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Landesman et al.

[11] **3,886,624**

[45] **June 3, 1975**

[54] **VACUUM TYPE SWEEPER**

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[73] Assignee: **Elgin Sweeper Company**, Elgin, Ill.

[22] Filed: **July 31, 1973**

[21] Appl. No.: **384,236**

Related U.S. Application Data

[62] Division of Ser. No. 271,684, July 14, 1972.

[52] **U.S. Cl.** **15/340;** 15/82; 15/87; 15/354

[51] **Int. Cl.** **A47l 9/00**

[58] **Field of Search** 15/82, 83, 87, 340, 354

[56] **References Cited**

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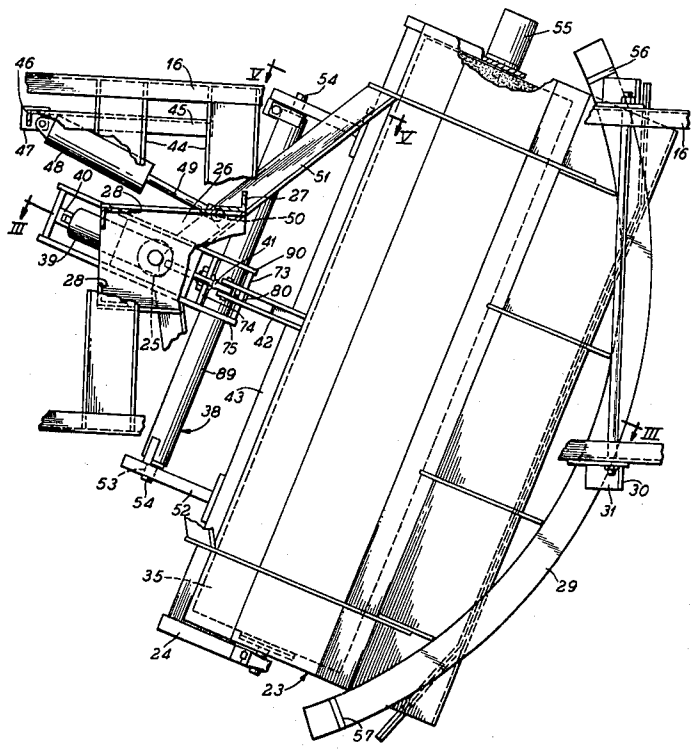
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Primary Examiner—Harvey C. Hornsby
Assistant Examiner—C. K. Moore
Attorney, Agent, or Firm—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

[57] **ABSTRACT**

A truck mounted vacuum type sweeper constructed for dual operation employs identical sweeping apparatus on each side of the machine and an extension broom which may be swiveled from one side of the machine to the other for left hand and right hand sweeping operations. The extension broom is mounted such that its axis of rotation is always parallel to the pavement being swept. A control system is provided for programming the operation of the machine and includes means for transferring from, for example, a left hand sweeping operation to a right hand sweeping operation by merely operating a toggle switch. The control system further includes means for automatically lifting the suction nozzles from the operator of the sweeper shifts into reverse in order to prevent damage to the nozzle supporting structure.

12 Claims, 11 Drawing Figures



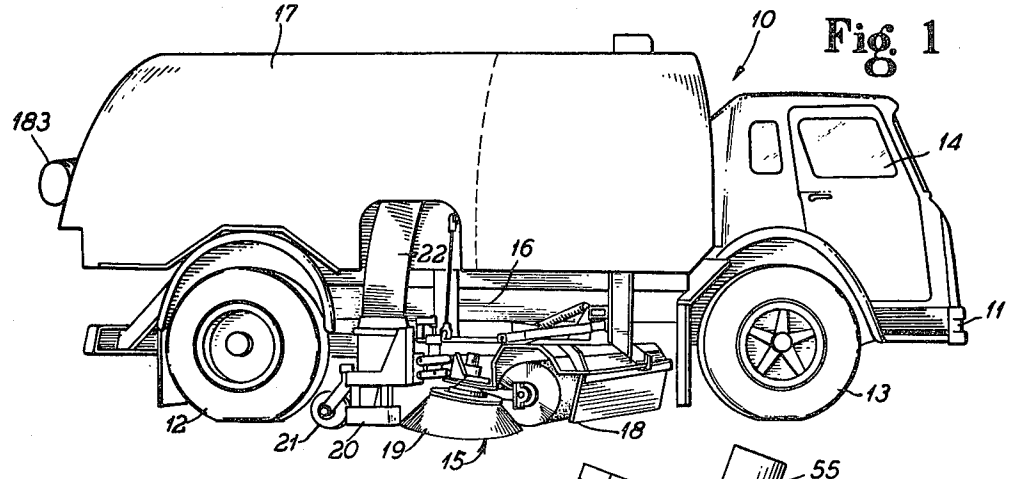

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Fig. 1

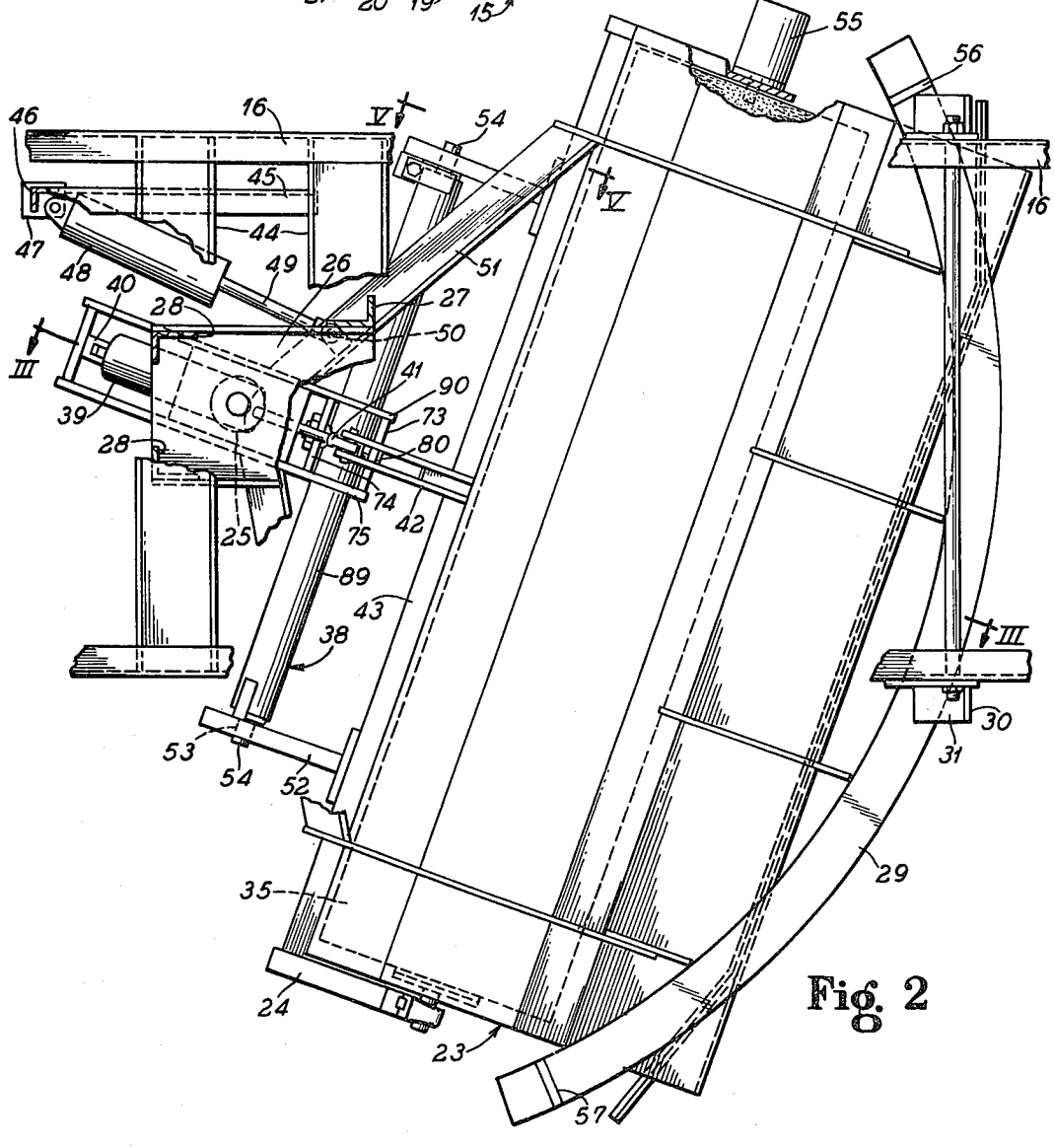

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V
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48
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49
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28
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III
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73
80
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89
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Fig. 2

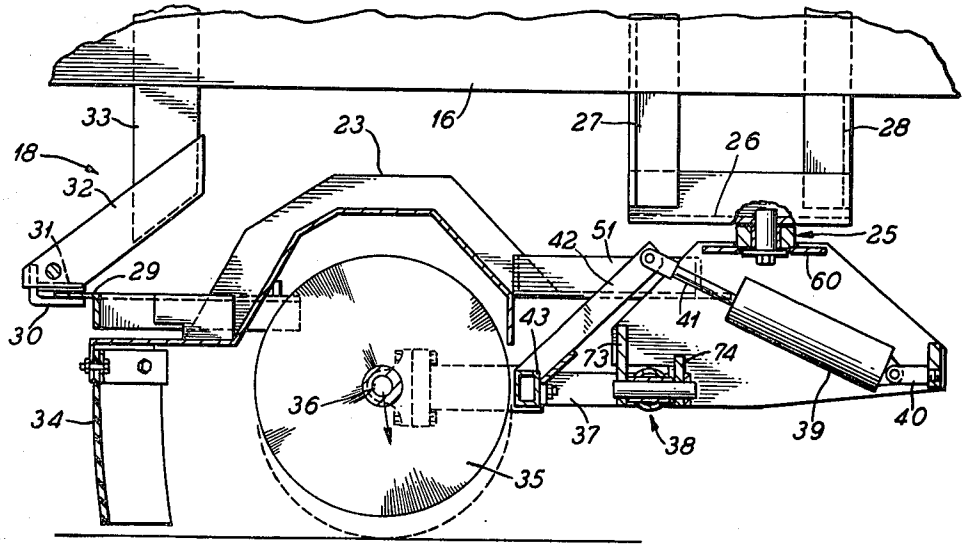


Fig. 3

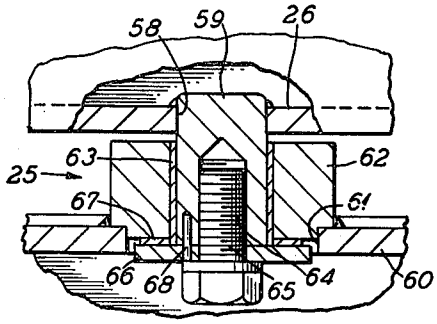


Fig. 4

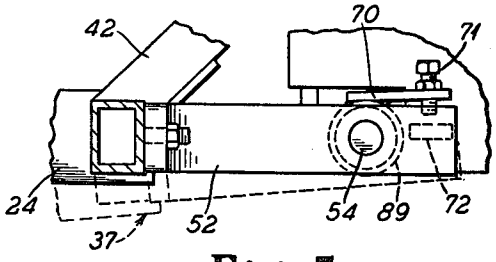


Fig. 5

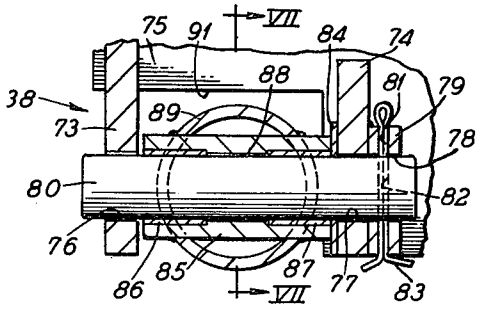


Fig. 6

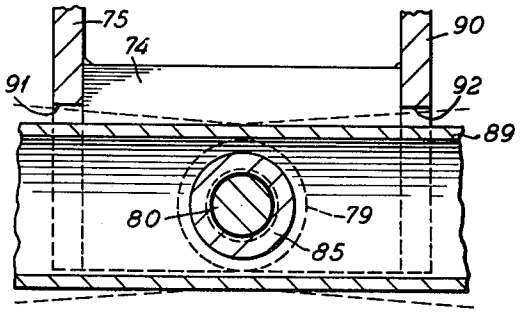


Fig. 7

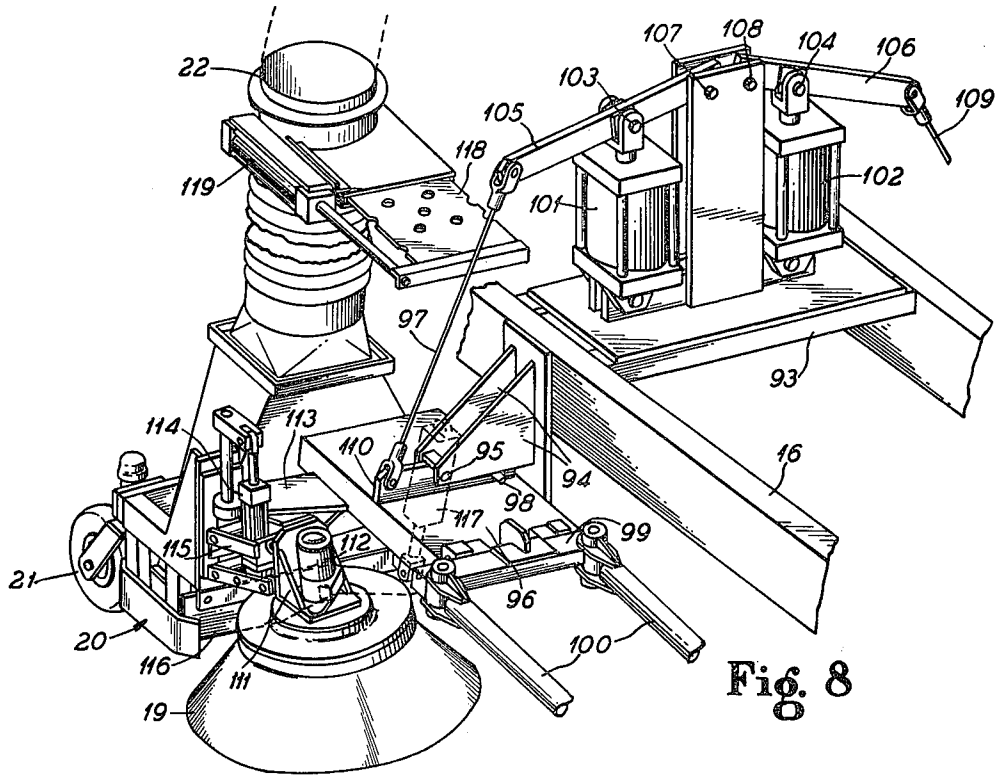

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116
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100
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Fig. 8

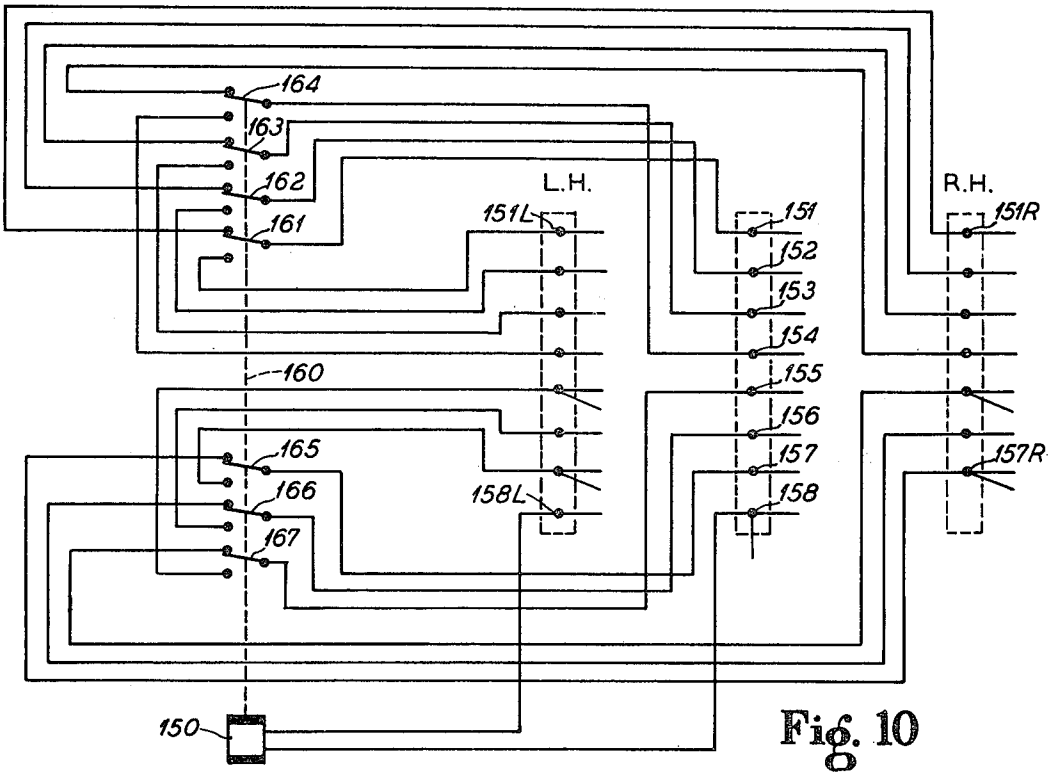

164
163
162
161
L.H.
151L
151
152
153
154
155
156
157
158
R.H.
151R
157R
160
165
166
167
158L
150

Fig. 10

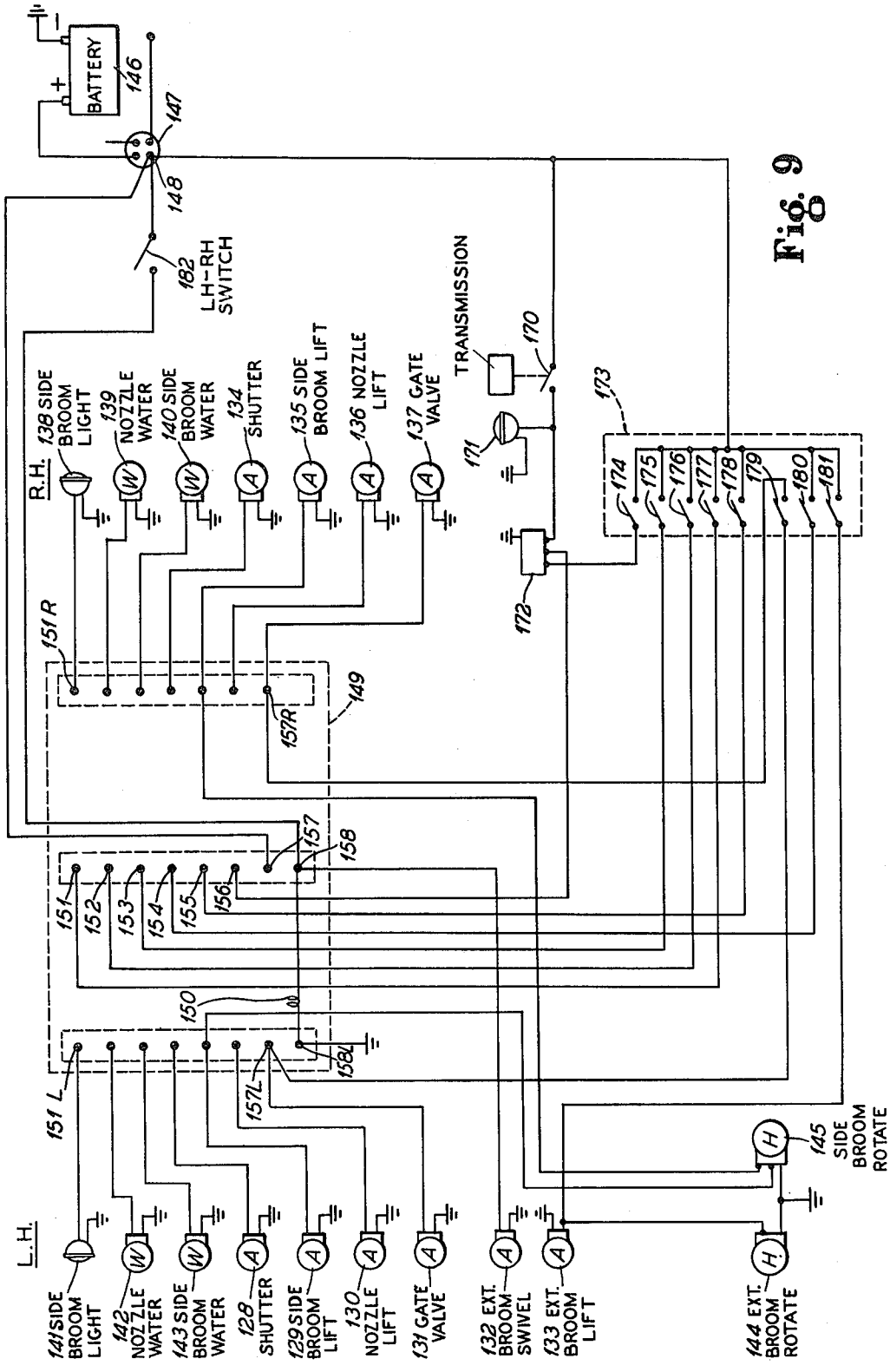

BATTERY
146
147
148
182
LH-RH SWITCH
TRANSMISSION
170
171
172
173
174
175
176
177
178
179
180
181
R.H.
138 SIDE BROOM LIGHT
139 NOZZLE WATER
140 SIDE BROOM WATER
134 SHUTTER
135 SIDE BROOM LIFT
136 NOZZLE LIFT
137 GATE VALVE
151R
149
157R
151
152
153
154
155
156
157
158
150
158L
151L
157L
L.H.
141 SIDE BROOM LIGHT
142 NOZZLE WATER
143 SIDE BROOM WATER
128 SHUTTER
129 SIDE BROOM LIFT
130 NOZZLE LIFT
131 GATE VALVE
132 EXT. BROOM SWIVEL
133 EXT. BROOM LIFT
144 EXT. BROOM ROTATE
145 SIDE BROOM ROTATE

Fig. 9

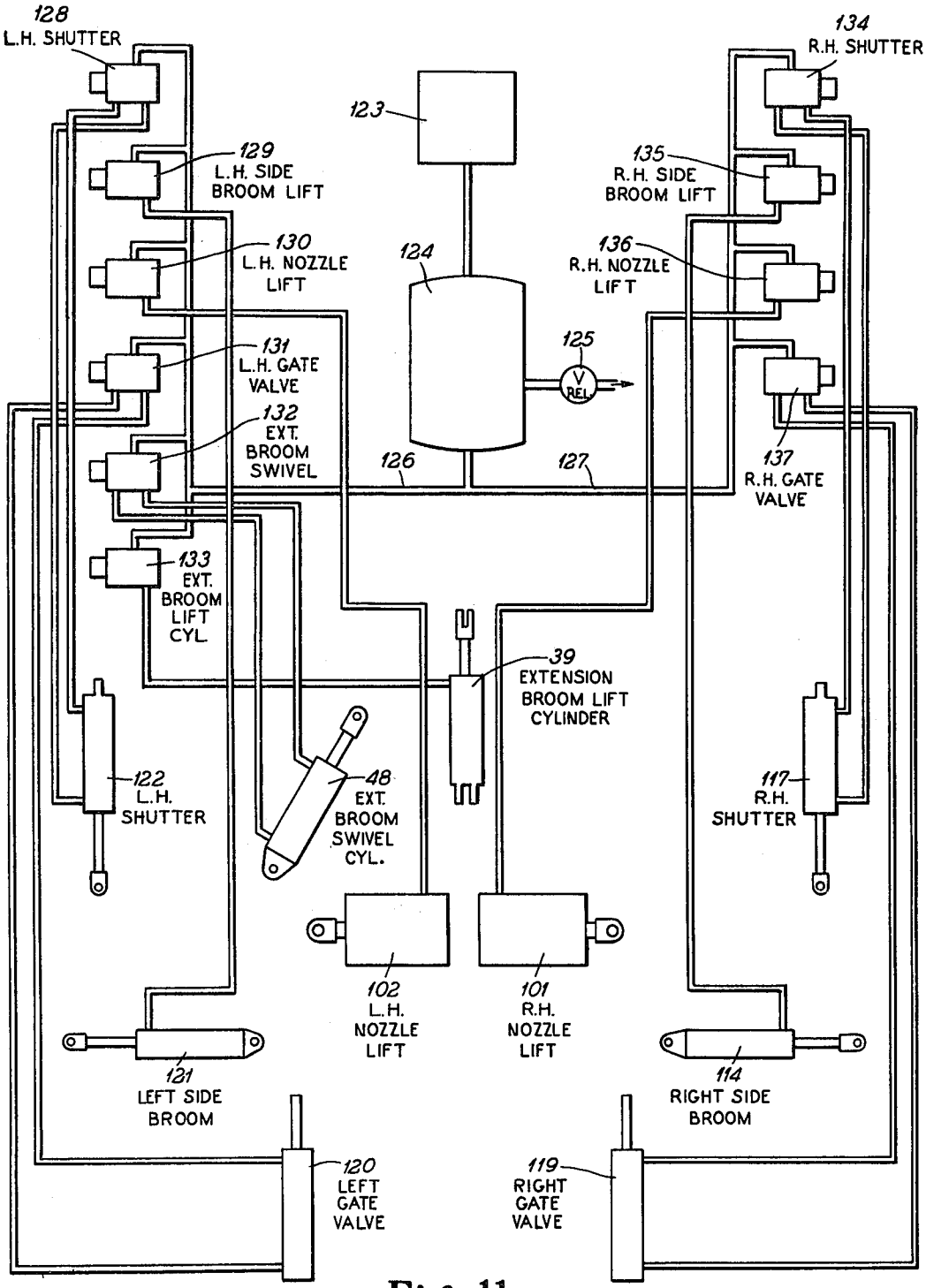

128
L.H. SHUTTER
134
R.H. SHUTTER
123
129
L.H. SIDE
BROOM LIFT
135
R.H. SIDE
BROOM LIFT
130
L.H. NOZZLE
LIFT
124
136
R.H. NOZZLE
LIFT
125
V
REL
131
L.H. GATE
VALVE
132
EXT.
BROOM
SWIVEL
126
127
137
R.H. GATE
VALVE
133
EXT.
BROOM
LIFT
CYL
39
EXTENSION
BROOM LIFT
CYLINDER
122
L.H.
SHUTTER
48
EXT.
BROOM
SWIVEL
CYL.
117
R.H.
SHUTTER
102
L.H.
NOZZLE
LIFT
101
R.H.
NOZZLE
LIFT
121
LEFT SIDE
BROOM
114
RIGHT SIDE
BROOM
120
LEFT
GATE
VALVE
119
RIGHT
GATE
VALVE

Fig. 11

VACUUM TYPE SWEEPER

This is a division, of application Ser. No. 271,684, filed July 14, 1972.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to truck type vacuum sweepers and is particularly concerned with vacuum sweepers which are constructed for dual operation.

2. Description of the Prior Art

Vacuum sweepers which are constructed on the chassis of a truck are well known in the art and generally include a rotating side broom which sweeps along a curb and deposits the sweepings into a large container carried by the truck by way of a vacuum nozzle which trails behind the side broom. Such vacuum sweepers are generally provided with a hydraulic system for operating the brooms, a pneumatiac system for raising and lowering the sweeping implements between a sweeping position and a transporting position, and a water spray system to aid in keeping dust at a minimum. In operation the sweeper is driven adjacent one curb and cleaning of the opposite side of the roadway must be accomplished by another machine or by making a second pass with the sweeper adjacent the opposite curb.

Dual machines make it possible to sweep either side of a roadway while traveling in one direction. Dual machines, however, conventionally have dual controls and it is common practice for the operator of a dual machine to swing from one side of the roadway to the other, either in accordance with a planned sweeping schedule or when he notices that a portion of the opposite roadway should be swept. Heretofore, the operator of a dual machine, in order to switch over to the opposite side of the roadway, would first disengage or shut down all operating components on a sweeping side of the machine, traverse the machine to the other side of the roadway, engage the required sweeping components on the other side of the machine and then travel that side of the roadway as necessary to complete his sweeping operation. Needless to say, the shutting down of one sweeping operation and the starting up of another sweeping operation for the opposite side of the machine requires that the operators attention be directed to machine functions, while at the same time he must be aware of traffic conditions and the like. This can become an inefficient and cumbersome procedure particularly if the machine operator is required to continuously transfer from one sweeping operation to the other.

Vacuum sweepers employ an extension broom in order to sweep a swath wider than that normally accommodated by the pickup nozzle. The extension broom is operated at an acute angle with respect to the transverse axis of the sweeper path and operates to move the sweepings toward the suction nozzle. On dual sweepers, the extension broom must have the capability of sweeping both for right hand and left hand operation and must therefore be mounted so as to swivel so that the angularity of the broom will cause the sweepings to be moved toward the proper pickup nozzle. Heretofore, the extension broom was suspended in such a manner that the broom was held parallel to the level of the truck frame. Inasmuch as a sweeper tends to load up in one side of the hopper, the weight distribution becomes uneven on the truck from left to right. With an uneven load, the truck spring suspension allows the truck frame to drop on one side and with the extension broom rigidly parallel to the truck frame, the engagement of the extension broom bristles with the pavement is heavy on one side and light on the other. This, of course, results in rapid wearing of the broom from a cylindrical shape to a conical shape. After a load has been dumped and sweeping is performed with an empty truck, the cone shaped broom does not have full contact with the pavement. This type of construction, therefore, leads to poor sweeping and short broom life.

Generally, the suction nozzles on a vacuum sweeper are suspended by a movable linkage at the front, for example a parallelogram linkage, and are supported by caster wheels at the rear. The suction nozzles must be lifted before the truck is operated in reverse. Heretofore, the operator has been provided with a switch for raising the suction nozzle prior to operating the truck in reverse. If the operator forgets to raise a suction nozzle, or if the suction nozzle is not raised in time before the truck is operated in reverse and the caster wheels are still on the ground, flat spots on the tires or tires popping off the rim would result.

SUMMARY OF THE INVENTION

In view of the evident foregoing disadvantageous constructions of vacuum sweepers and vacuum sweeper control systems, it is a primary object of the present invention to provide a dual vacuum sweeper having an integrated control system which will permit the operator to switch from a sweeping operation on one side of the machine to a sweeping operation on the other side of the machine by merely operating a single switch.

Another object of the invention is to provide an integrated control system for a vacuum sweeper which automatically raises the pickup nozzles in response to the operator shifting the truck into reverse.

Another object of the invention is to provide a dual vacuum sweeper having an integrated control system which causes the single extension broom of the sweeper to swivel from left hand to right hand operation, and vice versa, in response to the operation of a single toggle switch which controls the transfer of all sweeping functions from one side of the machine to the other.

Another object of the invention is to provide an extension broom for a vacuum sweeper which is maintained parallel to the pavement, wears evenly and has a prolonged sweeping life in spite of uneven loading and weight distribution transversely of the truck.

Another object of the invention is to provide a control system for a vacuum sweeper wherein sweeping functions may be manifest in an alterable program and the program may be selectively effective and the functions provided on either side of a dual vacuum sweeper in response to the simple manipulation of a single switch.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of the invention, its organization, construction and operation will be best understood from the following detailed description of a preferred embodiment of the invention, taken in conjunction with the accompanying drawings, on which:

FIG. 1 is a side elevation of a truck mounted dual vacuum sweeper;

FIG. 2 is a top view of a swivel extension broom employed in the vacuum sweeper of FIG. 1;

FIG. 3 is a sectional elevation of the swivel extension broom construction illustrated in FIG. 2 and taken generally along the line III—III;

FIG. 4 is a partial sectional view of apparatus for pivotally mounting the extension broom for movement about a vertical axis;

FIG. 5 is a fragmentary view of apparatus for pivotally mounting and limiting movement of the extension broom about an axis transverse of the machine;

FIG. 6 is a fragmentary sectional view showing the pivoting movemment of the apparatus of FIG. 5 in greater detail;

FIG. 7 is a further detail view of the apparatus of FIG. 5 taken generally along the line VII—VII of FIG. 6;

FIG. 8 is a fragmentary pictorial view of the side broom and vacuum nozzle apparatus as it relates to the frame of the truck;

FIG. 9 is a schematic electrical diagram illustrating an integrated control system having means for programming the operation of the sweeper and means for transferring the effect of the program from one side of the sweeper to the other;

FIG. 10 is a more detail schematic illustration of relay apparatus employed in the circuit of FIG. 9; and

FIG. 11 is a schematic diagram of the pneumatic system utilized in conjunction with the control system of FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a vacuum type sweeper is generally illustrated at 10 as comprising a truck 11 having a set of rear wheels 12 and a set of front wheels 13 supporting the sweeper. The truck 11 is provided with an operator's cab 14 which houses, in addition to an operator, a control console for controlling the sweeping operations of the sweeper.

The particular sweeper illustrated is a dual sweeper which includes sweeping apparatus 15 carrried beneath and on both sides of a truck frame 16. A hopper 17 is provided for receiving sweepings which may be moved from the pavement by way of an extension broom 18, a side broom 19, a suction nozzle 20 and a hose 22. Suction is provided by apparatus mounted forward of the hopper, such apparatus being well known in the art and not discussed in detail herein.

Inasmuch as the illustrated sweeper is a dual sweeper, a second side broom and a second suction nozzle are mounted on the other side of the sweeper. The nozzle 20 is supported by a trailing wheel 21, as is the corresponding nozzle on the opposite side of the machine. While the side brooms and suction nozzles are provided in duplicate, the extension broom serves both sides of the sweeper and is therfore pivotally mounted for movement toward the side of the sweeper which is performing a sweeping operation.

Referring to FIGS. 2–7, the extension broom 18 is illustrated as comprising a weldment or frame 23 which is pivotally connected at its rear portion at 25 to a plate 26 which is connected by a pair of angle members 27 and a pair of angle members 28 to the vehicle frame 16. At its forward end the frame 23 includes an arcuate member 29 which is supported on a pair of angle shaped members 30 connected to the frame 16 by way of depending members 32 and 33. A plate like member 31 is secured to the member 32 spaced from the member 30, whereby the members 30 and 31 embrace the arcuate member 29. As is common practice, a flexible dust shield 34 is suspended from the frame 23 forward of the rotating broom.

The extension broom 35 is supported by pins 36 for rotation by a motor 55. A pair of arms 37 support the pins 36 at the forward ends thereof and are connected to a pivot mechanism 38 at the rear ends thereof. An air cylinder 39 is fixed to the frame 23 at 40 and has an extensible member 41 which is connected by a link 42 to a member 43. The member 43 is connected between the arms 37 at a point which divides the arms 37 into two portions, 24 and 52. It is readily apparent that operation of the cylinder 39 moves the extension broom 35 between the transport and sweeping positions.

In FIG. 2 the frame 16 has a pair of transverse frame members 44. A longitudinally disposed member 45 is connected to the members 44. A vertically disposed angle member 46 depends from the member 45 and carries a plate 47. A cylinder 48 is pivotally secured to the plate 47 at one end and includes an estensible member 49 which is pivotally connected to a member 51 of the extension broom frame 23. Operation of the cylinder 48 therefore positions the extension broom for sweeping in cooperation with the left side broom or the right side broom against the respective stops 56, 57. Upon operation of the cylinder 48, the broom frame 23 is pivoted about the pivot 25 and the arcuate member 29 supports the forward end of the frame 23 in a sliding relationship upon the member 30.

Referring to FIG. 4, the pivot 25 is illustrated in greater detail. The plate 26 includes a bore 58 which has a pin 59 welded therein so as to extend below the lower surface of the plate 26. The frame 23 includes a plate 60 having a bore 61 therein which has a ring 62 welded thereto. The inner diameter of the ring 62 is provided with a sleeve 63 which receives the pin 59. The pin 59 includes a threaded bore 64 for receiving a bolt 65 by way of a washer 66 and a washer type bushing 67. As can be seen in the drawing, the ring 62 engages and moves with respect to the sleeve 63 and the bushing 67, while the pin 59, the washer 66 and the bolt 65 are located together by a pin 68 so as to remain stationary with respect to the vehicle frame.

Referring to FIGS. 5–7, the mechanism for maintaining the axis of rotation of the extension broom parallel to the swept surface is illustrated in greater detail. In FIG. 5, it can again be seen that the arm 37 includes a forward portion 24 for connection to the broom and a rear portion 52 for connection to the pivot 38. Each of the arms 52 rotatably receives a respective pin 54. The pins 54 are connected to opposite ends of a tube 89. The extension broom is therefore pivotal about the longitudinal axis of the tube 89. The tube 89 has connected thereto an arm 70 which carries an adjustable stop mechanism 71 for striking a cooperable member 72 carried at the rear end of the arm portion 52 for adjustably limiting the downward movement of the broom to prevent excessive bristle contact and wear. The air cylinder rod length and stroke limits the up position of the broom.

The frame 23 includes a pair of spaced vertically disposed member 73 and 74 having aligned bores 76 and 77, respectively. The members 73 and 74 are in the

form of plates and are connected between a pair of plates 75 and 90. A member 79 is secured to the plate 74 and includes a bore 78 which is aligned with the bores 76 and 77. The aligned bores receive a pin 80 which has a transverse bore 82 which may be aligned with a bore 81 of the member 79 for receiving a cotter pin 83 or the like.

The elements 75-81 are located at the center of the tube 89 and, as illustrated in particular in FIG. 7, form a second horizontal axis of rotation for the extension broom generally longitudinally of the sweeper at the pin 80. The plates 75, 90 include respective recesses 91, 92 for permitting a certain amount of rotation about this longitudinal axis. The tube 89 includes a transverse bore at its center for receiving a cylinder 85 having a longitudinal bore 88 for receiving the pin 80. The bore 88 is countersunk at its ends to seat and be partially defined by a pair of bearing sleeves 86 and 87.

The foregoing structure permits pivotal movement of the extension broom about a pair of generally horizontal axes. The first horizontal axis is the longitudinal axis of the tube 89 and the second horizontal axis is the axis of the pin 80. Therefore, in response to changes in transverse and longitudinal slope of the pavement, the extension broom pivots so as to maintain its axis of rotation at the pins 36 parallel to the pavement.

Referring now to FIG. 8, the side brush and suction apparatus for the right hand side of a sweeper is illustrated. Inasmuch as a dual sweeper is disclosed herein, similar apparatus is provided on the opposite side of the sweeper as indicated by the elements 102, 104, 106 and 109. A transverse sub-frame 93 is connected across the vehicle frame 16 and has connected thereto a pair of plates 94 which extend toward the outside of the sweeper. A safety pin 95 may be inserted between the plates 94 and through an upwardly extending member 110 of a side broom weldment or frame 96. The frame 96 includes a transverse bar 99 which is connected to a pair of guide arms 100. Although not illustrated in the drawing, the guide arms terminate in a pivot mechanism similar to that formed by the elements 94, 95 and 110. The member 110 has a stop pin 98 extending therefrom for abutting the bottom edge of the plates 94 to limit upward movement of the side sweeping apparatus.

The sub-frame 93 carries a cylinder 101 which has an extensible member 103 pivotally connected to a lever 105. The lever 105 is pivoted at one end by means of a pin 107 and is pivotally connected at its other end to a member 97 which is similarly attached to the member 110. The member 97 may advantageously be in the form of a cable or rod. Removal of air pressure from cylinder 101 causes the frame 96 to drop down and out due to gravity to lower the side sweeping equipment between transport and sweeping positions; the opposite action being effected upon application of air pressure.

The suction nozzle 20 is of generally known construction and is supported on the surface to be swept by a trailing wheel 21. The suction nozzle 20 is connected to and raised and lowered with the frame 96 by means of members 113. The nozzle 20 carries a cylinder 114 having a parallelogram linkage 115 connected to a side broom motor bracket 111. The motor bracket 111 mounts a motor 112 which is connected to and serves to rotate the side broom 19. Operation of the cylinder 114 is therefore effective to raise and lower the side broom 19.

Interposed in the hose 22 between the nozzle 20 and the hopper 17 is a gate valve 118 which is operated by a cylinder 119. In addition, the suctioon nozzle 20 includes a shutter 116 which is connected to and opened and closed by means of a cylinder 117.

Although the foregoing side sweeping apparatus is of generally conventional design, the control of such apparatus, particularly on a dual sweeper, is unique and will be best understood from the following description of FIGS. 9-11.

Referring first to FIG. 11, the pneumatic circuit for the sweeper disclosed herein is illustrated in schematic form. The circuit comprises a compressor 123 and a pressure tank 124 which are mounted forward of the hopper 17. The pressure tank has connected thereto a relief valve 125. The pressure tank 124 feeds a pair of main pneumatic lines 126 and 127. The line 126 is associated with the left hand side of the sweeper and with the extension broom and the line 127 is associated with the right hand side of the sweeper. The line 126 is connected in common to a plurality of electrically controlled valves 128-133 which respectively control operation of the left hand shutter cylinder 122, the left side broom cylinder 121, the left hand nozzle lift cylinder 102, the left gate valve 120, the extension broom swivel cylinder 48 and the extension broom lift cylinder 39. The line 127 is likewise connected to a plurality of electrically controlled valves 134–137 for controlling the right hand shutter cylinder 117, the right side broom lift cylinder 114, the right hand nozzle lift cylinder 101 and the right gate valve 119. The valves 128–133 and 134– 137 are electrically controlled air valves and the operation thereof is controlled by the circuit of FIG. 9.

Referring to FIGS. 9 and 10, an electrical schematic diagram of the circuits for controlling sweeping operations is illustrated as comprising a battery 146 having a negative terminal connected to ground and a positive terminal connected to the ignition switch 147 of the sweeper. The ignition switch 147 includes an accessory terminal 148 which serves to provide positive battery potential to the remainder of the circuit of FIG. 9. An eight pole double throw relay 149 includes a relay winding 150, a plurality of terminals 151L–158L connected to the left side sweeping devices, a plurality of termainals 151R–157R connected to the right hand sweeping devices and a plurality of terminals 151–158 which are connectable between the left and right hand terminals by corresponding switch contacts 161–167 (FIG. 10). The relay 149 has its contacts 161–167 normally connected in circuit with one set of terminals 151L–157L, for example, when the winding 150 is not energized, and connected in circuit with the terminals 151R–157R, for example, when the winding 150 is energized. The winding 150 is connected between ground and the accessory terminal 148 by way of the relay terminal 158 and a left hand-right hand selection switch 182. Therefore, upon operation of the switch 182 the movable contacts 161–167, shown connected at 160 in FIG. 10, transfer to the terminals 151R–157R.

The terminals 151L and 151R have respective side broom lights 141 and 138 connected thereto for providing light during night sweeping operations. The terminals 152L,152R connect to nozzle water spray valves 142 and 139. Similar water spray valves 143 and 140 associated with the side brooms are connected to the respective terminals 153L and 153R. The aforementioned valves 128–131 and 134–137 for controlling

the air supply to their respective cylinders are respectively connected to the terminals 154L–157L and 154R–157R. It should be noted that the extension broom swivel control valve 132 is connected to the terminal 158 for receiving energizing power when the switch 182 is closed. The extension broom is therefore biased toward one side of the sweeper and moved toward the other side of the sweeper in response to closure of the switch 182. In addition, the extension broom lift control valve 133 is not connected to the relay 149 inasmuch as transfer of sweeping operations from one side of the roadway to the other does not necessitate lifting of the extension broom, although this operation may be performed as will be understood from the following description. An electrically operated hydraulic valve 144 for controlling extension broom rotation by means of the motor 55 and a side broom rotation control hydraulic valve 145 are provided. The valve 144 is commonly connected with the extension broom lift control valve 133 and the side broom rotation control valve 145 is connected to the terminals 155L and 155R to control the direction of hydraulic fluid to one side broom or the other in response to operation of the switch 182. All of the above described lights and valves correspond to sweeping functions including illumination, spraying, lifting and lowering, gating, swiveling and controlling rotation. These functions may be individually selected and stored by means of a plurality of switches mounted in a single switch console 173.

The switch console 173 includes switches 174–181 which, with the exception of the switch 179, are commonly connected to the accessory terminal 148. The switch 175 is operable to store the side broom water spray function and extends positive potential to the terminal 153. The switch 176 is operable to extend positive potential to the terminal 152 and store the sweeping function of nozzle water spray. The switch 177 stores the illumination function and is connected to the terminal 151. The switch 178 stores the side broom lift function and is connected to the terminal 155. The switch 180 may store the shutter lift function and is connected to the terminal 154. The switch 181 stores the extension broom lift function and is connected directly to the extension broom lift valve 133 as indicated above. Generally, the console 173 is a sweeping function programmer and the switches thereof are operable to store sweeping functions. These functions are transferred into sweeping operations upon transfer of the relay contacts 161–167 to energize the selected sweeping control valves, or lights, as the case may be.

The switch 174 is extended to the terminal 156 for automatically controlling the nozzle lift. A relay 172 is interposed between the switch 174 and the terminal 156, the relay being controlled in the backup lamp circuit of the sweeper. A backup light switch 170 is associated with the transmission shifting mechanism of the sweeper and is operable to close and extend positive potential from the accessory terminal 148 to the relay 172 and the backup light 171 upon operation of the relay 172, with the switch 174 closed, positive potential is interrupted to the terminal 156 by the relay 172 to automatically lift the nozzle which is performing a sweeping operation at the time. This feature prevents inadvertent or tardy lifting of the nozzle by an operator and the attendant damage which may be caused to the nozzle apparatus as mentioned in the initial portion of the specification.

The sweeper includes a wandering hose 183 (FIG. 1) which is connectible in communication with the hopper 17 and which is used for picking up leaves, etc. at locations several feet beyond the curb. In order to provide sufficient suction for the wandering hose, it is necessary to close both gate valves 119, 120. Heretofore, this has been accomplished by hand in an operation wherein the operator manually closes each gate valve and opens the valving for the wandering hose. In this circuit the switch 179 provides simultaneous operation of both gate valves from the cab in that the switch 179 permits connection of the gate valve on one side of the sweeper to the terminal of the relay normally associated with the gate valve. It will be noted in FIG. 9 that the gate valve 137 is connected to the terminal 157R and to one side of the switch 179, and the gate valve 131 is connected to the terminal 157L and to the other side of the switch 179. Therefore, closure of the switch 179 automatically causes closure of both gate valves.

Although we have described our invention by reference to particular illustrations of a preferred embodiment thereof, many changes and modifications of our invention may become apparent to those skilled in the art without departing from the spirit and scope of the invention. We therefore intend to include within the patent warranted hereon all such changes and modifications as may reasonably and properly be included within the scope of our contribution to the art.

What we claim is:

1. A vacuum type sweeper of the type having dual side brooms mounted on opposite sides of a sweeper truck, a cylindrical rotating extension broom mounted beneath the sweeper truck and pivotable between positions wherein it is effective to sweep toward the side brooms, two transversely spaced vacuum sweepings pickups mounted on said frame immediately rearward of said extension broom, said extension broom when pivoted in one position, being operable to sweep into one of said vacuum sweepings pickups and when its other position being operable to sweep into the other of said vacuum sweepings pickups, means for selectively moving either vacuum sweepings pickup from a road travel position to a sweepings pickup position, and means for preventing uneven wear of said extension broom including means for maintaining the axis of rotation of said extension parallel to the surface being swept.

2. A vacuum type sweeper comprising: a vehicle frame for moving along a surface to be swept; a rotatable extension broom for sweeping the surface having an axis of rotation generally at an acute angle to the path of movement of said frame; a vacuum sweepings pickup mounted on said frame at one side of said extension broom, means connected to said pickup for moving said pickup selectively into a sweepings pickup position and into a road travel position, and mounting means for said extension broom mounting said broom in a position beneath said frame and immediately forward of said sweepings pickup for directing sweepings into said sweepings pickup, said mounting means including means positioned for maintaining said axis of rotation parallel to the swept surface.

3. A sweeper according to claim 2, wherein said means for maintaining the axis of rotation of said extension broom parallel comprises: pivotal connecting

means connecting said extension broom to said vehicle frame, said pivotal connecting means having a vertical pivot axis means, a first generally horizontal pivot axis means extending longitudinally of said vehicle frame, and a generally horizontal pivot axis means extending transversely of said vehicle frame, said first and second horizontal axes means being pivotable to maintain the axis of rotation of said extension broom parallel to the swept surface.

4. A sweeper according to claim **2**, wherein said means for maintaining the axis of said broom parallel includes means pivotal about at least two generally horizontal axes.

5. A sweeper according to claim **4**, wherein said means for mounting said extension broom comprises an extension broom frame having front and rear ends, said broom frame including said means pivotal about at least two horizontal axes and at least one broom supporting arm connected between said extension broom and said means pivotal about at least two horizontal axes.

6. A sweeper according to claim **5**, wherein said means pivotal about at least two horizontal axes comprises a first pivot member connected to said broom frame and extending longitudinally with respect to said vehicle frame, a second pivot member pivotally connected to said extension broom arm and extending transversely with respect to said vehicle frame for movement about a transverse axis, said second pivot member pivotally connected to said first pivot member for movement about a longitudinal axis.

7. A sweeper according to claim **6**, comprising means connected between said broom frame and said broom arm and operable to pivot said broom about the transverse horizontal axis between a sweeping position and a transport position.

8. A sweeper according to claim **5**, wherein said means for mounting said extension broom further comprises a pivotal connection means having a generally vertical pivot axis connecting the rear of said extension broom frame to said vehicle frame.

9. A sweeper according to claim **8**, comprising means connected between said vehicle frame and said broom frame and operable to pivot said broom about said vertical axis between positions where the broom sweeps toward respective opposite sides of the sweeper.

10. A sweeper according to claim **8**, wherein said pivotal connection means comprises a first member connected to said broom frame having a vertical bore therein, a pivot pin connected to said vehicle frame and received in said vertical bore, and means for releasably securing said pivot pin in said bore.

11. A sweeper according to claim **8**, wherein said broom frame comprises an arcuate member carried at its front end, and said mounting means further comprises means depending from said vehicle frame and supporting said arcuate member in sliding relationship.

12. A sweeper according to claim **11**, wherein said arcuate member includes stop projections thereon and said depending means includes means for striking said stop projections to limit arcuate movement of said extension broom frame.

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