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Bernardi

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[45] **Jan. 8, 1974**

[54] **MANUALLY CONTROLLED VEHICLE WASHING APPARATUS**

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[73] Assignee: **Bernardi Bros. Inc.,** Harrisburg, Pa.

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[52] **U.S. Cl.** ..... **15/21 E,** 15/DIG. 2

[51] **Int. Cl.** **B60s 3/06**

[58] **Field of Search** ..... 15/DIG. 2, 21 D, 15/21 E, 53, 97

[56] **References Cited**

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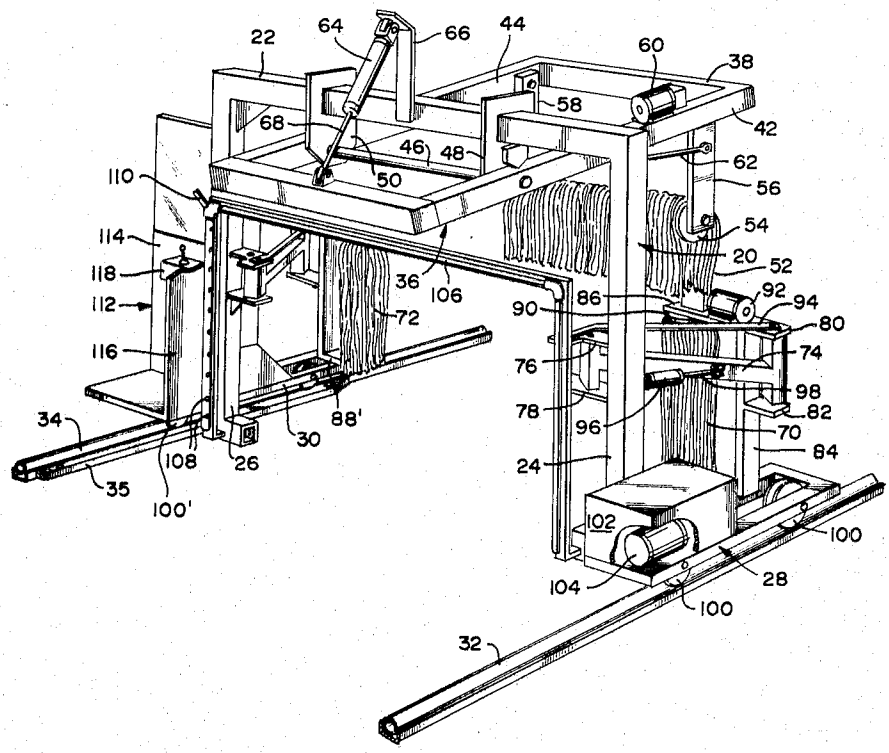
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Primary Examiner—Edward L. Roberts
Attorney—Anthony A. O'Brien

[57] **ABSTRACT**

Vehicle washing apparatus including a movable frame adapted to be driven in first and second opposite directions for passing over a vehicle to be washed, a pair of side brush assemblies disposed on the frame and transversely movable relative thereto, and a unitary control assembly which is manually movable to control both the movement of the frame and the transverse position of the side brush assemblies whereby the apparatus may be inexpensively manufactured and may be operated by the manipulation of only a single control device.

12 Claims, 13 Drawing Figures



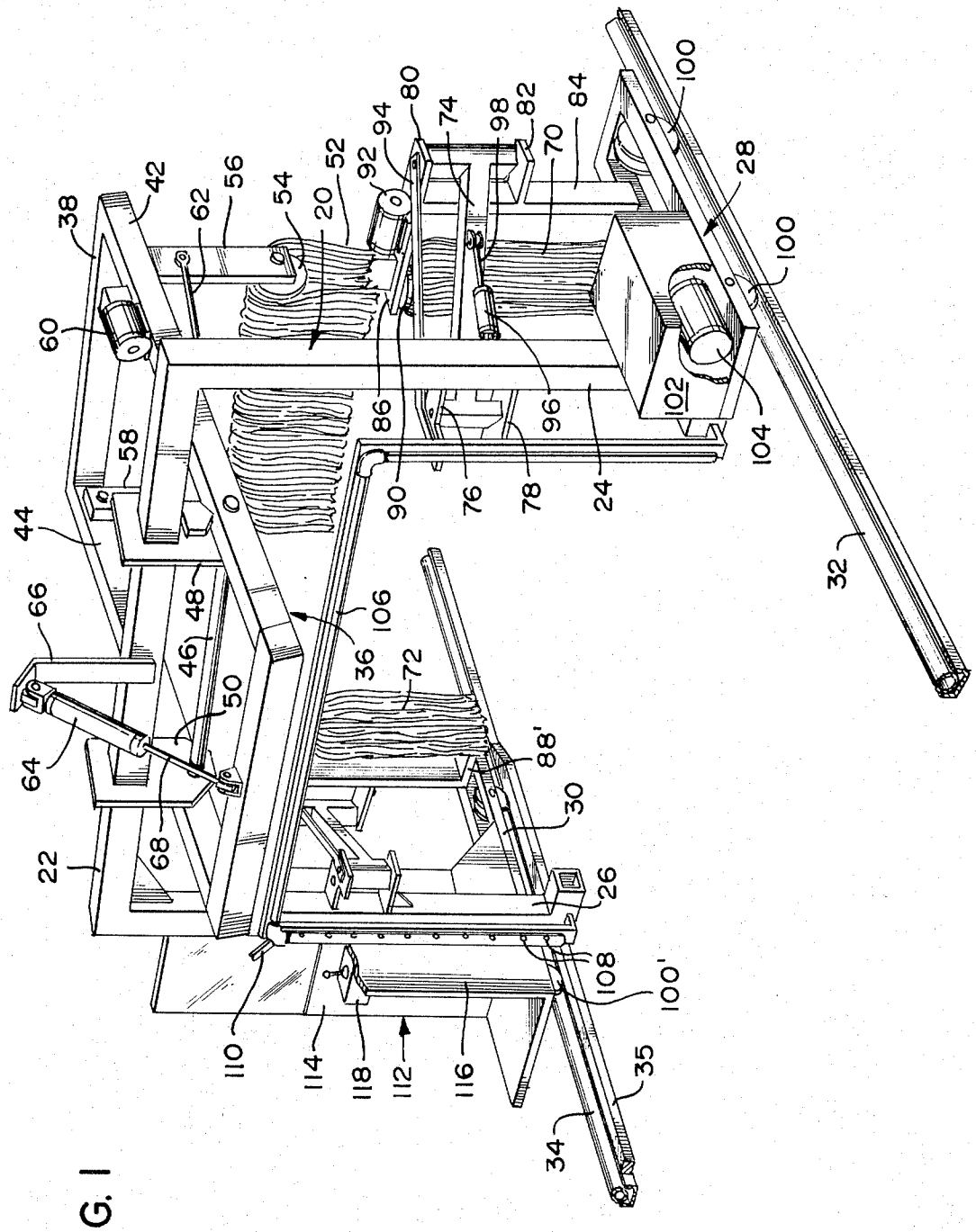

100
28
80
74
98
82
84
94
92
52
54
20
62
56
42
38
60
58
44
66
48
46
50
64
68
22
106
36
72
88'
30
26
108
100'
35
34
32
102
104
86
96
90
76
78
24
110
114
118
112
116

FIG. 1

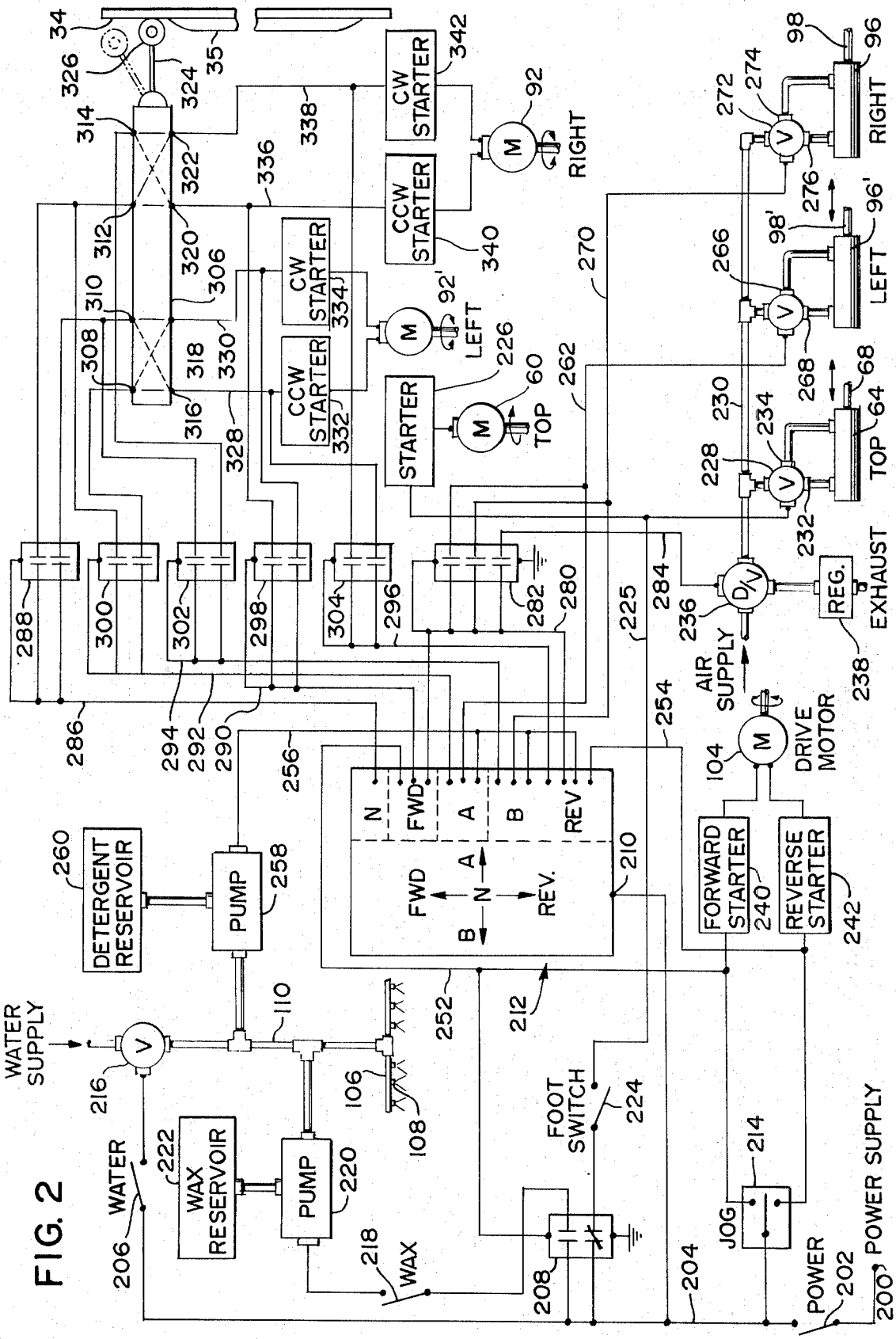

WATER SUPPLY
216
WATER
206
222
WAX RESERVOIR
PUMP
220
218
WAX
DETERGENT RESERVOIR
260
PUMP
258
110
106
108
FOOT SWITCH
224
208
204
JOG
214
POWER
202
200
POWER SUPPLY
252
212
256
N
FWD
A
B
REV
FWD
A
N
REV.
B
210
254
CW STARTER
342
CCW STARTER
340
M
92
RIGHT
CW STARTER
334
CCW STARTER
332
M
92'
LEFT
STARTER
226
M
60
TOP
262
270
272
274
98
96
RIGHT
276
98'
96'
LEFT
266
268
68
64
TOP
230
234
228
232
REG.
EXHAUST
284
236
D/V
AIR SUPPLY
225
280
282
104
M
DRIVE MOTOR
238
FORWARD STARTER
240
REVERSE STARTER
242
34
326
324
35
314
322
336
338
312
320
306
310
308
318
330
316
328
288
300
302
298
304
296
294
292
290
286

FIG. 2

FIG. 4

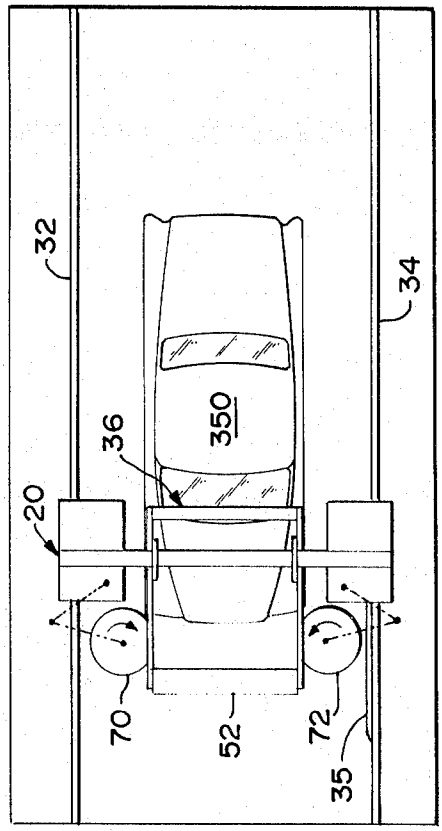


FIG. 6

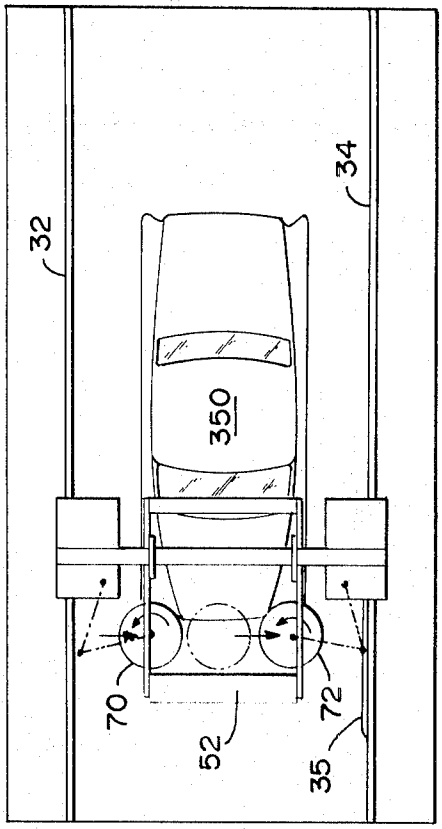


FIG. 3

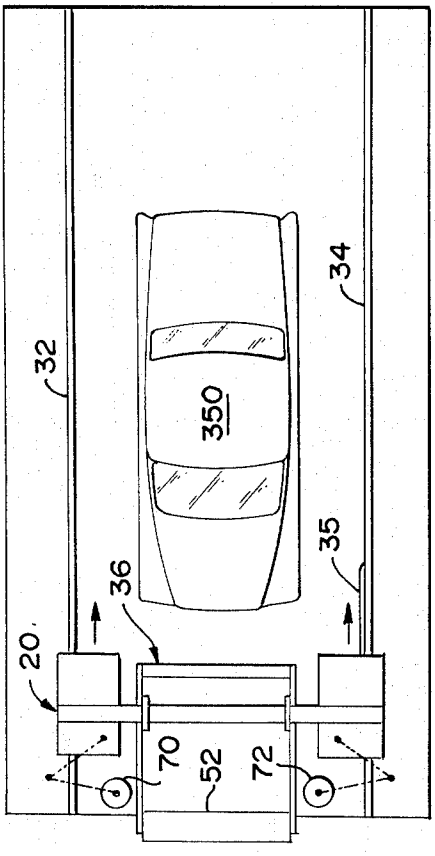


FIG. 5

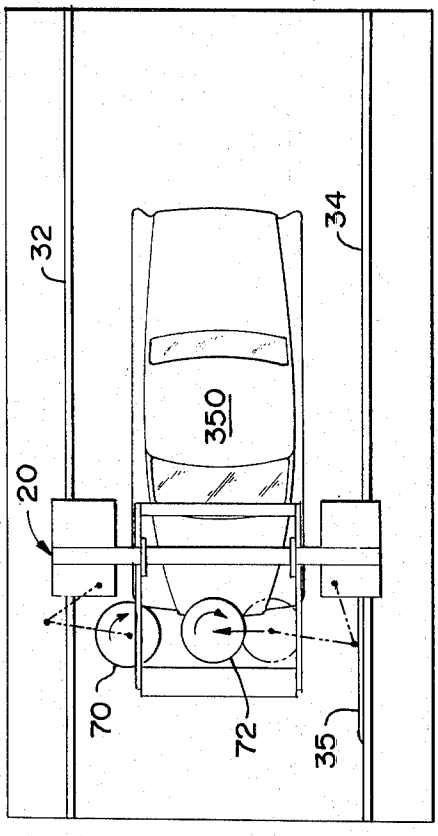


FIG. 8

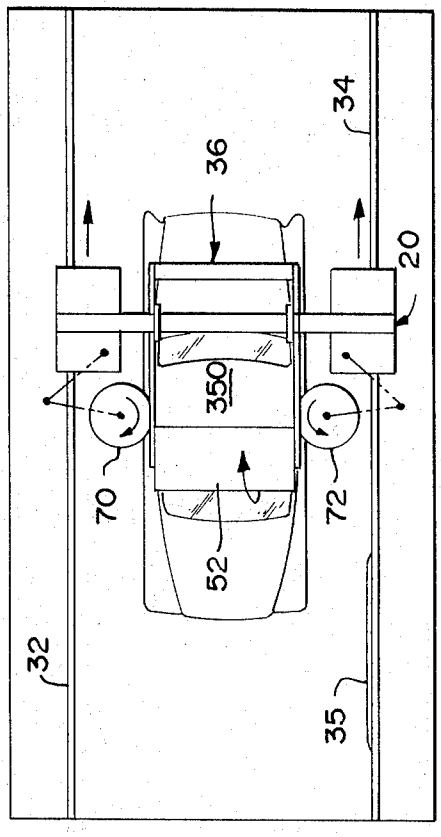


FIG. 10

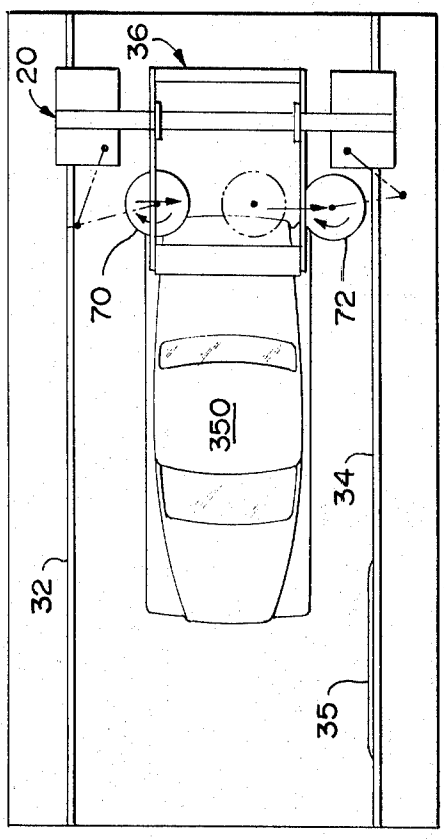


FIG. 7

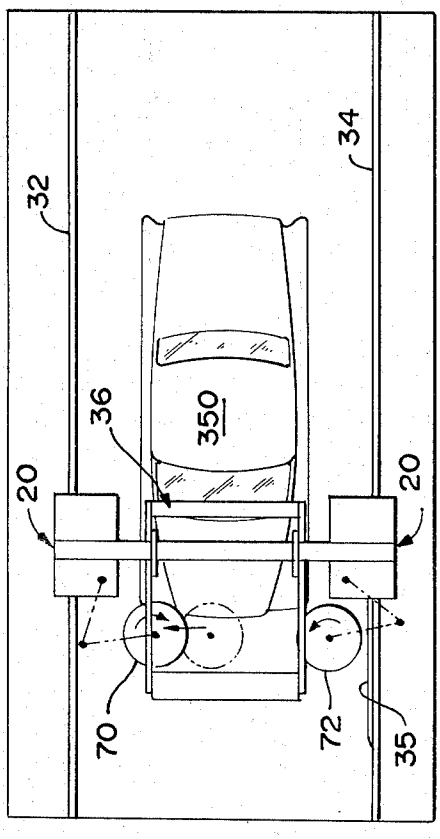


FIG. 9

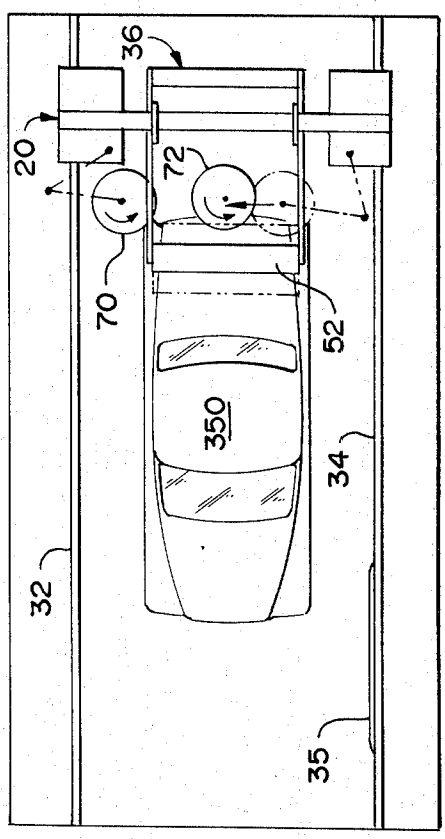


FIG. 12

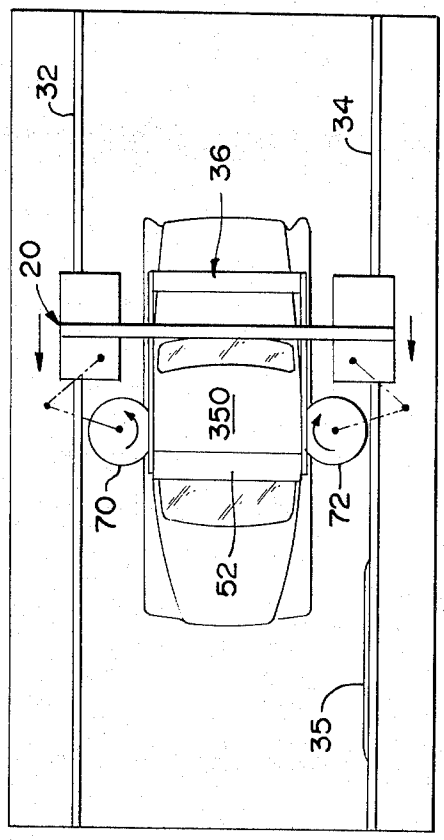


FIG. 11

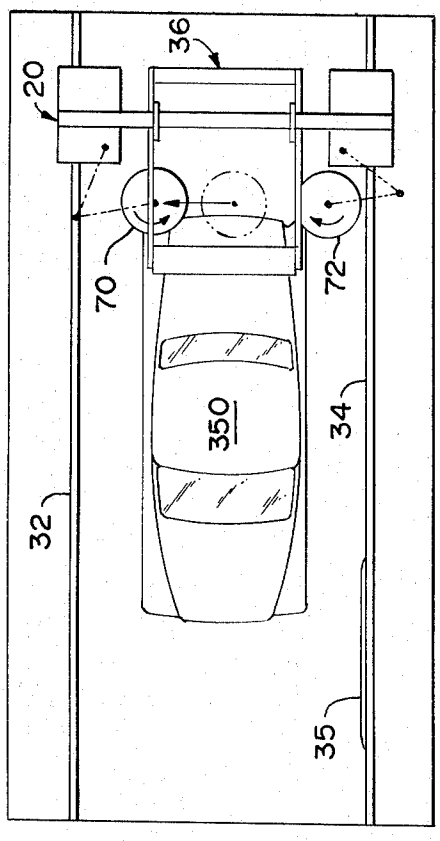
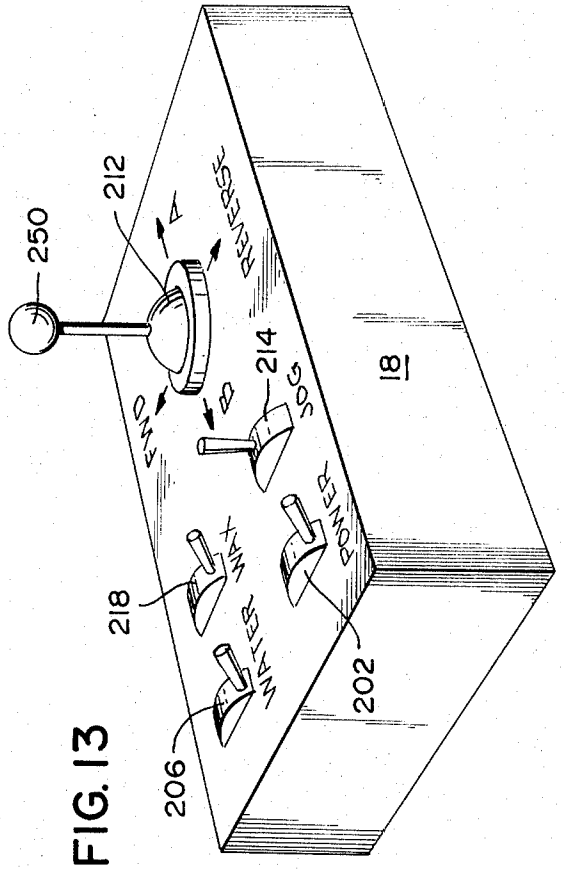


FIG. 13



MANUALLY CONTROLLED VEHICLE WASHING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to vehicle washing apparatus and, more particularly, to such apparatus which may be opperated by the manipulation of a unitary manual control assembly.

2. Description of the Prior Art

With the growing number of vehicles of all types in use today has come an increased demand for improved vehicle washing apparatus, particularly of the type which may be economically manufactured and installed in existing spaces such as the unused bays of local automobile service stations. While initial equipment cost is a critical factor, it is of prime importance that such a vehicle washing apparatus be designed to provide thorough and efficient cleansing of the particular vehicle for which it is designed. For example, for a car wash to be effective with today's modern cars, it must be capable of washing the many varying surfaces, protrusions and indentations of the front and rear ends of the car as well as customary accessory equipment such as lights, registration tags, bumper guards and the like.

Accordingly, there have been many attempts to develop improved vehicle washing apparatus which is inexpensive, compact and thorough in operation. Initial attempts generally have been directed toward the design of manually operated apparatus because of the low cost of such equipment; however, such efforts have generally proven to be unsatisfactory due to the complexity of the manual controls and the need for extensive operator training. As a result, automated washing equipment of various types has received more widespread acceptance in spite of the increased cost.

While the need for an inexpensive yet efficient manual washing apparatus has existed for some time, apparatus of this type which is simple in operation and requires little or no operator training heretofore has been unavailable and has proven to be a material disadvantage to manufacturers, potential car wash operators and to the public as well.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to construct vehicle washing apparatus which is inexpensive and is capable of thoroughly washing vehicles having irregular surface contours.

Another object of this invention is to control efficiently a vehicle washing apparatus adapted to move over a stationary vehicle by means of a unitary manual control assembly which requires minimal operator instruction.

The present invention is summarized in that vehicle washing apparatus includes a movable frame, a drive assembly connected with the frame and having first and second states for driving the frame in first and second opposite directions, respectively, side brush assemblies, support assemblies connecting the side brush assemblies with the frame and being movable between retracted and extended positions for transversely moving the side brush assemblies relative to the frame, motor assemblies connected with the side brush assemblies for rotating the same, and unitary manual control apparatus operatively connected with the drive assembly and the support assemblies and movable to control selectively both the state of the drive assembly and the position of the support assemblies whereby the vehicle washing apparatus may be operated by the manipulation of a single control device.

The present invention is advantageous over prior art washing apparatus in that initial equipment cost as well as operator instruction is minimized, that washing apparatus is controlled by the manipulation of a single primary control lever, and that irregular vehicle surfaces are thoroughly cleaned.

Other objects and advantages of the present invention will become apparent from the following description of a preferred embodiment when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of vehicle washing apparatus embodying the present invention;

FIG. **2** is a schematic diagram partially in block form of a control circuit of the apparatus of FIG. **1**;

FIGS. **3–12** are diagrammatic plan views of a preferred washing sequence performed by the apparatus of FIG. **1**; and

FIG. **13** is a perspective view of a control panel of the apparatus of FIG. **1.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

Vehicle washing apparatus according to the present invention is illustrated in perspective in FIG. **1** and is described hereinafter for use with automobiles; however, it will be appreciated that the present apparatus may be used with equal efficacy to wash any of various types of vehicle due to the location and operation of the brushes and the unique flexibility of operation of the control mechanism.

As illustrated in FIG. **1**, the apparatus of the present invention includes an inverted U-shaped frame **20** made of suitable material such as tubular steel and having a top member **22** and side members **24** and **26** which are attached to carriage units **28** and **30**, respectively, at their lower ends. Carriage units **28** and **30** are adapted to ride on a pair of parallel rails **32** and **34**, respectively, which extend throughout the length of a wash bay housing the apparatus. An elongated camming lobe **35** protrudes from a lateral interior surface of rail **34** adjacent the area normally occupied by the front portion of a vehicle to be washed and cooperates with a reversing or sequencing switch to be described below.

A rectangular frame or support **36**, including end members **38** and **40** and side members **42** and **44**, is pivotally suspended from top member **22** of frame **20** on a shaft **46** supported by a pair of plates **48** and **50**. A rotatable top brush **52** has a hub assembly generally indicated at **54** supported by a pair of arms **56** and **58** which are pivotally mounted at the end of frame **36** adjacent end member **38**.

An electric motor **60** is interconnected through suitable sprocket and gear assemblies to hub **54** of top brush **52** for rotating the same. End member **40** may be filled with lead or other dead weight to act as a counterbalance for top brush **52**, and a connecting rod **62** may be secured to plate **48** and arm **56** in order to maintain top brush **52** at a preselected desired angle.

A pneumatic cylinder **64** is secured to the offset end of a member **66** extending vertically from top member **22** of frame **20,** and piston shaft **68** of cylinder **64** is secured to end member **40** of top brush support frame **36.** Shaft **68** is normally extended to maintain top brush **52** in its rest position well above the upper surface of a vehicle to be washed.

Side brushes **70** and **72** are pivotally supported on either side of frame **20** by side members **24** and **26,** respectively; and, since the supporting and control structure for each side brush is the same, only the assembly for side brush **70** will be described hereinafter for the sake of brevity. The elements of the assembly for side brush **72** corresponding to the elements described with respect to the assembly for side brush **70** are given the same reference numerals with primes.

The assembly for side brush **70** includes a link member **74** pivotally mounted at one end between a pair of vertically spaced flanges **76** and **78** attached to side member **24** of frame **20.** The other end of link member **74** is pivotally mounted between vertically spaced arms **80** and **82** of a small clevis which is integrally formed with a larger clevis by a common vertical member **84.** The larger clevis has a pair of spaced horizontal arms **86** and **88** which rotatably support a hub assembly **90** for side brush **70.** An electric motor **92** is mounted on arm **86** and is suitably connected with hub assembly **90** to drive side brush **70.** A connecting rod **94** is attached to flange **76** and arm **80** to maintain side brush **70** at a preselected desired angle. A pneumatic cylinder **96** is attached to side member **24** and has a piston shaft **98** attached to link member **74** such that side brush **70** may be moved between retracted and extended positions as will be more fully described below.

Carriage units **28** and **30** are similar in construction and rotatably support a plurality of wheels **100** which are adapted to ride on guide rails **32** and **34.** Carriage unit **28** includes a housing **102** within which is mounted a drive motor **104** which is connected with at least one of the wheels **100** by suitable gear and sprocket assemblies (not shown).

An inverted U-shaped pipe **106,** which is closed at its ends, is secured to frame **20** and defines a plurality of spray nozzles **108** for applying washing fluid such as water and detergent and rinse water onto a vehicle to be washed. Washing and rinsing fluids communicate with pipe **106** via a flexible hose **110** which may be attached to pipe **106** at a corner thereof, as illustrated in FIG. **1,** or at any other desired point.

An operator platform **112** is mounted atop carriage **30** and includes side walls **114** and **116** which are at least partially constructed of a transparent material, such as glass or plastic. A control panel **118** is secured to wall **114** of platform **112** and houses the control circuitry according to the present invention, as illustrated schematically in FIG. **2.**

The control circuitry shown in FIG. **2** receives power from a suitable source of single or three-phase electricity as represented by terminal **200.** A main power switch **202** feeds power from source to a main power bus **204** to which are connected a water control switch **206,** a set of normally-open and normally-closed contacts of a relay **208,** a main input terminal **210** of a unitary lever controlled switching assembly **212,** and a common terminal of a neutral-biased, double-throw jog switch **214.** Water control switch **206** feeds power to an electrically controlled water valve **216** which is connected at its inlet to a source of water (not shown) and at its outlet to conduit **110** for supplying spray arch **106.**

The normally-open contacts of relay **208** are connected through a wax control switch **218** to supply operating potential to a pump **220** having a suitable liquid wax reservoir **222** connected at an inlet port thereof and being connected at its outlet port to feed conduit **110.** The normally-closed contacts of relay **208** are connected through a foot control switch **224,** which is preferably secured to the floor of operator platform **112** (FIG. **1**), and a branched lead **225** to a starter **226** which feeds top brush motor **60** as well as to an electrical operator of an electrically controlled two-way air valve **228.** It should be noted that the starter **226** is connected with motor **60** in a conventional manner so as to start the motor rotating in the same direction each time power is supplied thereto. Air valve **228** supplies pressurized air from a main supply conduit **230** to a first outlet port **232** only in the absence of electrical energization, and similarly supplies air to a second outlet port **234** only upon receipt of an electrical signal from foot switch **224.** Outlet ports **232** and **234** are connected with the top brush pneumatic cylinder **64** in the manner depicted in FIG. **2** such that piston shaft **68** is extended so as to raise the top brush **52** away from a vehicle to be washed when valve **228** is deenergized and is retracted so as to lower the top brush against the upper surface of the vehicle when valve **228** is electrically actuated. Supply conduit **230** is fed from a suitable air pressure source (not shown) through an electrically actuated diverter valve **236** which has its exhaust port vented through a pressure regulator **238;** in this manner, the pressure in supply conduit **230** is relatively high when diverter valve **236** is deenergized and drops to a relatively low level, dependent upon the setting or regulator **238,** when diverter valve **236** is actuated.

The two output terminals of jog switch **214** are respectively connected to a forward starter **240** and a reverse starter **242** for drive motor **104.** Starters **240** and **242** are wired to motor **104** in a conventional manner such that the frame **20** may be selectively driven in either the forward or the reverse direction.

Switching assembly **212** preferably includes a plurality of electrical switches which are operated in response to the movement of a single control lever **250** (see FIG. **13**) in any of four orthogonal directions from a neutral or centrally-biased point. For the sake of brevity and clarity, the various individual switching contacts of assembly **212** are not shown in FIG. **2;** however, the different sets of output terminals which are connected with input terminal **210** in response to the movement of lever **250** are clearly indentified by a legend corresponding to that used in the chart depicted on assembly **212** in FIG. **2.** In other words, if lever **250** is moved left to position B, for example, input terminal **210** will be electrically connected to three separate output terminals only which are grouped together and are identified by the letter B in FIG. **2.**

One of the forward (FWD) output terminals of assembly **212** is connected via branched lead **252** to the energizing coil for relay **208** as well as to the forward starter **240** for drive motor **104.** Similarly, a reverse (REV) output terminal is connected to reverse starter **242** by a lead **254.** One output terminal for each of positions A, B, and REV, is connected by a line **256** to

supply an electric pump **258** having an inlet port connected to receive a suitable detergent from a reservoir **260** and an outlet port communicating with conduit **110.**

One of the A outputs of switching assembly **212** is connected via lead **262** to an electrical operator of a two-way air valve **264** having an inlet communicating with supply conduit **230** and first and second outlets **266** and **268** which are connected with cylinder **96'** for the left side brush **72** such that valve **264** supplies pressurized air via port **266** to retract the side brush **72** when deenergized and likewise supplies pressurized air via port **268** to extend the side brush upon receipt of an electrical signal on line **262.** In an identical manner, one of the B outputs of switching assembly **212** is connected by a line **270** to an electrical operator of a two-way air valve **272** which has its inlet port connected with conduit **230** and first and second outlets **274** and **276** which communicate with cylinder **96** for the right side brush **70.**

One of the forward (FWD) outputs and one of the reverse (REV) outputs of assembly **212** are connected together at branched line **280** and feed an energizing coil of a relay **282** as well as one side of each of the three sets of normally-open contacts thereof. The other sides of the contacts of relay **282** are connected respectively to lines **262** and **270** for supplying the electrical operators of air valves **264** and **272** as well as to a line **284** which feeds the electrical operator of diverter valve **236.**

A neutral (N) output terminal of switch **212** is connected by a line **286** to an energizing coil of a relay **288** which has to sets of normally-open contacts also connected to line **286.** It should be understood, of course, that the energizing coil of relay **288** is returned to ground in the conventional manner. Similar connections exist from a forward (FWD), A, B, and reverse (REV) output terminal of assembly **212** via lines **290, 292, 294,** and **296** to relays **298, 300, 302** and **304,** respectively, which are wired identically to that of relay **288** as illustrated in FIG. **2.**

Relays **288, 300** and **302** are connected to feed an electrical signal from switching assembly **212** through a reversing switch **306** to motors **92** and **92'** for right and left side brushes **70** and **72,** respectively. Reversing switch **306** is mounted on frame **20** and includes two identical sections each having a pair of input terminals **308–310** and **312–314** and a pair of output terminals **316–318** and **320–322,** respectively. An actuating lever **324** for switch **306** has a suitable roller **326** rotatably disposed on a distal end thereof and is adapted to cooperate with lobe **35** of rail **34** to move between a first position (illustrated with solid lines) and a second position (illustrated with dashed lines) in response to the movement of frame **20.** When lever **324** is in its first position, switch **306** interconnects input terminals **308, 310, 312** and **314** with output terminals **316, 318, 320** and **322,** respectively; however, when lever **324** is moved to its second position the connections for each section of switch **306** are reversed such that terminals **308, 310, 312** and **314** are interconnected with output terminals **318, 316, 322** and **320,** respectively, as illustrated by the crossed, dashed lines.

The two sets of contacts of relay **288** are connected to switch **306** at terminals **310** and **312,** respectively, while those of relays **300** and **302** are likewise connected with terminals **308** and **312** and terminals **310** and **314,** respectively. Output terminals **316** and **318** are connected via lines **328** and **330** to counterclockwise and clockwise starters **332** and **334,** respectively, of the left side brush drive motor **92',** and output terminals **320** and **322** are connected via lines **336** and **338** to counterclockwise and clockwise starters **340** and **342,** respectively, of the right side brush drive motor **92.**

Before proceeding to a description of the operation of the apparatus of the present invention and referring to FIG. **13,** it can be seen that lever **250** of switching assembly **212** as well as the main power switch **202,** the water control switch **206,** the jog switch **214** and the wax control switch **218** are all mounted on control panel **118** in a convenient position for use by the apparatus operator. As will become more readily apparent below, primary control of the vehicle washing apparatus according to the present invention may be had by the simple manipulation of unitary control lever **250** alone.

In operation, and referring to FIGS. **3–12,** a vehicle **350** to be washed is driven into the wash bay and stopped at a preselected position as shown in FIG. **3.** Thereafter, the car wash operator, riding on platform **112,** actuates main power switch **202** (FIG. **2**) which supplies operating potential via power bus **204** to input **210** of switching assembly **212.** The operator then moves lever **250** of switching assembly **212** to the reverse (REV) position so as to supply operating potential to the four REV output terminals thereof as shown in FIG. **2.** As a result, operating potential is fed by line **254** from one of the REV terminals to the reverse starter **242** of drive motor **104.** Frame **20** is then driven back toward the vehicle **350** from the position diagramatically shown in FIG. **3** to that shown in FIG. **4.** At this same time, water control switch **206** is actuated to supply power to the electrical operator for valve **216** such that water is supplied through conduit **110** to the car wash spray arch **106.**

When the frame **20** reaches the position shown in FIG. **4,** control lever **250** is released to its neutral biased position whereupon an electrical signal will be supplied from output terminal N of switching assembly **212** through lead **286** and relay **288** to terminals **310** and **312** of revering switch **306.** When frame **20** reaches the position illustrated in FIG. **4,** lever **324** of reversing switch **306** will have been moved by lobe **35** of rail **34** to its second position (shown dashed) causing the interconnection of input terminals **310** and **312** of switch **306** with output terminals **316** and **322,** respectively. Consequently, the left brush motor **92'** will begin rotating in a counterclockwise direction while the right brush motor **92** will begin rotating clockwise as depicted in FIG. **4.**

At this point, the operator is ready to wash the front of the car whereupon lever **250** is moved to the A position to provide the washing step illustrated in FIG. **5.** This causes the application of operating potential to the three A output terminals of assembly **212,** resulting in the energization of detergent pump **258** via line **256** such that soapy water is sprayed onto the front of the car **350.** Furthermore, the electrical signal on line **292** actuates relay **300** so as to produce the clockwise rotation of both the left and the right brushes **72** and **70,** respectively, through terminals **308** and **318** and terminals **312** and **322** of the tripped reversing switch **306.** Also, the signal from assembly **212** on line **262** causes

the actuation of valve **264** so as to extend piston shaft **98'** of cylinder **96'** for moving brush **72** to its extended position which is preferably just beyond the centerline of the vehicle **350** being washed. It is noted that since diverter valve **236** is not energized when lever **250** is in position A, full pressure from the air pressure supply will be fed to conduit **230** and thence to cylinder **96'** so as to assure full movement of the left brush **72** to its extended position. It is further noted that in all of the washing steps in addition to that just described, the rotation of the various washing brushes is always in a direction to aid the movement of the brush along the vehicle surface being washed for precluding the tangling or fouling of the brush strands.

Following the completed movement of the left brush **72,** the operator then moves lever **250** to position B which removes power from the A output terminals and applies power to the B terminals of assembly **212.** Detergent pump **258** remains energized since both the A and B output terminals are connected with line **256;** however, the removal of the electrical signal from line **262** causes valve **264** to return to its deenergized position whereby piston shaft **98'** is retracted to move left brush **72** back from the vehicle to its rest position, as is illustrated in FIG. **6.** At the same time, line **270,** which is connected with one of the B output terminals, supplies operating potential to valve **272** which becomes actuated so as to cause the extension of piston shaft **98** for moving right brush **70** across the front of the car **350.** Since both the left and right brushes are moved to the left as a result of the movement of lever **250** to position B, they must both rotate in a counterclockwise direction at this time. To provide this function, relay **300** is deenergized, and the signal on line **294** from terminal B of assembly **212** actuates relay **302** so as to supply operating potential through terminals **310** and **316** and terminals **314** and **320** of tripped switch **306** for starting motors **92** and **92'** rotating counterclockwise.

The washing of the front of car **350** is completed by releasing lever **250** to its neutral position whereupon the energizing signal from output B of switch assembly **212** for actuating valve **272** is removed so as to withdraw brush **70** to its rest position as shown in FIG. **7.** Of course, as before, the neutral position of lever **250** deenergizes relay **302** and simultaneously actuates relay **288** whereupon the left brush **72** is maintained rotating in a counterclockwise direction while the rotation of right brush **70** is reversed to rotate clockwise.

Upon completion of the washing of the front of car **350,** the operator moves lever **250** to the reverse position so as to begin the top and side washing sequence. Referring to FIG. **2,** since power is supplied to foot switch **224** by the normally-closed contacts of relay **208** when the relay is not energized, the closure of switch **224** causes the energization of motor **60** through starter **226** and further causes the actuation of valve **228** which allows piston shaft **68** to be withdrawn into cylinder **64** for pivoting frame **36** thereby lowering top brush **52** onto the upper surface of car **350.** Thus, upon initiating the reverse movement of lever **250,** the operator simultaneously begins the top washing sequence by actuating foot switch **224.**

The movement of lever **250** for the reverse position causes operating potential to be applied to the four REV output terminals of assembly **212,** which produces four effects. First, power is supplied via line **254** to the reverse starter **242** of motor **104** which then begins to move frame **20** over the car **350** as shown in FIG. **8.** Second, detergent pump **258** is maintained energized via lead **256.** Third, side brush motors **92'** and **92** are caused to rotate in counterclockwise and clockwise directions, respectively, by the direct connection of switch assembly **212** with starters **332** and **342** by line **296** and relay **304.** Fourth, the signal on line **280** actuates relay **282** so as to actuate diverter valve **236** as well as valves **264** and **272.** As a result of the actuation of diverter valve **236,** the pressure in conduit **230** drops to a relatively low level such that the top, left and right brushes are gently urged against the surfaces of car **350** for effective washing without damage to the car or the washing apparatus.

As frame **20** moves over the car **350,** performing the above-described washing operations, lever **324** of switch **306** will be released to its first position as wheel **326** rolls off lobe **35.** Thus, the apparatus will be automatically sequenced in preparation for the washing of the rear of the vehicle **350.** It can be appreciated that this sequencing or reversing step is necessary to assure that the direction of rotation of side brushes **70** and **72** is such as to assist in the movement of the brushes across the rear of the car as explained above. In other words, since the front of the car is washed by the right side of the brushes (as visualized in FIGS. **5, 6** and **7**) and since the rear of the car is washed by the left side of the brushes (as visualized in FIGS. **9, 10** and **11**), the direction of rotation of the two side brushes must be reversed in order to provide the desired operation. As noted, this function is automatically provided by reversing switch **306** and its cooperation with track lobe **35.**

The rear surface washing sequence is identical with the front surface washing sequence described above and thus will not be described again for the sake of brevity. However, it is noted that when the side and top washing sequence is complete, the operator releases foot switch **224** causing top brush **52** to cease rotation and deenergizing valve **228** to move the top brush upwardly away from the vehicle. Lever **250** is also released to its neutral position which causes the frame **20** to stop in the position shown in FIG. **9.** Thereafter, lever **250** is moved to position A to cause left brush **72** to wash the left rear vehicle surface (FIG. **9**), is then moved to position B to complete the washing of the left rear surface and begins the washing of the right rear surface (FIG. **10**), and finally is released to the neutral (N) position to complete the washing of the right rear surface (FIG. **11**).

With the first pass of frame **20** complete, the frame is then moved forward over car **350** to complete the rinsing sequence. This step is effected by moving lever **250** to the forward (FWD) position which causes the application of an electrical signal to the forward starter **240** of drive motor **104** via line **252.** The signal on line **252** also energizes relay **208** which removes power from the foot switch **224,** so as to preclude operation of the top brush, and simultaneously applies power to wax control switch **218.** If the application of wax to the vehicle is desired, the operator need only throw switch **218** which causes pump **220** to feed a suitable wax solution from reservoir **222** to water supply conduit **110** of the spray arch **106.** Also, since line **256** is not energized during the forward sequence, no detergent will be supplied to the spray arch by pump **258.**

The output signal on the FDW terminals of assembly **212** also causes the energization of relay **282** via line **280** such that diverter valve **236** and valves **264** and **272** are actuated for urging the side brushes **70** and **72** gently against the side of car **350** as shown in FIG. **12.** Relay **298** is also actuated to cause the rotation of motors **92'** and **92** in clockwise and counterclockwise directions, respectively, as is desired.

Upon completion of the forward pass of frame **20** over the vehicle **350,** the frame is moved to the position illustrated in FIG. **3,** lever **250** is released to its neutral position, and main power switch **202** is turned off whereupon the washing sequence is completed, and the vehicle **350** may be driven from the wash bay area.

As can be appreciated from the above sequence, whereever the front and rear surfaces of the vehicle are being washed, lever **250** will be in either position A or position B. Since lever **250** cannot be moved to more than one position at a time, and since it may be necessary or desirable to slightly move frame **20** in a forward or reverse direction when the front or rear surfaces of the car are being washed, jog switch **214** is provided on the control panel **118** for selectively energizing drive motor **104** through either the forward starter **240** or the reverse starter **242** as shown in FIG. **2.** Thus, the operator need not interrupt the front or rear washing sequence should any correction in the longitudinal position of frame **20** be required. Furthermore, the jog switch **214** enables the operator to precisely follow any exaggerated surface protrusions of the front or rear of the vehicle being washed, as is often the case with today's modern automobiles.

It should also be reiterated that according to the unique control circuitry embodied in FIG. **2,** primary control of the washing apparatus of the present invention is effected by the simple manipulation of the single lever of switching assembly **212** which enables control of the operation of both the washing brushes and the movement of frame **20** with minimal operator instruction. Furthermore, the control circuit of the present invention automatically assures the proper washing of a vehicle by providing for the dispensing of detergent only when the side brushes are being extended or when the frame is moving backward over the vehicle, by providing for the dispensing of wax only during the rinsing sequence when the frame is moving forward, and by precluding the operation of the top brush during the rinsing cycle when the frame is moving forward.

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

What is claimed is:

1. Vehicle washing apparatus comprising

a movable frame,

drive means connected with said frame and having first and second states for driving said frame in first and second opposite directions, respectively,

side brush means,

support means connecting said side brush means with said frame and being movable between retracted and extended positions for transversely moving said side brush means relative to said frame,

motor means connected with said side brush means for rotating the same, and

unitary manual control means operatively connected with said drive means and said support means and movable to control selectively both the state of said drive means and the position of said support means whereby the vehicle washing apparatus may be operated by the manipulation of a single control device.

2. The invention as recited in claim **1** wherein said support means includes electropneumatic means electrically connected with said unitary manual control means for moving said side brush means in response to preselected movement of said unitary manual control means.

3. The invention as recited in claim **1** wherein said motor means has first and second states for rotating said side brush means in first and second opposite directions, respectively, and wherein said unitary manual control means is connected with said motor means for controlling the state of said motor means.

4. The invention as recited in claim **3** wherein said frame is movable along a predetermined path of travel between a first position adjacent the front of a vehicle to be washed and a second position adjacent the rear of the vehicle, and further including switching means mounted on said frame and interconnecting said unitary manual control means with said motor means, said switching means being responsive to movement of said frame from said first position to said second position for reversing the resultant rotational movement of said motor means produced by the manipulation of said unitary manual control means.

5. The invention as recited in claim **1** wherein said unitary manual control means includes a manually operable lever movable along first and second intersecting paths for controlling the state of said drive means and the position of said support means, respectively.

6. The invention as recited in claim **5** further including supplemental manual control means operatively connected with said drive means for controlling the state thereof whereby movement of said frame may be controlled during periods when said lever of said unitary manual control means is positioned along said second path.

7. The invention as recited in claim **5** wherein said unitary manual control means includes a plurality of electrical switches selectively operable in response to movement of said manually operable lever along said first and second paths.

8. The invention as recited in claim **5** wherein said manually operable lever is biased to a position intermediate said first and second paths.

9. The invention as recited in claim **8** wherein said unitary manual control means is operative to place said drive means in said first state when said manually operable lever is moved along said first path in a first direction from said intermediate position, and wherein said unitary manual control means is operative to place said drive means in said second state when said manually operable lever is moved along said first path in a second direction from said intermediate position.

10. The invention as recited in claim **8** wherein said unitary manual control means coacts with said support means to place said support means in said extended position when said manually operable lever is moved along said second path from said intermediate position.

11. The invention as recited in claim **10** wherein said side brush means includes first and second side

brushes, and wherein said support means includes first and second support assemblies for said first and second side brushes, respectively, said first and second support assemblies being connected to said frame in opposition.

12. The invention as recited in claim **11** wherein said unitary manual control means coacts with said first support assembly to place said first side brush in an extended position toward said second side brush when said manually operable lever is moved along said second path in a first direction from said intermediate position, and wherein said unitary manual control means coacts with said second support assembly to place said second side brush in an extended position toward said first side brush when said manually operable lever is moved along said second path in a second direction from said intermediate position.

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