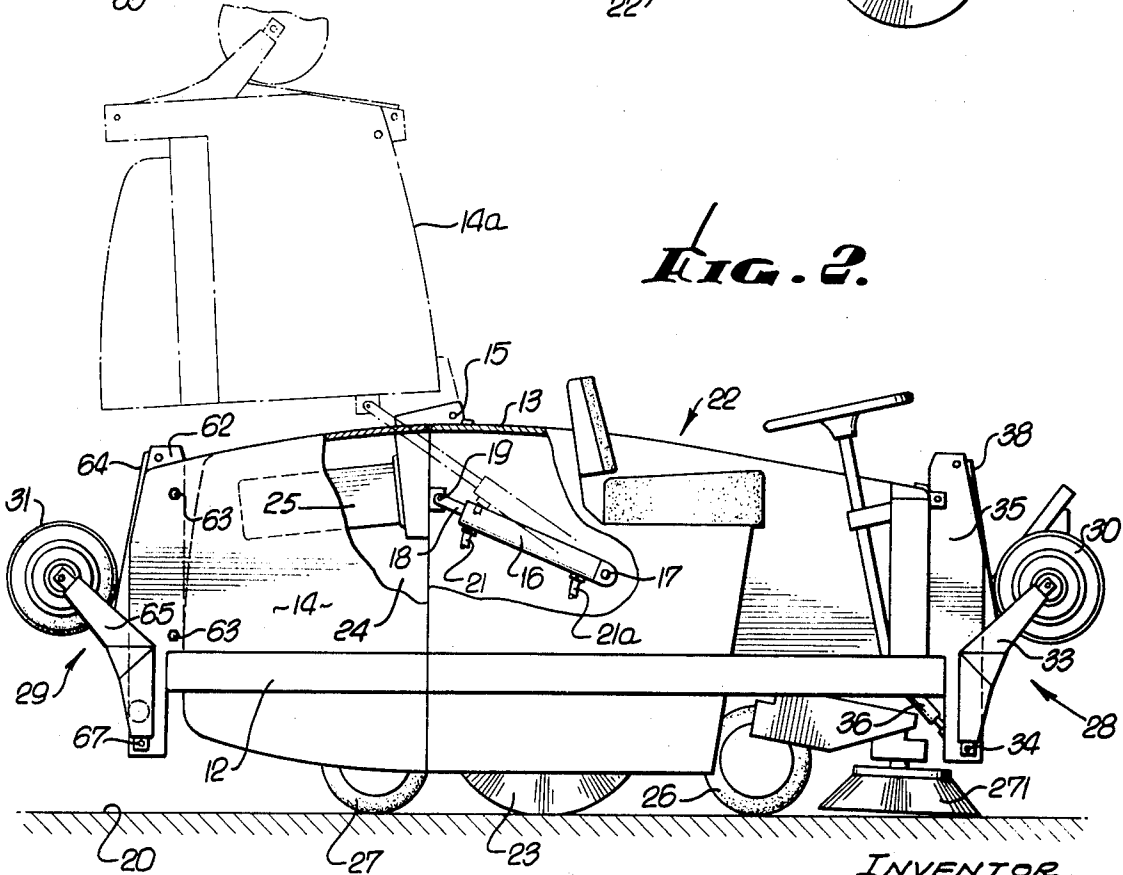


FIG. 2.

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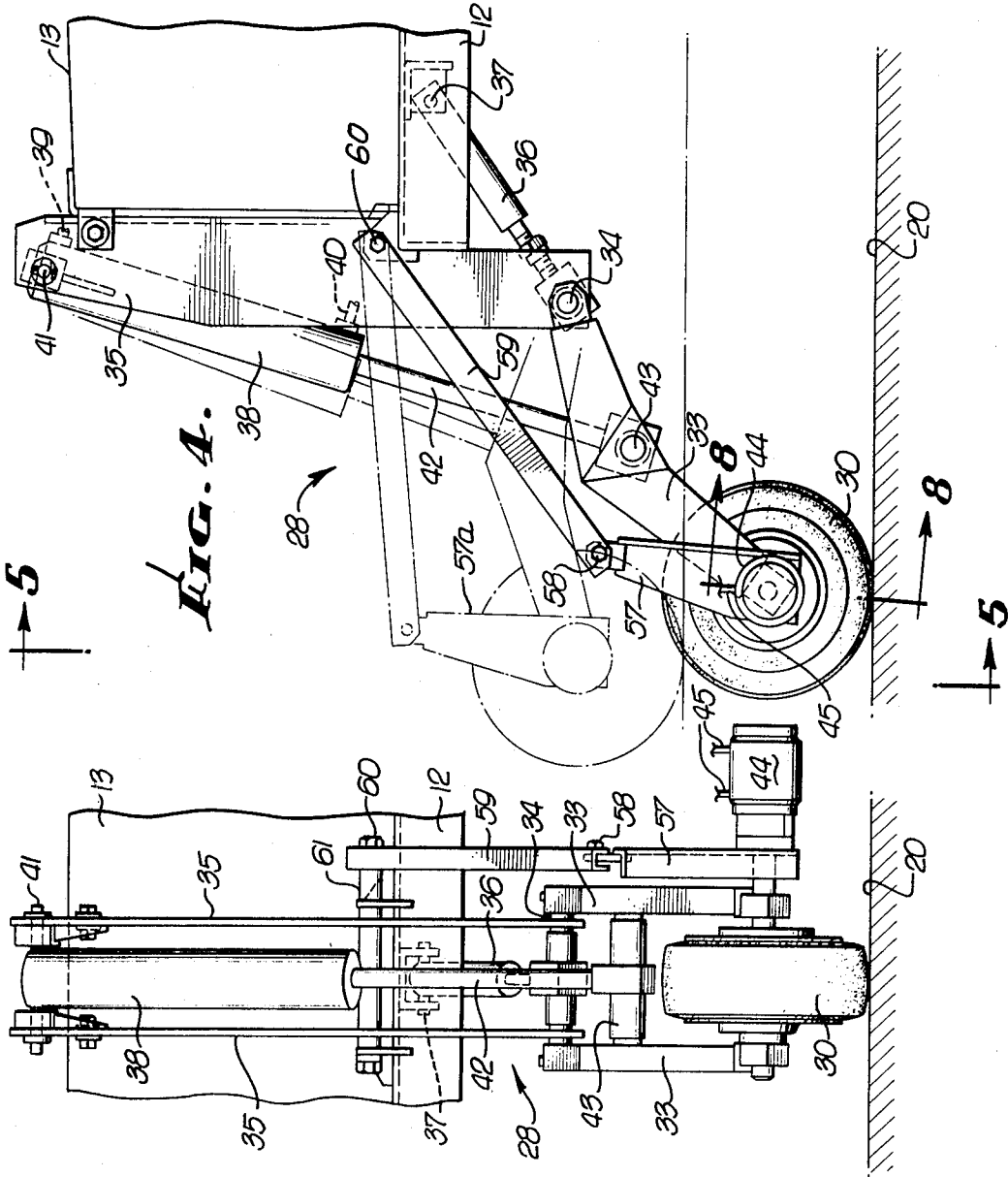
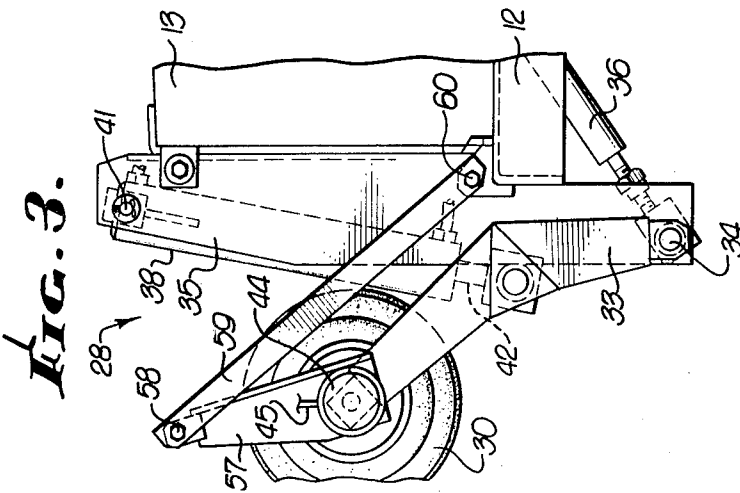
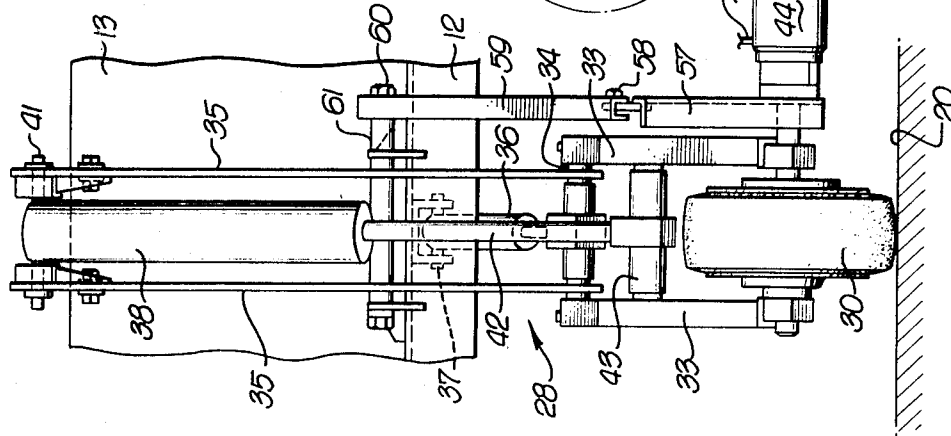


FIG. 5.



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FIG. 6.

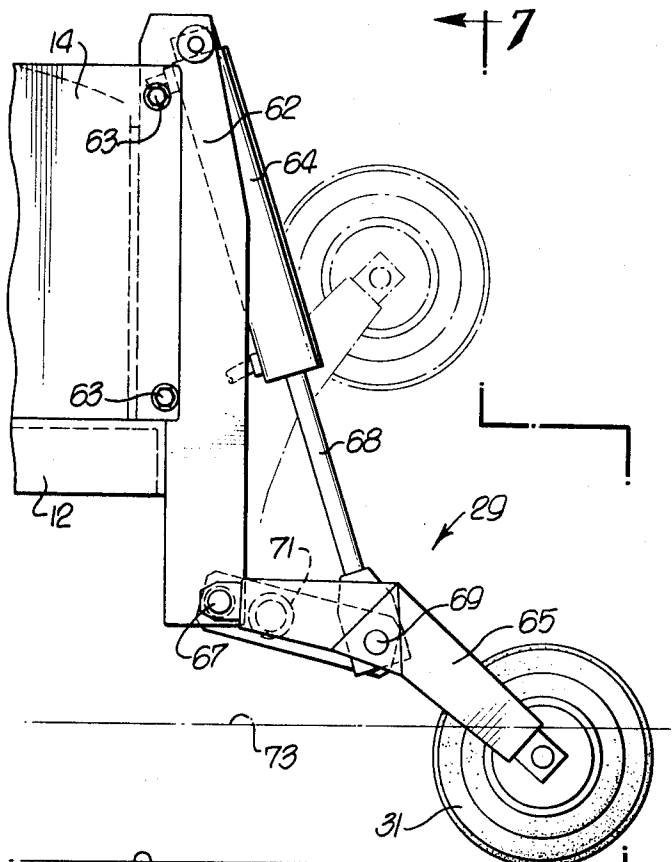


FIG. 7.

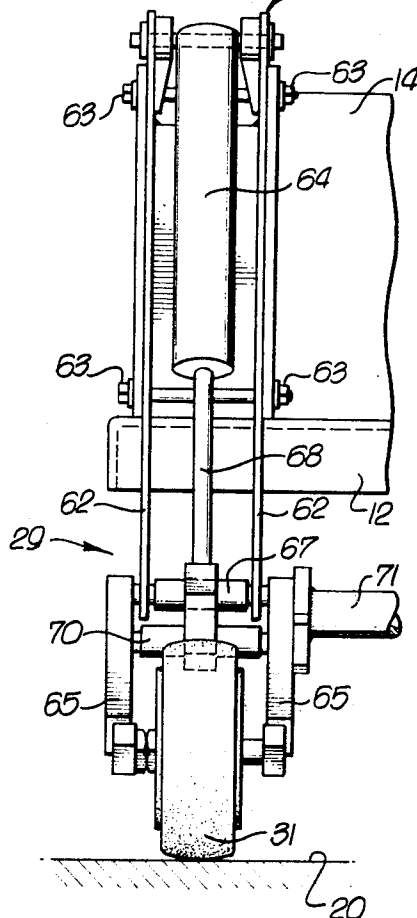
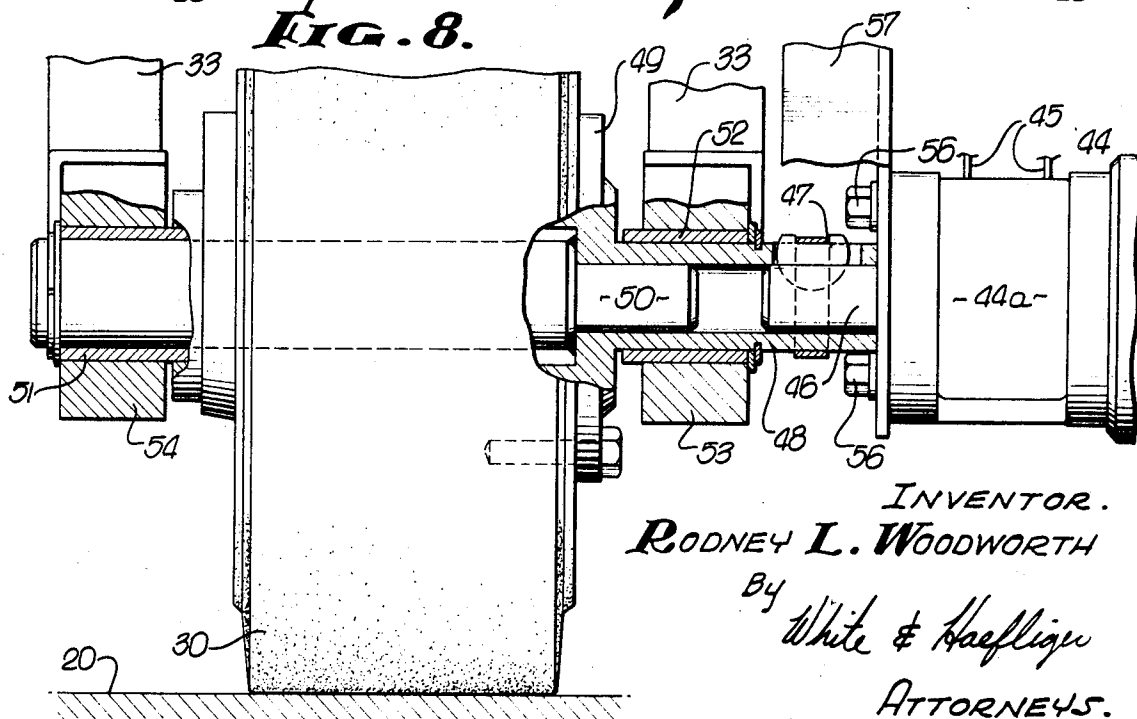


FIG. 8.



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FIG. 10a.

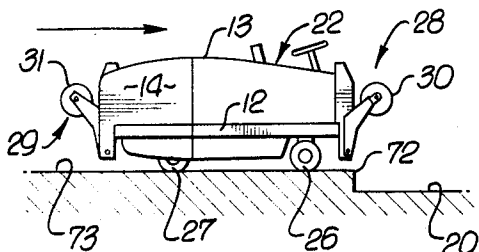


FIG. 10b.

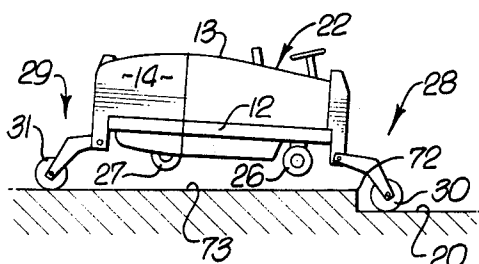


FIG. 10c.

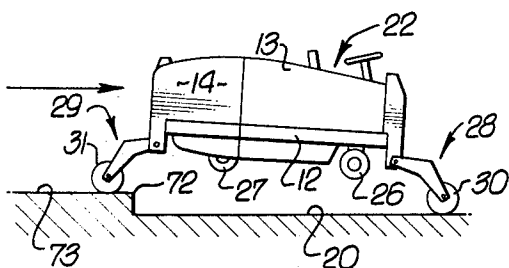


FIG. 10d.

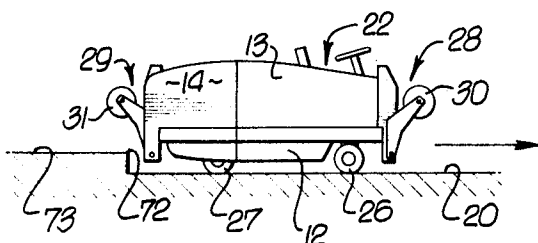


FIG. 9a.

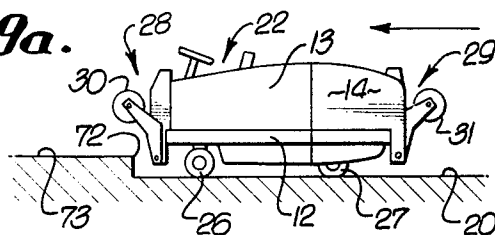


FIG. 9b.

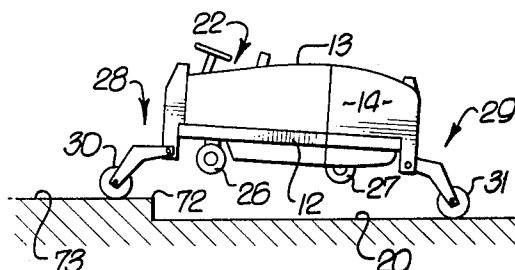


FIG. 9c.

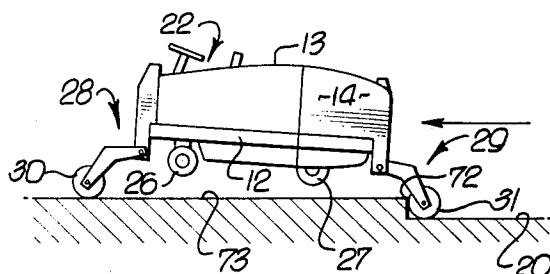
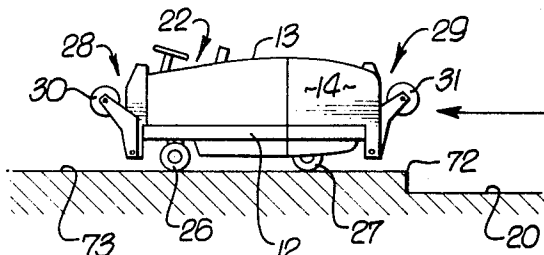


FIG. 9d.



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CURB TRAVELLING SWEEPER VEHICLE BACKGROUND OF THE INVENTION

Modern highways frequently have raised, e.g., divider or sidewalk surfaces defined by curbs and which, along with the highway, require or could benefit from sweeping. The curbs however may be either too high or abrupt to be traversed by the usual sweeper vehicle, or if attempted to be climbed would subject the vehicle to excessive stresses and strains.

SUMMARY OF THE INVENTION

The present invention has for its general object to adapt a sweeper vehicle for curb traverse or climb.

More particularly the invention aims to provide auxiliary sweeper-mounted mechanisms selectively operable to elevate the sweeper for raised surface travel and to return the sweeper to the normal road surface.

Structurally the invention contemplates as adjuncts to the normal traveling wheels of the sweeper, front and rear lifter wheels mounted to the sweeper for powered movement from their normal road clearance raised positions to lowered positions on the road surface to support and permit elevation of the vehicle for curb clearance by its traveling wheels.

While adaptable to sweeper vehicles generally, the invention has particular applicability to known types of three wheel sweepers having powered rear wheels and a front steered essentially single wheel. In this adaptation the invention employs three lifter wheels forwardly and rearwardly of the respective traveling wheels.

The invention also contemplates the provision of power means for driving the vehicle in elevated condition. This objective may be achieved by the association of a motor with at least one of the lifter wheels, and specifically in the case of a three wheel sweeper, with a motor drive for the forward lifter wheel.

As will appear the invention has an optional feature as applied to a dump type sweeper having a rear debris chamber section invertable upwardly for dumping, of mounting the rear lifter wheels to be carried by the chamber section in its dumping and restorative movements.

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

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the sweeper vehicle;

FIG. 2 is a partly sectional side elevation of FIG. 1;

FIG. 3 is a fragmentary enlarged side elevation of the front lifter wheel assembly in raised position and as viewed from 3—3 in FIG. 1;

FIG. 4 is a similar view showing the lifter wheel lowered to the road surface;

FIG. 5 is an end elevation as viewed from 5—5 in FIG. 4;

FIG. 6 shows the front lifter wheel in side elevation;

FIG. 7 is a front elevation as viewed from line 7—7 of FIG. 6;

FIG. 8 is an enlarged section on line 8—8 of FIG. 4; and

FIGS. 9a to 9d and 10a to 10d are diagrammatic illustrations of the sweeper movements onto and off a curbed raised surface.

DESCRIPTION OF THE PREFERRED EMBODIMENT

First in reference to FIGS. 1 and 2, the invention is illustrated as applied to a road sweeper vehicle having a suitable frame structure 12 mounting a body 13 having a rear dump section 14 hinged at 15 for dumping elevation and inversion depicted by the broken line position 14a. Section 14 may be actuated by suitable means deriving its power from the sweeper engine, not shown, such as hydraulic cylinder 16 stationary pivoted at 17 and having its piston rod 18 pivoted to the dump section at 19. Through suitable means, not shown, pressurized fluid is delivered to cylinder 16 through connections 21 and 21a under control from the operator station 22.

Without necessity for further illustration the sweeper may have any suitable means such as rotatably driven pickup broom 23 operable in conventional manner to displace sweepings into the debris chamber 24 below air filter 25 which elevates along with section 14 to the inverted chamber dumping position 14a.

The sweeper vehicle has forward and rear wheels 26 and 27, called travelling wheels because they travel the road surface 20 in normal sweeping operations. As best illustrated in FIG. 1 the wheels 26 are arranged in closely spaced relation at opposite sides of the vehicle longitudinal center line and may be regulated essentially as a single forward wheel steered by the operator at station 22. The sweeper may have appurtenances such as a conventional gutter broom 271.

The invention is more primarily concerned with the provision of front and rear lifter wheel assemblies generally indicated at 28 and 29 which perform the function of elevating the entire vehicle for curb climb or traverse, and returning the vehicle to the normal road sweeping condition of FIG. 2. In general the function of the assemblies at 28 and 29 is to effect powered lowering of the front and rear lifter wheels 30 and 31, to elevation of the vehicle for sweeping on a raised area above the normal road surface 20, and return of the vehicle for normal sweeping on that surface.

FIGS. 3, 4, 5 and 8 illustrate the structure and positions of the front lifter wheel assembly 28 wherein the wheel 30 is supported by and between the forward ends of a pair of carrier arms 33 pivoted at 34 to a pair of spaced supports 35 mounted to the vehicle frame, the carrier thrusts being transmitted to a stationary brace 36 extending from the pivot 34 to a connection at 37 with the frame 12. Supports 35 serve also to mount between them a power cylinder 38 to and from which hydraulic fluid is delivered under control of the operator through line connections 39 and 40, the fluid being pressurized by a pump, not shown, driven by the sweeper engine. Cylinder 38 is pivotally suspended from shaft 41 between the supports 35 and the cylinder piston rod 42 extends down between the supports to a pivotal connection by shaft 43 with the carrier arms 33.

In normal sweeper operation the lifter wheel 30 is maintained in the elevated FIG. 3 position wherein the carrier arms 33 are shown to be swung upwardly and piston rod 42 retracted into the cylinder 38. In the vehicle elevating position of FIG. 4 rod 42 has been actuated to swing the carriers 33 and wheel 30 downwardly, first onto the road surface 20 and then to raise the vehicle onto the later described elevated surface beyond a curb.

The lifter wheel 30 is driven by hydraulic motor 44 having fluid line connections 45 with a pump, not shown, powered by the sweeper engine, operation of the motor being under control from station 22. As shown in FIG. 8, shaft 46 of the rotor within the motor housing projects within and is connected by key 47 to the tubular lifter wheel drive shaft 48 bolted at 49 to the wheel hub 50. The lifter wheel stub shaft 51 is supported within shaft 48 and the wheel trunnion 52 at the opposite side is journaled in bearing 53 contained as is also bearing 54 within the extremities of the carrier arms 33.

The hydraulically driven motor 44 is of a known type which when not in operation locks the shaft 48 and wheel 30 against rotation. However during final downward displacement of the assembly 28 following initial road surface contact by the wheel and during subsequent elevation of the vehicle, bodily movements of the wheel relative to the road surface may tend to pull the vehicle forward. To compensate this tendency, the motor housing 44a is connected by screws 56 to an arm 57 which in turn is pivoted at 58 to link 59 pivotally connected at 60 to the vehicle frame by way of shaft 61. Thus arm 57 and the wheel 30 are so held as to eliminate pulling tendencies of the locked wheel resulting from the wheel bodily displacements relative to the ground. As will be observed the arm positions 57 and 57a in FIG. 4 are essentially parallel.

The rear lifter wheel assemblies 29 are similar to the described forward assembly except for the motor drive and its

linkage association with the vehicle frame. As shown in FIGS. 6 and 7 the assemblies 29 include spaced supports 62 attached at 63 to the dump chamber 14, the wheels 31 being actuated in their displacement between the illustrated positions by pressurized fluid delivery to and releasing from cylinder 64 as previously described in reference to the operation of cylinder 38. As before, the pair of rear wheels 31 individually are carried by arms 65 pivoted at 66 to shaft 67 extending between the supports 62. The piston rod 68 is pivotally connected at 69 to the carrier arms 65 by way of shaft 70 interconnecting the arms. As illustrated in FIG. 1 the innermost carrier arms 65 are interconnected by shaft 71 extending between the assemblies 29. Being mounted to the debris chamber 14, the wheel assemblies 29 elevate with the chamber to its inverted dumping position 14a as illustrated in FIG. 2.

The FIG. 9 and 10 sequences diagrammatically illustrate the lifter wheel operations and controls as the sweeper vehicle is elevated from the normal road surface 20 over curb 72 unto a raised sidewalk or divider surface 73. In FIG. 9a the sweeper vehicle is shown to approach the curb 72 in normal sweeping condition with front and rear wheels 26 and 27 on the road surface 20. After the curb approach the lifter wheels 28 and 29 are lowered bringing the forward wheel 28 onto surface 73 with the rear lifter wheels 29 remaining on the road surface 20. Continuing to FIG. 9c the vehicle is pulled forward by the front lifter wheel drive to engagement of the rear wheels 29 against the curb. Then with the sweeper wheels 26 and 27 positioned above the raised surface 73 the lifter wheels are retracted upwardly to the FIG. 9d position, depositing the sweeper vehicle and its travelling wheels on the raised surface. Initially the hydraulic motor 44 may be locked under control of the operator and wheel 28 held against rotation until the vehicle reaches the FIG. 9b position. Then the motor may be hydraulically powered to rotate the lead lifter wheel to advance the sweeper to the FIG. 9c position.

For travel off the curb the lifter wheels are elevated as in FIG. 10a with the vehicle approach to the curb such that upon lowering of the lifter wheels as in FIG. 10b the forward wheel 28 will be returned to the road surface 20. Motor 44 then advances the vehicle as in FIG. 10c and subsequent elevation of the wheels returns the vehicle for travel on the normal road surface.

I claim:

1. In a road cleaning vehicle having a body including an elongated continuous unit frame structure mounting a debris chamber and a driver steering and control station, the frame being supported by forward and rear traveling wheels for normal travel on the road and the sweeper having road cleaning means positioned longitudinally of the frame between the front and rear traveling wheels; the improvement comprising forward and rear lifter wheels carried by the frame structure respectively in front of said station and rearwardly of said cleaning means, supports mounting said lifter wheels to the frame independently of the traveling wheel axles and forwardly and rearwardly thereof to be bodily displaceable between raised and lowered positions in the latter of which the vehicle including said traveling wheels is elevated above the road surface for curb clearance, and means for so displacing the lifter wheels.

2. A vehicle according to claim 1, in which said lifter wheels are mounted for elevation above the sweeper frame.

3. A vehicle according to claim 1, in which said traveling wheels consist of a pair of rear wheels and a single steerable front wheel.

4. A vehicle according to claim 3, including power means for rotationally driving said front lifter wheel in road contact.

5. A vehicle according to claim 4 in which said power means is bodily displaceable with the driven lifter wheel.

6. A vehicle according to claim 5, in which said power means includes a self locking hydraulic motor having a housing, an arm connected to the housing, and a link pivotally interconnecting the arm and a stationary pivot.

7. A vehicle according to claim 1, including power means for rotationally driving one of said lifter wheels in road contact.

8. A vehicle according to claim 7, in which said power means is bodily displaceable with the driven lifter wheel.

9. A vehicle according to claim 1, in which said displacement means comprises movable wheel carriers and fluid powered piston and cylinder units supported by the vehicle frame and connected to said carriers.

10. A vehicle according to claim 9 in which said carriers are pivoted for up and down swinging movement forwardly and rearwardly of the vehicle traveling wheels and above and below the frame elevation.

11. A vehicle according to claim 10, in which each of said units is pivoted to swing between spaced vertically extending supports and is connected to a pair of said carriers at opposite sides of the associated lifter wheel.

12. A vehicle according to claim 10, in which the rear lifter wheels are axially aligned and their carriers are interconnected by a rod extending transversely of the vehicle.

13. A vehicle according to claim 10, in which the vehicle has a single front traveling wheel and a forward single lifter wheel aligned therewith longitudinally of the vehicle.

14. A vehicle according to claim 13, including a motor having a drive connection with said forward lifter wheel.

15. A vehicle according to claim 14, including also an arm connected to the motor housing, and a link pivotally connecting said link to a stationary pivot.

16. A vehicle according to claim 1, in which said debris chamber has forwardly of the rear lifter wheels a rear section hinged to the body for upward dumping movement, and power means for actuating said section in its dumping movement.

17. A vehicle according to claim 16, in which the rear lifter wheels are mounted to said rear section and are carried therewith in its dumping movement.

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