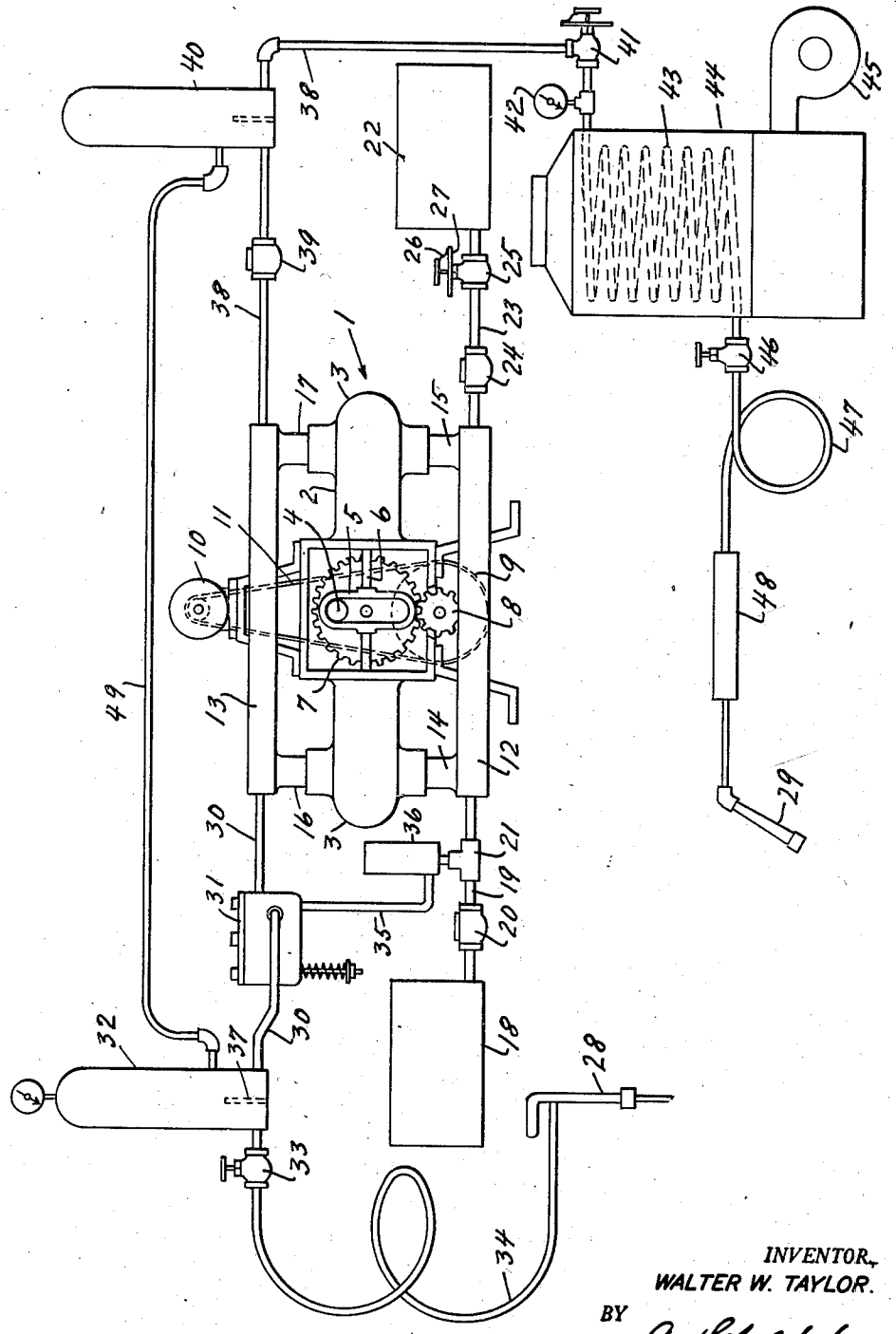
Feb. 4, 1947. W. W. TAYLOR 2,415,265

PUMPING SYSTEM

Filed Feb. 22, 1944



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Patented Feb. 4, 1947 2,415,265

UNITED STATES PATENT OFFICE

2,415,265

PUMPING SYSTEM

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Application February 22, 1944, Serial No. 523,400

11 Claims. (Cl. 103—6)

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The present invention relates to improvements in a pumping system, and has particular reference to a pumping system adapted for use in connection with a cleaning machine for motor vehicles, trucks, tractors or the like, as described in Patent No. 2,295,228, granted to Job F. Malsbary and myself as joint inventors.

In the patented machine it was proposed to provide for a wide range of cleaning sprays by utilizing a high-pressure pump for pumping a cleaning liquid through a heating coil and thence through a hose connection into a gun adapted for operation by an attendant. The gun was provided with a nozzle with a restricted orifice for maintaining a desired pressure in the coil. The latter pressure was also controlled by a feeding valve at the entrance of the coil, the pump being designed to produce pressure and to feed liquid greatly in excess of coil requirements and having a by-pass arrangement whereby excess liquid was re-circulated through the pump. Suitable means were provided for heating the coil and for controlling the heat.

The cleaning liquid, in the patented machine, was obtained by feeding the pump from two or more different sources, one source containing clear water and the other a cleaning solution which was admitted into the clear water on the suction side of the pump.

It was found convenient to provide, in combination with the cleaning machine, a cold water outlet to produce a cold water spray under pump pressure. This cold water outlet was obtained by a more or less direct connection to the pump, by-passing the heating coil.

It was also found desirable, in actual practice, to arrange the pumping system in such a manner that both the hot water spray (or steam jet as the case might be) and the cold water spray could be used at the same time through different operators, as well as individually. A special problem arose in this connection insofar as it was found that the cold water spray did not need any cleaning solution. Under the previous set-up, the solution being fed into the clear water on the intake side of the pump, it is apparent that it would mix with the cold water as well as into the hot water or steam spray. This led to considerable waste in the use of the cleaning solution, particularly in view of the fact that the cold water spray, not having to overcome the coil resistance, fed much faster than the hot water spray, discharging the water in quantities several times greater than the hot water spray.

It is proposed in the present invention to remedy this situation by providing a pumping system, in the combination set forth, in which the cleaning solution is fed into the clear water on the suction side of the pump, in such a manner that the solution will mix into the hot water circuit, but will stay substantially away from the cold water circuit when both are in operation at the same time.

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It is further proposed to provide certain incidental improvements and refinements in the pumping system which will render the operation smooth and check the spreading of pump vibrations through the system, particularly in the coil and discharge gun.

Further objects and advantages of my invention will appear as the specification proceeds.

The preferred form of my invention is illustrated in the accompanying drawing, the single figure of which illustrates the pumping system in connection with a cleaning machine of the type described.

While I have shown only the preferred form of my invention, I wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

Referring to the drawing in detail, my pump 1 is preferably of the reciprocating type to insure positive feed of measured quantities, and is here shown as a double-acting pump, although it may contain more pumping units, preferably driven from the same shaft, depending upon the desired capacity of the pump. It is designed for high pressure, approximately 300 to 400 pounds in conventional cleaning machines, and for discharge of liquid in excess of the normal maximum requirements of the cleaning machine.

The details of the pump are not illustrated in the drawing, being of conventional character, but the pump may be described as comprising an elongated housing 2 having pump chambers 3 at opposite ends thereof and a central drive including an eccentric pin 4 operating in a vertical slot of a box 5 which has the plunger rods 6 attached thereto. The plungers (not shown) reciprocate in their respective pump chambers to produce alternate suction and pressure.

The eccentric pin 4 is revolved by a gear wheel 7 meshing with the pinion 8 mounted concentrically with a pulley 9 which is driven by a motor 10 through the belt 11.

Relatively long intake and discharge manifolds 12 and 13 are arranged on opposite sides of the pump housing 2. The intake manifold is

connected, at its ends, to the pump chambers 3 by means of piping 14 and 15 containing conventional intake valves, and the discharge manifold is connected, at its ends, with opposite sides of the pumping chambers through pipes 16 and 17 containing conventional discharge valves.

A water tank is indicated at 18. This tank may be fed from any suitable or available water supply, and a constant water level is preferably maintained through a suitable float control, not shown.

The water tank is connected to one end of the intake manifold which may be referred to as the left end, through a pipe 19, this pipe containing a suitable check valve 20 and a by-pass connection 21 to be described later. The check valve is of the spring-loaded type so as to offer a certain amount of resistance to the flow of the water passing therethrough from the tank to the intake manifold. It prevents flow in the opposite direction to keep solution from reaching the water tank.

A second tank is indicated at 22. This tank is intended to hold a cleaning solution, preferably in concentrated form. It is connected to the opposite or right end of the intake manifold 12 through a pipe 23 containing a check valve 24 and a metering valve 25 of conventional character, this valve having an indicator 26 moving over the dial 27 to allow an operator to feed a predetermined amount of solution into the intake manifold.

The discharge manifold is connected, also at opposite ends, to the two outlets provided in the machine, namely the cold water outlet indicated at 28 and the hot water or steam nozzle shown at 29.

The left side of the discharge manifold is connected to the cold water outlet 28 through the piping 30 containing a control valve 31, an air dome 32, and a valve 33 leading to the flexible conduit 34.

The control valve 31 is designed to by-pass an excess amount of liquid discharged by the pump back into the suction side of the pump, through the pipe 35 and a suction dome 36, the latter serving to absorb surges or pulsations in the by-pass circuit.

The control valve is of the type known as the "Friend" automatic pressure controller adapted to by-pass under no pressure. It comprises a main passage leading to the work (nozzle 28) and a by-pass leading back to the pump intake. The by-pass is controlled by a valve adapted to be opened by the pressure in the main passage, and a check valve in the main passage maintains the pressure in the air dome 32 constant when the valve 33 is closed and the by-pass is fully open.

This construction offers the advantage of a free flow through the by-pass, in case the outlet valves are closed, with pump and engine idling under no load, and little heating effect.

The dome 36 is subject to the suction of the pump, and a reduced pressure is maintained therein, particularly due to the fact that the check valve 20 in the pipe 19 is spring-loaded and offers a certain resistance to the flow from the tank 18 to the pump. The function of this suction dome is substantially the same as that described in the Job F. Malsbary application, Serial Number 511,809, now pending in the Patent Office.

The air dome 32 used in the present invention is also of special construction. While conventionally air domes are attached to pipes carrying a liquid under pressure by means of a single connection, allowing the liquid to surge in and out to absorb vibrations, the present air dome is connected into the pipe so as to cause the entire body of liquid to pass therethrough.

This air dome, however, does not form part of the present invention, and has been described in greater detail in the application of Job F. Malsbary, Serial Number 511,809, filed substantially the same time as the present application.

The opposite or right hand of the discharge manifold is connected to the hot water or steam nozzle 29 through pipe 38, a check valve 39, an air dome 40, a metering valve 41, and a coil 43 mounted in the housing 44 and over a heater 45. The coil discharges, through the valve 46, into the tubing 47, and the gun 48 carrying the nozzle 29. A pressure gauge 42 is provided at the coil entrance.

The details of the above arrangement have been fully described in the Patent No. 2,295,228, previously referred to. The air dome 40 is of the same type as air dome 32, and the two air domes are interconnected by a small-diameter tubing 49. The use of this tube is made necessary on account of the specific construction of the control valve 31. As has been pointed out before, the by-pass in this valve remains fully open, as long as the pressure in the main passage of the valve is maintained at a predetermined degree.

This free flow through the by-pass is maintained, as long as the pressure in the main passage of the controller 31 and in the air dome 32 remains the same. And, in the absence of the tube 49, this pressure would remain the same, as long as the valve 33 is closed, regardless of the opening of valve 41. Thus, in the absence of the tube 49, the opening of valve 41 would have no effect on the free flow through the by-pass and it would be impossible to build up the desired pressure at the coil 43.

The tube 49 connects valve 41, through the air domes 40 and 32, with the main passage in the controller 31, and allows the pressure in the latter passage and in the air dome 32 to be relieved by the opening of valve 41, with the result that the by-pass valve in controller 31 closes and the desired pressure can be obtained at the coil. The tube 49 thus serves to bleed the main passage in controller 31 when valve 41 is opened.

But, the presence of tube 49 again creates a problem, because the tube essentially is a part of a second by-pass circuit, including the tube 49, the dome 40, the pipe 38, the discharge manifold 13, the pipe 30, the main passage in the controller 31 and the dome 32. In case both outlet valves 33 and 41 are closed, the intention is to keep the by-pass valve leading to the pump fully open, and this valve is held fully open by the pressure in the main passage of the controller 31. But this main passage forms part of the second by-pass circuit including the tube 49 and, with the by-pass leading to the pump intake fully open, it is apparent that this by-pass would draw on the main passage in the controller 31, through the second by-pass 30—13—38—40—49—32, thus relieving the pressure in the main passage of the controller and closing the by-pass valve. To avoid this occurrence, a check valve 39 is provided in the pipe 38. This check valve prevents bleeding of the pressure in the main passage of controller 31 through the second by-pass (tube 49, etc.) into the pump intake by-pass.

In operation, it will be noted that the pump is definitely divided into two parts, a left-hand

side and a right-hand side. The water is definitely fed into the left-hand side and the cleaning solution is definitely fed into the right-hand side. It will be understood, of course, that the amount of water passing through the pump is vastly in excess of the amount of solution passing therethrough, the pipe **23** being of very small diameter as compared with the pipe **19**.

The water, naturally, will flow through both sides of the pump, and its pressure, on both sides, will be controlled by the control valve **31**. But the solution, being fed into the right-hand side of the pump, and finding its most immediate and easiest exit at the right-hand side of the pump, will follow the path of least resistance, and will stay on the right hand side, mixing with the water for discharge through the coil and the nozzle **29**, while the water on the left-hand side remains substantially clear.

Thus, a much smaller amount of solution is required to maintain the hot water spray at a given strength than if the solution were mixed into all the water passing through the pump.

This travel of the liquid through the pump in two separate paths takes place only when both outlets are in use. If only one of the outlets is in use, all the liquid will, of course, pass through that outlet. Thus, if the cold water outlet alone is used, the soap solution will spread to the entire body of water and will also mix into the re-circulating by-pass **35**. This may be prevented by closing the valve **25**.

But in practical use it may not be convenient to close the valve **25** every time the nozzle **29** is laid aside temporarily. In that case the solution may be allowed to feed continuously and the loss will be relatively small since the solution feed has been reduced to possibly a fraction of the feed required under the previous arrangement.

As soon as the nozzle **29** is put to use again, the solution will confine itself to the right-hand side of the pump and the left-hand side will clear up in a very short time.

If the outlet **28** is closed, a small amount of solution may find its way into the left-hand side of the pump, but this side will clear again as soon as outlet **28** is re-opened.

If no solution is desired on either side of the pump, this may be readily accomplished by closing valve **25**.

If the pump is designed to feed equal parts of liquid on each side and the discharge ratios of the cold and hot water outlets are different, it is apparent that a certain amount of solution will find its way into the cold water side.

If, for instance, each side of the pump discharges seven gallons during a given time period, making a total of fourteen gallons, and the cold water outlet consumes nine gallons, it is apparent that two gallons of the solution-laden water passing through the right-hand side of the pump would be transferred to the left-hand side and would reach the cold water outlet. This loss is inconsiderable, however.

A small loss of solution would also be occasioned by the mere fact that the pump is designed to discharge more liquid than both outlets taken together will consume. If, for instance, the outlets were designed to discharge fourteen gallons and the pump to discharge sixteen gallons, two gallons would be re-circulated through the by-pass **35**, and one of these two gallons would come from the right-hand side of the pump and would thus add some slight amount of solution to the cold water discharge.

If these solution losses were sufficiently serious to be considered damaging, this defect could be readily remedied by proportioning the pump discharge ratios to substantially correspond to the discharge ratios at the two outlets.

If, for instance, the outlets were designed to discharge in the ratio of 2:1, the opposite sides of the pump might be designed to discharge in the same ratio or even at a slightly higher ratio to take care of the re-circulation in the by-pass **35**.

The same object might be accomplished by providing two pumps on the cold water side to one pump on the hot water side, all served by the same manifolds.

I claim:

1. In a cleaning machine of the character described, a pump having two pump chambers with common intake and discharge manifolds, spaced discharge conduits connected to the discharge manifold at the different chambers, means for feeding a liquid into the intake manifold near one of the chambers, and means for feeding a solution into the intake manifold near the second pump chamber, whereby the solution is substantially confined to the discharge conduit of the second pump chamber.

2. In a cleaning machine of the character described, a pump having two pump chambers with common intake and discharge manifolds, spaced discharge conduits connected to the discharge manifold at the different chambers, means for feeding a liquid into the intake manifold near one of the chambers, and means for feeding a solution into the intake manifold near the second pump chamber, whereby the solution is substantially confined to the discharge conduit of the second pump chamber, and control means in one of the discharge conduits for re-circulating an excess portion of the liquid through the first pump chamber.

3. In a cleaning machine of the character described, a pump having two pump chambers with common intake and discharge manifolds, spaced discharge conduits connected to the discharge manifold at the different chambers, means for feeding a liquid into the intake manifold near one of the pump chambers, and means for feeding a solution into the intake manifold near the second pump chamber, whereby the solution is substantially confined to the discharge conduit of the second pump chamber, and control means in one of the discharge conduits for re-circulating an excess portion of the liquid through the first pump chamber, the liquid feeding means having a spring-loaded check valve and the re-circulating means having a suction dome cooperating with the check valve in absorbing surges in the re-circulating liquid.

4. In a cleaning machine of the character described, a pump having two pump chambers with common intake and discharge manifolds, spaced discharge conduits connected to the discharge manifold at the different chambers, means for feeding a liquid into the intake manifold near one of the pump chambers, and means for feeding a solution into the intake manifold near the second pump chamber, whereby the solution is substantially confined to the discharge conduit of the second pump chamber, the second discharge conduit having a check valve preventing return of the solution-laden liquid to the pump.

5. In a cleaning machine of the character described, a pump having two pump chambers with common intake and discharge manifolds, spaced

discharge conduits connected to the discharge manifold at the different chambers, means for feeding a liquid into the intake manifold near one of the pump chambers, and means for feeding a solution into the intake manifold near the second pump chamber, whereby the solution is substantially confined to the discharge conduit of the second pump chamber, the second discharge conduit having a check valve preventing return of the solution-laden liquid to the pump, and the two discharge conduits having air domes for absorbing surges and a tube connecting the air domes for equalizing pressures therein.

6. In a cleaning machine of the character described, a pump having a discharge manifold with two spaced outlets and two different lines served by the outlets, a controller in one of the lines having a main passage and a by-pass subject to the control of the pressure in the main passage, an air dome in each line, a connection between the two air domes allowing the second line to draw on the main passage when the second line is opened, and a check valve in the second line between the manifold and its air dome for preventing the by-pass to draw on the main passage through the air domes and the manifold when both lines are closed.

7. In a cleaning machine of the character described, a pump having a discharge manifold with two spaced outlets and two different lines served by the outlets, a controller in one of the lines having a main passage and a by-pass subject to the control of the pressure in the main passage, an air dome in each line, and a connection between the two air domes allowing the second line to draw on the main passage when the second line is opened.

8. In a cleaning machine of the character described, a pump having two pump chambers and a discharge manifold with two spaced outlets and two different lines served by the outlets, an intake manifold for the two pump chambers, means for feeding a major liquid constituent into the intake manifold for discharge through both lines, and means for feeding a minor constituent into the intake manifold adjacent one of the pump chambers for discharge into one of the lines only.

9. In a cleaning machine of the character described, a pump having two pump chambers with

an intake and discharge passage for each, a manifold connecting the discharge passages and having outlets at opposite ends for serving two different lines, a manifold connecting the intake passages, means for feeding a major liquid constituent into one end of the intake manifold for feeding both lines, and means for feeding a minor liquid constituent into the opposite end of the intake manifold so as to substantially confine the same to one of the lines.

10. In a cleaning machine of the character described, a pump having two pump chambers and a discharge manifold with two spaced outlets and two different lines served by the outlets, an intake manifold for the two pump chambers, means for feeding a major liquid constituent into the intake manifold for discharge through both lines, and means for feeding a minor constituent into the manifold adjacent one of the pump chambers for discharge into one of the lines only, the other line having a control constructed for by-passing liquid back to the pump under no pressure when both lines are closed.

11. In a cleaning machine of the character described, a pump having two pump chambers and a discharge manifold with two spaced outlets and two different lines served by the outlets, an intake manifold for the two pump chambers, means for feeding a major liquid constituent into the intake manifold for discharge through both lines, and means for feeding a minor constituent into the manifold adjacent one of the pump chambers for discharge into one of the lines only, the other line having a control constructed for by-passing liquid back to the pump under no pressure when both lines are closed, and the two lines being interconnected for relieving the by-pass control when the first line is opened.

WALTER W. TAYLOR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,719,373	Hull	July 2, 1929
212,777	Wolf	Feb. 25, 1879
2,295,228	Malsbary et al.	Sept. 8, 1942
2,266,126	Malsbary et al.	Dec. 16, 1941