ABSTRACT: A vehicle-washing apparatus having a carriage movable on a track about a vehicle and having a top rotatable nozzle assembly rotatable about a vertical axis for directing sprays of liquid downwardly on an upwardly facing surface of the vehicle and a side nozzle assembly rotatable about a substantially horizontal axis for directing sprays of liquid at substantially vertical surfaces of the vehicle.
VEHICLE-WASHING APPARATUS

This application is a continuation-in-part of our copending application Ser. No. 545,496, filed Apr. 26, 1966, and now U.S. Pat. No. 3,400,727.

This invention relates to washing apparatus and more particularly to apparatus for washing vehicles.

An object of this invention is to provide a new and improved vehicle-washing apparatus for washing vehicles with a wash liquid, such as a hot solution of chemicals and water and then mixing the vehicle with a rinse liquid, such as hot water.

Another object is to provide a vehicle-washing apparatus having nozzle assemblies which direct sprays of liquid on the external surfaces of the vehicle at continuously varying angles of incidence to facilitate dislodgement of dirt particles and film adhering thereto.

Still another object is to provide a vehicle-washing apparatus wherein the sprays of liquid are not directed upwardly at the upper portions of the closures of the vehicle, such as the windows thereof at the locations of their engagement with seal means of the vehicle to prevent leakage of the liquids into the interior of the vehicle since the seal means at the upper portions of the closures of the vehicle are not designed to prevent upward and inward movements of liquids therepast.

A further object is to provide a vehicle-washing apparatus having a top nozzle assembly which is rotatable about a substantially vertical axis for directing sprays of liquid on upwardly facing surfaces of the vehicle and a side nozzle assembly rotatable about an axis which directs sprays of liquid on vertical surfaces of the vehicle.

A still further object is to provide a washing apparatus wherein the side nozzle assembly directs the sprays of liquid at the portions of the side surfaces of the vehicle below the locations of engagement of the top portions of vertically movable windows of the vehicle with the seal means of the vehicle engaged thereto when the windows are in closed positions so that the liquids are not directed at high velocity at the locations of the engagement of the windows with such seal means.

A still further object is to provide an apparatus wherein both the front and side nozzle assemblies direct a plus plurality of sprays of liquid at high velocity from nozzles of the nozzle assemblies which themselves are being rotated to cause the surfaces of the vehicle to be repetitively and successively subjected to sprays of liquid directed at continuously varying angles of the incidence thereto.

Another object is to provide a new and improved washing apparatus having means for subjecting the surfaces of the vehicle to sprays of wash and rinse liquids which do not impinge upon the surfaces at locations of the closures thereof in directions in which seal means of the vehicle are not designed to prevent leakage of liquids inwardly into the vehicle.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

FIG. 1 is a front perspective view of a vehicle washing apparatus embodying the invention;
FIG. 2 is a top view, with some parts broken away, of the washing apparatus;
FIG. 3 is a side view of the washing apparatus;
FIG. 4 is a sectional view taken on line 4-4 of FIG. 2;
FIG. 5 is an enlarged vertical sectional view with some parts broken away of the top portion of the carriage of the vehicle washing assembly;
FIG. 6 is a vertical sectional view with some parts broken away taken on line 6-6 of FIG. 5;
FIG. 7 is a horizontal sectional view taken on line 7-7 of FIG. 8;
FIG. 8 is an enlarged sectional view with some parts broken away taken on line 8-8 of FIG. 7;
FIG. 9 is a vertical sectional view of the side nozzle assembly taken on line 9-9 of FIG. 6;
FIG. 10 is a sectional view taken on line 10-10 of FIG. 9;
FIG. 11 is a sectional view of the main swivel or rotary joint assembly of the apparatus;
FIG. 12 is a schematic illustration of an electrical control circuit of the washing apparatus; and,
FIGS. 13 and 14 are schematic views illustrating the direction of the sprays delivered by the nozzles of the nozzle assemblies relative to their axes and direction of rotation.

Referring now to the drawings, the wash apparatus 20 embodying the invention includes a track assembly 21 which is securable to a building structure or other overhead support. The track assembly includes a track frame 22 formed of a pair of U-shaped sections 23 rigidly secured to one another by tie straps 24 which overlie the legs of the sections and are secured thereto by bolts 25. A plurality of C-shaped support plates 27 are secured at their lower ends to the track frame sections in any suitable manner, as by angle members 28 and bolts 29, the angle members being welded to the support plates. The upper ends of the support plates similarly have angle members 30 welded thereto and are secured to longitudinally extending side beams 31 by bolts 33 and tie bars 34, the bolts clamping the side beams between the angle members and the tie bars. The side beams 32 in turn are rigidly securable to the transverse beams 36 of a support or building structure by means of tie plates 38 and bolts 39. The U-shaped track frame sections 23 are movably spaced between a lower carriage 41 having the C-shaped support plates providing clearance for the movement of the upper portions of a carriage 40 between the side beams and the track assembly.

The track assembly frame has a horizontal internal lower support track 42 formed of two sections rigidly secured in any suitable manner, as by welding, to the track frame sections 23. An upper reinforcing flange 43 is similarly secured to the track frame sections to provide strength and rigidity to the track assembly.

The carriage 40 includes a suitable frame 45 having a pair of vertical angle members 46 and 47 rigidly connected to each other by a lower channel member 49 which may extend between the parallel flanges 50 and 51 of the angle members 46 and 47, respectively, and be rigidly secured thereto in any suitable manner, as by welding, a middle bar 53 which is secured to the other flanges 55 and 56, respectively, of the vertical frame members 46 and 47 by bolts 58, and a transverse plate 60 which is secured to the flanges 55 and 56 of the vertical angle members by bolts 62.

The brackets 65 of lower inner guide rollers 66, which are adapted to engage the internal surfaces of the track frame 22 below the support track, are also secured to the beam by the bolts 58. Similar upper inner guide rollers 70, rotatably mounted on brackets 71 secured to the plate 60 by the bolts 62, engage the internal surface of the support frame above the reinforcing flange 43.

A pair of bearing blocks 76 rigidly secured to the plate 60 by means of bolts rotatably support a shaft 80 on whose lower end is rigidly mounted a carriage drive wheel 82 having the usual pneumatic tire which engages the track frame. A pulley 84 rigidly secured to the upper end of the shaft 80 is connected to the output shaft 85 of a speed reducing transmission 86 by means of a belt 87 and a pulley 88 rigidly secured to the output shaft. The speed reducing transmission is driven by an electric motor 88. The assembly of the electric motor 88 and the transmission 86, commercially available as a unit, is rigidly secured to the track frame 22. The carriage extends between the vertical carriage members 46 and 47 and is rigidly secured thereto in any suitable manner, as by welding. The bolts 91 extend through suitable slots 95 of the mount plate to permit adjustment of the position of the motor on the mount plate and thus the tension on the belt 87.

The carriage has a pair of upper outer guide rollers 96 which engage the upper outer surface of the track frame and which are rotatably mounted on brackets 97 secured by bolts 98 to an horizontal angle member 99 which is spaced outwardly of the track frame and is rigidly secured, as by welding, to the outer ends of a pair of angle members 100 rigidly secured, as by welding, to the upper ends of the vertical carriage members 46 and 47. The carriage also has a pair of lower outer guide roller 102 rotatably mounted on brackets...
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103 which are secured by bolts 104 to an angle member 106 in turn secured, as by welding, to the outer ends of a pair of horizontal angles 107 which extend outwardly from the vertical carriage members 46 and 47 and are rigidly secured thereto, as by welding.

The carriage is supported on the track flange 42 by a pair of rollers 108 suitably mounted on brackets 109 which are rotatably secured by bolts 109a to brackets 109b in turn secured to the plate 60 by bolts 109c.

Sufficient clearance or play is provided between opposed guide rollers, which may have resilient tires or bodies, to permit the carriage to move about the curved portions of the track.

A vertical support 110 of the carriage is secured to a pair of L-shaped members 111 of the carriage, whose inner lower ends are secured, as by welding, to the vertical frame members 46 and 47, respectively, and whose upper ends are secured, as by welding, to the angle members 107, by means of a pair of angle brackets 114. The horizontal flanges of the angle brackets rest on suitable flanges of the horizontal portions of the member 111 and are secured thereto by bolts 116 and their vertical flanges abut the opposite sidewalls of the support 110 and are secured thereto by bolts 117.

It will be apparent that while a carriage having a particular structure has been illustrated and described, the carriage may be formed in any other suitable manner as long as it is provided with suitable guide rollers, such as the two pairs of upper and lower guide rollers which rotate about vertical axes and hold the carriage against lateral displacement on the track frame, the support rollers 108 which ride on the track flange 42 and support the carriage against downward movement, and a drive wheel which engages the track frame to move the carriage thereabout when the motor 89 is energized. For example, the carriage illustrated and described in our copending application Ser. No. 545,496 may be used in this apparatus.

The tire of the drive wheel is, of course, inflated sufficiently to cause it to maintain a desired frictional contact with the inner surface of the track frame.

A side nozzle assembly 125 is mounted on the lower end of the support 110 and includes a hollow shaft 126 which extends through suitable aligned apertures in the sides 127 and 128 of the support 110 and is rotatably mounted therewith by means of suitable bearing assemblies 131 and 132 which are rigidly secured to the column or support member by bolts 133.

The hollow shaft is rotated by an electric motor 134 which drives a speed reducing transmission 135 whose output shaft 136 is connected to the hollow shaft by a pulley 137 rigidly secured to the output shaft by a plurality of bolts 140 and a pulley 141 rigidly secured to the hollow shaft. The motor transmission assembly is mounted by means of bolts 143 to a base 144 pivoting secured to the column 110 by means of arms 145 rigidly joined to the base whose upper ends are secured to the tubular support member 110 by pins or shafts 146. The tension of the belts may be adjusted by pivoting the motor and speed-reducing assembly either upwardly or downwardly about the axis of the pins 146 by means of an adjusting link whose lower end is pivotally secured to a bracket 147 of the base and whose upper end may be secured by a bolt 149 to the support 110 in any adjusted position, as by providing the link with a slot through which the bolt 149 may extend.

A side nozzle assembly 125 includes a spray wheel 150 provided with a peripheral outwardly extending flange 151. Channel-shaped brace members 153 of the spring wheel have webs 154 which abut the rear surface of the wheel and are rigidly secured thereto by welding. The parallel flanges 155 of the brace members extend outwardly from the wall of the hollow shaft 126 and overlie the inner end portions of the brace members and is rigidly secured to the flanges thereof by welding. The manifold has a central chamber 161 to which the passage of the hollow shaft 126 opens and a plurality of circumferentially spaced ports 163 in whose outer ends are threaded suitable fittings or connecters.

164. Conduits 165 connected at their inner ends to the fittings 164 extend outwardly in a curved manner therefrom to suitable fittings 166 which connect their outer ends to spray nozzles 167. Each nozzle is secured to a brace member by suitable means and extends through aligned apertures in the web of its brace member and the wheel 150. The nozzles 167 are inclined to direct sprays of liquid toward the axis of rotation of the wheel, and also in the direction of the movement of the nozzle during the rotation of the spray wheel so that the velocity of the spray is increased due to the movement of the nozzle.

A circular shield 170 is secured to the support 110, as by means of one or more of the bolts 133 which secure the bearing assemblies to the support member. The shield has a suitable aperture through which the shaft extends.

Liquids under pressure are supplied to the outer end of the hollow shaft by a suitable rotating joint or union 172 whose rotating member 173 is connected to the outer end of the hollow shaft by a coupling 174, and whose stationary housing or member 175 has an inlet to which is secured a flexible conduit 176 by means of a suitable coupling means 176. The flexible conduit extends upwardly into the interior of the support through a tubular bushing 178 welded to the support and then upwardly through the support. The upper end of the flexible conduit is connected by a suitable coupling means 180 to one end of an elbow 181 whose other end is connected by a nipple 182 to one outlet of a T-coupling 184. The inlet end of the T-coupling is connected to the rotating member 186 of a main rotating joint or union 188 of a swivel assembly 190 by a nipple 191, an elbow 192, a vertical pipe 193, an elbow 194, a nipple 195 and a flexible conduit 197 one of whose ends is connected to the nipple 195 by a suitable connector means 198 and whose other end is connected by a similar connector means 199 to a rigid conduit 201 which in turn is connected by a nipple 202 to the rotatable member 186 of the rotary joint.

An overhead nozzle assembly 205, identical in structure although not in dimensions to the nozzle assembly 125, includes a hollow shaft 206 which extends through suitable bearing assemblies 207 secured, as by bolts 209, to a horizontal support member 210 of the carriage which extends inwardly of the support 110 thereof. The inner end of the hollow shaft 206 is connected to a manifold 211. A plurality of conduits 212 have their inner ends connected in circumferentially spaced ports of the manifold and have their outer ends connected to spray nozzles 214 by means of fittings 215. The nozzles are secured to the circular disk shaped spray wheel 216. The nozzles are inclined to direct sprays of liquid in the direction of their movement as the spray wheel is rotated. A circular shield 218 secured to the horizontal support member 210 as by the bolts 209 which secure the bearing assemblies to the horizontal support member 210 extends about the spray wheel. The upper end of the vertical hollow shaft 206 is connected by a suitable coupling 220 to the rotatable member 222 of a swivel or joint 223 whose nonrotating member 224 is rigidly secured to the horizontal support member 220 by a bracket 225. Liquid under pressure from the rotatable member 186 of the main rotary unit or joint 188 is supplied to the inlet 227 of the stationary member 224, the inlet 227 being connected to the other outlet end of the T-coupling 184 by a suitable conduit means which may include an elbow 230, a connector assembly 231, a flexible conduit 232, a coupling assembly 233, a nipple 234, an elbow 235, a nipple 236, elbows 237 and 238, and a nipple 239. The various conduit means by which liquid under pressure is delivered to the hollow shafts of the two nozzle assemblies are secured to the carriage at appropriate locations in any suitable manner, as by suitable clamps 240. It will now be apparent that whenever liquid is supplied to the side nozzle assembly 125, it is also supplied to the top nozzle assembly 205.

The horizontal support member 210 is rigidly connected to the tubular support 110 of the carriage by a pair of tie plates 242 which may be welded or otherwise rigidly secured to the
support 110 between which the horizontal support member extends and is secured by means of bolts 244. The support member may also be welded to the tubular support 110 and to the tie plate 116. The hollow shaft 206 of the top nozzle assembly is rotated by a motor 250 and a speed reducing transmission 251, the motor and transmission assembly being rigidly secured as by bolts 254 to a vertical plate 255 welded or otherwise secured to the outer end of a horizontal support member 256 which extend between the outer portions of the tie plates 242, and is rigidly secured thereto by bolts 257. The outer 260 and inner 261 shaft of the speed-reducing transmission is connected to the hollow shaft 206 by a pulley 262 rigidly secured to the output shaft 260, a plurality of V-belts 263 and a pulley 264 rigidly secured to the hollow shaft.

The stationary member 270 of the main swivel joint 188 is connected by a suitable coupling 271 to a pipe 271 which is rigidly secured, as by suitable clamps 274, to a transverse frame member 277 of the overhead track assembly which is secured to the side beams 32 thereof in any suitable manner, as by welding.

The swivel assembly 190 includes a pair of electrically conductive collector rings 280 and 281 mounted on the pipe 272 by means of 282 insulating sleeve 284 rigidly secured to the pipe by means of the electric contacts 285 and 286 of a cable 287 connected to the rings 280 and 281 respectively. The conductor 286 extends downwardly from the top collector ring through a suitable aperture in the top collector ring and is insulated from the top collector ring. A pair of brush holder 294 and 295, whose brushes 296 and 297 are in sliding electric contact with the collector rings 280 and 281 respectively, are mounted by means of a bolt 298 on the horizontal arm 299 of a bracket 300. The brushes may be of any suitable type, such as carbon brushes, spring biased toward the collector rings and connected to the electrical conductors 302 and 303 of a cable 304. The bracket 300 is provided at its lower end with a hub 306 mounted on the outlet to which its lower end with a hub 306 mounted on the nipple 202 to which the hub is secured by the setscrew 307. The bracket may be formed of two sections which are bolted together to facilitate its assembly to the other swivel assembly component if desired.

A spray shield 310 of the swivel assembly 190 may include a tubular housing 311 whose reduced lower end portion 312 is telescoped over the rotating member 186 and is secured thereto in any suitable manner, as by a setscrew 313. A cover 315 of the spray shield is secured to the pipe 272 by setscrews 316 and has a dependent peripheral flange 317 which telescopes over the upper end of the housing. The cable 293 extends upwardly from the spray shield through a suitable seal or bushing 320 secured to the cover while the cable 304 extends through a suitable seal bushing 321 secured to the housing 311. The top end of the stationary pipe 272 of the swivel assembly 190 is connected to a supply conduit 330, which is connectable to a suitable source of hot water under pressure, by means of an elbow 331 and a nipple 332, a T-coupling 333, and a nipple 334, and a solenoid valve 335. A wash agent from a supply conduit 340 connected to a source of the liquid agent under pressure, may be introduced into the hot water flowing to the pipe 272, the supply conduit 340 being connected to an inlet of the T-coupling 333 by a nipple 341, a T-coupling 342 and a solenoid valve 344. Another agent such as a liquid wax solution may be admixed to the hot water nipple 343 flowing to the pipe 272 from a conduit 350 connected to a suitable source of such agent by means of a nipple 351 which is connected to an inlet of the T-coupling 342, a solenoid valve 352, a nipple 353, and an elbow 354. It will be apparent that when only the solenoid valve 335 is open, hot water will be supplied to the two nozzle assemblies; that when the solenoid valves 335 and 344 are open, a mixture of hot water and chemical, such as a detergent, i.e., wash liquid is supplied to the nozzle assemblies; and that when all three valves 335, 344, and 352, are open, a mixture of hot water, wax and chemical is supplied to the nozzle assemblies.

Suitable covers or housings are provided to cover such components of the apparatus as the rotary union 23, the upper portion of the carriage 40, and the rotary union 172. Any suitable controls may be provided for controlling operation of the valves and of the electric motors which drive the carriage motors and the nozzle assemblies. In FIG. 12 is illustrated a circuit which may be operated manually by an operator of the washing apparatus although, if desired, a suitable coin-operated control circuit of the general type illustrated and described in our copending application Ser. No. 545,496, filed Apr. 26, 1966, may be employed to cause the apparatus during the first complete cycle of travel of the carriage about the track to spray a hot solution of chemical and water on the top and side surfaces of the vehicle, a solution of hot water, chemical and wax agent during the second complete movement of the carriage about the vehicle and the track, and only hot rinse water during the third and final movement of the carriage about the track and about the vehicle.

Referring now particularly to FIG. 12, the control circuit may include a manually operable switch 401 whose contacts 402 and 403 when the switch is in closed position connect the conductors 285 and 286 of the cable 287 to an input circuit 406 of electric current by means of the conductors 406 and 407 respectively. The cable motor 89 and the nozzle assembly motors 134 and 250 are connected across the conductors 302 and 303 which are connected to the brushes 296 and 297, respectively. A third contact 410 of the main switch connects the solenoid of the valve 335 across the main lines 406 and 407 by means of the conductors 412, 414, 415, and 416. The solenoid of the valve 344 is connectable across the main lines by the conductor 412, a manually operable switch 418 and the conductors 419 and 416. Similarly, the solenoid of the valve 352 is connectable across the main lines by the conductors 412 and 422, a switch 423, and the conductors 424, 425 and 416.

In use, the vehicle to be washed is driven to a predetermined position below and within the track frame 22 being guided to such position by means of guide rails 430, 431 and 432, which are engageable by its wheels. Suitable stop means or indicating means may be provided to give a visual or other indication to the driver of the vehicle when his car reaches a proper central position below the track. The driver of the vehicle may now remain in the vehicle or may step out of it. The operator of the apparatus then closes the switches 401 and 418 simultaneously, the carriage motor 89 is energized and drives the carriage around the track frame, the nozzle assembly motors 134 and 250 are energized and rotate the spray wheels 150 and 216, and the valves 335 and 344 are opened and a mixture or solution of hot water and wash agent is supplied to the nozzles of the two nozzle assemblies.

The nozzles of the side nozzle assembly 125 direct sprays of liquid at the lower portions of vertical or side surfaces of the vehicle immediately below the lower edges of the closed vertically movable side windows of the vehicle in order that the sprays of liquid do not impinge upwardly and inwardly at the locations at which the seals or gaskets of the vehicle are engaged by the top portions of the windows. Such seal means are not designed to prevent forcible upward and inward flow of liquid between the top edge portions of the windows and such gasket or seal means.

The sprays of liquid from the nozzles, as illustrated in FIGS. 13 and 14, are directed in the direction of rotation of the spray wheel 150 and toward the horizontal axis of its rotation so that the velocity of the sprays directed toward the side surfaces of the vehicle is increased by the velocity of rotation of the spray wheel itself, as is more fully explained in my copending application Ser. No. 545,496.

The nozzles of the top spray assembly 205 direct sprays of the liquid substantially downwardly at the upwardly facing surfaces of the vehicle and also at the top portion of the side surfaces thereof so that the sprays from the nozzles of the two spray assemblies overlap at the upper portions of the vertically movable windows of the vehicle. The high velocity sprays...
from the nozzles of the top assembly are directed downwardly at the upper end portions of the windows and thus do not tend to move forcibly upwardly between the top edge portions of the windows and the gaskets which engage them. The nozzles of the top nozzle assembly also direct sprays of liquid toward and in the direction of the axis of rotation of the spray wheel 216 so that the velocity with which the sprays impinge on the upward facing surfaces is increased by the velocity of rotation of the spray wheel 216.

As the spray wheels rotate, the sprays of high velocity wash liquid from the nozzles of the two spray assemblies are directed at the external surfaces of the vehicle repeatedly and at varying angles of incidence as the nozzles are rotated and the carriage moves about the vehicle. For example, as the carriage, FIG. 2, rides on the right side spray wheel 150 of the side nozzle assembly rotates in a clockwise direction, FIG. 13, particles or films of dirt adhering to the vertical surfaces of the vehicle at a location forwardly of the movement of the side nozzle assembly are first subjected to high velocity sprays of wash liquid which are directed downwardly and, as the nozzle assembly moves past such location, such surfaces of the vehicle are subjected to upwardly directed sprays of the wash liquid. The successive impingement of the surfaces of the vehicle repeatedly to sprays of high-pressure wash liquid whose angle of incidence to the surfaces of the locations of impingement thereof varies as the carriage moves about the vehicle, causes mechanical forces to be applied to the dirt particles and film to dislodge such dirt particles and film from the surfaces of the vehicle. Since the sprays of the wash liquid are directed not only inwardly toward the direction of rotation of the two spray wheels but also in the direction of movement of their nozzles, the velocities of the sprays are increased by the very rapid rotary movement of the nozzles themselves. The successive impingement of the sprays in effect hammers or knocks off the dirt. The hot wash liquid also tends of course to dissolve any soluble dirt adhering to the vehicle. Such dissolution of the dirt is facilitated by the addition of the chemical in the usual well known manner.

After the carriage has made one complete movement about the vehicle, during which the surfaces of the vehicle have been subjected to sprays of wash liquid directed at continuously varying angles of incidence to the surfaces, these surfaces are wetted by the wash liquid which tends to penetrate, soften and dissolve any remaining dirt adhering to the surfaces. It is desired that the surfaces of the vehicle be treated with the wax agent as the carriage begins its second movement about the tracks, the operator closes the switch 423 and a mixture of hot water, detergent and the wax agent is then supplied to the nozzles of the two spray assemblies. As the carriage makes the second complete movement about the vehicle, the external surfaces of the vehicle are subjected to sprays of this solution which further tends to wash off the dirt and also deposits a coating or film of the wax agent on the vehicle. As the second movement of the carriage about the vehicle is completed the operator opens the switches 418 and 423 and only hot rinse water is then delivered to the nozzle assemblies. The sprays of hot water then wash any remaining detergent and excess wax agent off the vehicle during the third complete movement of the carriage about the track and the vehicle. Upon completion of the third movement of the carriage above the track, the operator opens the switch 401. The carriage is then again at the side of the vehicle, as for example, in the position illustrated in FIG. 1 and the washed vehicle may then be driven forwardly from beneath the track.

The sprays of liquid from the nozzles of the top nozzle assembly when the carriage is at the side of its vehicle subject the upwardly facing surfaces of the vehicle over more than half its width and also impinge on the upper portions of the forwardly and inwardly sloping side surfaces of the vehicle so that all areas of the upwardly facing surfaces of the vehicle are subjected to the sprays from the top nozzle assembly during each movement of the carriage.

It will be apparent that, if desired, the top spray wheel could be driven by the force of the liquid under pressure exerted thereon as the liquids flow from the spray nozzles, or such wheel could be omitted, since the top surfaces of the vehicle may not have as much dirt adhering thereto or deposited thereon as on the side surfaces.

It will further be seen that the mounting of the motor 250 of the carriage outwardly of the track serves to counterbalance the weight of the nozzle assembly 205 in order to minimize the stresses and strains on the track and on the carriage.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art without departing from the spirit of the invention. We claim:

1. A vehicle-washing apparatus including: a substantially rectangular track means; a carriage mounted for movement about said track means; drive means on said carriage for moving said carriage about said track means when said drive means is energized; a top nozzle assembly mounted on said carriage for directing sprays of liquid substantially downwardly on upwardly facing surfaces of vehicle positioned within said track means as said carriage moves about said track means; a side nozzle assembly mounted on said carriage for delivering sprays of liquid at portions of the side surfaces of a vehicle below the top portions of the vertically movable window thereof as said carriage moves about said track means; and means for supplying liquid under pressure to said nozzle assemblies, said top nozzle assembly including a plurality of nozzles rotatable and spaced about a substantially vertical axis and said side nozzle assembly including a plurality of nozzles rotatable and spaced about a substantially horizontal axis, said nozzles of each of said nozzle assemblies being positioned to direct sprays of liquid in directions inclined toward the axes of rotation of said nozzles and also inclined in the direction of rotary movement of said nozzles.

2. The vehicle-washing apparatus of claim 1, and drive means on said carriage for individually rotating said nozzle assemblies.

3. The vehicle-washing apparatus of claim 2, wherein said means for supplying liquid to said nozzles includes first and second rotary unions mounted on said carriage and a main rotary union spaced from said carriage, each of said unions having a stationary member and a rotary member, and conduit means connecting the stationary members of said first and second rotary unions with the rotary member of said main union.

4. The vehicle-washing apparatus of claim 3, wherein the stationary member of said main union is disposed within said track means.

5. The vehicle-washing apparatus of claim 3, wherein said carriage has means supporting said top nozzle assembly inwardly of said track means and supporting said drive means for said top nozzle assembly outwardly of said track means.

6. A vehicle-washing apparatus including: a substantially rectangular track means; a carriage mounted for movement about said track means; drive means on said carriage for moving said carriage about said track means when said drive means is energized; a top nozzle assembly mounted on said carriage for directing sprays of liquid substantially downwardly on upwardly facing surfaces of a vehicle positioned within said track means as said carriage moves about said track means; a side nozzle assembly mounted on said carriage for delivering sprays of liquid at portions of the side surfaces of a vehicle below the top portions of the vertically movable window thereof as said carriage moves about said track means; and means for supplying liquid under pressure to said nozzle assemblies, said means for supplying liquid to said nozzles including first and second rotary unions mounted on said carriage and a main rotary union spaced from said carriage, each of said unions including a stationary member and a rotary member, and conduit means connecting the stationary members of said first and second rotary unions with the rotary.
member of said main union, the stationary member of said main union being disposed within said track means, each of said assemblies including a plurality of spaced nozzles rotatable about a common axis and conduit means connecting said nozzles to the rotary member of one of said first and second rotary unions, said nozzles of each of said nozzle assemblies being positioned to direct sprays of liquid in directions inclined toward the axis of rotation of said nozzles and also inclined in the direction of the rotary movement of said nozzles.