Oct. 9, 1973 A. D. McBURNETT 3,764,383

APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

Filed June 4, 1971 8 Sheets-Sheet 1

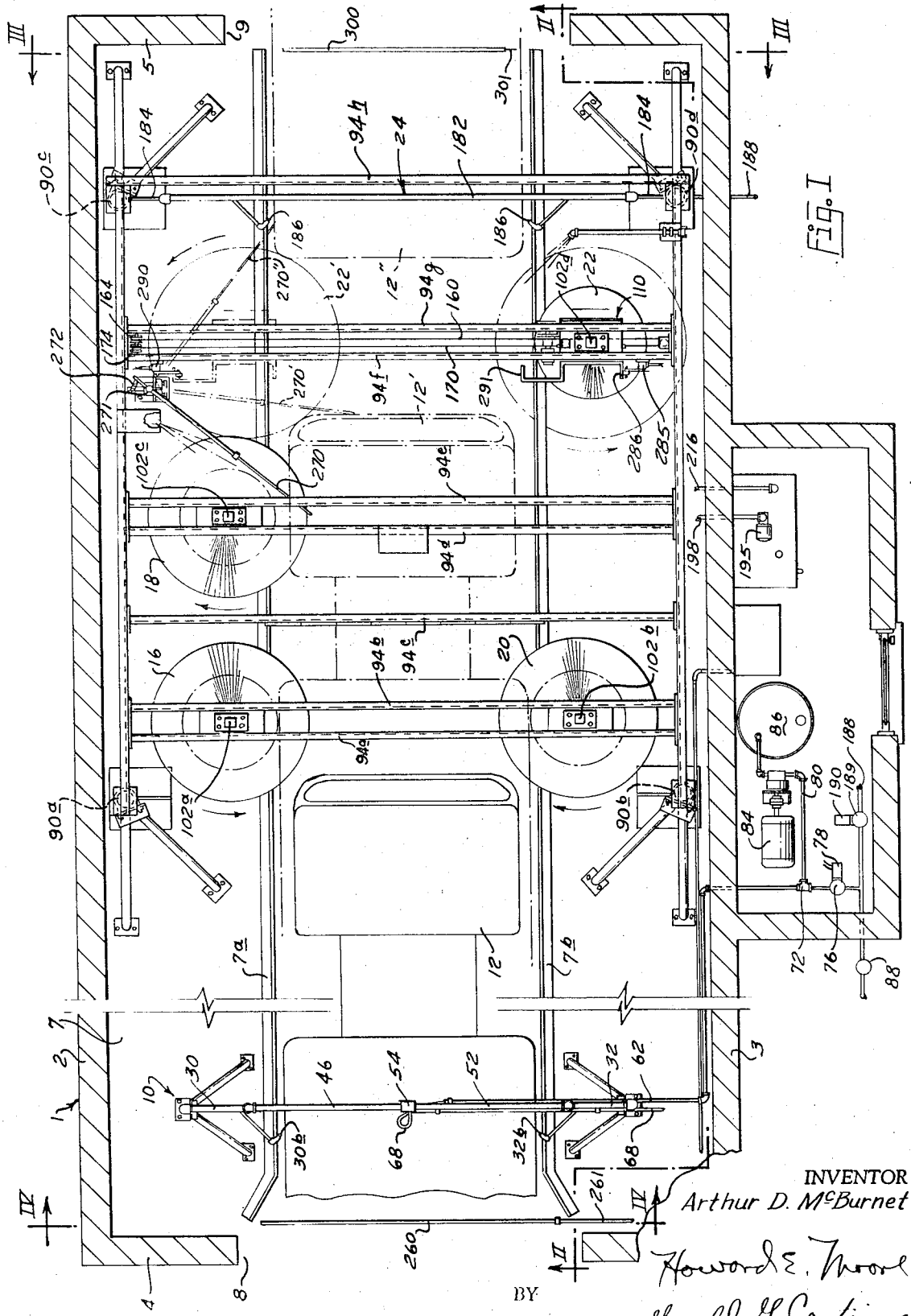


Fig. I

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APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

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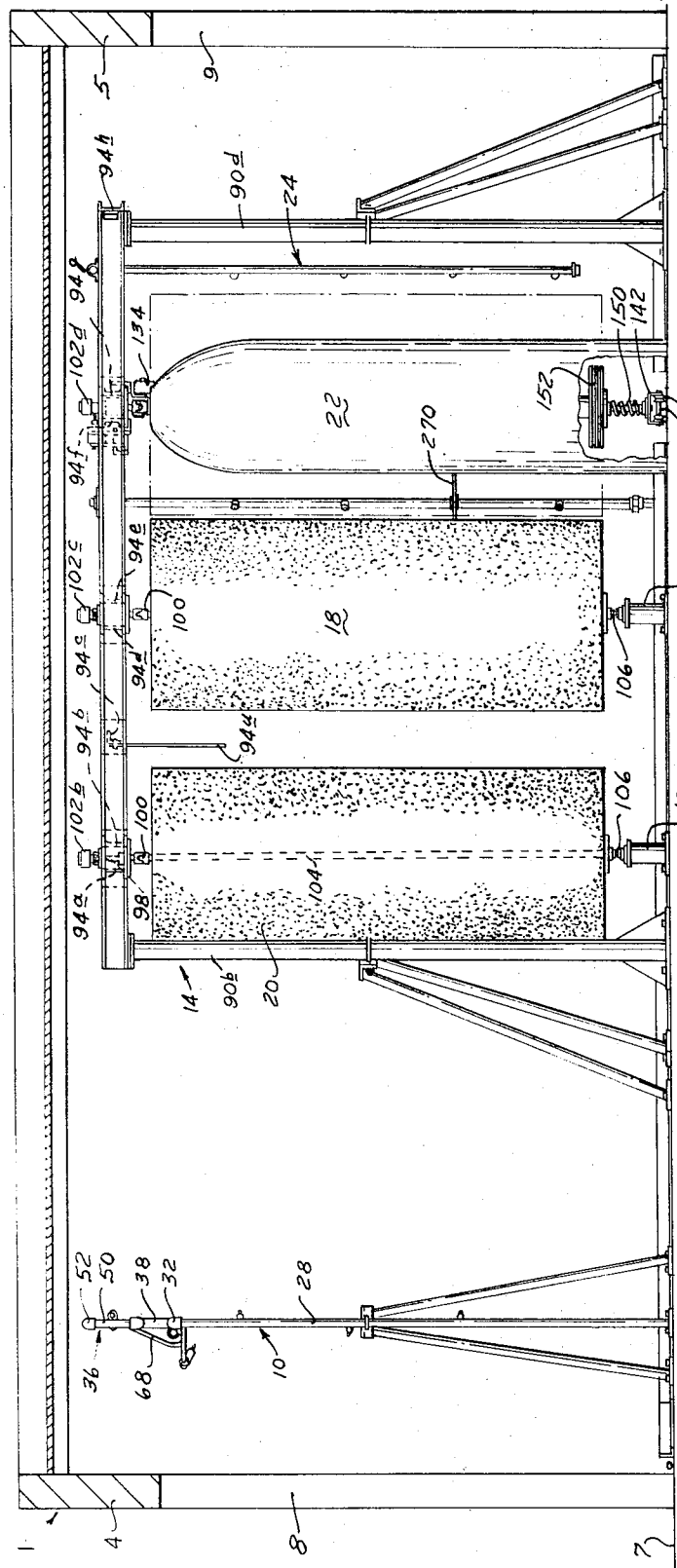


Fig. II

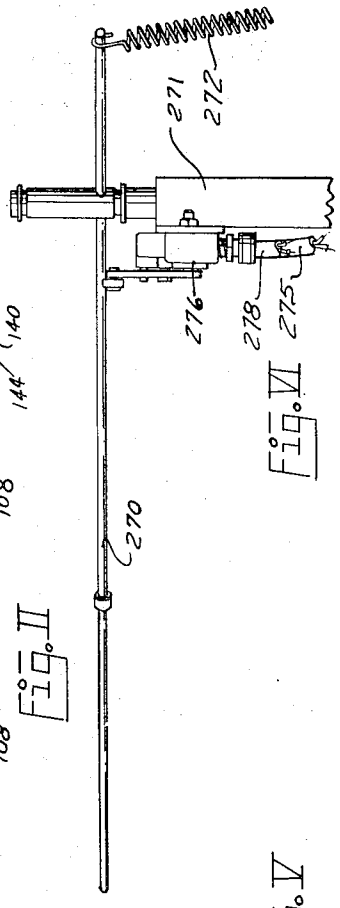


Fig. VI

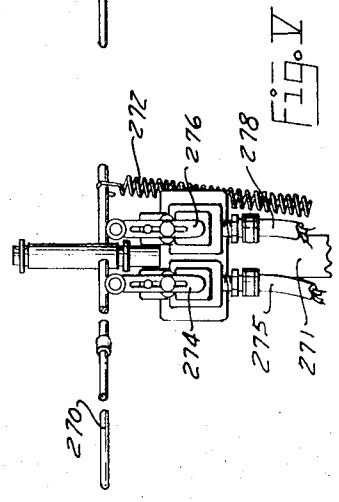


Fig. V

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APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

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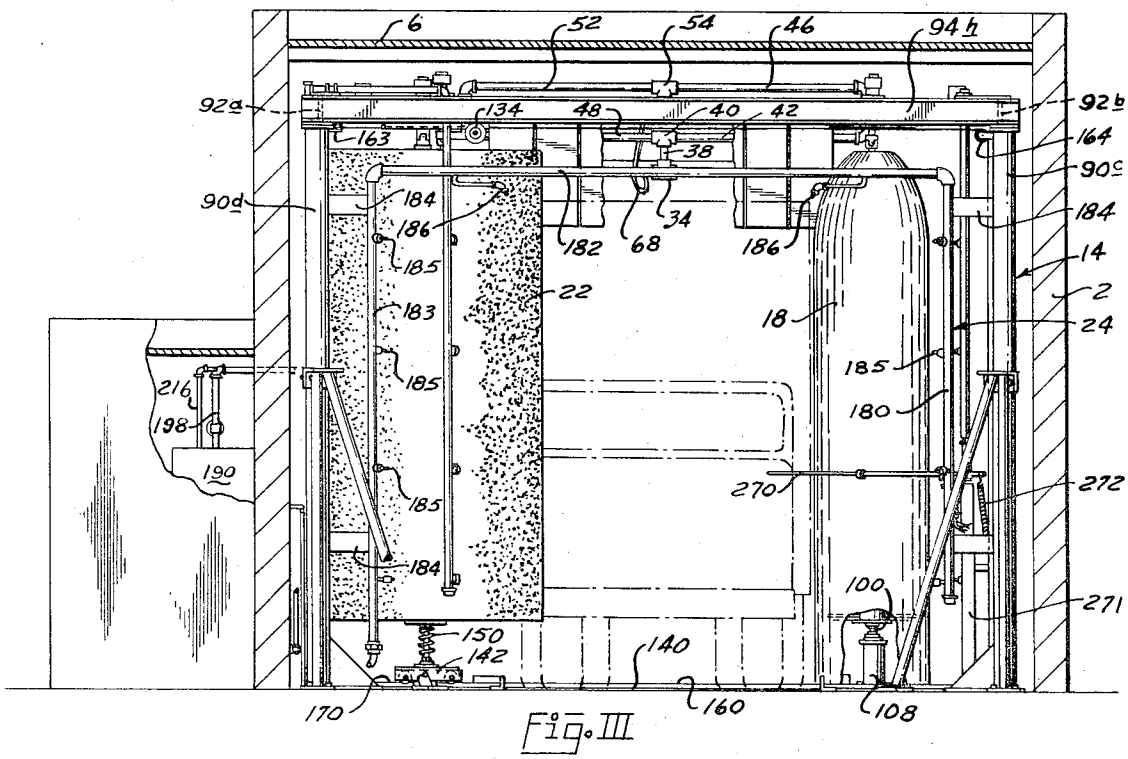


Fig. III

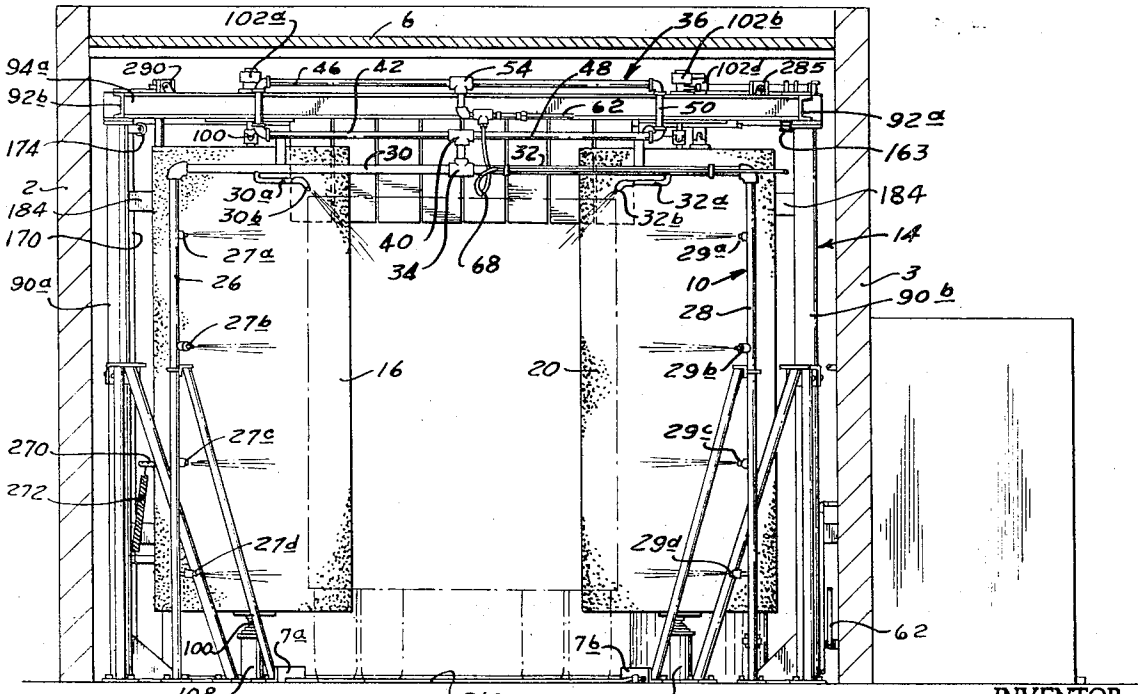


Fig. IV

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APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

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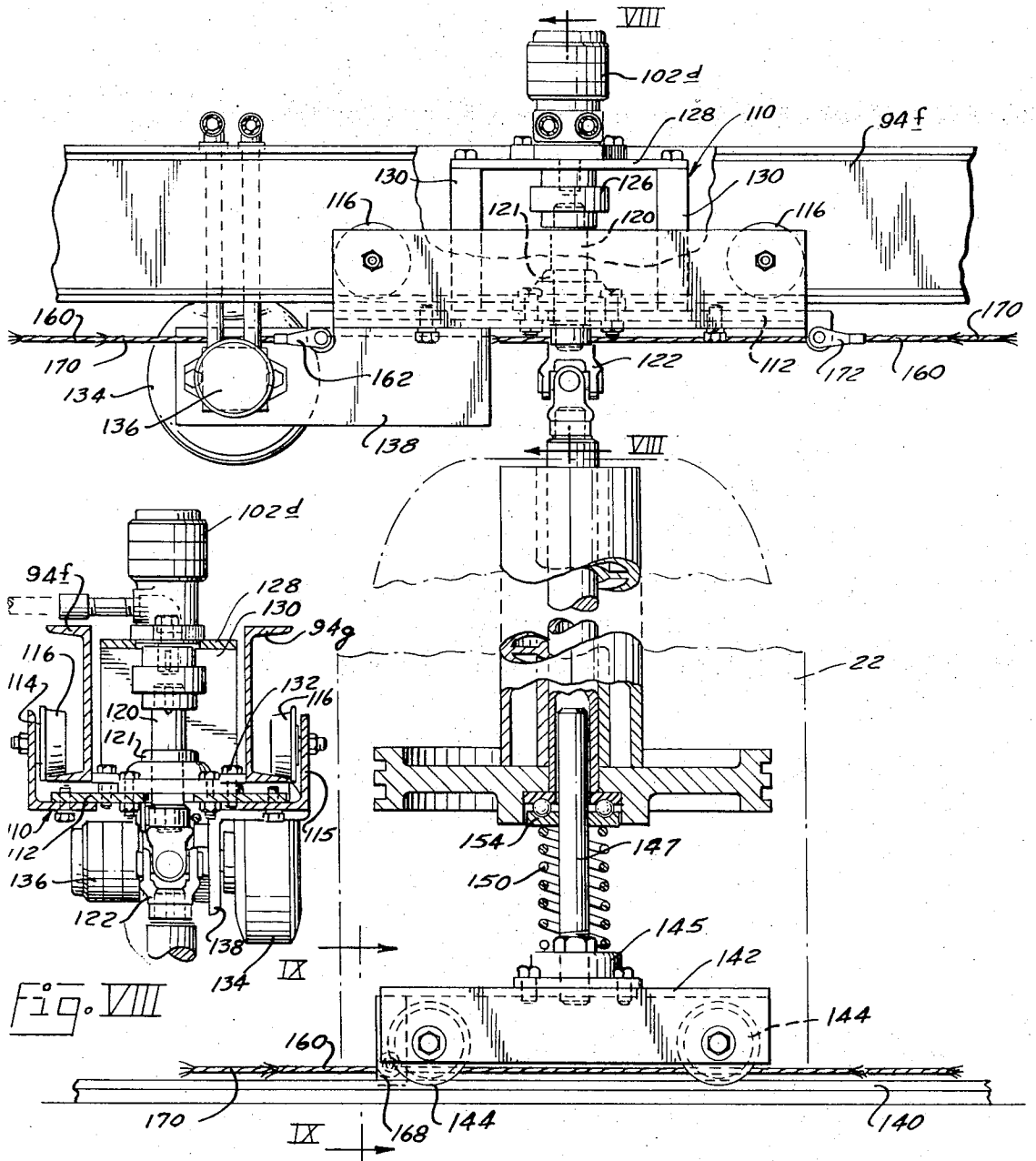


Fig. VIII

Fig. VII

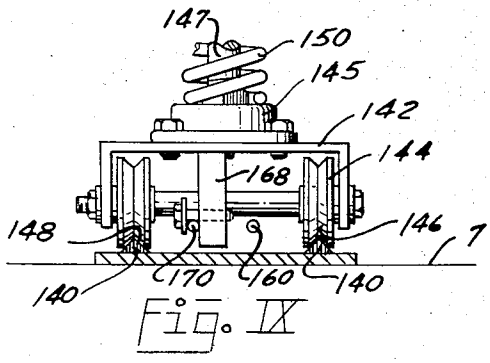


Fig. IX

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APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

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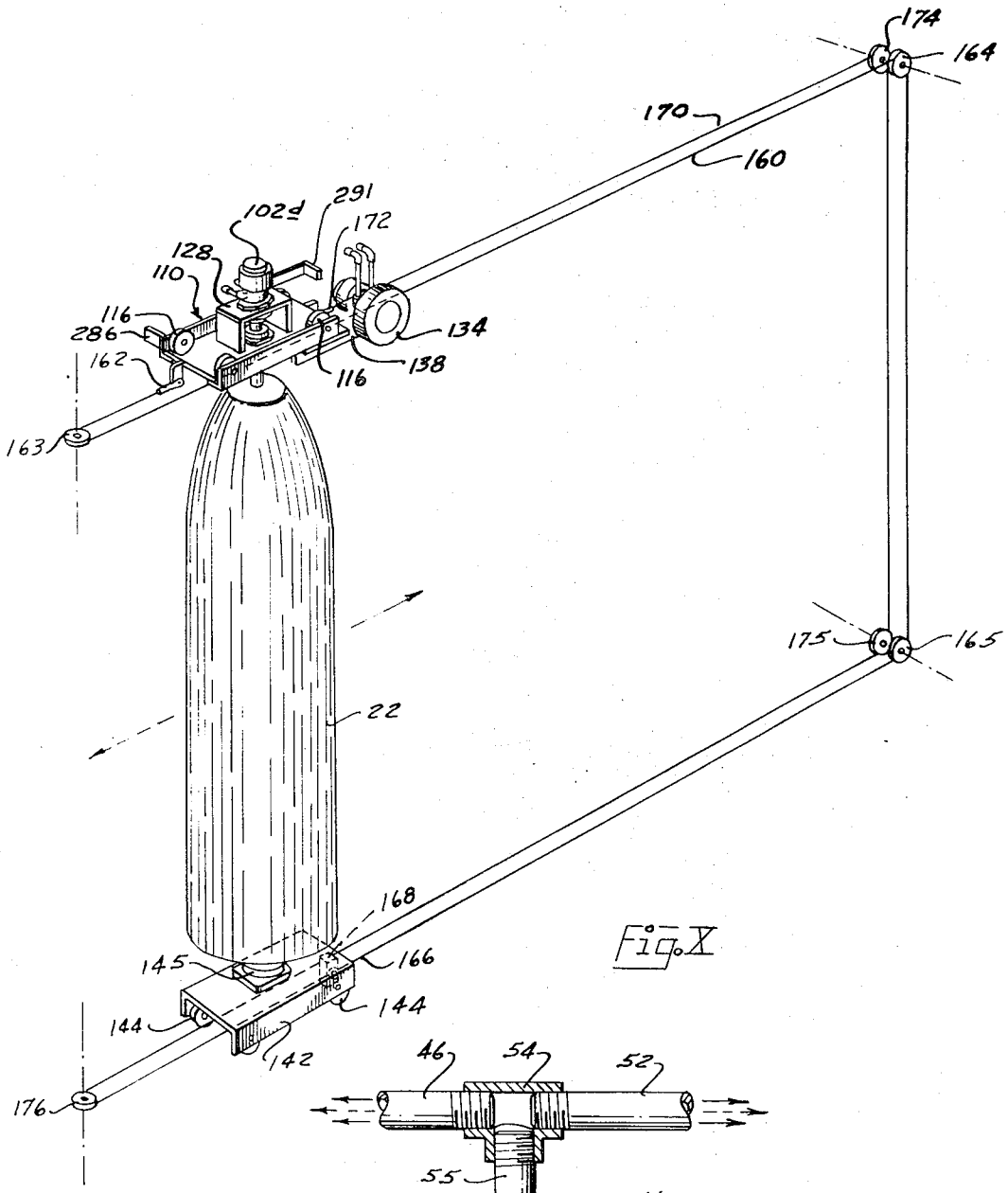


Fig. X

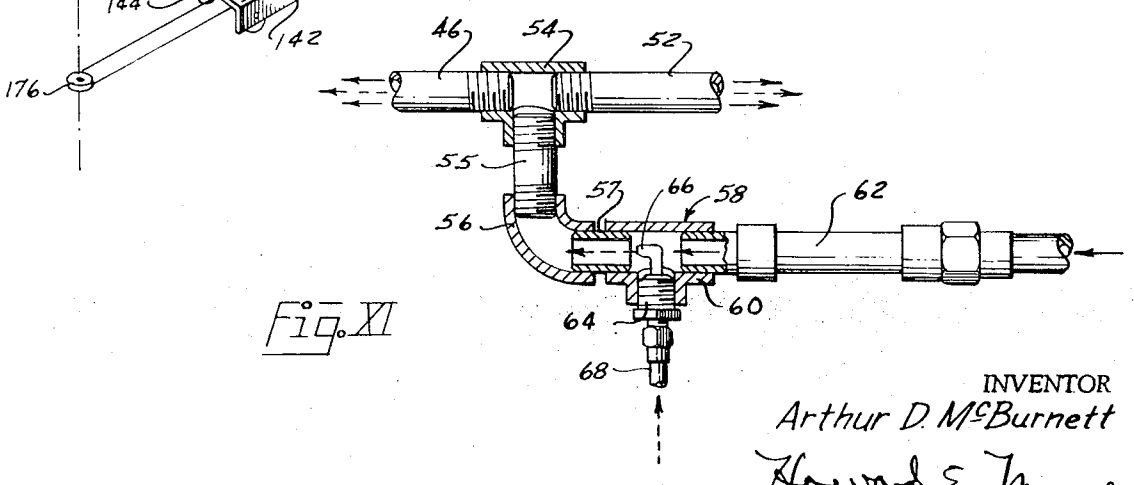


Fig. XI

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APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

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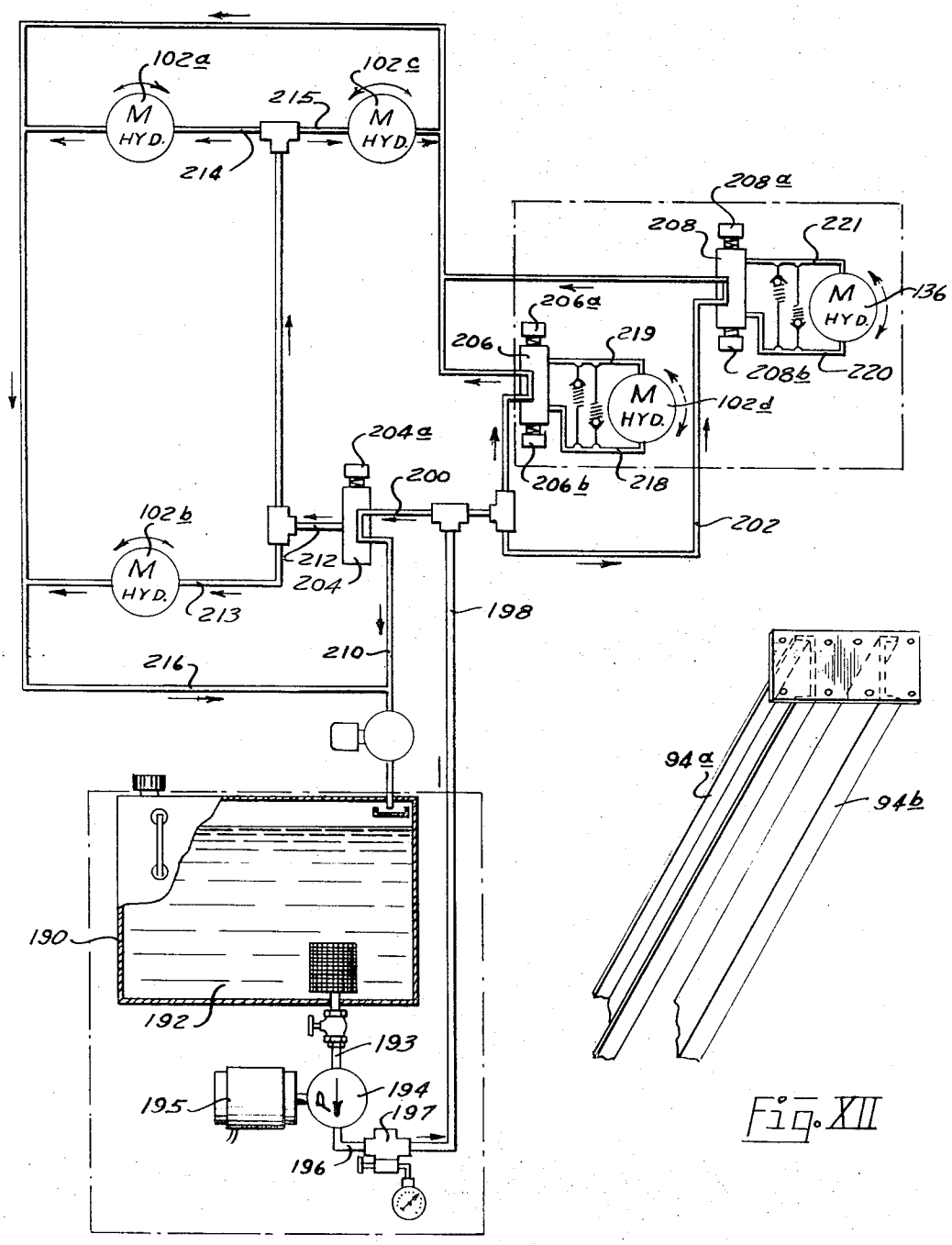


Fig. XIV

Fig. XII

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APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

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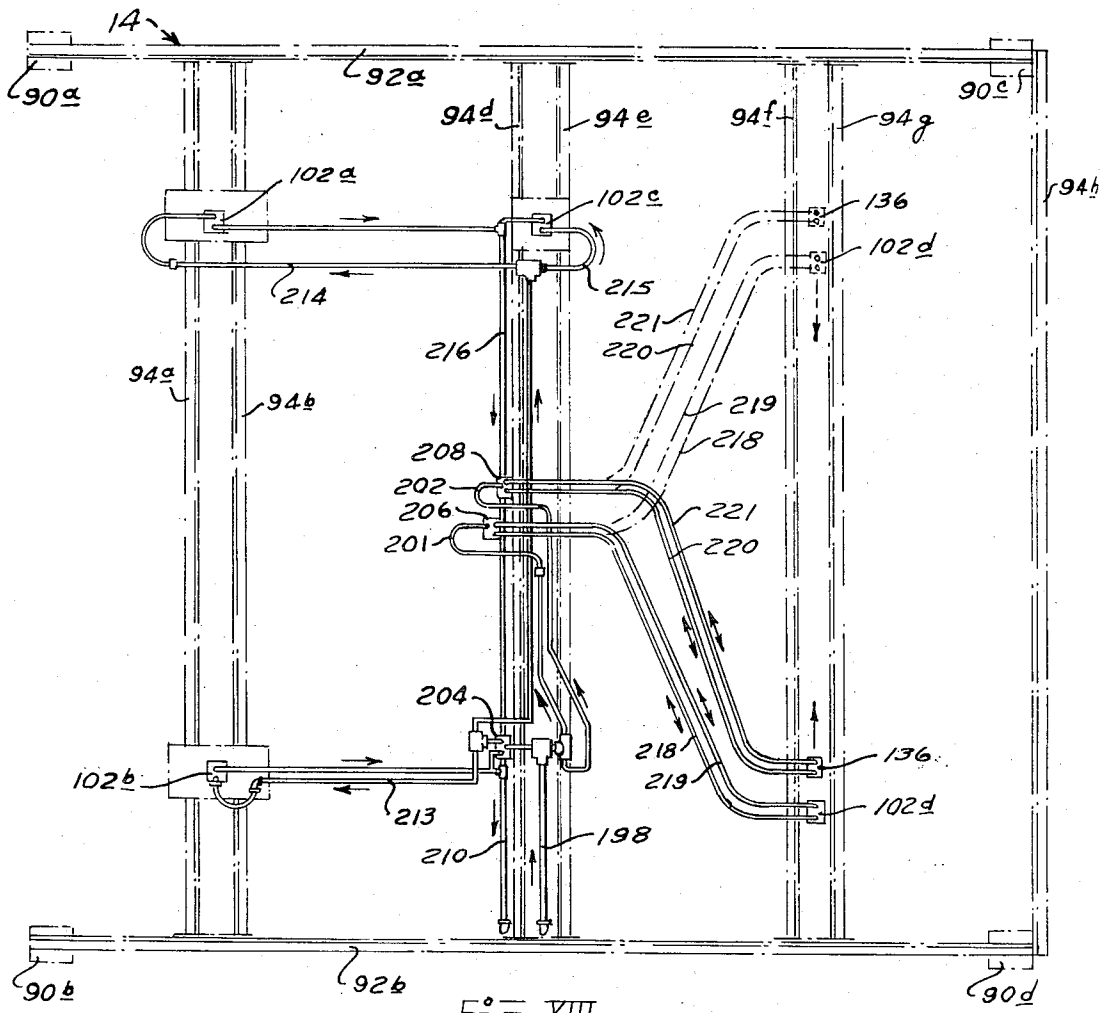


Fig. XIII

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APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

Filed June 4, 1971 8 Sheets-Sheet 8

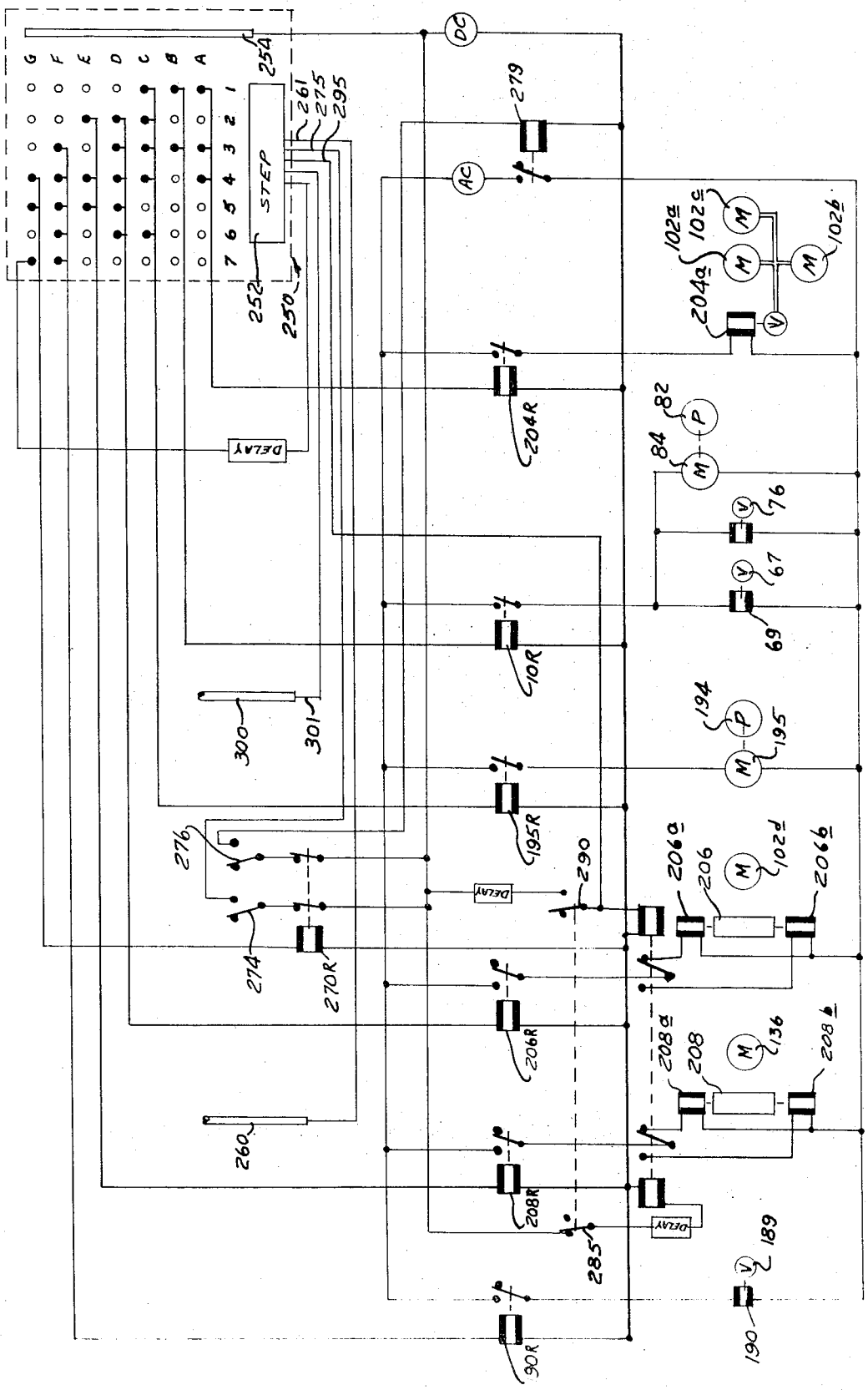


FIG. XV

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3,764,383

APPARATUS AND METHOD FOR WASHING TRUCKS AND BUSSES

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Filed June 4, 1971, Ser. No. 150,024
Int. Cl. B08b 1/04; B60s 3/06
U.S. Cl. 134—6 27 Claims

ABSTRACT OF THE DISCLOSURE

Rotating brushes are positioned at each side of a path along which a vehicle moves for scrubbing sides of the vehicle. One of the brushes is mounted on a carriage which travels transversely across the path of the vehicle to scrub the front and rear ends thereof. The traveling brush has cables connected between upper and lower ends thereof for maintaining the brush in a vertical position. Each side and each end of the vehicle is scrubbed by brushes rotating in opposite directions or by a single brush which moves across surfaces twice rotating in opposite directions on each pass.

BACKGROUND OF INVENTION

Large commercial vehicles such as trucks and busses are generally washed by manual labor because vehicle washing devices heretofore developed, the use of which was economically feasible, were ineffective for cleaning heavy deposits of mud, dirt and grime from surfaces of the vehicles.

Vehicle washing devices heretofore devised may be categorized primarily as spray devices and brush devices. Spray devices, employing spray nozzles to form high velocity jets, are effective for removing dust and soil loosely adhering to the surfaces of vehicles. However, such devices have limited effectiveness for removing deposits of grease, road tar, and grime which tenaciously adhere to surfaces.

Brush type vehicle cleaning devices heretofore devised have been ineffective for washing large trucks and busses because such vehicles generally have curved and recessed surfaces which are bridged by bristles of brushes limiting the effectiveness of cleaning. For example, moving a rotating vertically disposed brush across a vertically corrugated surface, often found on truck trailers, results in cleaning approximately one-half of the surface.

Another major shortcoming of vehicle washing devices heretofore devised has been the inability of such devices to effectively clean large vehicles within a short period of time. Owners were deprived of use of the vehicles, not only during the time required to wash and service same, but also during the time the vehicle was sitting while other vehicles were being washed and serviced.

SUMMARY OF INVENTION

I have developed an improved method and apparatus for washing vehicles, such as trucks and busses, comprising rotating brushes positioned at each side of a path along which the vehicle moves through a wash bay. Adjacent the entrance end of the wash bay, an improved foam generating apparatus is positioned to apply detergent to surfaces of the vehicle as the vehicle moves thereto. A rotating traveling brush moves transversely across the wash bay to scrub the front of the vehicle. The brush then moves back across the wash bay rotating in the opposite direction still in engagement with the front of the vehicle.

Sets of brushes positioned at each side of the path through the wash bay rotate in opposite directions such that the counter-rotation of the brushes causes bristles thereof to exert scrubbing action in opposite directions to effectively clean curved and recessed surfaces of the vehicle.

The traveling brush is driven by an overhead motor drivingly connected to rotate the brush and exerting reactive force on the brush to move the brush across the wash bay. A friction unit is employed to exert forces to control the rate of movement of the brush and may drive or brake the brush, depending upon the rate of movement as a result of the reactive forces exerted through the rotating bristles.

The traveling brush is maintained in a vertical position by an arrangement of cables and pulleys.

A primary object of the invention is to provide improvements in apparatus for washing trucks and busses and particularly adapted for scrubbing both sides and both ends of the vehicle within a short time period, for example, of less than five minutes.

Another object of the invention is to provide apparatus for washing vehicles, such as trucks and busses, having brushes particularly adapted for cleaning around curved and recessed surfaces.

Another object of the invention is to provide apparatus for washing vehicles, such as trucks and busses, which is adapted to clean a vehicle without damaging windshield wipers and mirrors.

A further object of the invention is to provide apparatus for washing vehicles, such as trucks and busses, having a traveling brush which is moved across a wash bay while rotating in a first direction and moved back across the wash bay while rotating in an opposite direction to provide scrubbing action of front and rear ends of the vehicle.

A further object of the invention is to provide apparatus for washing vehicles, such as trucks and busses, which is capable of automatic operation by the driver of a vehicle as the vehicle is moved therethrough.

A further object of the invention is to provide apparatus for washing vehicles, such as trucks and busses, which is of simple construction to minimize maintenance and repair of the apparatus.

A further object of the invention is to provide apparatus for washing vehicles, such as trucks and busses, having a traveling brush disengagably connected to a guide track to positively urge the brush into engagement with the vehicle yet adapted to allow the brush to swing freely if force exerted by the vehicle on the brush exceeds a predetermined magnitude.

A further object of the invention is to provide apparatus for washing vehicles, such as trucks and busses, having a traveling brush which is urged toward a vertical position by tension in flexible lines connected between upper and lower ends of the brush.

Other and further objects of the invention will become apparent upon referring to the detailed description hereinafter following and the drawings annexed hereto.

DESCRIPTION OF DRAWING

Drawings of a preferred embodiment of the invention are annexed hereto so that the invention may be better and more fully understood, in which:

FIG. I is a partially sectionalized plan view of the vehicle washing apparatus;

FIG. II is a partially sectionalized side elevational view of the vehicle washing device looking in the direction of arrows II—II of FIG. I;

FIG. III is an elevational view of the washing apparatus as viewed from the exit end of the wash bay looking in the direction of arrows III—III of FIG. I;

FIG. IV is an elevational view of the wash device as viewed from the entrance end of the wash bay, looking in the direction of arrows IV—IV of FIG. I;

FIG. V is a side elevational view of the wand apparatus for controlling movement and rotation of the traveling brush;

FIG. VI is an end view of the apparatus illustrated in FIG. V;

FIG. VII is an enlarged fragmentary elevational view of the traveling brush and apparatus for moving same, parts being broken away to more clearly illustrate details of construction;

FIG. VIII is a cross sectional view taken substantially along line VIII–VIII of FIG. VII;

FIG. IX is a cross sectional view taken substantially along line IX—IX of FIG. VII;

FIG. X is a schematic perspective view of the traveling brush and apparatus for controlling movement thereof;

FIG. XI is a fragmentary cross-sectional view of foam generating apparatus positioned adjacent the entrance end of the wash bay;

FIG. XII is an enlarged fragmentary perspective view of the overhead track along which the traveling brush is moved;

FIG. XIII is a diagrammatic view of the fluid pressure system employed for actuating fluid motors employed to rotate the brushes and to move the traveling brush transversely across the wash bay;

FIG. XIV is a flow diagram of the hydraulic system illustrated in FIG. XIII; and

FIG. XV is a wiring diagram of the electrical control system.

Numeral references are employed to designate like parts throughout the various figures of the drawing.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to FIGS. I and II of the drawing, the numeral **1** generally designates a vehicle wash bay having spaced side walls **2** and **3**, spaced end walls **4** and **5**, a roof **6** and a floor **7**. Entrance and exit openings **8** and **9** are formed in the end walls **4** and **5**, respectively, and rails **7***a* and **7***b* are positioned on the floor to direct a vehicle **12** along a desired path therebetween.

Adjacent the entrance end of the wash bay **1** is positioned an arch, generally designated by the numeral **10**, adapted to generate and apply foam, comprising a mixture of aerated detergent and water, to surfaces of a vehicle **12** moving therethrough.

Support means **14** is spaced longitudinally of the wash bay **1** from arch **10** and has brushes **16**, **18**, and **20** rotatably secured thereto, preferably at fixed locations. Support **14** has a traveling brush **22** secured thereto by suitable means adapted to move the brush transversely across the path of vehicle **12** through the wash bay **1**, as will be hereinafter more fully described.

A second arch **24** is disposed adjacent the exit end of wash bay **1** and is adapted to apply rinse water to surfaces of vehicle **12**.

Referring more particularly to FIGS. I, II, IV and XI, arch **10**, adjacent the entrance end of wash bay **1**, comprises spaced upwardly extending tubular members **26** and **28** having upper ends connected by outwardly extending tubular members **30** and **32**. Tubular members **30** and **32** are joined by a suitable connector **34** to a pressure equalizing loop **36**. Pressure equalizing loop **36** comprises line **38** joined by a suitable connector **40** to a first loop half including outward extending tube **42**, vertically disposed tube **44**, and inwardly extending tube **46**. Connector **40** is also connected with a second loop half comprising outwardly extending tube **48**, upwardly extending tube **50**, and inwardly extending tube **52**. The first and second loop halves are of identical construction and upper ends thereof are connected by suitable coupling means, such as T **54**.

As best illustrated in FIG. XI, T **54** is connected through nipple **55**, elbow **56** and nipple **57** with means **58** to aerate a mixture of soap and water to generate foam.

The means to aerate the mixture of soap and water comprises T **60** connected through line **62** to a suitable source of soap and water as will be hereinafter more fully described. A fitting **64** having a nozzle **66** secured thereto is threadedly secure to T **60** such that the outlet opening of the nozzle is positioned to direct air supplied through the fitting in a direction substantially parallel to the direction of flow of the mixture of soap and water flowing through T **60**. Fitting **64** is connected through line **68** and solenoid actuated valve **67** to a suitable source of pressurized air.

As best illustrated in FIG. I, line **62** is connected through T **72** with a water line **74** having a valve **76** controlled by a suitable actuating means, such as current responsive solenoid device **78**. Water line **74** is connectable to a suitable source of water, such as a city water line (not shown).

T **72** also communicates with a detergent line **80**, having a pump **82** driven by a motor **84** disposed therein, communicating with a suitable source of detergent **86**. Manually operated valves **88** and **89** are disposed in water line **74** and detergent line **80** respectively for controlling the flow rate of fluid through the respective lines allowing mixing of water and detergent in desired proportions.

It should be readily apparent that when valve **76** is opened and pump **82** running a mixture of detergent and water is delivered to T **60**. When valve **62** is opened pressurized air is injected into the mixture through nozzle **66** to generate foam. The foam flows through pressure equalizing loop **36** and is dispensed through nozzles **27***a–d*, **29** *a–d*, **30***a* and **30***b* onto surfaces of vehicle **12**.

It should be noted (FIG. III) that the nozzles are positioned to assure that all surfaces of the vehicle will be covered. The nozzle sizes are preferably selected such that greater quantities of foam are applied to upper surfaces of the vehicle than to lower portions thereof and to equalize fluid pressure along the length of tubular members **26** and **28**.

As best illustrated in FIG. I and II of the drawing, brush support means **14** comprises spaced stanchions **90***a*, **90***b*, **90***c*, and **90***d* having upper ends connected by longitudinally extending beams **92***a* and **92***b* and transversely extending beams **94***a–94h*. As best illustrated in FIG. XII, beams **94***a* and **94***b* comprise channel members spaced for supporting upper ends of brushes **16** and **20**. As best illustrated in FIG. II, suitable means, such as support plate **96**, is secured between channel members **94***a* and **94***b* for rotatably supporting a shaft **98** having a universal joint **100** secure to the lower end thereof. Rotary power means, such as pressure fluid driven motor **102**, is secured between beams **94***a* and **94***b* and has a powered shaft connected for rotating shaft **98**.

Brushes **16**, **18** and **20** are similarly mounted for rotation by motors **102***a*, **102***b* and **102***c*, respectively. Each of the brushes **16**, **18**, and **20** comprises a central tubular member **104** having elongated flexible bristles secured thereto and extending substantially radially therefrom when the brushes are rotated. The upper end of each tubular member **104** is suspended from universal joint **100** while the lower end thereof is connected through universal joint **106** to a pedestal **108** anchored to floor **7**.

As best illustrated in FIGS. I and II, brush **18** is spaced from brush **16** and is suspended from beams **94***a* and **94***e*, said brushes being positioned to scrub opposite sides of vehicle **12**.

As best illustrated in FIGS. VII–X, brush **22** is suspended from a carriage, generally designated by numeral **110**, adapted to move along beams **94***f* and **94***g* positioned to form an overhead track extending transversely across the path along which vehicle **12** moves.

Carriage **110** comprises a support plate **112** having angle members **114** and **115** secured to opposite sides

thereof to which rollers **116** are rotatably secured. Rollers **116** are positioned to roll along the lower flanges of channel members **94***f* and **94***g* as best illustrated in FIG. VIII.

Support plate **112** has a central opening extending therethrough about which a thrust bearing **118** is secured for supporting shaft **120**, having a shoulder **121** formed thereon.

The lower end of shaft **120** has a universal joint **122** suspended therefrom to which the upper end of tubular member **124** of brush **22** is secured. The upper end of shaft **120** is secured by a suitable connector **126** to the powered shaft of motor **102***d*. Motor **102***d* is secured by a suitable mount, comprising plate **128** and spaced members **130** extending upwardly from plate **112**, to carriage **110**.

Spaced guide surfaces **132** extend upwardly from plate **112** and are in sliding engagement with webs of beams **94***g* and **94***f* to prevent lateral movement of carriage **110** relative to said beams.

Friction drive means including roller **134** powered by motor **136** is secured by a suitable bracket **138** to plate **112**. Roller **134** may be employed to apply driving force or braking force to carriage **110** as desired depending upon the rate of movement of carriage **110** as a result of reactive forces exerted through bristle of the rotating brush **22**.

From the foregoing it should be readily apparent that carriage **110** is supported by rollers **116** and is movable longitudinally of beams **94***f* and **94***g* by powered wheel **134** which is in friction engagement with the lower surface of the lower flange of channel member **94***g*.

As best illustrated in FIGS. VII and IX, guide surfaces, comprising tracks **140**, are secured to floor **7** of the wash bay and extend substantially parallel to beams **94***f* and **94***g*. A carriage **142** having wheels **144** is adapted to roll along tracks **140**. It should be noted that wheels **144** and tracks **140** have interengaging surfaces comprising annular grooves **146** which engage inclined surfaces **148** on tracks **140**.

Carriage **142** has a flanged coupling **145** secured to a central portion thereof for supporting upwardly extending rod member **147** which is telescopically disposed in the lower end of tubular member **124** of brush **22**. Resilient means, such as spring **150**, urges carriage **142** downwardly for maintaining annular grooves **146** in engagement with inclined surfaces **148** of tracks **140**.

If a lateral force is applied to brush **22**, as by running into same with a vehicle, spring **150** allows vertical movement of carriage **142** such that wheels **144** will become disengaged from tracks **140** allowing brush **22** to pivot about universal joint **122** thus preventing damage to structural parts of the apparatus.

A spreader disc **152** is secured to the lower end of tubular member **124** for maintaining the elongated flexible bristles of brush **22** in spaced apart relation from bearing **154**, about which brush **22** rotates, and from wheels **144**.

Brush **22**, driven by wheel **134** on upper carriage **110**, is maintained in a vertical condition by a parallel traverse mechanism comprising an arrangement of flexible cables and pulleys, as best illustrated in FIG. X.

As viewed in FIG. X, a first cable **160** has an end **162** secured to an end of carriage **110**, said cable extending around pulleys **163**, **164** and **165**, the opposite end **166** of said cable being connected by suitable means, such as anchor members **168**, to the lower carriage **142**. A second cable **170** has an end **172** secured to the opposite end of overhead carriage **110** and extends around pulleys **174**, **175** and **176** to anchor member **168** secured to lower carriage **142**. It should be readily apparent that as upper carriage **110** is moved by wheel **134**, the lower carriage **142** will be moved a corresponding distance in the same direction by forces exerted through cables **160** and **170**.

A wiper member **94***w* is suspended from beam **94***c* to exert squeegee-like action on the top of the vehicle.

As best illustrated in FIGS. I and III, rinse water arch **24** comprises pipes **180**, **182**, and **183** supported by suitable hanger members **184** and having spray nozzles **185** and **186** positioned thereon for spraying water onto sides, ends and the top of a vehicle for removing soap therefrom. Rinse water arch **24** is connected through rinse water line **188**, having a valve **189** actuated by solenoid **190**, to water line **74**.

As best illustrated in FIG. XIV, a source of pressurized fluid is provided in combination with means for controlling the rotation of pressure actuated motors **102***a*, **102***b*, **102***c*, **102***d*, and **136**.

A reservoir **190**, containing fluid **192**, is connected through line **193** with the intake port of a pump **194** which is driven by motor **195**. The high pressure side of pump **194** is connected through line **196**, pressure control regulator **197**, and line **198** to lines **200**, **201** and **202** which are in turn connected to valves **204**, **206**, and **208** as illustrated in the flow diagram.

Valve **204** is biased to a position wherein fluid is directed from line **200** to a return line **210**. Solenoid **204***a* is arranged to actuate valve **204** for directing fluid from pressure line **200** to line **212**. Line **212** is connected through line **213** to motor **102***b* and through lines **214** and **215** to motors **102***a* and **102***c*, respectively. Fluid exhausted from motors **102***a*, **102***b*, and **102***c* passes through return line **216**, return line **210** to reservoir **190**.

Valves **206** and **208** are four-way valves actuated by solenoids **206***a*, **206***b*, and **208***a*, **208***b*, respectively for directing pressurized fluid to the respective motors **102***d* for rotating brush **22** and to motor **136** for rotating friction wheel **134**.

When solenoid **206***a* is energized fluid is directed from pressure line **201** through line **218**, motor **102***d* and through line **219** to return line **216**. When solenoid **206***b* is energized fluid is directed from line **201**, through line **219**, motor **102***d* and line **218** to return line **216**. It should be readily apparent that when solenoid **206***a* is energized motor **102***d* rotates in a direction which is opposite to the direction of rotation when solenoid **206***b* is energized.

When solenoid **208***a* is energized fluid flows from pressure line **202** through line **220**, motor **136** and line **221** to return line **216**. When solenoid **208***b* is energized fluid flows through line **221**, motor **136** and line **220** to return line **216**. It should be readily apparent that when solenoid **208***a* is energized the direction of rotation of motor **137** is opposite to the direction of rotation thereof when solenoid **208** is energized.

Suitable means is provided for actuating various elements of the structure hereinbefore described.

A simplified wiring diagram of a suitable electrical control system is illustrated in FIG. XV. A seven level seven contact stepping switch **250** is disposed in a low voltage DC circuit including current responsive switching means such as relays **190R**, **208R**, **206R**, **195R**, **10R** and **204R**. Contacts of the various relays are arranged for actuating solenoids and energizing motors as will be hereinafter more fully explained in combination with the method of operation of the device.

Stepping switch **250** includes stepping means **252** arranged to control movement of wiper **254** relative to contacts of the stepping switch.

Referring to FIGS. I and XVI a pressure switch **260** is positioned adjacent the entrance opening **8** of the wash bay **1** and is connected through electrical conduit **261** to stepping device **252**. Actuation of pressure switch **260** causes stepping device **252** to energize the first contact of levels A–G of stepping switch **250** through wiper **254**.

A wand **270** is pivotally mounted on a support post **271** (see FIGS. V and VI) and is biased by spring **272** to the position illustrated in full outline in FIG. I. Switches **274** and **276** are secured to post **271** and positioned to be actuated by wand **270** which is pivoted relative to

post 271 by engagement with vehicle 12 moving relative thereto as illustrated in FIG. I.

Switch 274 is connected through conduit 275 to stepping device 252 to move wiper 254 to energize the second contact in levels A–G of stepping switch 250 while de-energizing the first contact of each level.

Switch 276 is connected through conduit 278 to a relay having a switch which when opened will break the circuit of the electrical system to prevent movement of brush 22 along tracks 94*f* and 94*g* if the front of vehicle 12 is positioned beyond a predetermined point along the length of wash bay 1 so as to interfere with movement of brush 22 across the path of the vehicle.

It should be noted that the third, fourth and fifth contacts in level G of stepping switch 250 are connected through line 280 for energizing the coil of relay 270R to break the circuit through switches 274 and 276 at a predetermined level in the sequence of operation of the apparatus as will be hereinafter more fully explained.

As best illustrated in FIG. I switches 285 and 290 are secured to beam 94*f* adjacent opposite ends thereof such that lugs 286 and 291 on upper carriage 110 actuate the switches at the respective ends of the path of travel of brush 22 for reversing the direction of rotation of motors 102*d* and 136 as will be hereinafter more fully explained. Switch 290 is connected through the electrical conduit 295 to stepping device 252 for stepping wiper 254 for energizing the third contact of each level of stepping switch 250.

A pressure switch 300 is positioned adjacent the exit end of wash bay 1 and is connected through electrical conduit 301 to the stepping device 252 of stepping switch 250 for stepping wiper 254 into engagement with the fourth contact of each level of the stepping switch.

Limit switch 290 steps switch 250 to the fifth position as carriage 110 returns to the position illustrated in FIG. I after washing the rear of the vehicle.

OPERATION

The operation and function of the device hereinbefore described is as follows:

A vehicle entering wash bay 1 actuates pneumatic switch 260 to deliver a signal through conductor 261 to stepping device 252 of the programmed stepping switch 250, completing a circuit through wiper 254 and contacts A–1, B–1, C–1 to relays 204R, 10R and 195R, which results in actuation of air solenoid for opening water valve 76, energization of the soap pump motor 84, energization of hydraulic pump motor 195 to impart rotation to pump 194, and actuation of solenoid 204*a* to deliver pressurized fluid to hydraulic motors 102*a*, 102*b* and 102*c* for imparting rotation to brushes 16, 18, and 20.

When air valve 67 and water valve 76 are open and soap pump 82 is energized pressurized air is delivered through line 68 and a mixture of soap and water is delivered through line 62 through the aeration device 58 (FIG. XI) to generate foam which is delivered through pressure equalizing loop 36 to arch 10.

As the vehicle passes through arch 10 foam is applied to the front, top, both sides and rear end of the vehicle.

Arch 10 is spaced from brushes 16 and 20 a distance sufficient to allow action of the detergent to loosen and soften dirt and grime on surfaces of the vehicle.

As the vehicle advances between brushes 16 and 20 opposite sides of the vehicle are scrubbed by bristles moving in a direction opposite to the direction of travel of the vehicle.

As the vehicle reaches the position illustrated in dashed outline at 12′ in FIG. I, the front end of the vehicle engages wand 270 and advances same to the position indicated at 270′ thereby actuating switch 274 for delivering a signal through conductor 275 to stepping device 252 for stepping wiper 254 into electrical connection with contacts C–2, D–2, and E–2 for energizing the coil of relay 206R for maintaining hydraulic pump 195 in an energized condition energizing solenoid 206*a* to deliver fluid to hydraulic motor 102*d* for rotating brush 22 in a clockwise direction, and energizing solenoid 208*a* to deliver fluid to hydraulic motor 136 thus imparting rotation to wheel 134 for moving brush 22 to the position illustrated in dashed outline at 22′ in FIG. I. It should be noted that as wiper 254 is stepped to the second contacts in levels A–G relays 204R and 10R are released, thus de-energizing solenoid 204*a*, causing brushes 16, 18, and 20 to stop rotating and causing air valve 67 and water valve 76 to close while soap pump motor 84 is de-energized, resulting in cessation of flow of detergent from arch 10.

It should be appreciated that should the vehicle advance past the position illustrated in dashed outline and indicated as 12′, wand 270 will engage switch 276 thereby opening the electrical circuit to prevent a collision between brush 22 and the vehicle.

As brush 22 moves into position 22′, a switch 290 is actuated which results in a cessation of all action for a predetermined interval of time, for example three seconds, releasing solenoids 206*a* and 208*a* to stop rotation of brush 22 and to terminate lateral movement thereof along tracks 94*f* and 94*g*. Actuation of switch 290 also disconnects wand actuated switches 274 and 276 from the circuit.

After the predetermined period of time has elapsed a circuit is completed to solenoids 206*b* and 208*b*, thereby directing fluid to motors 102*d* and 136, causing brush 22 to rotate in a counterclockwise direction and causing wheel 134 to rotate in a direction for driving brush 22 along tracks 94*f* and 94*g* to the full outlined position of FIG. I.

When brush 22 reaches the full outline position as illustrated in FIG. I, switch 285 is actuated, causing stepping device 252 to move wiper 254 to the third contact of levels A–G of stepping switch 250 for energizing solenoid 204*a* to commence rotation of brushes 16, 18 and 20; to open air valve 67, open water valve 76, and energize soap pump motor 84, causing foam to be dispensed from arch 10; for releasing solenoid 208*b* causing cessation of transverse movement of brush 22; for energizing solenoid 206*b* maintaining counterclockwise rotation of brush 22; and for energizing rinse water solenoid, maintaining valve 189 open for dispensing rinse water from nozzles in arch 24.

After brush 22 has returned to the full line position illustrated in FIG. I, vehicle 12 is moved forward, brushes 16 and 18 rotating in opposite directions scrubbing one side of the vehicle; and brushes 20 and 22, rotating in opposite directions, scrubbing the other side of the vehicle.

When the front wheels of vehicle 12 engage pneumatic switch 300 a signal is delivered through a conductor 301 to the stepping device 352, causing wiper 254 to move to the next position, causing the circuit to wand switches 274 and 276 to be closed while simultaneously closing air valve 67, closing water valve 76 and opening the circuit to motor 84 which drives soap pump 82.

Wand 270, urged in a clockwise direction as viewed in FIG. I of the drawing, slides along the side of the vehicle in the position illustrated in dashed outline at 270″ until the rear end of the truck is positioned to be engaged by brush 22. When the rear end of the truck is properly positioned, wand 270 drops off of the rear corner of the vehicle and is urged by spring 272 to the full outline position thus actuating switch 274, delivering a signal to stepping device 252, thereby stepping wiper 154 to the next position. This causes brushes 16, 18 and 20 to stop rotating while energizing solenoids 206*a* and 208*a* to impart counterclockwise rotation to brush 22 to the position 22′. When switch 290 is actuated, as hereinbefore described, a time delay of for example three seconds, is initiated after which solenoids 206*a* and 208*a* are released and solenoids 206*a* and 208*b* are energized causing brush 22 to rotate in

a clockwise direction as it moves back to the position illustrated in full outline.

When brush **22** returns to the full outline position switch **285** is actuated stepping the program switch **250** back to the home position stopping all action with the exception of closing rinse water solenoid actuated valve **189** which continues to operate through a time delay mechanism for a predetermined period of time, for example twenty seconds to provide rinse water for rinsing the rear end of the vehicle as the vehicle is moved out of the wash bay.

It should be appreciated that other and further control mechanism may be employed in lieu of program stepping switch **250** for controlling the sequence of operation of the various elements as hereinbefore described, however, the electrical system hereinbefore described is exemplary for a system for providing the desired sequence of operation; providing the desired function of applying foam to surfaces of the vehicle, allowing sufficient time for the foam to act, providing rotation of brushes in opposite directions for cleaning both ends and both sides of the vehicle, and rinsing the vehicle at the end of the washing operation.

From the foregoing it should be appreciated that depending upon the configuration of vehicles primarily washed by the apparatus hereinbefore described and the frequency of such washing, brushes **16** and **20** could be eliminated. However, such would greatly reduce the maximum capability of the preferred embodiment of the apparatus which is intended to clean accumulated deposits of dirt and grime from vehicles, such as trucks and busses, regardless of the shape and configuration thereof.

It should be appreciated other and further embodiments of my invention may be employed without department from basic concept of my invention.

Having described my invention I claim:

1. A method of washing a vehicle comprising the steps of: applying cleaning fluid to surfaces of a vehicle; scrubbing each side of the vehicle by rotating cleaning means in contact with a side of the vehicle in first and second directions; rotating a brush having a lower end resiliently urged into engagement with a track; and scrubbing a first end of the vehicle by moving said brush along said track in a first direction in contact with the first end of the vehicle and then moving the brush in the opposite direction along said track in contact with the said first end of the vehicle while rotating said brush in the opposite direction.

2. The method called for in claim **1** with the addition of the step of applying rinse water to surfaces of the vehicle after the scrubbing steps.

3. Apparatus for washing a vehicle as the vehicle is moved along a path comprising, support means extending transversely across the path of the vehicle; a track extending transversely across the path of the vehicle; a traveling scrubber member; means to movably secure said traveling scrubber member to said support means; a carriage secured to the lower end of the traveling scrubber member; interengaging surfaces on the carriage and track to limit movement of the carriage in a direction parallel to the path of the vehicle; power means for rotating the traveling scrubber member in opposite directions about its longitudinal axis to scrub an end of a vehicle and to cause reactive force between the vehicle and the traveling scrubber member for moving said traveling scrubber member transversely across the path of the vehicle; a second scrubber member positioned adjacent a side of the path along which the vehicle is moved; means to support the second scrubber member; and means for rotating the second scrubber member.

4. The combination called for in claim **3** wherein the traveling scrubber member is a brush; and means to control the rate of movement of the brush transversely across the path of the vehicle.

5. The combination called for in claim **3** with the addition of flexible means secured to opposite ends of the traveling scrubber member for maintaining said scrubber member in a substantially vertical position as it is moved transversely across the path of the vehicle.

6. The combination called for in claim **3** with the addition of resilient means between the carriage and the lower end of the traveling scrubber member, said resilient means being adapted to allow disengagement of the carriage from the track when a force exceeding a predetermined magnitude is applied to said traveling scrubber member.

7. The combination called for in claim **3** with the addition of a third scrubber member positioned adjacent said second scrubber member; means to support said third scrubber member; means to rotate said third scrubber member in a direction opposite to the direction of rotation of said second scrubber member; and a fourth scrubber member positioned adjacent the opposite side of the path of the vehicle from the second and third scrubber members; means to support the fourth scrubber member; and means to rotate said fourth scrubber member.

8. The combination called for in claim **7** with the addition of programmed means connected to the means to rotate each of said scrubber members to impart rotation to the scrubber members in a predetermined sequence.

9. Apparatus for washing a vehicle as the vehicle is moved along a path comprising, first and second brushes; means to rotatably support said first and second brushes adjacent one side of the path; means to rotate said first and second brushes in opposite directions; third and fourth brushes; means to rotatably support said third brush adjacent the opposite side of the path; support means extending transversely across the path of the vehicle; means to movably secure said fourth brush to said support means; means to rotate said third and fourth brushes in opposite directions, each of said brushes being rotatable about substantially vertical axes and having a length greater than the height of the vehicle; a track extending transversely across the path of the vehicle; a carriage secured to the lower end of the fourth brush; interengaging surfaces on the carriage and track to limit movement of the carriage in a direction parallel to the path of the vehicle; and means to move the fourth brush along said support means and said track.

10. The combination called for in claim **9** wherein the means to support at least one of the brushes is adapted to permit movement of the brush transversely across the path of the vehicle.

11. The combination called for in claim **10** wherein the means to rotate at least one of the brushes is adapted to rotate said brush in opposite directions as the brush moves in opposite directions across the path of the vehicle.

12. The combination called for in claim **9** wherein the means to rotatably support each of the brushes includes universal joints.

13. The combination called for in claim **9** wherein the means to rotate the brushes comprises fluid actuated motors.

14. Vehicle washing apparatus comprising an elevated track; guide means below said track; a brush; a carriage movably secured to said track; first connector means to rotatably secure an end of the brush to the carriage; means to rotate said brush; support means engageable with said guide means; and second connector means to rotatably secure the other end of the brush to said support, at least one of said connector means being adapted to permit vertical movement of said support means relative to the guide means for disconnecting said support means from said guide means when a force exceeding a predetermined magnitude is exerted on said brush.

15. The combination called for in claim **14** with the addition of means connected between the carriage and the support means for urging the support means toward a position substantially under said carriage.

16. The combination called for in claim 14 wherein the track and guide means comprise substantially straight members, said track having first and second ends positioned substantially above first and second ends of the guide means; and with the addition of first upper and lower pulleys positioned adjacent first ends of the track and guide means; first and second upper and lower pulleys positioned adjacent the second ends of the track and guide means; a first flexible member secured to the carriage and extending around the upper pulley adjacent the first end of the guide means, around the first upper pulley adjacent the second end of the guide means, and around the first lower pulley adjacent the second end of the guide means; means to secure the first flexible member to the support means; a second flexible member secured to the support means and extending around the lower pulley adjacent the first end of the guide means, around the second lower pulley adjacent the second end of the guide means, and around the second upper pulley adjacent the second end of the guide means; and means to secure the second flexible member to the carriage such that movement of the carriage exerts force through said flexible members to move the support means a corresponding distance.

17. The combination called for in claim 14 wherein the first connector comprises a universal joint positioned to permit swinging movement of the brush relative to said carriage.

18. Vehicle washing apparatus comprising, an elevated track; a carriage movably secured to said track; fluid actuated power means on said carriage; a brush; flexible power transmission means between said fluid actuated means and said brush, said transmission means being adapted to transmit torque to said brush while permitting swinging movement of the brush relative to the carriage; and resilient means to bias the brush toward a substantially vertical position.

19. The combination called for in claim 18 with the addition of control means associated with said fluid actuated means for rotating said brush in opposite directions.

20. The combination called for in claim 18 with the addition of control means associated with the fluid actuated means for rotating said brush in opposite directions, such that rotation of the brush contacting a vehicle in a clockwise direction moves the carriage along the track in a first direction and rotation of the brush in a counterclockwise direction moves the carriage along the track in a second direction.

21. The combination called for in claim 20 with the addition of means on the carriage to control the rate of movement of the carriage along the track.

22. Vehicle washing apparatus comprising, a brush having a rigid central shaft; support means for opposite ends of the brush; a universal joint securing at least one end of the central shaft to the support means; means to rotate the brush; and resilient means secured to an end of said central shaft, said resilient means being adapted to permit axial movement for disconnecting the end of the shaft from the support means when a force exceeding a predetermined magnitude is exerted on said brush.

23. In a device for washing a vehicle; a supporting frame defining a zone through which the vehicle is moved; fluid emitting conduits carried by the frame positioned to emit washing fluid on the surface of the vehicle; at least one brush rotatably suspended to the frame on each side thereof; means to rotate the brushes to cause them to impinge against the surface of the vehicle; upper and lower mounting means traversing the frame; upper and lower carriage means on the mounting means rotatably supporting one of the brushes at opposite ends thereof, said carriage means being arranged to move across and return on the mounting means to cause the brush to rotatably engage an end of the vehicle; and means to move the carriage means on the mounting means.

24. The combination called for in claim 23 wherein the brush is resiliently mounted on the lower carriage means whereby the lower carriage means may be disengaged from the mounting means therefor by a lateral force applied thereagainst.

25. The combination called for in claim 23 wherein the brushes are mounted at upper and lower ends by flexible joinder members.

26. The combination called for in claim 23 with the addition of means to maintain upper and lower carriage means in vertical alignment.

27. Apparatus for washing a vehicle as the vehicle is moved along a path comprising, support means extending transversely across the path of the vehicle; a traveling scrubber member; means to movably secure said traveling scrubber member to said support means; power means for rotating the traveling scrubber member in opposite directions about its longitudinal axis to scrub an end of the vehicle and to cause reactive force between the vehicle and the traveling scrubber member for moving said traveling scrubber member transversely across the path of the vehicle; flexible means secured to opposite ends of the traveling scrubber member for maintaining said scrubber member in a substantially vertical position as it is moved transversely across the path of the vehicle; a second scrubber member positioned adjacent the side of the path along which the vehicle is moved; means to support the second scrubber member; and means for rotating the second scrubber member.

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