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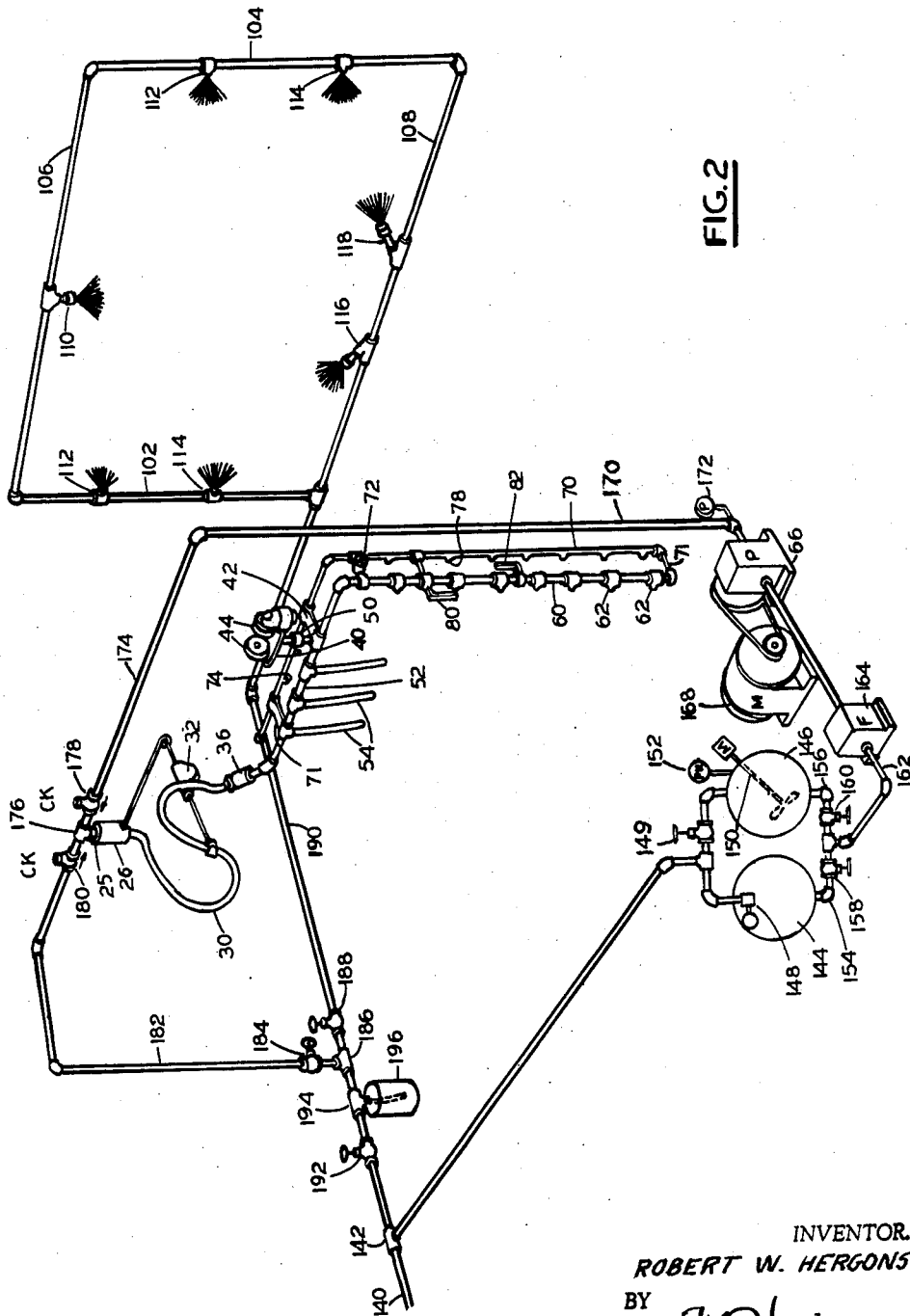
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METHOD FOR VEHICLE WASHING

Original Filed May 23, 1962

3 Sheets-Sheet 2



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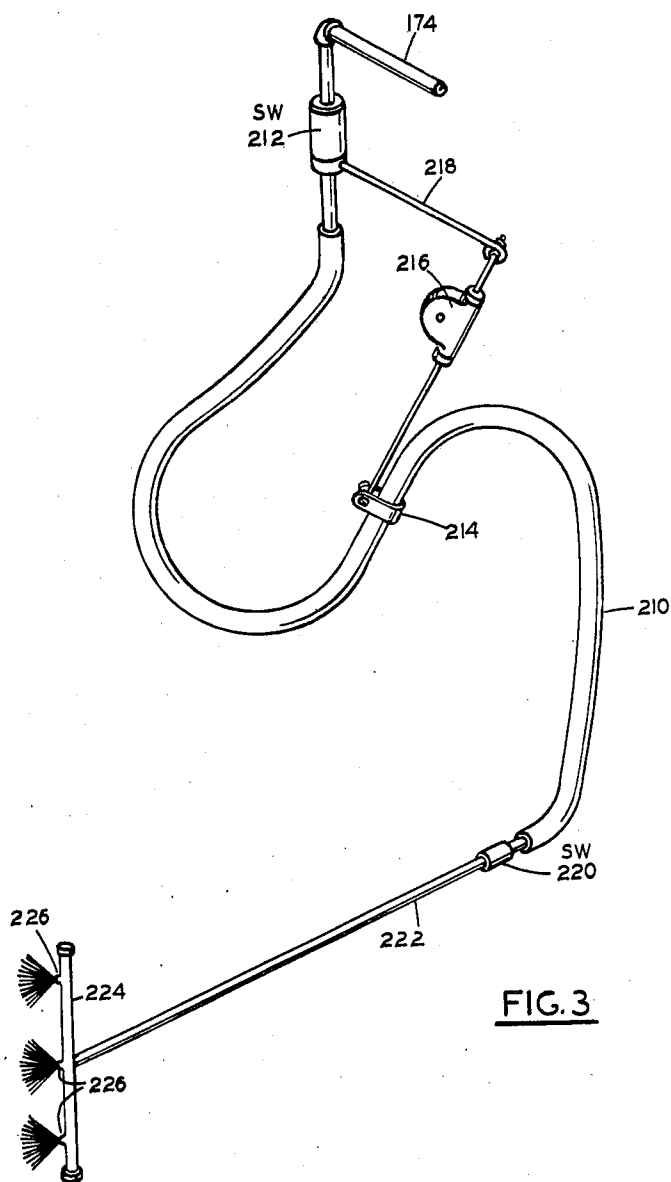
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METHOD FOR VEHICLE WASHING

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4 Claims. (Cl. 134—7)

This invention relates to vehicle washing apparatus and more particularly the method of washing associated therewith.

In vehicle washing apparatus it has been the usual practice to apply water and detergent while manually scrubbing or brushing the vehicle, for the removal of soil and film, and to thereafter rinse such water and detergent from the vehicle by use of clear water, followed by manual application of absorbent drying cloths or the like to eliminate droplets and water streaks and finish the job. In car washers of the drive through type considerable manual labor is required not only in the initial stages as set forth above, but also in the final stages following the application of clear rinse water to remove the detergent laden water and particularly in the course of final drying of the vehicle in such manner as to eliminate drip and droplet marks.

The present invention is directed to the method of application of washing compositions through the operation of the apparatus so as to expeditiously effect a wash and subsequent rinses, and which eliminates completely the need for manual scrubbing effort during the entire cycle of operation. The invention further has to do with the application during the initial washing stage, of a composition comprising water, detergent and an insoluble applied solely by high pressure spray, to effect a vapor blasting of the vehicle surfaces to scrub the same clean without manual effort, in a minimum of time, and using a minimum of material.

Such vapor blasting stage is followed by a high pressure rinse to remove the composition, and is followed by a low pressure rinse with wetting agent to complete the wash without the formation of droplets or streaks which in the usual practice would require laborious manual wiping or drying with towelling or the like.

The invention further has to do with a method utilizing washing apparatus which may be conveniently and readily transported a number of times around a standing vehicle in a relatively short space of time, while applying the sequence of the vapor wash blasting, high pressure rinse and final rinse in successive excursions about the vehicle. The apparatus is especially capable of use in garages having no drive through facilities.

The above and other features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings wherein like reference characters indicate like parts:

FIGURE 1 is a perspective view of one form of car washer adapted to the method of car washing con-

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templated herein and adapted for power or manual movement about a vehicle;

FIGURE 2 is a diagrammatic view of the mechanism for applying the washing and rinsing solutions to the vehicle in rapid sequence, and

FIGURE 3 is a view of an alternative apparatus, adapted for manual carrying about a vehicle.

In FIGURE 1, there is shown a vehicle V disposed in normal relation beneath the overhead car washing assembly. As shown, there is an elongate oval or curved end rectangular track 10 which may be formed of spaced angle irons 20 and 22, such angle irons being supported from the ceiling or overhead beams by cables or other means indicated at 24. Located above the track, and centrally with respect thereto, is a depending supply pipe 25, provided with a swivel connection 26, of any suitable form, and to which is connected a flexible hose 28, having a slack portion 30, the slack portion being supported by a spring take up at 32 and cable 33, mounted on the rotatable portion of the swivel connection 26. The hose 28 is connected to the end 34 of an inverted L shape high pressure spray pipe 35, through a second swivel connection 36. The L shaped pipe is supported from a carriage 40 having a bracket 42 and rollers 44 riding on the flanges 46 and 48 of the angle iron track 10. Support between the pipe 35 and the bracket 42 is effected by a swivel joint 50.

The horizontally extending portion 52 of the spray pipe is provided with three depending flexible hoses 54 connected to T connections in the pipe portion 52, and the lower ends of the hoses have recessed therein high pressure spray nozzles each providing a fan spray approximately 90 degrees in breadth, the planes of the spray extending transversely of the vehicle. The three fan spray nozzles are adapted to deliver wash water to the vehicle hood, top, and trunk deck over an area embracing the center area of the hood, top and deck, and the area to one side thereof, and the flexible hoses 54 accommodate cars, the height of which vary.

The vertical portion 60 of the pipe 35 is provided with a plurality of fan spray nozzles 62 disposed approximately six inches apart along the vertical portion 60, and the fan sprays are directed generally toward the vehicle, with the fan of each spray lying substantially in vertical planes. The individual adjacent spray nozzles are adjusted so that the planes of their respective fan sprays do not interfere with one another, the planes of adjacent sprays being angularly displaced from one another by a few degrees.

Carried by the pipe 35, is a second inverted L-shaped low pressure spray pipe extending substantially parallel thereto, as is indicated at 70 and suitable tie members 71 are provided to support the pipe 70 from pipe 35. A connection, through a manually operated valve 72 is provided between the high pressure spray pipe 35, and the low pressure pipe 70. The low pressure spray pipe is provided with a plurality of downwardly directed rinsing nozzles 74 along its horizontal portion 76, and inwardly directed rinsing nozzles 78 along its vertical portion as herein shown in FIGURE 2.

The pipe 35 is provided with suitable handles 80 and 82 for convenient grip by an operator whereby the pipes 35 and 70 may be caused to be moved in unison around the vehicle at a rapid rate, the trackway providing support for the pipes 35 and 70, and the flexible hose and

take up together with the swivel connections affording adequate freedom for repeated rapid excursions of an operator with the spray pipes 35 and 70 about the track and vehicle, at a relatively rapid rate.

In FIGURE 1, there is also shown a spray frame 100, which is of sufficient size to permit a car to be driven therethrough with adequate clearance. The frame may be located inside of the entrance door of the garage. The frame comprises vertical pipes 102 and 104, connected to overhead and ground level pipes 106 and 108. The overhead pipe has a central wide angle spray nozzle 110, and each of the vertical pipes are provided with inwardly directed wide angle spray nozzles 112 and 114, at approximately the car window level and fender and wheel level respectively, while the ground level pipe 108 is provided with two spray nozzles 116 and 118 located near the center, each angularly disposed to spray divergently upwardly and outwardly at an angle of about 45° from the floor level, each spray nozzle also being of the wide angle type and adapted to soak the fender and rocker panels, as for example for salt removal. Such a frame provides a pre-rinse or soak effective as the car is driven therethrough, and in hot climates, will have a cooling effect upon the vehicle, prior to placing the vehicle in position for the high pressure wash.

In FIGURE 2 there is shown a diagrammatic illustration of the apparatus and the liquid supply connections. In FIGURE 2, there is shown a municipal or city water supply line 140 having a connection through a T 142 to a pair of tanks 144 and 146 each of about 10 gallons capacity. The tank 144 is preferably provided with a float valve 148 tending to maintain the tank full at all times. The tank 146 is provided with a fill valve 149, and may have an opening in the top for the administering to the water contained therein when filled, a detergent and an insoluble compound, reference to which will hereinafter be made in more detail. The tank 146 is provided with a motor driven mixer 150, and may have a pH indicator 152. Both tanks have outlet connections 154 and 156 controlled by valves 158 and 160, and connected together to a common pipe 162 leading through a screen filter 164, and to a high pressure pump 66, driven by a motor 168. Such outlet connections will be of a size to adequately supply the high pressure pump. The pump outlet is connected to a riser 170, having a pressure indicator 172, and leading to a pipe 174 extending to the center area above the elongate frame to a T 176, through a check valve 178. The city water supply previously referred to is also connected to the other branch of the T 176, through a check valve 180, and through a pipe line 182 leading to a valve 184 to a T connection 186, which provides a branch connected to the spray frame 100 through a valve 188 and pipe line 190. The T 186 is connected to the water supply 140 and T 142, through a valve 192 and an aspirating mixing device 194 adapted to introduce a small percentage of wetting agent from container 196 into the water flowing through the aspirator device.

The swivel connection 26 is connected to the T 176, so that the high pressure output of pump 66, from either tank 146 or 144 may be supplied to the spray pipe 35, the check valve 180, blocking the flow towards the aspirator 196. On the other hand, water under city pressure may be supplied to the spray pipe 35, check valve 178 blocking flow towards the pump 66. When the city pressure rinse is employed, the valve 72 is opened to permit the water and wetting agent under city pressure to be sprayed from the multiple low pressure spray heads mounted at frequent intervals along the horizontal and vertical reaches of spray pipe 70, as at 78, the high pressure nozzles 62 offering considerable restriction to any substantial spraying at the lower city pressure.

In performing a washing operation with the apparatus described, the vehicle, if a pre-wetting or rinse is desired, is driven through the spray frame 100, while the valves 188 and 192 are sequentially or simultaneously opened,

valve 184 being closed. When the vehicle is in a central position beneath the frame 10, the valves 192 and 188 are closed, in that order, or simultaneously tank 144 is filled with rinse water, such as 10 gallons and tank 146 is filled with a similar quantity. At this point detergent and an insoluble finely divided solid is placed in suspension in tank 146 and the stirring apparatus energized. Valve 149 is closed. Valve 158 is closed. Valve 160 is opened. Valve 72 is closed. Thereupon the pump 66 is started, to start the spraying action, and an operator quickly traverses the spray pipe 35 around the vehicle in two quick successive excursions and during which time the contents of tank 146 are discharged through the high pressure nozzles to provide the vapor detergent insoluble solids blasting action over the vehicle. Thereafter valve 160 is closed and valve 158 opened and the operator thereupon, with the pump 66 running, completes two more excursions about the vehicle to provide an effective high pressure rinse. Thereafter the pump 66 is stopped, the valve 158 closed, the tank valve 149 opened to refill tank 146 for the next cycle, while the operator opens valves 72, 184 and 192 and thereafter applies rinse water with wetting agent to the vehicle in two more successive rapid excursions around the vehicle, the low pressure spray pipe 70 being supplied through check valve 180 and open valve 72. The entire wash is thus completed under an elapsed time of two or three minutes, and the vehicle subsequently dries without droplets, or streaks, and without further manual effort.

An important feature of the invention is the application of an insoluble suspended solid in a detergent stream administered by the high pressure spray from the tank 146. The insoluble suspended solid in the detergent stream may consist of polymeric materials which can be a polymer or combination of polymers in a physical mixture or a chemical combination. These polymers can be of the thermosetting or thermoplastic type. The particle size is substantially within the range of 0.5 mil to 25 mils. Examples of the polymers or resins used are phenolformaldehyde, epoxy resins, polyesters, polyethylene, polypropylene, polyvinylchloride, polyvinylacetate, polystyrene and polyurethane. A copolymer of 75-90% polyvinylchloride and 25-10% polyvinylacetate is effective, for example.

In practice approximately 8 ounces by weight of car wash detergent per ten gallons of water, in combination with 3 ounces by weight of insoluble solids provides an effective mixture or solution, and the presence of a proper ratio may be ascertained by the alkalinity of the solution, as indicated on the pH meter 152, which may be in the order of 7 to 10.

While the extensive apparatus of FIGURE 1 may be highly desirable for effecting a car wash with a minimum of effort, a simple hand sprayer, as indicated in FIGURE 3 may be effectively employed with the high pressure supply apparatus described. As shown therein a high pressure hose 210 connects with a swivel 212 to the high pressure line 174 leading to the pump 66. The hose has a slack portion 214 supported from a spring take up reel and cable 216, which depends from an arm 218 extending from the rotary portion of the swivel 212. The hose 210 is connected by a swivel 220 to a pipe 222, serving as a handle, the end of which is provided with a T pipe 224 having a plurality of high pressure fan type spray nozzles 226 disposed about six inches apart. The planes of the fan sprays may be approximately at right angles to the handle, and are set in planes lying at small angles to one another to avoid interference, between sprays. Such apparatus is supplied from the same pump and reservoirs 144 and 146 shown in FIGURE 2, the operator making one or two excursions about the vehicle while manually applying the broad fan spray to all parts of the sides, hood, top and trunk of the vehicle. Thereafter a high pressure rinse from tank 144 is applied while the operator passes around the vehicle once or twice. Thereafter a

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rinse with wetting agent at low pressure can be applied by an ordinary low pressure hose and suitable nozzle, supplied from the domestic water supply with an aspirator mixer as indicated at 194.

The apparatus of FIGURES 1 and 2 will be seen capable of bringing the fan sprays of the nozzles relatively close to the vehicle side wall and top whereby the spray velocity created by the high pressure pump, operating in the range of 300 pounds per square inch will be effective to provide the washing action referred to. The depending hoses 54, with their fan nozzles protectively disposed just within the ends are capable of bringing the spray close to the hood and trunk, and yield for such body roofs as may be higher than others.

It is contemplated in practice that the spray pipes 35 and 70 may be, if desired, power driven about the track 10 at a prescribed rapid rate of speed as by a motor 99 driving one or both of the rollers 44, the motor being supplied by swivel connectors or slip rings associated with the swivel 26. In addition the valves 149, 158, 160, 192, 184 and 72, may be solenoid controlled, and may be operated automatically in a cycle, by a timer which may also control the operation of the motor mixer 150, pump motor 168 and track motor 99.

In addition to the reference to the the insoluble suspended solid in the detergent stream, an effective cleaning agent suitable for use with the high pressure spray system may be prepared from a composition comprising the following ingredients, all expressed in parts by weight.

	Parts
A detergent or wetting agent	4-36
Sodium tripoly phosphate	3-27
Tetrasodium pyrophosphate	2.5-22.5
Sodium sulfite	0.5-4.5
Powdered plastic material	10-90

As detergent, any compatible non-ionic or anionic surface active agent may be used, an agent of the alkyl aryl sulfonate type being, for example, well suited for the purpose. The combination of the two phosphate compounds serves to maintain the proper pH value of the diluted composition and improves its properties. The sodium sulfite is also effective in enhancing the cleaning properties of the composition and in stabilizing the same.

As plastic material a water-insoluble copolymer of 75% polyvinyl chloride and 25% polyvinyl acetate has been found to be very satisfactory. The particle size of such polymeric material may be critical for effective operation and should be such that 100% of said material will pass thru a 40 mesh screen, 90% will pass thru a 100 mesh screen, and the material may be as small as 10 microns in size.

In place of the polyvinyl chloride polyvinyl acetate copolymer other plastic materials may be employed providing they are insoluble in water, have the proper degree of hardness, and are of correct particle size. Examples of suitable polymeric materials which may be used in the composition are: polyethylene or polypropylene, polyvinyl chloride, polystyrene, polyesters or polyamides, phenolic resins, urea- or melamine-formaldehyde resinous materials and the like.

An example of a composition adapted for use in the high pressure wash may be as follows:

	Percent
Sodium alkyl aryl sulfonate detergent	20.0
Sodium tripoly phosphate	15.0
Tetrasodium pyrophosphate	12.5
Sodium sulfite	2.5
Polyvinyl chloride/polyvinyl acetate copolymer (75:25)	50.0

The foregoing are expressed as percentages on a weight basis, and from 0.25 to 3.0 ounces of the composition may be used, very satisfactory results being obtained, for example, with one ounce per gallon of water and with a pH in the range of 7.5 to 10. The dispersion is passed thru

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a coarse screen in the filter 164 which will permit the passage of the polymeric material but serves to retain larger particles of foreign matter. The dispersion is pumped under high pressure of 200 lbs. per square inch or more and preferably 300 lbs. per square inch thru the spray nozzles onto the vehicle to be cleaned.

The second rinse employs water to which has been added by the aspirator or other means about 50 to 100 parts per million of a surface active agent or detergent material. The water in this case may be under normal "city" pressure, and a nonionic or anionic detergent or a mixture of such detergents is suitable for the second rinsing operation. A suitable surface active agent for the purpose is Nacconol BB.

In practice, the operator, or the motor track drive 99 for the spray pipe 60 and the high pressure nozzles may be coordinated such that two excursions about the vehicle at a steady rate will be such as to consume a 10 gallon batch from the tank 146.

The effectiveness with which the apparatus operates in vehicle washing will be noticeably apparent, the method being effective to remove insects, bird droppings and the like from the grills, chrome, enamel, and glass, and to clean white side wall tires all without manual effort, and in general providing a clean and polished lasting appearance in a relatively short space of time with a minimum of manual effort.

While a single modification of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

This application is a division of my copending application Serial Number 197,064, filed May 23, 1962.

What is claimed is:

1. The method of cleaning a vehicle which comprises dispersing under high pressure in the order of 300 pounds per square inch a detergent stream containing a small percentage of finely divided insoluble plastic material against the sides and a portion of the top of said vehicle while proceeding around the vehicle at least once, and thereafter rinsing the residue of said stream from said vehicle by dispersing water under pressure against the sides and a portion of the top of said vehicle while proceeding around the vehicle at least once, and thereafter spray rinsing under a substantially lower pressure the sides and a portion of the top of said vehicle with water containing a small amount of a surface active agent.

2. The method of cleaning a vehicle which comprises preparing in a reservoir a batch mixture of water, detergent and finely divided insoluble plastic, agitating the mixture to maintain suspension of the insoluble plastic therein dispersing under pressure in the order of 300 pounds per square inch a stream of said mixture against the sides and a portion of the top of said vehicle while proceeding around the vehicle at least once, and thereafter rinsing the residue of said stream from said vehicle by dispersing water under pressure against the sides and a portion of the top of said vehicle while proceeding around the vehicle at least once, and thereafter spray rinsing under a substantially lower pressure the sides and a portion of the top of said vehicle with water containing a small amount of a surface active agent.

3. The method of cleaning a vehicle which comprises dispersing against the sides and a portion of the top of a vehicle under high pressure in the order of 300 pounds per square inch a stream containing approximately .625 percent by weight of a detergent, and approximately .24 percent by weight of finely divided insoluble plastic material comprising a polyvinylchloride-acetate copolymer having a particle size substantially within the range of .5 mil to 25 mils.

4. The method of cleaning a vehicle which comprises dispersing against the sides and a portion of the top of a vehicle under high pressure in the order of 300 pounds per square inch a stream containing approximately .625 percent by weight of a detergent, and approximately .24 percent by weight of finely divided insoluble plastic material comprising a polyvinylchloride-acetate copolymer of 75 to 90 percent polyvinylchloride having a particle size substantially in the range of 0.5 mil to 25 mils.

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