United States Patent

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[54] **RADIO CONTROLLED MOBILE CLEANING APPARATUS**
7 Claims, 3 Drawing Figs.

[52] U.S. Cl. **222/76, 134/57**
[51] Int. Cl. **B67d 5/06**
[50] **Field of Search** 239/171; 222/76; 325/37; 134/57, 58

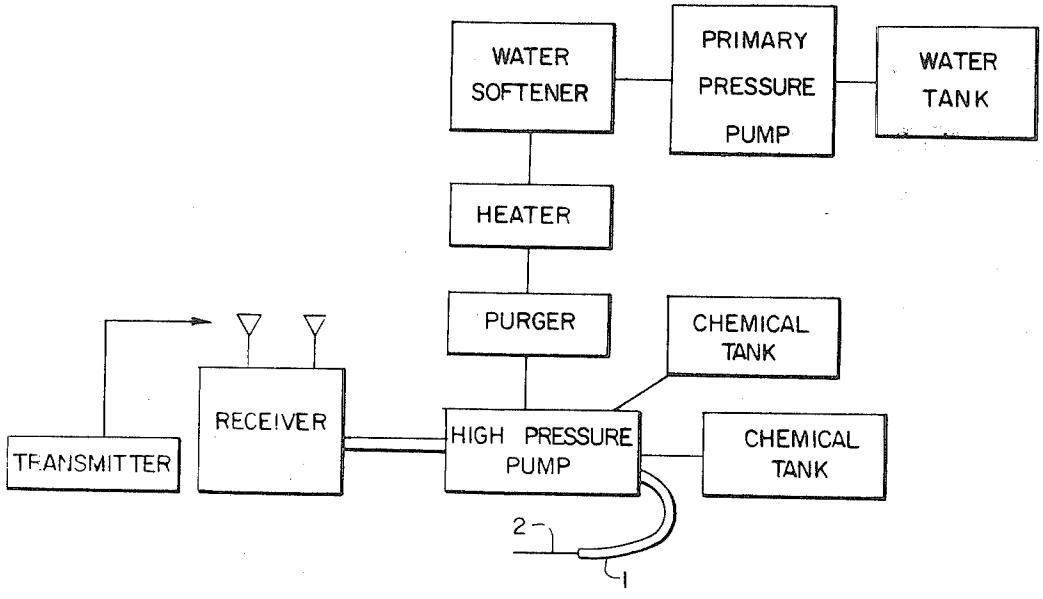
[56] **References Cited**

UNITED STATES PATENTS

2,941,753	6/1960	Ripper	239/171
3,512,721	5/1970	Barlow et al.	239/171 X

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ABSTRACT: A remotely controlled cleaning apparatus in which the cleaning composition is provided in response to a radio signal.



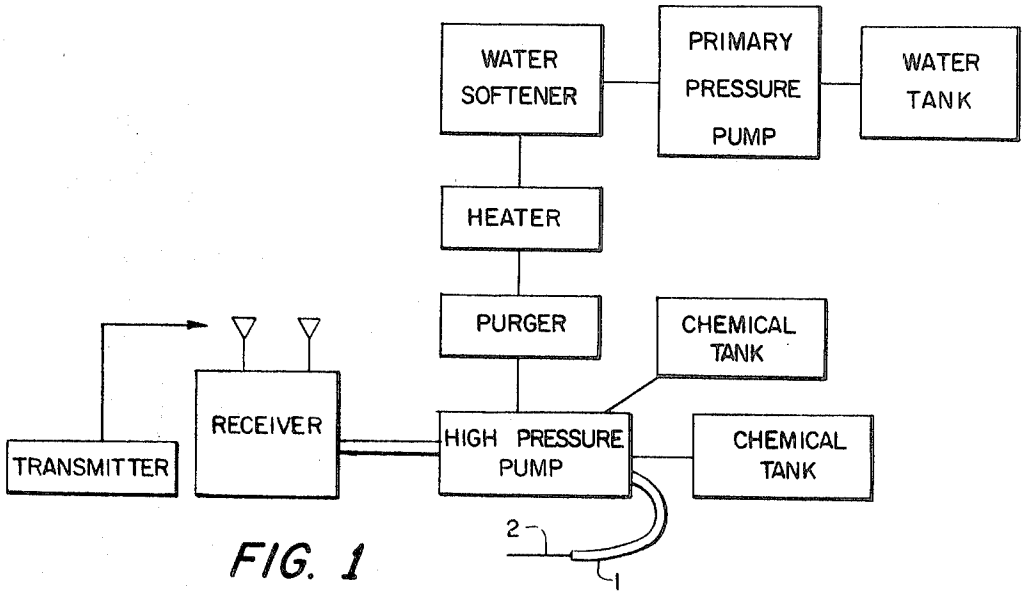


FIG. 1

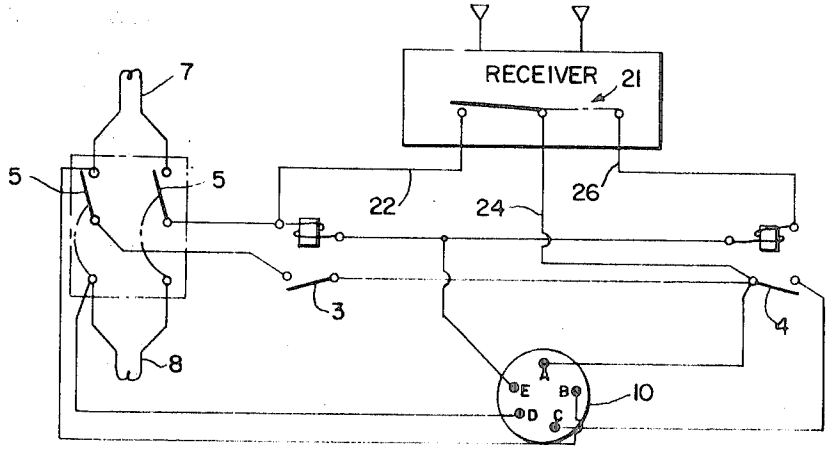


FIG. 2

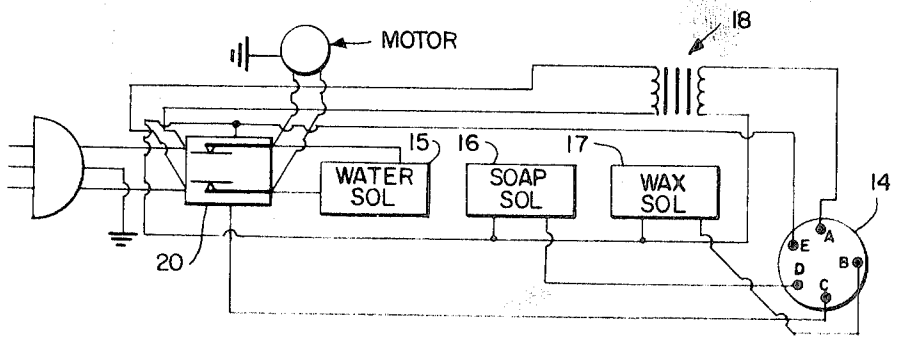


FIG. 3

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RADIO CONTROLLED MOBILE CLEANING APPARATUS

BRIEF DESCRIPTION OF THE INVENTION

This invention relates to a cleaning apparatus and more particularly to apparatus in which the cleaning compositions are provided in response to a radio signal.

BACKGROUND OF THE INVENTION

In the past, it has been a difficult task to clean large and inaccessible surfaces which are not located near sources of water, detergent or other cleaning materials. Accordingly, portable of mobile cleaning units have been provided to bring the chemicals to the article desired to be washed. These units commonly consist of a supply of cleaning substances and a hose through which the substances are directed. The conventional means for controlling the flow of the cleaning solution can be either a manually operated switch located at the source of the chemicals or an electrically operated switch placed near the nozzle or the outlet of the hose. The advantage of the latter arrangement is readily apparent because the apparatus can be operated by a single person who does not have to return to the central unit and manually flip switches or does not need an assistant to perform this function. However, the electrically operated switch has its limitations because it necessitates the use of a heavy hose in order to properly insulate the wires running from the control switch to the central unit. If the surface to be cleaned is located at any great distance from the central unit, the cost of such an insulated hose and the difficulty of manipulating the hose will become extreme.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a wireless, remotely controlled cleaning apparatus.

Another object of this invention is to provide a cleaning apparatus in which the cleaning chemical flows in response to a radio signal.

A further object of this invention is to provide a mobile and portable cleaning apparatus.

Still other and further objects of this invention will be more clearly apparent by reference to the following description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic diagram of the cleaning apparatus;

FIG. 2 is a part of the wiring circuit connecting the receiver to the high-pressure pump; and

FIG. 3 is part of the wiring circuit for the high-pressure pump.

DETAILED DESCRIPTION OF THE SPECIFIC EMBODIMENTS

Referring to the drawings, and in specific to FIG. 1, there is therein shown the principal elements of the present invention. Water is taken from a high-pressure tank of 300 gallon capacity and fed into a primary pressure pump which builds up the pressure to 50 p.s.i. It then flows through a water softener to a propane heater which heats the water to 70° F. above ambient water temperature. From this the water passes through a purger in order to eliminate any air introduced from the heater and then into a high-pressure pump where the pressure is built up to 500 p.s.i. The detergent and water are contained in chemical tanks which feed into the high-pressure pump. These tanks are of 2–15 gallon capacity and can be lined with plastic to prevent corrosion from forming. According to the invention, the water is pumped at a high pressure, either by itself or with the desired chemical, through the hose 2 and emitted through nozzle 1. The chemicals are injected into the pump by means of suction created by Venturi action of the water flowing under pressure. The hose can be of any length and depends on the needs of the particular situation. However, a 75 foot hose has been found to be adequate for ordinary usage with large tractor trucks.

The transmitter is a 2-channel transmitter which generates radio signals on two distinct frequencies and is powered by ordinary batteries. One frequency can be designated "rinse" and the other "soap or wax".

With reference now to FIGS. 2 and 3, the electronic circuitry involved in the present invention will briefly be described. It should first be noted that the power originates from a standard 115 volt household line or from a 115 volt generator. This power is fed directly to the primary winding of a transformer 18. The secondary winding of the transformer, hosting approximately 45 volts, feeds the relay 20 of the associated circuitry so dictates.

The operation of the circuit of FIGS. 2 and 3 is as follows. When the receiver is fed a signal from the transmitter, an internal switch 21, common to lead 24, makes contact with either lead 22 or lead 26, depending upon the frequency of the received signal. In this manner, either relay 3 or 4 is caused to go into its closed circuit mode. Switches 3,4 are mechanical lock impulse relays (AEMCO type 48 Intermittent) which are closed by a flow of current activating a solenoid and then are mechanically locked to complete the circuit. The terminal E of plug 10 is common to one side of the secondary winding of transformer 18 and the lead A is common to the other side of the winding. Therefore, when leads 22 and 24 are short circuited (and hence terminals A and E), a closed loop is defined by a secondary winding of transformer 18 and the relay 3. Thus the relay coil receives current and the switch closes. Similarly, relay 4 activates when the leads 24 and 26 are short circuited together.

When the relay 4 is closed, the rinse cycle is operative since a short circuit exists between points A and C of plug 10. The same situation exits, of course, in the corresponding plug 4. Therefore, the secondary winding of the transformer 18 feeds power directly to the relay switch 20. Closure of switch 20 permits the 115 volt AC signal from the power source to reach the motor, and thus to initiate the pumping of water.

On the other hand, when the relay 3 is closed (assuming the switch 5 is in its uppermost position) a short circuit exists between points A and B of plug 10. From FIG. 3, it will be evident that the solenoid 17 associated with the wax will form a part of the closed loop with the relay switch 20. Under these conditions, the wax cycle is operative. If, on the other hand, the switch 5 is in its downwardmost position, the soap solenoid 16 is activated rather than the wax solenoid 17.

Accordingly, a selection of either "soap" or "wax" is made by moving toggle switch 5 to complete the appropriate circuit. In order to show the operator which cycle is in motion, lights 7, 8 are inserted in the circuit. As shown in FIG. 2, the toggle switch is arbitrarily placed in the wax position and therefore light 7 would be lighted.

The water supply is controlled by solenoid 15 which is dependent on switch 4. When this switch is closed, the solenoid is activated and the motor is started, thus initiating the flow of water. Since, as noted previously, soap and wax are fed into the high-pressure pump by means of Venturi action, if the transmitter orders that the water-pumping motor be deactivated, the soap or wax has no driving force and the output of these chemicals is thereby interrupted. Then, when the motor is again activated, the flow of soap or wax is reinitiated due to the Venturi interaction between the flowing water and the chemical sources. The means for stopping the operations of "rinse" or "soap or wax" actually consists of a reactivation of a solenoid in response to a second signal from the transmitter which releases mechanical switch 4 or 5. Because the flow of chemicals depends on the water, it is only necessary to activate switch 4.

A 2-channel transmitter and receiver is employed in the cleaning system because it is commercially available at a reasonable cost. One source for such a transmitter and receiver is a remote control device for opening doors of a two car garage as made by the Berry Doors Co. of Birmingham, Mich. In this way the invention can be easily assembled and manufactured from readily available parts.

Obviously, many modifications can be made in the cleaning apparatus without departing from the scope of the invention. For example, the capacity of the water and chemical tank is not critical and the tanks can be of any size desired. However, it is to be remembered that one of the advantages of this invention is that it is portable or mobile which is achieved if the components are of equivalent size and weight to these already described and therefore can be placed on the back of a small truck. Also, a 300 gallon tank has been found to be adequate for approximately 4 hours of operation.

As far as the pressure and temperature at which the cleaning process is performed, the specific values recited are only optimum and comparable temperature and pressure can be used without significantly effecting the operation of the invention. In addition, the chemical tanks can contain compositions other than detergent or wax such as solvents useful to disinfect.

The apparatus can be further modified to contain manual switches on the high-pressure pump to operate the rinse and wash cycles so that there is a means of control at the central unit.

In this way, a truck which contains the apparatus according to the invention can wash and wax, when appropriate, a variety of equipment from automobiles, buses, trucks, mobile homes, boats and airplanes to highway signs, tunnels and buildings. The apparatus can also perform functions other than washing, as for example disinfecting animals and their surroundings, deicing aircraft or decreasing various types of machinery.

It will be understood that various other changes and modifications will suggest themselves to those skilled in the art without departing from the spirit and intent of the invention. All such changes, modifications and equivalent construction and operations as may come within the scope of the appended claims are therefore contemplated.

We claim:

1. An apparatus comprising:
a pump means for providing under pressure water alone or water with a chemical;
a hose means through which the water or aqueous solution is directed to the surface to be contacted;
a water supply connected to said pump means;
at least one chemical supply connected to said pump means;
a control means located remotely from said pump means which comprises a transmitter capable of generating two discrete radio frequencies;
a receiver electronically connected to said pump means capable of receiving either radio signal from said transmitter, which upon reception of said signal activates said pump means to emit water with or without a chemical as designated by the particular signal transmitted.

2. An apparatus according to claim 1 wherein said water supply comprises:
a water tank containing water;
a primary pressure pump connected to said tank;
a water softener section connected to said pump;
a heater connected to said water softener system; and
a purger connected to said heater whereby the water is drawn from said tank, put under initial pressure, softened, heated and purged from air dissolved therein before introduced into the high-pressure pump.

3. An apparatus according to claim 1 wherein there are two separate sources of different chemicals.

4. An apparatus according to claim 3 wherein one chemical is a detergent and the other is a wax.

5. An apparatus according to claim 1 wherein said electronic connection between the receiver and the high-pressure pump contains a switch means to select the chemical desired.

6. An apparatus according to claim 5 wherein said switch means is a toggle switch.

7. A mobile cleaning apparatus according to claim 1 wherein said apparatus is located on a vehicle capable of transporting it.