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Abeles et al.

[11] **3,910,462**

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[54] **APPARATUS FOR DISPENSING CLEANING SOLUTION**

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[52] **U.S. Cl.** **222/135**

[51] **Int. Cl.²** **B05B 7/00**

[58] **Field of Search** 222/135, 145, 255, 63, 222/144.5; 239/312, 310; 417/435; 137/566, 567

[56] **References Cited**

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Assistant Examiner—John P. Shannon

[57] **ABSTRACT**

Apparatus for dispensing a cleaning solution, comprising a mixer for mixing cleaning composition and water to form a cleaning solution; conduits between the mixer and sources of supply of water and of cleaning composition, each conduit including a valve therein for controlling the throughput therethrough; a dispenser, such as a nozzle, for dispensing cleaning solution under pressure; and a pump for pumping the water and the cleaning composition to the mixer via the conduits and for pumping the cleaning solution from the mixer to the dispenser. A separate pumping system, including an independent pump, is provided to dispense rinse water.

8 Claims, 2 Drawing Figures

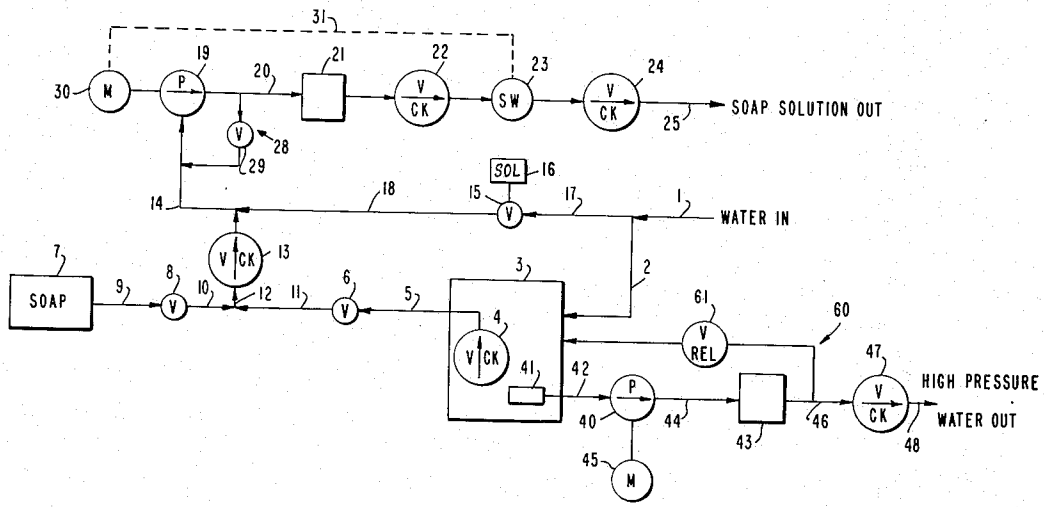


FIG. 1

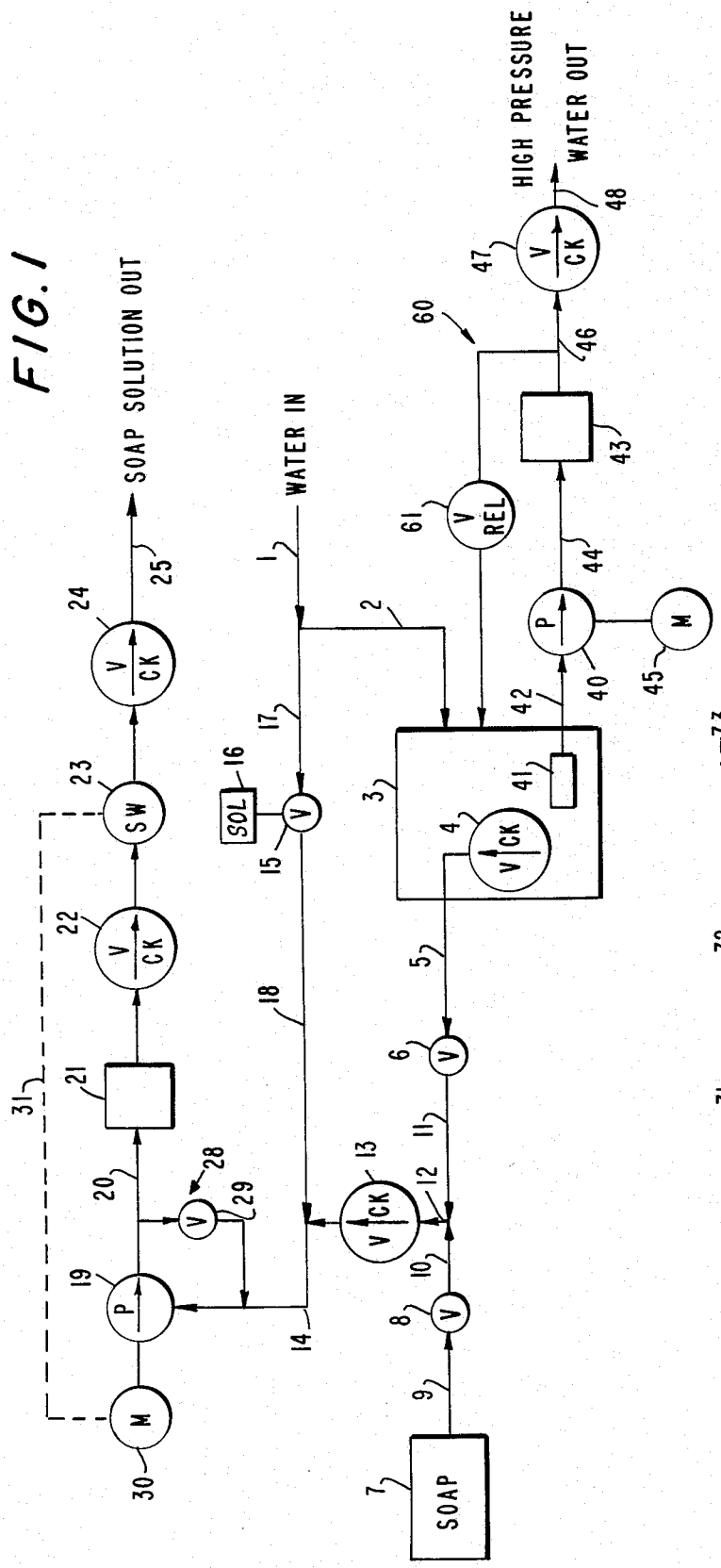
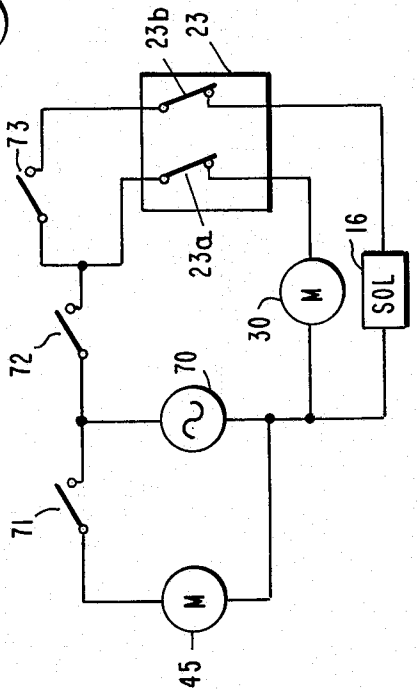

SOAP SOLUTION OUT
WATER IN
HIGH PRESSURE WATER OUT
SOAP
SOL
SW
V
CK
P
M
REL

FIG. 2


SOL
M

APPARATUS FOR DISPENSING CLEANING SOLUTION

The present invention relates to apparatus for brushless cleaning, and in particular to a system for delivering a solution of soap or detergent under pressure.

Prior art systems for delivering a soap solution under pressure generally employ a single pump that has a primary suction inlet connected to a water reservoir and a secondary suction inlet connected between a pump by-pass and a soap reservoir, the mixing then taking place in the pump itself. This system is based on the fact that rinse water is delivered by the same pump employed to deliver the soap solution by shutting down the inlet to the soap reservoir. This suffers from the disadvantages that the soap solution is delivered at extremely low concentration and far too high a pressure. In addition, maintenance problems arise which render the system ineffective for long term reliable use. It is therefore an object of the present invention to provide a soap system that is economical and reliable.

It is another object of the invention to provide separate soap and rinse systems that are capable of being used together to provide an overall washing apparatus capable of economical and reliable operation.

These objects of the invention are accomplished by the provision of apparatus for dispensing a cleaning solution, comprising a mixer for mixing the cleaning composition and water to form a cleaning solution; conduits between the mixer and sources of supply of water and of cleaning composition, each conduit including a valve therein for controlling the throughput therethrough; a dispenser, such as a nozzle, for dispensing cleaning solution under pressure; and a pump for pumping the water and the cleaning composition to the mixer via the conduits and for pumping the cleaning solution from the mixer to the dispenser.

The present invention is illustrated in terms of a preferred embodiment in the accompanying drawings, in which:

FIG. **1** is a schematic representation of the soap and rinse systems, and

FIG. **2** is a diagrammatic representation of the electrical circuits employed.

Water from any suitable source enters line **1** and flows via line **2** to tank **3.** The level of water in tank **3** is controlled via a conventional ball float valve (not shown). Water is taken out of tank **3** via valve **4** and line **5** and delivered to valve **6,** which is preferably a needle valve. Liquid detergent or soap is stored in tank **7** and is delivered to valve **8,** also preferably a needle valve, via line **9.** Either or both of tanks **3** and **7** may be permanently connected to the system, or either or both of tanks **3** and **7** may be separate from the system. Valves **6** and **8** are adjusted to give the proper ratio of water to soap. The invention is operable with any detergent or soap, but the preferred cleaning composition is the detergent composition described in U.S. Pat. application Ser. No. 269,545, filed July 7, 1972, entitled "Liquid Cleaning Compositions," in the name of Richard Abeles, one of the coinventors of the present application. U.S. Pat. application Ser. No. 269,545 is incorporated herein by reference thereto. When the detergent composition of U.S. Pat. application Ser. No. 269,545 is employed, it has been found that good results are obtained when the ratio, by volume, of water to soap is from 3:1 to 30:1, preferably 9:1. While valves

6 and **8** can be freely adjustable, it is preferred to lock them into a particular setting so as to insure the proper ratios and prevent unauthorized tampering.

Soap, via tube **10,** and water, via line **11,** join in common line **12** and pass through check valve **13** to line **4.** Line **12** and check valve **13** function as a mixture, and a mixture of soap and water is thus delivered via line **14** to soap pump **19.** Soap pump **19** is operated to deliver the soap solution at low pressure, e.g. in the range of 20 to 50 psig, preferably 30 to 40 psig, at a rate of from about 1/**16** to ¼ gallons per minute, preferably about ⅛ gallon per minute. Soap solution is delivered by pump **19** through lines **20** to filter **21,** and to check valve **22.** Check valve **22** acts to minimize surging problems which might otherwise arise from operation of the pressure switch **23.** Pressure switch **23** operates to open, and thus cut off motor **30,** when the pressure reaches a maximum value and to close when the pressure falls back to a minimum value. The connection between switch **13** and motor **30** is diagrammatically shown by the dotted line **31,** and is explained in more detail below. We have found that good results are obtained with a cut-in at 30 psig and a cut-out at 35 psig. Finally, the soap solution passes through check valve **24** and leaves via line **25.** Line **25** may be connected to any suitable nozzle to deliver the desired spray pattern.

To regulate the spray pattern and to adjust the pressure in line **20,** a by-pass **28,** including a by-pass valve **29,** preferably a needle value, is provided. At higher pressures, there is more fanning at the nozzle, and this is often desirable.

To prime pump **19,** a normally closed priming valve **15** is located in lines **17** and **18.** Valve **15** is operated by a solenoid **16** in a manner to be described below.

Another pumping system is used to deliver rinse water from tank **3.** This is provided by pump **40** which delivers water from tank **3** via strainer **41,** and lines **42** and **44** to surge tank **43.** Surge tank **43** is an accumulator that damps pulsations in the high pressure rinse system. Motor **45** operates pump **41** to deliver water at 400 to 500 psig, preferably 500 psig, at 2 to 10 gallons per minute, preferably 3 gallons per minute. Water at high pressure leaves surge tank **43** via lines **46** and passes through check valve **47** before exiting via line **48.** Line **48** is also connected to a suitable nozzle (not shown).

An unloader circuit **60** is provided, including a pressure relief valve **61,** to guard against buildup of excessive pressure.

FIG. **2** shows the circuitry employed. Motor **45** is connected to a source of AC power **70** and pump **40** is turned ON and OFF via rinse switch **71.** Motor **30** is connected to the AC power source through soap switch **72** and one set of **23***a* of switches in pressure switch **23.** The solenoid **16** used to control priming valve **15** is connected to the AC source, and in series with soap switch **72** via priming switch **73** and the other set **23***b* of switches in pressure switch **23.**

In operation, the device of the present invention functions as follows. The rinse valve **47** is closed and the rinse switch **71** is turned ON, so that the rinse system is inactive during the initial soaping operation, the pump **40** then merely being used to pump water through the bypass **60.** The two sets of switches **23***a* and **23***b* and the pressure switch **23** are left in the normally closed position. The soap valve **24** is opened and the soap switch **72** is turned ON. This activates the

motor **30,** which starts the pump **19** working to deliver the mixture of soap and water through line **25.** When the pressure exceeds the preset maximum of 35 psig, the pressure switch **23** opens switch **23***a* and thus disconnects the motor **30** from the pump **19.** The soap solution continues to be delivered through the outlet line **25,** and the pressure in the line **25** will fall until it reaches the preset minimum value, normally 30 psig, and then pressure switch **23** cuts in and closes switch **23***a* to activate motor **30** and pump **19** again.

If the pump **19** needs priming for an initial use, soap switch **72** and prime switch **73** are turned ON, and this will activate the solenoid **16** to open valve **15,** thereby priming pump **19.** To guard against damage to the lines in the soap system from excessive water pressure, the prime switch **73** is in series with the other switch **23***b* of pressure switch **23.** Switches **23***a* and **23***b* are ganged together so that both open when excessive pressure is detected in the lines.

Since the valves **6** and **8** are preset prior to use, the proper ratio of water to soap is automatically obtained in the soap solution delivered through line **25.** The line **25** is connected to a suitable nozzle, such as a No. 4003 nozzle so as to obtain a desired spray pattern.

It is a feature of the present invention that a separate rinse system is provided so as to insure maintenance-free operation of the entire wash and rinse system. Thus, to rinse after washing, soap valve **24** is closed and rinse valve **47** is opened. In this way, the system immediately switches from a low pressure, low flow rate soap system to a high pressure, high flow rate rinse system. To obtain a suitable spray pattern for the high pressure rinse, a 5008 nozzle may be used.

By the use of separate systems for soap and rinse, it is possible to optimize the systems so that each can provide a pressure which is most suitable for the purpose. In addition, in the preferred embodiment of the invention, the rinse system and soap system are physically adjacent one another, so that the operator can instantly change from soap to rinse, and vice versa. However, under some circumstances, it may be desired to physically separate the soap and rinse systems or to use the soap system in conjunction with a rinse system other than as disclosed herein.

What is claimed is:

1. Apparatus for dispensing a cleaning solution, comprising

a. means for mixing a cleaning composition and water to form a cleaning solution;

b. conduit means for establishing fluid communication between sources of supply of water and of cleaning composition and said mixing means, each conduit means including a valve means therein for controlling the throughput therethrough;

c. means for dispensing said cleaning solution under pressure;

d. first pump means downstream of said mixing means for pumping said water and said cleaning composition to said mixing means via said conduit means and for pumping said cleaning solution from said mixing means to said dispensing means, said first pump means having an inlet and an outlet, said pump means inlet being connected in fluid communication with said mixing means and said pump means outlet being in fluid communication with said cleaning solution dispensing means; and

e. rinse means for dispensing water at a higher pressure than the cleaning solution dispensed from said cleaning solution dispensing means, including second pump means for pumping water from said supply of water through said rinse means.

2. Apparatus according to claim **1,** wherein said mixing means includes check valve means.

3. Apparatus according to claim **1,** including by-pass means for passing cleaning solution downstream of said first pump means to the inlet to said pump means, said by-pass means including a valve for controlling the extent of solution to be by-passed, said by-pass means being operable to adjust the pressure of cleaning solution dispensed by said cleaning solution dispensing means.

4. Apparatus according to claim **1,** including pressure switch means for disabling said first pump means when the pressure downstream of said first pump means exceeds a predetermined upper value and for reenabling said first pump means when said pressure falls to a predetermined lower value.

5. Apparatus according to claim **1,** including a check valve upstream of said pressure switch means.

6. Apparatus according to claim **1,** including a check valve between said pressure switch means and said dispensing means.

7. Apparatus according to claim **1,** including pump-priming means for conveying water to said first pump means.

8. Apparatus according to claim **1,** including a reservoir means for storing water supplied from said supply of water, said first pump means being operable to pump said water from said reservoir to said mixing means and said second pump means being operable to pump said water from said reservoir to said rinse means.

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