Method and apparatus are provided for cleaning heavily soiled surfaces or surfaces coated with strongly adhering organic materials which comprises providing a water stream, either by itself or in combination with cleaning solutions to a plurality of bays at a temperature of at least 190°F and a pressure of at least about 650 psi. A network of lines is provided for carrying and mixing the water stream and one or more cleaning solutions or solvent streams. As part of the network, a manifold serves to distribute the water stream through a plurality of conduits to the bays. Each cleaning solution or solvent stream has a separate line coupled to each of the conduits through separately actuatable valves, so as to allow each of the operators at the bays to independently choose the cleaning mode employed. Each of the cleaning solutions are pressurized to at least the pressure of the water stream. A single pump is employed for each of the streams maintaining the streams substantially at the same pressure, irrespective of the degree to which the stream is in use.

11 Claims, 3 Drawing Figures
FIG_2

FIG_3

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HOT WATER (RINSE)
HOT WATER AND SOLVENT
HOT WATER AND SOAP
HOT WATER AND CHEMICAL
HOT WATER (RINSE)
HOT WATER AND SOLVENT
HOT WATER AND SOAP
HOT WATER AND CHEMICAL

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HIGH PRESSURE HOT WATER SPRAY SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 124,141 filed Mar. 15, 1971 now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

Cleaning methods have primarily relied on hot water streams, mixtures of hot water and solvents, or steam. High pressures have also been taught, but not in combination with water at temperatures approaching the boiling point of water.

Steam cleaning is inefficient for many reasons. First, the rapid expansion of the steam as it leaves the nozzle of the hose, results in substantial cooling, so that the temperature of the steam at the surface to be cleaned is far below the temperature of the steam exiting from the nozzle. Secondly, because the steam rapidly vaporizes, the water molecules reach the surface at relatively low velocities. Therefore, there is little mechanical effect in removing the dirt or grime.

With water at high pressure, but not high temperature, one obtains a mechanical effect, but no softening effect, and poor solvency. Thus, against heavy organic accumulations, the removal of the coating is slow and difficult. Attempts to provide a water stream at high temperatures and high pressures are subject to serious difficulties. A high pressure pump causes a vacuum when drawing the stream into the pump. When water at high temperatures is the stream, the water will vaporize and the pump will be acting against a mixture of vapor and water. Having to pump against the vapor results in the rapid destruction of the pump.

In many operations and installations, it is desirable that there be three or more bays or outlets so that cleaning can be carried out simultaneously and at various stations or areas. For most cleaning operations, it is frequently desirable to have a plurality of cleaning solutions in addition to the water. For efficient cleaning, there should be available a soap solution as well as one or more organic solvents which, when mixed with the water stream, aid in softening the dirt or coating as well as dissolving the dirt or coating, so as to greatly enhance the efficiency and rate of removal of the coating on the surface. With a plurality of bays, a plurality of streams rapidly becomes uneconomical, if a separate pump is required for each stream and at each bay. Therefore, a commercially practical system must minimize the number of pumps involved while providing the necessary versatility in varying the streams on demand and at the elevated temperatures and pressures which are desirable.

In many cleaning situations, particularly food processing, there is an accumulation of bacteria or fungi which can not only be unsightly, but can act to contaminate the food which is being processed. In order to ensure a substantial removal and destruction of such living organisms, temperatures in excess of 180°F are desired. Therefore, a cleaning stream at high pressure and temperatures in excess of 180°F is not only effective in destroying living organisms, but also serves to remove sticky tenacious slime and other organic exudates from food which is being processed.

2. Description of the Prior Art

U.S. Pat. No. 3,421,694 discloses a cleaning system using volumetrically working pumps for controlling the rate of addition of chemical cleaning solutions to a water system and either is limited to having a plurality of bays all using the same cleaning stream or separate pumps for each stream for each bay.

U.S. Pat. No. 3,543,787 provides a high water pressure source limited to a single pump system with a single outlet. Other patents of interest are U.S. Pat. Nos. 2,207,809, 2,919,070, 3,037,707 and 3,380,658.

SUMMARY OF THE INVENTION

A method and cleaning apparatus are provided for providing a water stream, by itself or in combination with small amounts of cleaning solutions or materials, at temperatures of at least about 190°F and pressures of at least about 650 psi through one or a plurality of outlets, allowing for individual selection of the particular cleaning mode at each outlet. The apparatus comprises a heating and pressurizing means for providing a water stream at a temperature of at least about 190°F and pressure of at least about 650 psi. A network of conduits is provided having first conduits connecting a manifold, which is in liquid receiving relationship with the heating and pressurizing means, to a plurality of outlets. Crossing the first conduits are second conduits, each second conduit being connected to a source of a particular cleaning solution. A pump is interposed between the second conduit and the cleaning solution source to provide the cleaning solution at a pressure at least equal to and normally greater than the pressure of the water stream. Each of the second conduits is coupled with each of the first conduits through a selectively actuable valve. When the apparatus is in operation, all the pumps are run continuously providing a fixed rate of flow with pressure regulators providing an auxiliary circuit, when the stream is not in use.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of the device including ancillary holding tanks;
FIG. 2 is an electrical circuit for controlling the flow of the various streams; and
FIG. 3 is an elevated view of a wash wand for high pressure operation.

DETAILED DESCRIPTION OF THE SPECIFIC EMBODIMENTS

The subject invention provides, in combination, a heating and pressurizing means to provide water at high pressures and temperatures; a network of conduits, including a first one or set of conduits supplying water to one or a plurality of outlets from a manifold in liquid receiving relationship with said heating and pressurizing means, and a second set of conduits, each conduit in liquid receiving relationship with a source of a different cleaning solution or solvent at high pressure and individually coupled with each of said first conduits through a separately actuable valve, and means for controlling at the outlets, or other convenient place, each of the valves along the conduit connected to the particular outlet. In this manner, at each outlet, each operator may choose the particular cleaning mode desired, including the high pressure — high temperature water stream by itself or in combination with small amounts of one or more cleaning solutions and/or sol-
vents. The streams exit from the outlet in the liquid state and due to the high pressures arrive at the surface to be cleaned substantially in the liquid state. Therefore, high energy is imparted to the surface by the water stream to provide mechanical as well as solvent action in the cleaning of the surface. In addition, even relatively volatile organic solvents can be applied to the surface substantially in the liquid state as part of the water stream, so as to dissolve, soften and aid in cooperation with the water in removing strongly adhering organic matter.

In order to provide the capability for each of the operators to selectively choose the cleaning mode independently of what the other operators are doing, each of the solvent streams is pumped at a constant rate to provide a substantially constant pressure. The volume pumped for each stream will be somewhat in excess of the maximum volume of the stream capable of being discharged when all the bays are employing the stream simultaneously.

A pressure regulator, upstream from the pump, either returns the cleaning solution to the cleaning solution reservoir or to the line connecting the cleaning solution reservoir to the pump. Depending on the performance of the pressure regulators, some variations in the pressure of the stream will result. However, it is found that in normal operation when the water stream is used in conjunction with a cleaning solution stream, the drop, if any, in pressure which results in the discharge of the combined streams from the outlet, allows for relatively constant differential between the cleaning solution stream and the water stream. Thus, the cleaning solution is introduced into the water stream in the same amount to each of the water streams, regardless of the number of bays using the cleaning solution.

For further understanding of this invention, the drawings will now be considered. A water source is provided which may be obtained from municipal water supply and used directly at the pressure of the system or may be treated, such as by softening, and stored in a water tank. If the pressure of the water is not sufficient, the water is passed to a low pressure pump by means of low pressure pump inlet conduit and exits from the low pressure pump by means of low pressure pump outlet conduit. A pressure regulator is provided as depicted in the drawing. The equipment employed is commercially available and chosen according to cost, convenience and availability.

Normally, the water pressure will be raised to at least 25 psi, preferably about 50 psi, and usually not exceeding 100 psi, preferably not exceeding 75 psi.

Raising the water pressure above the ambient water pressure at this point serves a dual function. It is found essential that the pressure be at least about 25 psi when introducing the hot water into the high pressure pump. Otherwise, vaporization occurs at the inlet of the high pressure pump interfering with the control and smooth flow of the water through the pump. In addition, serious damage to the pump may occur, where the pump is subjected to variation in the physical state of the water from liquid to vapor. Also, the method employed to provide a stream of water saturated with detergent, as will be described subsequently, requires a positive pressure to force the water through the powdered detergent.

If a municipal water supply is relied upon, it is essential that an insured supply of water at at least 25 psi be provided. Otherwise, sudden reduction of the pressure of the water source to the high pressure pump can be catastrophic. As an alternative to a low pressure pump, a pressure gauge or other pressure detecting device, can be employed which automatically shuts off the high pressure pump or the entire system any time a pressure below 25 psi is detected from the water source.

The outlet conduit feeds into a tee which is used to direct the total flow of water through hot water heater inlet conduit and through the soap tank inlet conduit.

In the hot water circuit, the water flows through conduit into an instant hot water heater. There are commercially available heaters which may be used which provide for rapid rise of temperature from ambient to at least 190°F. Preferably, the water is heated to 200°F or somewhat higher, not exceeding about 220°F. Under no circumstances is the water to be heated to a temperature at which substantial vaporization would occur at the relatively low pressures provided by the low pressure pump.

From the hot water heater, the hot water passes through high pressure pump inlet conduit into the high pressure pump. Any high temperature pump may be used which will provide the necessary high pressure for the water stream. The minimum pressure required is at least about 650 psi and preferably about 750 psi, usually not exceeding about 900 psi. Conveniently, a pump may be employed, such as supplied by FWI, as their 10 horsepower vertical triplex plunger pump.

It is necessary that the water introduced at an elevated temperature to the high pressure pump be at a sufficient pressure so that there is no significant vaporization of the water upon introduction into the pump. If a moderate pressure is not employed, it is found this results in severe wear on the pump resulting in rapid breakdown. Furthermore, there is interference in the smooth flow of the water resulting in inefficient use of the equipment.

A pressure regulator is provided to control the pressure at the high pressure pump. The high pressure pump pumps at such a rate as to provide a continuous volume of water equal to that required for all of the outlets in the system. When none of the outlets are in use, the water will be pumped through circuit and continually recycled. Instead of recycling to conduit, the water can be recycled to conduit, so that if there are long interruptions in the use of the system, while the pumps are continuously allowed to pump, the temperature of the water will be maintained. Because a constant rate of flow and constant volume of flow are employed, pumps can be employed which are not adjustable for variable flow.

The water now at high pressure passes through high pressure pump outlet conduit into bay inlet conduit or manifold.

Normally, there will be a plurality of bays being fed by the various streams, whereby one or more people may be operating simultaneously, each selecting the wash mode desired. Two, three or ten or more bays can be accommodated simultaneously by the subject apparatus. Each bay is independently operable to select its own washing mode or cycle. The temperature and pressure in each unit will be the same, since the pump is de-
signed to provide a volume of water in excess of that which can be used by all of the bays. Furthermore, the system is versatile in allowing for additional bays being added without substantial modification of the equipment, either by initially employing a pump having a greater capacity than is required, or by exchanging a smaller pump with a pump having sufficient capacity for the increased number of bays.

Since each bay is substantially the same as the others, a typical bay is indicated by the portion enclosed within the broken line 38. The three bays A—1, A—11, and A—III are merely indicative of the plurality of bays possible and do not intend this invention to be limited to three, any number of bays being possible, depending on the equipment supplying the various streams to the bays. For convenience, only the bay indicated as A—II will be described.

The water at high pressure from the bay inlet 36 passes through valve inlet conduit 40 and water control solenoid valve 42. The water control valve may be conveniently controlled by remote control at the site of the operator, so that it may be turned on and off at will. The circuitry for such system will be discussed subsequently. The valve may be an on and off valve or if desired, means may be provided for controlling the rate of flow of the water. Since in most instances the water will be subsequently mixed with another stream at a predetermined ratio by varying the flow of the water, the ratio of the water to the other stream may also be varied. If the water control valve is merely an on/off valve, then a control valve or other means is provided for controlling the flow of the other streams to be mixed with the water. Normally, varying the ratio of water to the other stream is not required, and a fixed ratio will be employed.

In addition to the water, there will usually be a source of an organic solvent, stored conveniently in a storage tank 44. The solvent should have at least a moderate boiling range, so as not to vaporize too rapidly prior to impinging upon the surface to be cleaned. While miscible organic solvents may be employed, immiscible hydrocarbon solvents are preferred. Normally, the solvents will have an initial boiling point of at least 120°F, more usually 140°F. Preferably, substantially all of the organic solvent will boil above 150°F. The final boiling point is one of convenience. Low boiling solvents may be used in this invention and be applied to the surface at high speed and elevated temperatures in the liquid phase. The solvents should be of relatively low viscosity, and should have some solvency for the protective surface, so as to aid in the softening and removal of the protective surface from the surface to be cleaned.

Since the organic solvent will normally be in relatively small proportion to the water, there is no need to heat the organic solvent. It is found in operation that there is no significant reduction in the temperature of the water at the ratios normally employed.

In the organic solvent circuit, the organic solvent passes from the storage tank 44 through storage tank outlet conduit 46 into high pressure pump 48. The high pressure pump should be adapted to deal with the organic solvents without significant deterioration of sealing glands, etc. A pump regulator 50 is provided for control of the high pressure pump. The pressure of the organic solvent will be raised to at least the pressure of the water, and preferably at least 25 psi greater than the water. Usually, the pressure of the organic solvent will be from about 25 to 75, preferably 50 psi greater than the water. This provides rapid mixing when the two streams are brought together so as to provide a substantially uniform application of the mixture to the surface to be cleaned.

As already indicated, the pump 48 runs continuously during the operation of the cleaning apparatus providing a constant volume of solvent. The volume of solvent pumped is somewhat greater, normally about 10 percent or more greater than the total volume required when all of the units are employing the solvent. Therefore, some or all of the solvent will be continually recycled through circuit 50a and may be returned to conduit 46 or solvent tank 44.

The organic solvent is then fed through bay inlet conduit or line 52 to a needle valve 54 so as to provide adjustment of the amount of organic solvent to be ultimately mixed with the water. An electric control valve 56 is provided which can be controlled from a remote position, so as to turn the organic solvent stream on or off. From the electric control valve 56, the organic solvent passes through a check valve 58, the check valve preventing water from entering the organic solvent circuit.

The water passing through the control valve 42 enters the mixing circuit 60 which is connected to the various other streams with which the water may be mixed. By opening control valves 42 and 56, the water flowing through conduit 60 meets the organic solvent flowing through check valve outlet conduit 62. Since the streams are moving at high speed under the high pressures being applied, rapid mixing of the two streams occurs with substantially uniformity of the heterogeneous mixture.

Depending on the efficiency of the pressure regulator 50, when control valve 56 is open, some pressure drop in conduit 52 may result. However, it is found in practice that in opening control valve 42 for the flow of the water stream and control valve 56 for the flow of the solvent stream, the pressure drop, if any, in the two streams maintains a sufficient differential, so that the solvent stream can enter into the water stream to provide the desired mixture at a substantially constant composition.

The combined streams then flow through hose connector 64 to a flexible hose 66 which may be connected to any convenient outlet hardware, not depicted in FIG. 1. A particularly advantageous wash wand to be used with the subject apparatus is depicted in FIG. 3, which will be described subsequently.

Additionally, and preferably, a source of water saturated with detergent is provided to be mixed with the high temperature, high pressure water stream. In order to provide a continuous source of water saturated with soap or other detergent, the water is introduced into the saturated detergent circuit by means of inlet conduit 24 through float valve 68 connected by arm 70 to float 72. The float valve 68 maintains a constant level of an aqueous saturated detergent solution, with the water stream from the tee 20 and inlet conduit 24. The water passes downwardly through feed inlet conduit 74 and out through slotted water feed 76 into the detergent water tank 78. In the tank 78 is provided a relatively high level of wet detergent powder 80 so as to insure the substantial saturation of the water as it passes through the detergent powder. Above the detergent powder, a substantial amount of water 82 saturated
with the soap is maintained to insure a continual availability of a detergent saturated water solution. A guard 84 is provided so that when introducing solid soap into the container 78 so as to maintain the soap level 86, none of the soap enters the outlet conduit 88 which might result in clogging.

The soap water 82 is pumped from the container 78 through the outlet conduit 88 into the soap water high pressure pump 90. The pressure is regulated by pressure regulator 92. The same level of pressures are used with the soap water as are employed with the organic solvent.

As indicated for the other pumps, the soap water pump also provides a constant volume of soap water which is recycled to conduit 88 through circuit 92a. The volume of soap water pumped is slightly in excess (~10%) of the total volume of soap water required for use by all the bays.

From the high pressure pump 90, through pump outlet conduit 91, the soap water is introduced through the bay inlet conduit or line 94 into the needle valve 96 which controls the rate of flow of the soap water. The flow of the soap water is controlled by the electrical valve 98, the soap water passing through the electrical valve 98, the check valve 100 and the check outlet valve conduit 102 into the water stream or mixing conduit 60.

One or more streams may be mixed in the mixing conduit 60 and then applied to the surface to be cleaned. In order to provide the desired mechanical cleansing action, a hard steady liquid stream is desirable. Any convenient spray tip may be used, which is fixed or adjustable. Usually, the arc will not exceed about 15°, so that a relatively narrow concentrated stream is provided. In view of the high temperatures and pressures involved, an insulated holder is necessary, which is attached to the flexible hose 66.

While the spray tip may be quite close to the insulated holder, from 6 to 12 inches, it is preferable to have the spray tip at least 18 inches and possibly as much as 36 inches distant from the holder. In this manner the operator is reasonably distant from the hot stream and can proximately approach the surface to be cleaned with the spray tip without being subjected to undue splashing of the hot stream.

In FIG. 3 a wash wand is depicted having a connector 104 suitably adapted for connection to the hose 66. The connector, conveniently in the form of a reducing valve fitting, can be rigidly attached to a conduit 106. Suitable pipe of ½ inch inside diameter can be used for conduit 106. The connector and conduit are centered in an outer metal cylinder 108 by means of blocks 110, 112, 114 and 116. The blocks are welded to the conduit and the outer cylinder to support the two parts concentrically and are of a size large enough to afford rigidity to the parts, but not so large as to establish a substantial heat path from conduit 106 to outer cylinder 108. One inch diameter thin wall electrical conduit can be used as the outer cylinder. Surrounding the outer cylinder is heat insulation 118, which can be provided by 1¼ inch diameter rubber hose.

The conduit 106 exits forwardly from the cylinder 108 and then arcs downwardly forming an arc 120 having about a 1 inch radius. While the drawing depicts the conduit as a continuous single tube, a connector is preferably provided at 115 so as to permit exchange of the conduit to vary the length or shape of the wand.

The portion extending downwardly 122 will normally be at least about 2 inches and usually not exceeding about 6 inches, more usually from about 3 to 5 inches. The conduit then curves forward forming a second arc 124 of about 1 inch radius. The conduit includes a segment 126 that extends for about 1½ to 3 feet, so as to remove the hot stream a sufficient distance from the operator and terminates in a spray tip 128 which provides a sharply defined stream. The spray tip 128 can be nonadjustable or adjustable to vary the nature of the stream. Normally, a narrowly defined stream is maintained to provide a concentrated high pressure stream of water particles.

In order to reduce fatigue with the long wash wand, the nature of the arcs is such that, with the conduit segment 126 of the wand in the horizontal plane, the portion of the conduit 106 within the handle makes an acute angle between 20° to 40° to the horizontal. The particular angle is determined by that required to provide a convenient relaxed position for holding the handle at the insulation 118 at an angle, where the wrist is not extended in an uncomfortable way.

The horizontal segment 126 defines a line which, if extended backwards, would pass intermediate the ends of the hand grip. That is, the counter thrust resulting from the discharge of the water is directed toward the hand grip. In this manner, the arm which holds the hand grip in a tilted position appears, in practice, to be more comfortable with the forces resulting from the discharge of the streams, than having the wash wand as a straight pipe with the counter thrust directed directly along the line of the wash wand.

Depending upon the particular system, master switches can be employed adjacent the various pumps so as to turn each pump on and maintain the pump operating continuously during working hours. For convenience and economy, switches can be provided so that each operator may turn a pump on or off, as required, from his operating position. By having the switches in parallel, the pump will continue to operate as long as one or more switches are in the on position, and will stop operating only when all the switches are in the off position.

The control system (see FIG. 2) employs a main power line 130 connected to a common electrical power terminal 132. Connected to the main line are three switches 133, 136 and 138, which move in tandem as indicated by the broken line 139. The first switch 133 turns on the high pressure pump 30 which is connected at the terminal 134. Pump 12, if required, may also be turned on simultaneously by also being connected at terminal 134. The second switch 136 connects the control switches for the pumps and also opens the valve 42, which is connected at terminal 135 so that hot water at high pressure begins to flow in the hot water circuit. The third switch 138 connects the control switches for the valves.

The control system intends that the switches connected directly to the main power line control the flow of water so that the pumps can be turned on only when a stream of water is flowing. This protects the high pressure pump 30, while providing the necessary versatility in varying the streams. If it were desired to have a second independent stream, this could be provided for in the same manner as provided for the hot water circuit.

The two rotary switches 142 and 143 will normally be in positions 140 and 141 respectively, indicating that
The hot water from heater 26 is then introduced into high pressure pump 30 where the pressure is raised to about 750 psi. Because the water introduced into the pump was already at a mild positive pressure produced by pump 12, vaporization of the water is avoided and stresses on the pump minimized. The hot water under high pressure is then fed in a steady, narrowly defined stream onto the car either by itself or in combination with an organic solvent.

While various organic solvents may be used, preferred organic solvents are those boiling above ambient temperatures, but normally below about 125°C, and of relatively low viscosity. Kerosene, very light diesel oil No. 2, naphtha, etc. may be used.

When a mixture of the organic solvent and water is desired, the organic solvent is introduced into the water stream under high pressure so as to provide rapid mixing and a relatively uniform distribution of the organic solvent in the water. Usually, at least 10 parts by volume of the water will be used per part of organic solvent, and usually not more than about 50 parts of water per part of organic solvent, preferably being about 25 to 30 parts of water per part of organic solvent.

The rate of flow which will be maintained in order to provide the heavy cleansing stream will be at least about 2.5 gallons per minute, usually about 3 to 6 gallons per minute.

After the automobile or other object has been sprayed with the water or the water and organic solvent or both, and substantially all of the protective or dirt covering has been removed, the surfaces may then be conveniently cleansed by using a mixture of the saturated soap solution and water. Similar ratios of the soap solution to water may be employed, as were employed with the organic solvent and water. These ratios will vary somewhat more widely, depending on the detergent being employed, the degree of saturation of the water in the detergent solution, and the nature of the surface being cleaned. Alternatively, liquid detergents can be used, which would not require the water saturating mechanism, but would be introduced in the same manner as the solvent.

By virtue of applying a steady hard stream to the metal surface, the protective coating is removed not only by solution, but also by the mechanical action of the water particles impinging upon the surface. Because the water is not permitted to vaporize in the system of this invention, the force of the material sprayed onto the surface is relatively great. A solid stream of hot water mechanically works the surface. Since the force of impingement is proportional to mass, the water stream has a force far greater than that afforded by conventional steam cleaners. A strong scrubbing action is achieved with the liquid stream. The liquid stream has a high latent heat which is transferred to the surface so as to raise the temperature of the surface rapidly and maintain the temperature during the cleaning.

In addition, the organic solvent is maintained in the liquid phase and is able to reach the surface to be cleansed at a high temperature providing a high degree of solvency for the protective coating. The high speed of the solvent provides effective penetration into the surface. Thus, surfaces which were only difficulty cleansed, requiring extensive manual effort to remove all of the undesirable protective coating, can now be rapidly cleansed, quickly and conveniently with excellent efficiency, insuring complete cleaning.
While one embodiment of the invention has been shown and described, it will be obvious that other adaptations and modifications can be made without departing from the true spirit and scope of the invention.

What is claimed is:

1. An apparatus for cleaning difficult to clean surfaces which comprises:
   heating and continually operating pressurizing means for providing a constant volume of a water stream in excess of the total maximum requirements of said apparatus at a temperature of at least 190°F and a pressure of at least 650 psi having a single high pressure pump;
   a network of conduits comprising a plurality of first conduits and at least one second conduit, wherein said first conduits are in liquid receiving relationship with a manifold operably connected with said heating and pressurizing means and each of said second conduits is coupled with each of said first conduits by a different one of a plurality of separately actuable valves;
   operably connected to each of said second conduits a separate auxiliary solution pressurizing means having a single high pressure pump for providing a constant volume in excess of the total maximum requirements of said apparatus to said second conduit of an auxiliary solution at a pressure at least equal to the pressure of said water stream;
   a different one of a plurality of separately actuable water valves operably connected to each of said first conduits between said manifold and said coupling of said first and second conduits; and
   means for controlling all of said valves.

2. An apparatus according to claim 1, wherein said controlling means includes a plurality of individual control means, each of said individual control means controlling the valves coupled with a separate one of said first conduits.

3. An apparatus according to claim 1, having at least two second conduits, wherein said auxiliary fluid for one of said second conduits is a saturated soap solution and the auxiliary fluid for a second of said second conduits is an organic solvent.

4. An apparatus according to claim 3, wherein said saturated soap solution is formed by passing water at a mildly elevated pressure through solid soap particles.

5. An apparatus according to claim 1, wherein said heating and pressurizing means comprises water source means for providing water at a pressure of at least about 25 psi but less than about 100 psi; and

6. An apparatus according to claim 1, wherein each of said pressurizing means is operably connected to a pressure regulator.

7. An apparatus for cleaning difficult to clean surfaces which comprises:
   water source means for providing an insulated source of water at a pressure of at least 25 psi and less than about 100 psi; heating means; continually operating water high pressurizing means for providing a constant volume of water in excess of the total maximum requirements of said apparatus consisting of a single high pressure pump; a manifold; wherein said heating means, water high pressurizing means and manifold are serially connected to said water source means; a plurality of first conduits having one end connected to said manifold and an outlet at the other end; at least one second conduit connected to each of said first conduits by a different one of a plurality of separately actuable valves; a different one of a plurality of separately actuable water valves connected to each of said first conduits intermediate said manifold and said connection to said second conduits; a separate one of a number equal to the number of said second conduits of auxiliary liquid high pressurizing means operably connected to each of said second conduits; and control means for controlling all of said valves.

8. An apparatus according to claim 7, wherein said water source means is a low pressure pump.

9. An apparatus according to claim 7, wherein said water source means includes a pressure gauge and means for turning off the pressurizing means when said pressure gauge detects a pressure below 25 psi.

10. An apparatus according to claim 7, wherein said control means includes a plurality of control means, wherein in each of said plurality of control means, controls all of the valves connected to one of said first conduits and is in juxtaposition to said one of said first conduits.

11. An apparatus according to claim 7, having at least three first conduits and at least two second conduits.