

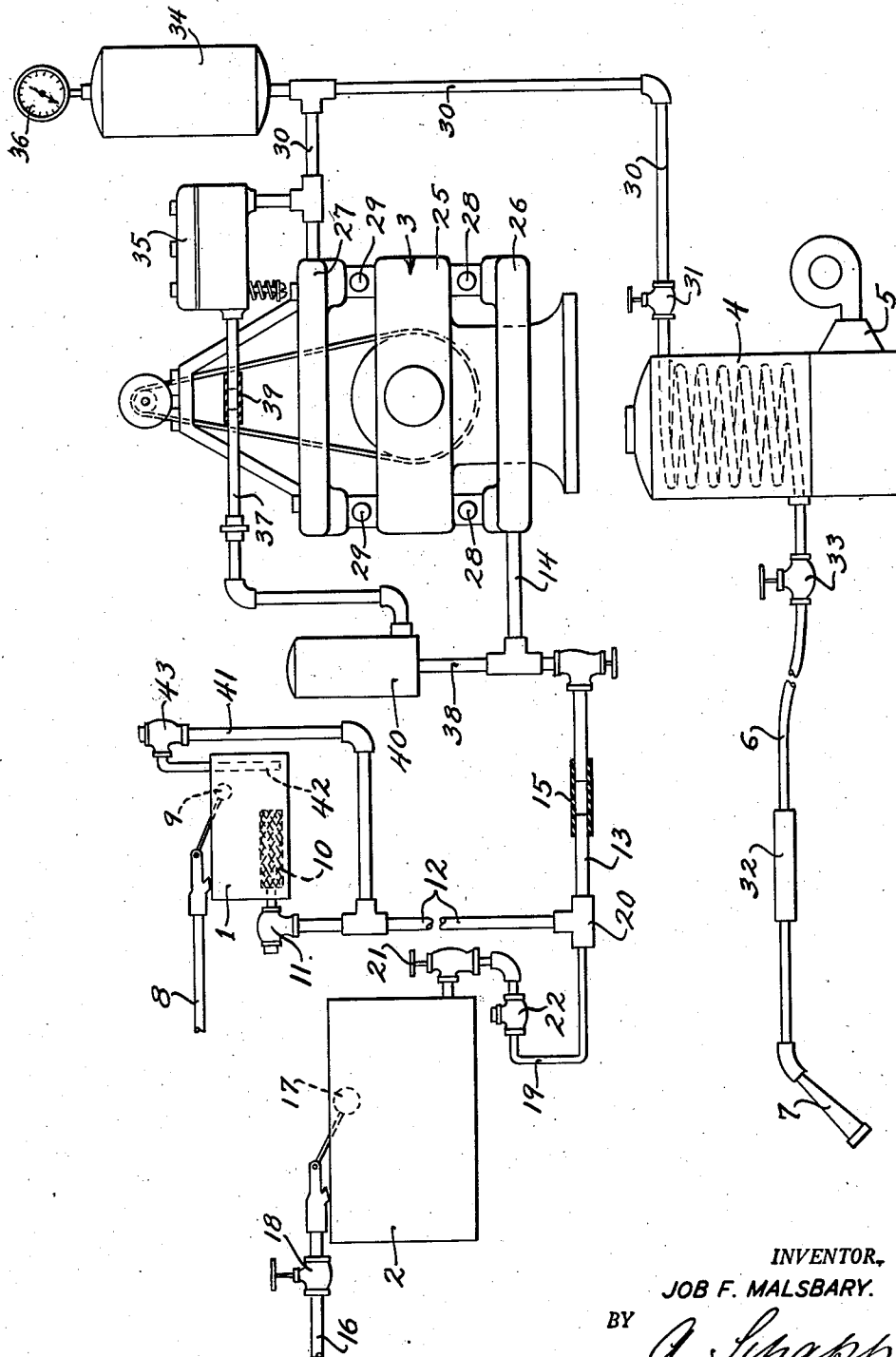
Dec. 18, 1945.

J. F. MALSARY

2,391,177

FEED MEANS FOR CLEANING MACHINES

Filed Nov. 26, 1943



INVENTOR,
JOB F. MALSBARV.
BY *A. Snapp*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,391,177

FEED MEANS FOR CLEANING MACHINES

Job F. Malsbary, Oakland, Calif., assignor to
Malsbary Manufacturing Company, Oakland,
Calif., a copartnership composed of Job F.
Malsbary and Walter W. Taylor

Application November 26, 1943, Serial No. 511,809

11 Claims. (Cl. 299—83)

The present invention relates to improvements in feeding means for cleaning machines adapted particularly for cleaning trucks, tractors, automobiles and the like.

A cleaning machine of this type is illustrated and described in Patent No. 2,295,228, issued to myself and Walter W. Taylor as co-inventors on September 8th, 1942.

In the patented machine it was proposed to feed a liquid solution to a pump from two different tanks, one containing water and the other a cleaning solution, to discharge from the pump into a coil for heating the resulting solution and to discharge from the coil through a hose and a nozzle having a restricted orifice.

It was further proposed to utilize a pump of a capacity considerable in excess of the normal requirements of the coil, to provide control means for producing a wide variety of sprays at the option of the operator, and to provide further control means for by-passing the excess liquid discharged by the pump back to the intake side of the pump for effecting a more thorough mixing of the ingredients.

In the patented machine the solution tank was placed at a higher level than the water tank so as to feed the solution into the water under a certain amount of pressure, the pipe connection from the water tank to the pump being provided with a check valve to prevent the solution from flowing into the water tank while the machine was idle. While this arrangement as a whole was satisfactory, it was found that occasionally, due to a leaky check valve, the solution would flow into the water tank during an extended period of rest, as at night time, and would flood the water tank, the solution tank being much larger than the water tank.

The water was fed from the water tank through a strainer, and it was further found that even a relatively small amount of solution reaching the water tank accidentally would tend to clog the strainer, due to the reaction of the soap in the cleaning solution with the minerals in the water precipitated on the strainer.

In the present invention it is proposed to ameliorate this condition generally by placing the solution tank at a lower level than the water tank so as to prevent any flow of the solution from the solution tank to the water tank under the force of gravity.

But in this connection a different problem had to be met to prevent any part of the cleaning solution from reaching the strainer in the water tank.

As has been pointed out, the pump has a capacity greatly in excess of the maximum coil requirements, the outlet side of the pump usually registering a pressure of about 300 pounds, while the coil pressure hardly ever exceeded a pressure of 200 pounds under normal operating conditions.

To accommodate the excess pressure and the excess volume fed by the pump the outlet conduit of the pump was provided with a compression chamber and a relief valve connected to the pump intake for by-passing any excess volume back to the intake side of the pump. This arrangement was satisfactory under normal operating conditions.

But it would happen that with the pump in operation, feed to the coil or to the nozzle would be shut off, as by the operator laying aside the nozzle temporarily without stopping the pump, and in that case all the liquid pumped by the pump would be forced back to the pump intake through the relief valve and the by-pass. This would further tend to increase the pressure in the pump outlet circuit, due to the resistance offered by the relief valve and might raise the pressure in the compression chamber to 400 pounds.

This extreme pressure would tend to force the liquid through the relief valve in surges and, spasmodically, at least, in quantities in excess of the capacity of the intake of the pump to absorb.

These spasmodic excesses would feed back into the water tank through a special relief passage (not shown in the patent) and both the solution tank and the water tank would be drawn upon to compensate for the amount of solution fed back to the water tank.

Thus the solution would find its way into the water tank with the result that the water in the tank would gradually change into solution, with the deleterious effect on the strainer previously pointed out.

It is the object of the present invention to overcome this difficulty, principally by providing a compensating device in the by-pass circuit whereby the latter will be made to absorb the surges and to accommodate spasmodic excesses of liquid passed therethrough so that even during idling periods the danger of feeding solution into the water tank is further removed.

Further objects and advantages of my invention will appear as the specification proceeds and the novel features of my invention will be fully defined in the claims hereto attached.

The preferred form of my invention is illustrated in the accompanying drawing, the sole figure of which represents a diagrammatic view illustrating my invention.

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

In its general features my cleaning machine comprises a water tank 1, a solution tank 2, a pump 3, a coil 4 provided with a heater 5, and a discharge hose 6 terminating in a nozzle 7.

The water tank may be of any suitable form and is fed from the pipe 8, a predetermined level being maintained by a float control 9. Water is fed from this tank through a strainer 10, the check valve 11 and the pipes 12, 13 and 14 to the intake side of the pump 3.

The check valve 11 is of the spring-loaded type and offers a certain amount of resistance to water passing therethrough from the tank, for purposes to be explained later. The combined length of the pipes 12 and 13 is considerable and adds to the resistance. The pipe 13 is preferably formed with a rubber joint 15 allowing of a certain amount of expansion and contraction.

The solution tank is much larger than the water tank, and is fed from a water pipe 16, a float control 17 serving to shut off the supply when the water reaches a predetermined height. Any suitable soap or other cleaning medium may be dissolved in the water, and the pipe 16 may be closed by means of a valve 18. The outlet pipe 19 connects into the water pipes through a T 20. It is of much smaller diameter than the water pipe and is provided with a shut-off valve 21 and a check valve 22.

The solution tank is disposed at a level lower than that of the water tank so that no solution will flow into the water tank under the force of gravity, even if the check valve 11 should develop a leak.

The pump 3 is preferably of the double-acting type and comprises a housing 25 accommodating the pistons (not shown), an intake manifold 26 and exhaust manifold 27. The intake manifold connects with the pump chambers through intake valves 28 and receives liquid from the pipe 14. The exhaust manifold communicates with the pump chambers through delivery valves 29, and discharges, through pipes 30 and the valve 31, into the coil 4. The valve 31 may be of any suitable type, preferably either a metering valve or a pressure-responsive reducing valve, depending upon general characteristics desired of the cleaning machine.

The coil is mounted over a heater indicated at 5 and discharges through the hose 6 into the nozzle 7, which preferably has a restricted orifice. A handhold 32 may be provided for convenient handling of the hose and a valve 33 allows the coil outlet to be closed.

The pump is intended to have a capacity considerably in excess of the coil requirements. Under ordinary working conditions the pressure in the coil hardly ever exceeds 200 pounds while the pressure maintained in the pump outlet circuit, up to the valve 31, is considerably higher. This outlet circuit is provided with a compression chamber 34 to absorb surges and a relief or control valve 35 which may be set to maintain a pressure of 300 pounds in the outlet circuit, as indicated on the gauge 36.

The relief or control valve 35 may be of any suitable construction, and is connected, through pipes 37—38, with the intake pipe 14, whereby any excess amount of liquid forced into the outlet circuit, is by-passed back to the intake side of the pump. The pipe 37 preferably is provided with a rubber coupling 39 allowing of a certain amount of expansion and contraction.

A suction chamber or dome 40 is connected into the pipes 37—38. This chamber is preferably arranged fairly close to the intake side of the pump so that the suction of the pump becomes effective on the dome more immediately than on the two tanks 1 and 2, which are further away, particularly in view of the fact that the diameter of pipe 19, coming from the solution tank, is very small, and the pipe 12, coming from the water tank, is provided with the resistance of a spring-loaded check valve 11.

Thus, in the normal operation of the machine, a large portion of the liquid will be drawn out of the dome 40, leaving rarified air above the liquid.

In case pressures should develop which for some reason cannot be accommodated in the piping, the rubber couplings and the suction chamber 40, I provide an additional safety feature in the pipe 41 connecting the pipe 12 (underneath the check valve 11) with the water tank and discharging into the latter under water level, as at 42. A check valve 43 prevents return flow from the tank into the pipe.

The operation of the machine is as follows:

Normally the pump, drawing on the suction chamber 40 and on the two tanks creates a reduction of air pressure in the suction chamber and sucks in water from the tank 1 and solution from the tank 2, the solution mixing with the water at the T 20. The diluted solution enters the pump intake and is forced through the discharge manifold into the outlet circuit.

Assuming that the relief valve 35 is set to respond to 300 pounds of pressure, the latter pressure will build up in the outlet circuit and will register on the gauge 36. The valve 31 may be set to discharge into the coil at a predetermined lower pressure, say 200 pounds, and the solution is finally discharged through the nozzle 7. Any excess amount of liquid pumped by the pump will be forced through the relief or control valve 35 and the pipes 37, 38 and 14, back into the intake side of the pump.

If, now, for some reason, the operator closes the valve 33 or the valve 31, no liquid can pass through the outlet conduit, and all the liquid pumped has to pass through the relief or control valve 35 to be by-passed back to the intake side of the pump. The relief valve and the conducting pipes will oppose resistance to the increased flow of liquid therethrough and will build up greater pressure in the outlet conduit 30, which may register at the gauge 36 at say 400 pounds.

This increased pressure, in the attempt to force too much liquid through the pump will result in spasmodic surges, forcing spasmodically more liquid through the valve than the intake side of the pump can accommodate.

In the absence of any provision for the contingency, and with an entirely rigid construction, the system would begin to hammer, resulting eventually in breakage. With the suction chamber 40 omitted, but the by-pass 41 arranged as shown, the surges would cause excess amounts of liquid solution to be discharged into the water tank 1, while during intermittent periods the

tank 2 would be drawn upon, to a considerable extent, to compensate for the amount of solution discharged into the tank. Thus the tank 1 would gradually fill with solution, with the detrimental result on the strainer 10 previously commented on.

The suction chamber 40 is intended to guard against this occurrence. Due to its proximity to the pump, as compared to the relatively long distance to be travelled by the water from the water tank and the solution from the solution tank, and due to the further fact that the water-line is provided with the spring-loaded check valve or resistance 11, while the solution-line is of relatively small diameter the suction chamber will be drawn upon ahead of the two tanks and will be emptied sufficiently to accommodate the surges caused by the high pressure. The suction chamber thus serves as a reserve chamber adapted to accommodate surges and to release the same in response to the suction of the pump. Since, in the operation of the pump, the total output corresponds to the total intake, and the surges are thus accounted for, there is no occasion for the surges to spread beyond the by-pass circuit, and as a consequence no solution is pumped from the solution tank into the water tank.

While I have described the advantages of the suction chamber 40 principally in connection with the extreme case where all the output of the pump has to be by-passed back to the intake side of the pump, it is obvious that even in normal operation, the introduction of the suction chamber serves its purpose in smoothing out the operation and preventing pulsations in the line.

The rubber couplings 15 and 39 not only serve to facilitate assembling of the pipes but increase the flexibility of the system.

Thus my new arrangement protects the strainer 10 in two ways. The lower elevation of the solution tank prevents solution from flowing into the water tank by gravity; and the suction chamber 40 prevents solution by-passed by the pump from reaching the water tank.

I claim:

1. In a cleaning machine of the character described, a source of liquid, a pump, a connection between the source and the pump intake, a liquid-receiving element, a connection between the pump outlet and the latter element having a compression chamber and relief valve therein, a by-pass connection between the relief valve and the pump intake whereby excess liquid may be returned to the pump intake in a circulatory path, and a suction chamber in said by-pass connection for accommodating excessive surges in the latter.

2. In a cleaning machine of the character described, a source of liquid, a pump, a connection between the source and the pump intake, a liquid receiving element, a connection between the pump outlet and the latter element having a compression chamber and relief valve therein, a by-pass connection between the relief valve and the pump intake whereby excess liquid may be returned to the pump intake in a circulatory path, and a suction chamber in said by-pass connection for accommodating excessive surges in the latter, the connection from the source of liquid having a resistance therein for augmentating the suction effect of the pump on the suction chamber.

3. In a cleaning machine of the character described, a source of liquid, a pump, a connection

between the source and the pump intake, a liquid receiving element, a connection between the pump outlet and the latter element having a compression chamber and relief valve therein, a by-pass connection between the relief valve and the pump intake whereby excess liquid may be returned to the pump intake in a circulatory path, and a suction chamber in said by-pass connection for accommodating the excessive surges in the latter, the suction chamber being disposed in closer proximity to the pump than to the source of liquid so as to be more immediately subject to the suction effect of the pump.

4. In a cleaning machine of the character described, a source of liquid, a pump, a connection between the source and the pump intake, a liquid receiving element, a connection between the pump outlet and the latter element having a compression chamber and relief valve therein, a by-pass connection between the relief valve and the pump intake whereby excess liquid may be returned to the pump intake in a circulatory path, and a suction chamber in said by-pass connection for accommodating excessive surges in the latter, the suction chamber being disposed in closer proximity to the pump than to the source of liquid so as to be more immediately subject to the suction effect of the pump, and the connection from the source of liquid having a resistance therein for augmentating the suction effect of the pump on the suction chamber.

5. In a cleaning machine of the character described, a tank for holding water, a pump, a connection between the tank and the pump intake including a strainer, a second tank for holding a cleaning solution, and a conduit leading from the second tank to the water connection for feeding solution into the water, the second tank being disposed at an elevation lower than the strainer to prevent solution from flowing to the strainer under the force of gravity, the pump having means for discharging under high pressure and means for feeding excess liquid back to the pump intake, and the feed back having means for absorbing surges to prevent the latter from feeding back into the water tank.

6. In a cleaning machine of the character described, a tank for holding water, a pump, a connection between the tank and the pump intake including a strainer, a second tank for holding a cleaning solution, and a conduit leading from the second tank to the water connection for feeding solution into the water, the second tank being disposed at an elevation lower than the strainer to prevent solution from flowing to the strainer under the force of gravity, the pump having means for discharging under high pressure and means for feeding excess liquid back to the pump intake, and the feed back having a suction chamber for absorbing surges to prevent the latter from feeding back into the water tank.

7. In a cleaning machine of the character described, a tank for holding water, a pump, a connection between the tank and the pump intake including a strainer, a second tank for holding a cleaning solution, and a conduit leading from the second tank to the water connection for feeding solution into the water, the second tank being disposed at an elevation lower than the strainer to prevent solution from flowing to the strainer under the force of gravity, the pump having means for discharging under high pressure and means for feeding excess liquid

back to the pump intake, the feed back having a suction chamber for absorbing surges to prevent the latter from feeding back into the water tank, and the water connection having a flow-resisting means to encourage suction of the pump intake on the suction chamber.

8. In a cleaning machine of the character described, a source of liquid, a pump, and a connection between the source and the pump intake, the pump having means for discharging under high pressure and means for feeding excess liquid back to the pump intake, and the feed back having means for absorbing surges to prevent the latter from feeding back into the source of liquid.

9. In a cleaning machine of the character described, a source of liquid, a pump, and a connection between the source and the pump intake, the pump having means for discharging under high pressure and means for feeding excess liquid back to the pump intake, and the feed back having a suction chamber for absorbing surges to prevent the latter from feeding back into the water tank.

10. In a cleaning machine of the character described, a source of liquid, a pump, and a con-

nection between the source and the pump intake, the pump having means for discharging under high pressure and means for feeding excess liquid back to the pump intake, the feed back having a suction chamber for absorbing surges to prevent the latter from feeding back into the water tank, and the connection from the source having a flow-resisting means to encourage suction of the pump intake on the suction chamber.

11. In a cleaning machine of the character described; a source of liquid, a pump, a connection between the source and the pump intake, a liquid receiving element, a connection between the pump outlet and the latter element having a compression chamber and a relief valve therein, a by-pass connection between the relief valve and the pump intake whereby excess liquid may be returned to the pump intake in a circulatory path, and a suction chamber in said by-pass connection for accommodating excessive surges in the latter, the suction chamber having separate connections with the relief valve and the pump intake to insure uni-directional flow in said connection.

JOB F. MALSBARY.