

April 15, 1969

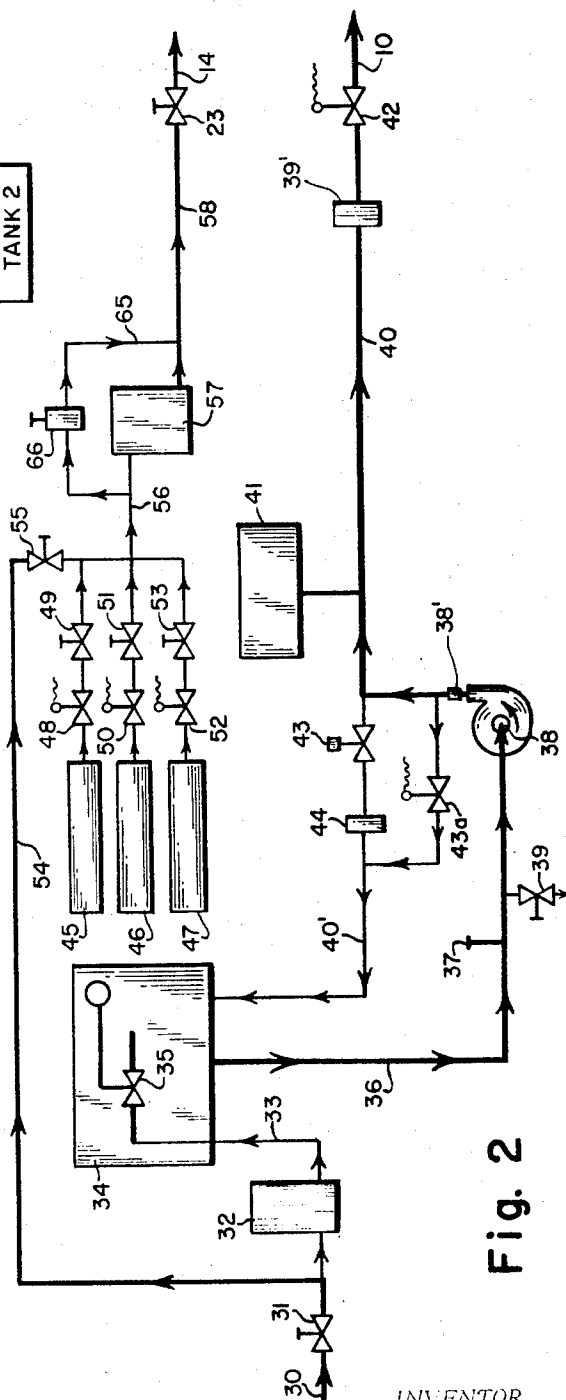
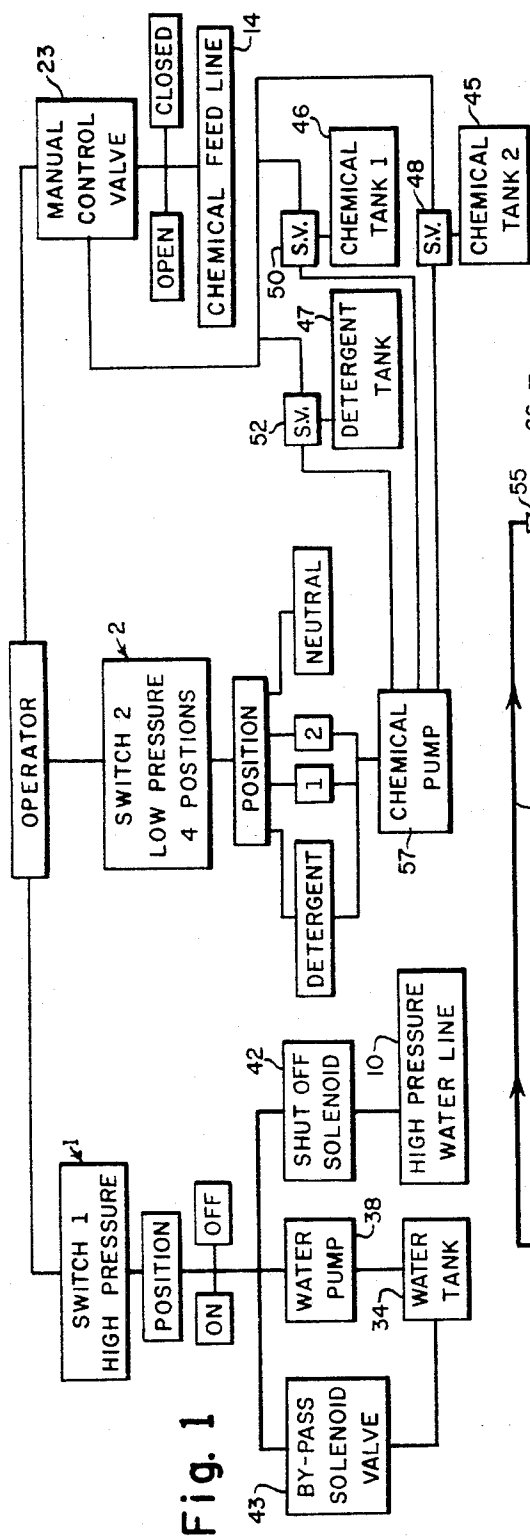
R. LAWRENCE III

3,438,583

CLEANING APPARATUS

Filed April 18, 1966

Sheet 1 of 2



INVENTOR.
ROBERT LAWRENCE III
BY

James W. Gyle
ATTORNEY

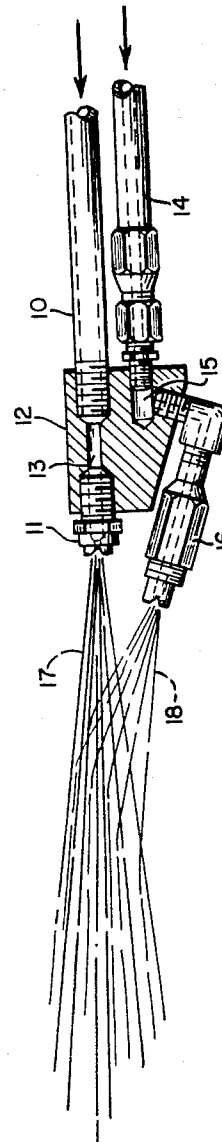
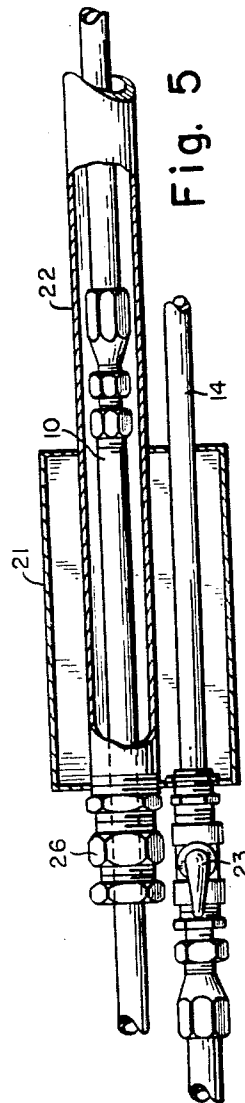
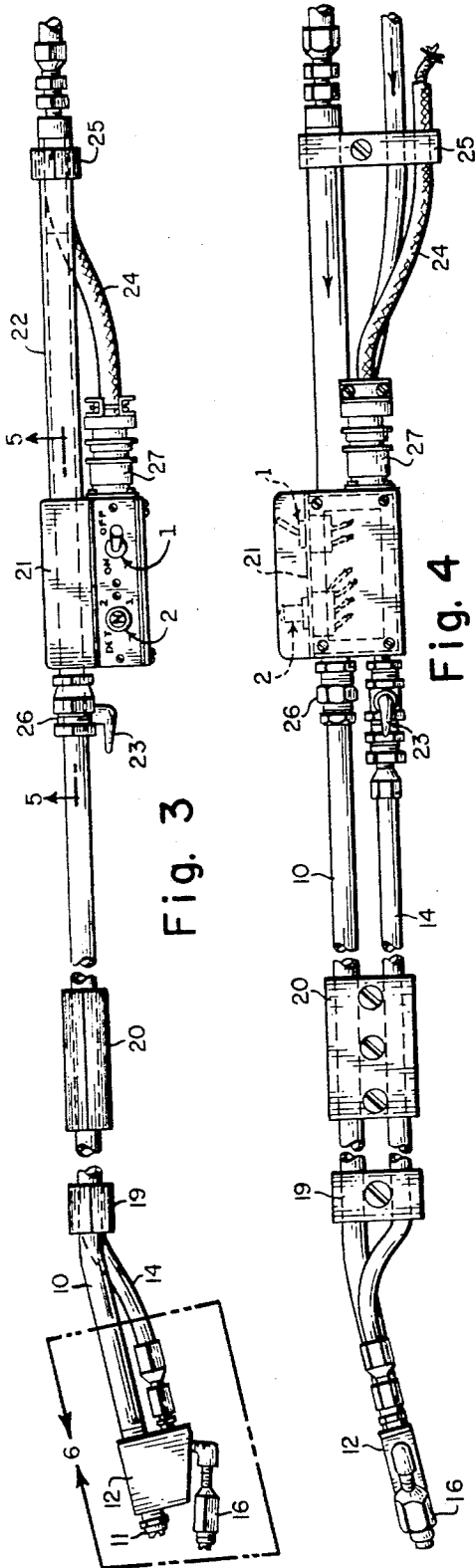
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Sheet 2 of 2



INVENTOR.
ROBERT LAWRENCE III

BY *James H. Gye*
ATTORNEY

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3,438,583

CLEANING APPARATUS

Robert Lawrence III, Hollywood, Fla., assignor to
Heinicke Instruments Co., Hollywood, Fla., a cor-
poration of Florida

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2 Claims

ABSTRACT OF THE DISCLOSURE

Composite liquid spray system suited for cleaning operations and adapted to spray high pressure water along with chemical solutions such as cleaning solutions. The spraying device has two nozzles, one of which is angularly disposed to the other in such a fashion that liquid streams originating from said nozzles impinge upon each other. Flow from both nozzles is regulated by appropriate valves and switches. One nozzle is connected to supplies of two different chemical solutions and is adapted to spray a single chemical solution or a mixture of chemical solutions. The other nozzle is adapted to spray a continuous or pulsating stream of high pressure water.

This invention relates to spraying apparatus such as can be used for cleansing or the treating of articles or surfaces with liquids of various kinds, and the invention has particular reference to a means by which the spraying of liquids of various kinds can be selectively performed.

For example, the spraying apparatus might be employed for the spraying of hot or cold water, water diluted with a chemical, a chemical alone, several different chemicals, a detergent or mixtures of any of the above liquids as may be required for any special spraying, washing or cleansing tasks.

It is therefore an object of the invention to provide a spraying apparatus and system therefore, by means of which an operator can readily and easily control the flow of one or more liquids out of the apparatus by simple switch and valve operation, thereby having within his control a means by which spraying operations for various purposes can be performed.

More particularly, the invention contemplates the provision of a pair of spray tubes terminating at one end in nozzles, one of which is angularly disposed in respect to the other; of a source of water under pressure connected through valves to one of the tubes; of a plurality of tanks containing fluids of different kinds; of electrically-controlled valves through which the tanks and a pressure source can be selected and coupled to the second spray tube, and switch means by which the valves can be controlled.

With these and other objects to be hereinafter set forth in view, I have devised the arrangement of parts to be described and more particularly set forth in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is shown;

FIG. 1 is a diagram showing the flow arrangement for the various liquids adapted to be sprayed by the improved spraying apparatus;

FIG. 2 is a diagram disclosing the valve arrangement and the various elements of the system;

FIG. 3 is a top plan view of the spraying device;

FIG. 4 is a side elevational view of the same;

FIG. 5 is a sectional view, taken substantially on the line 5—5 of FIG. 3, looking in the direction of the arrows; and

FIG. 6 is a sectional view of the spray head and the

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nozzles therein, or that portion of the device enclosed by the line 6 of FIG. 3.

Referring to the drawings, and particularly to FIGS. 3 to 6, there is therein shown the spraying device forming part of the present invention. The same includes a spray tube or pipe 10 constituting a water supply line and which terminates at its forward end in a spray nozzle 11. As seen in FIG. 6, the water spray nozzle 11 is mounted in a block or spray head 12, provided with a passage 13 that establishes communication between the forward end of the water tube 10 and the spray nozzle 11.

Extending alongside and substantially parallel with the water tube 10 is another supply tube shown at 14 and used for the spraying of chemicals, a detergent or other desired fluids. Said tube 14 has its forward end connected into the block or head 12 and by means of a passage 15 in the head communicates with a spray nozzle 16 that is employed for the spraying of the chemicals, detergents or other fluids that are selectively supplied to the nozzle 16 through the tube 14. The nozzle 16 is angularly disposed in respect to the nozzle 11 so that the stream or flow from the nozzle 16 will be directed toward the water stream 17 emanating from the water nozzle 11. Thus, when a water dilution of any fluid directed from nozzle 16 is desired, this can be accomplished by mixture of the fluid 18 emanating from the nozzle 16 with the water flow 17 issuing from the nozzle 11 as clearly shown in FIG. 6.

The two side-by-side tubes 10 and 14 are held in suitably spaced relation as shown in the drawings by means of clamp members 19 and 20.

A housing 21 constitutes an enclosure by switches, indicated respectively at 1 and 2, and extending longitudinally through said housing 21 is a pipe or sleeve 22 which encloses a portion of the water tube 10. The chemical or detergent feed tube 14 passes through the housing 21 as clearly seen in FIG. 4, and forwardly of the housing 21 the tube 14 is provided with a manually operated valve 23. The detergent operating pressure is normally 200 p.s.i. This valve is shut off during the rinsing process so that chemical does not bleed into the high pressure heater as would be the case if the valve were left open and the chemical line pressure allowed to bleed down to spray. Also leading into the housing 21 is a wiring cable 24 containing the required wiring leading from the switches 1 and 2 to various electrical components disclosed in FIG. 2 and to be presently described. A clamp 25 serves to hold the tubes 10 and 14 as well as the cable 24 in the relationship disclosed in FIG. 4. Suitable couplings 26 and 27 are employed for respectively mounting the sleeve 22 and the cable 27 to the housing 21.

By reference to FIG. 2, the spraying device and the fluid supply system with which it is associated will be made clear. The water supply, which is eventually sprayed from the nozzle 11, comes from a suitable source and flows through a supply line 30 to pass a manually-controlled valve 31. If the water is to be heated it will pass through a suitable heater 32 to flow through pipe 33 to enter and fill a tank 34 to a desired level that is maintained in the tank by means of a float valve 35 contained within the tank. From the tank 34 the water is drawn through piping 36 to a pressure equalizer 37 to enter the intake of a pump 38. A drain valve is shown at 39. From the pump 38 the water flow is forced through a fluid vibrating or pulsing device 38' and then into piping 40 which is provided with a surge chamber 41, the piping 40 being connected to a solenoid valve that is controlled by the operation of switch 1 when said switch is in one of its several positions. From the operation of the solenoid switch and the valve controlled thereby, the water is forced into the tube 10 to be ejected in spray form out of the nozzle 11.

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If desired, a pulsating effect of the water out of the nozzle 11 may be secured by providing in the line to the pipe 10, a fluid pulsing device 39' used as a booster for the pulsations generated by the high pressure pump, a pulsating device commercially known as a "Heipulser," such a device being shown and described in my copending application S.N. 369,515, wherein a device is provided, having a tubular housing and a plurality of vanes therein against which the fluid impinges to provide a vibratory motion to the fluid, to impart a push-pull action of the water against the object to be cleaned.

The water line 10 is provided with a by-pass line 42 which includes a by-pass solenoid valve 43a, controlled by the switch 1. The by-pass line also includes a safety valve 43 and a by-pass regulator shown at 44.

Three fluid supply tanks are respectively shown at 45, 46 and 47. The tank shown at 45 may be utilized for containing a chemical of one kind, for example, a suitable chemical; tank 46 might contain a second and different type of liquid chemical and tank 47 might contain a detergent. It will be apparent that other types of fluid might be contained in these tanks. The outlet pipe from tank 45 is provided with a solenoid valve 48 as well as with a manual shut-off valve 49. Similarly, tank 46 has its outlet provided with a solenoid valve 50 and with a manually-operated valve 51. The outlet from tank 47 also has a solenoid valve 52 and a manually-operated valve 53. The water line 54, leading from the supply line 30 and connected as shown, has a purge valve shown at 55. The tanks are coupled by the pipe 56 to a chemical pump 57, the outlet of which connects to pipe 58 which has a manual valve 23 that is shown in both FIG. 2 and FIG. 4. A solenoid by-pass regulator valve is shown at 66 in the chemical by-pass line 65.

The operation of the three solenoid valves 48, 52 and 50 is controlled by the positioning of the switch 2, and the manner by which the switches control the various solenoid valves is seen in FIG. 1. For example, when it is desired to eject water only, under high pressure from the nozzle 11 to thereby secure a high pressure rinse, the switch 1 is moved to "on" position, or that shown in FIG. 3. Switch 2 is then in neutral position; the manual shut-off valve is in "off" position; the chemical pump 57 is shut off; the water pump 38 is in operation; the water solenoid valve 42 is open and the by-pass solenoid valve 43a is closed. The result is that water under pressure will then be sprayed from nozzle 11 while none of the liquids from the tanks 45, 46 and 47 will be sprayed.

If a chemical or other fluid from tank 45 is to be sprayed under pressure from the nozzle 16 and mixed with the water that is being simultaneously sprayed from the nozzle 11, as shown for example in FIG. 6, the switch 1 will be "on"; switch 2 is then in one of its positions; the manual shut-off valve 49 will be open; the chemical pump 57 is in operation; the water pump 38 will also be operated; the solenoid valve 42 will be open and the by-pass solenoid valve 43a will be closed.

If a chemical 46 is to be mixed with water and sprayed under high pressure, the switch 1 will be placed in its

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"on" position; the switch 2 is placed in another or second one of its positions, manual shut-off valve 49 is opened; the chemical and water pumps 57 and 38 respectively are operated; solenoid valve 42 is open and the by-pass solenoid valve 43a is closed.

From the several examples given above, it will be apparent that by the suitable operation of the switches and the several valves controlled thereby as well as the control of the pumps, water alone, water to be mixed with a chemical or detergent, chemical or detergent alone and under either high or low pressure can be readily sprayed.

Having thus described an embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. A spraying apparatus comprising, a pair of spray tubes terminating in nozzles, the first of the nozzles being employed for the spraying of water under pressure, the second nozzle being employed for the spraying of another liquid such as a chemical or detergent, a plurality of liquid supply tanks, one of said tanks being a water supply tank, a water pump for supplying water under pressure from the water tank to the first nozzle for ejection therefrom, several of the other tanks being employed for the supply of chemicals or detergents for spraying out of the second nozzle, a pump for supplying the selected chemical or detergent out of the required tank to the second nozzle, a plurality of electrically-controlled valves for respectively controlling the flow of the liquids from the several tanks, switch means for controlling the operation of said valves so that either water alone, a chemical or detergent alone or a chemical or detergent and water can be ejected from the nozzle, said two nozzles being so positioned in relation to one another that when spray is simultaneously ejected from both of the nozzles, the spray from one of them will impinge against and mix with the spray from the other nozzle, said apparatus having a fluid pulsing device disposed between the water pump and the first nozzle to vibrate and also rotate the water and to impart a push pull action to it.

2. A spraying apparatus according to claim 1, wherein the device is provided with two fluid pulsing devices one adjacent the nozzle and the other on the water pump.

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EVERETT W. KIRBY, *Primary Examiner*.

M. Y. MAR, *Assistant Examiner*.

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134—123; 239—118, 433, 543