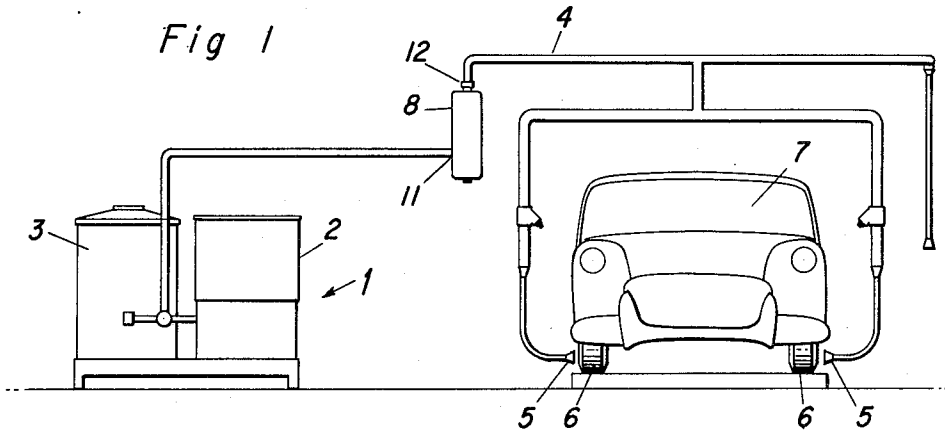
Jan. 16, 1962 W. F. MALSBARY 3,017,122

STEAM CLEANING MACHINE

Filed Jan. 27, 1958

Fig 1



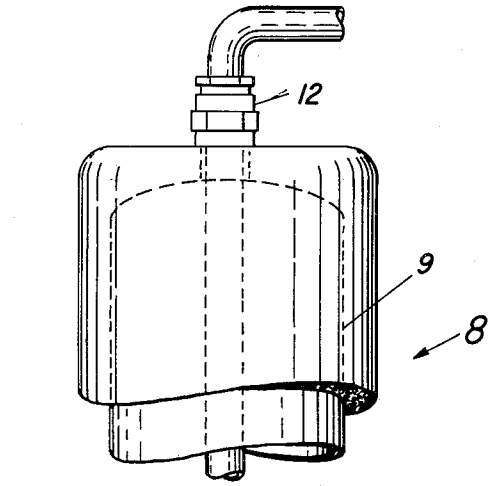
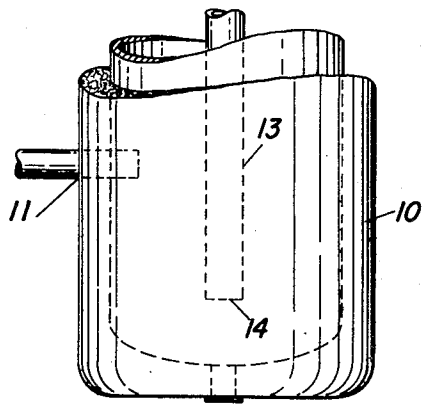


Fig 2



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3,017,122

STEAM CLEANING MACHINE

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2 Claims. (Cl. 239—135)

The present invention relates to improvements in cleaning machines, and has particular reference to a cleaning machine such as is described in the Malsbary Patent No. 2,345,614, in which water or solution is pumped through a heating coil under high pressure for discharge through a nozzle toward an object to be cleaned, such as heavy machinery, trucks and the like.

With the advent of the modern chain-rack automatic car wash, this cleaning machine is being used successfully in the washing of the wheels of cars.

In an installation of this character, the car is slowly advanced through various stations for different operations involved in the cleaning of an automobile, one of these operations being the washing of the wheels of the car under application of steam applied to the wheels through the nozzles sometimes in conjunction with brushes.

In this operation, the nozzles, usually carried by small trucks, are made to point toward the side walls of the wheels while discharging the steam, and to slowly advance with the car until the entire face of the wheel has been cleaned, at which time the car advances to the next station while the truck carrying the nozzles is returned for operation on the next vehicle.

During the return trip of the trucks, the steam supply through thhe nozzles is cut off, with the pump idling. In the normal operation of a system of this character, the idling periods, with incident delays, take up approximately as much time as the active periods, and usually even more time.

Now, a favorite set-up is to provide a nozzle with an orifice which will discharge approximately six gallons of water or solution per minute under a pressure of ninety pounds. To feed this amount of super-heated water at this pressure requires a cleaning machine of considerable capacity, and it is desirable, of course, in the interest of economy, to make a machine of less capacity perform the work, as long as the discharge at the nozzle remains the same.

In this connection, it might be stated that a cleaning machine built to full capacity under the pressure indicated costs approximately twice the amount of a machine designed to discharge about one-half the amount of water or solution under the circumstances indicated.

It is the object of the present invention to provide means for making a less expensive machine perform the work of the more expensive machine, or, to adhere to the concrete example selected, to discharge six gallons of water or solution per minute, although its real capacity is only three gallons per minute.

To accomplish this result, advantage is taken of the fact that in the normal use of the machine, idling periods alternate with active periods, the idling periods being of substantially the same length as the active periods.

The idling periods are utilized, in my invention, to build up a reserve supply of superheated water or chemical solution under pump pressure, this reserve supply being made to deliver, during the active periods, substantially the same amount of water as does the pump, under substantially the same pressure, so as to practically double the output of the pump.

By the expression "superheated water," I mean a confined solid body of water heated to a degree above its boiling point at atmospheric pressure.

Further objects and advantages of my invention will

appear as the specification proceeds, and the new and useful features of my cleaning machine will be fully defined in the claims hereto appended.

The preferred form of my invention is illustrated in the accompanying drawing, forming part of this application, in which:

FIGURE 1 shows a diagrammatic view explaining the general lay-out of the plant; and

FIGURE 2, an enlarged detail view of an accumulator, used in my invention.

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

Referring to the drawings in detail, FIGURE 1 illustrates the general lay-out of the system as used in a modern chain-rack car washing plant.

The clean machine, shown at **1**, may be made substantially in accordance with the teachings of the Malsbary Patent, No. 2,345,614, and is not illustrated in detail. It comprises a pumping plant, indicated at **2**, a coil housing shown at **3**, a delivery pipe **4** terminating in a pair of nozzles **5** directed at the outer faces of the wheels **6** of a motor vehicle **7** to be cleaned.

In the normal operation of this conventional layout, the pumping plant **2** delivers water to the coil in the housing **3** where it is super-heated by means of a gas heater and finally discharged against the vehicle wheels in the form of steam for cleaning the same.

The nozzles discharge against the side faces of the tires at the forward portions thereof, in a median horizontal plane, and advance with the vehicle so as to wash the entire side face of the wheel as the latter rotates, until the tires have gone through at least one entire revolution.

Suitable conventional means are employed to cause the nozzles to advance with the car, to stop when the cleaning operation is finished and to automatically return to an initial position ready to begin on the next car.

Conventional means are also provided, as shown in the Malsbary patent referred to, to automatically by-pass the pumped water back into the pump in case of excess pressure as would be caused by the closing of the nozzles.

Conventional means are further provided to open the nozzle at the beginning of the operation and to shut off the nozzle at the end of the operation, so that no steam is ejected on the return or idling trip.

All of these features are conventional, and therefore, are not shown in detail.

For the purposes of the present description, it may be assumed that the pump discharges super-heated water or solution through the nozzle at a pressure of ninety pounds, and that the capacity of the pump is related to the nozzle orifices to normally discharge water at the rate of about three gallons per minute, whereas a discharge or output of about six gallons per minute is needed.

To increase, or practically double the output of the pump, under the conditions indicated, I take advantage of the fact that the idling periods alternate with the active periods, and utilize the idling periods to build up a reserve which discharges water during the active periods at a pressure approximating the pump pressure.

For this purpose, I provide the accumulator **8**, shown in detail in FIGURE 2. This accumulator is in the form of an elongated cylindrical tank **9**, heavily insulated, as at **10**, and is connected into the delivery pipe **4** in the manner shown in FIGURE 1.

The tank **9** may have a capacity of five gallons and is connected into the delivery pipe in vertical position, with the water entering near the bottom, as at **11**, and leaving through the top thereof, as at **12**, the latter con-

nection having a vertical central tube 13, projecting downwardly into the tank to a point near the bottom thereof, as at 14, so as to leave the major portion of the tank to form a pressure chamber above the outlet 14.

In operation:

During each idling period, with the nozzle closed, the superheated water coming from the coil rushes into the accumulator and fills the same completely, immediately condensing any steam present as a result of the preceding operation. At this time the temperature of the liquid in the cylinder is approximately 330° Fahrenheit and the gauge pressure of system may be about 140 pounds.

At the beginning of the active period, as the nozzles are opened, the pressure automatically drops to ninety pounds, a portion of the water in the accumulator flashes into steam trapped in the upper portion of the tank, and the expansive force of the steam crowds water from the accumulator through the tube 13 along with the water fed through the intake 11 under pump pressure and substantially at the same rate, whereby the output at the nozzle is substantially doubled.

At the end of the active period, as the nozzles close again, the pump furnishes a new supply of superheated water to the accumulator, compressing the steam released during the previous period into a solid body of liquid, thus establishing a new body of liquid in the accumulator and a new source of energy for discharging the liquid through the nozzles along with the liquid furnished by the pump.

Thus, each idling period is utilized in re-filling the accumulator and building up energy by compressing and condensing steam for release during the next active period.

It should be understood that, while I have developed and described by invention with particular reference to a car washing system, the principle of the invention may be empolyed wherever it is desired to step up the output of a pumping plant feeding superheated water or other liquid through a resistance in intermittent impulses.

The operation of the system may be further explained as follows:

Assuming first, that a heavy pump is used capable of discharging water at the rate of six gallons per minute, and at a pressure of ninety pounds, in combination with a nozzle designed to discharge water at the same rate under the pressure indicated, so as to provide proper cleaning action at a predetermined distance of the orifice. This is the general set-up prior to my invention.

Now, I decide, for reasons of economy, to substitute a lighter pump which pumps only three gallons per minute at a pressure of ninety pounds. In substituting this pump, I find, of course, that the same nozzle will discharge only three gallons per minute, whereas it is designed to discharge six gallons under ninety pounds of pressure. This naturally means that there is a considerable drop in pressure between the pump and the nozzle, for lack of water to sustain the pressure.

Here is where the importance of the accumulator comes in, which, during a previous idling period, has built up a reserve supply of water substantially equal to that supplied by the pump during the active period and under substantially the same pressure. Thus, the accumulator and the pump combine to deliver to the nozzle the full

six gallons per minute under the full ninety pounds pressure, as in the original set-up.

I claim:

1. In a car wash system of the class having a spray nozzle operative for discharging superheated liquid in alternating active and idling periods, the active and idling periods being of substantially the same length, pumping means supplying at the discharge of the pumping means liquid at a constant rate of flow and pressure, heating means connected to said pumping means and adapted to superheat a liquid, a hollow pressure accumulator means to provide a reservoir, first conduit means connecting said pumping means and said heating means with said reservoir, said reservoir being downstream of said heating means, second conduit means connecting said reservoir with said spray nozzle, said pump having a rate of flow substantially one-half the rate of flow through said nozzle at pump pressure during the active periods, said reservoir having a capacity sufficient to accommodate the superheated liquid supplied by the pump during the idling periods, and said second conduit having a capacity at least as large as that of the nozzle at similar pressures so as to add liquid from the reservoir to the stream delivered by the pump and thereby providing the full rate of flow through the nozzle during the active periods.

2. In a car wash system of the class having a spray nozzle operative for discharging superheated liquid in alternating active and idling periods, the active and idling periods being of substantially the same length, pumping means supplying at the discharge of the pumping means liquid at a constant rate of flow and pressure, heating means connected to said pumping means and adapted to superheat a liquid, a hollow pressure accumulator means to provide a reservoir, first conduit means connecting said pumping means and said heating means with said reservoir, said reservoir being downstream of said heating means, second conduit means connecting said reservoir with said spray nozzle, said second conduit means having an opening formed therein which is located at all times below the liquid level in said reservoir whereby drop in pressure in said reservoir occasioned by opening of the nozzle for an active period will cause said superheated liquid to flash-vaporize and raise the pressure in the reservoir to approximate pump pressure, said pump having a rate of flow substantially one-half the rate of flow through said nozzle at pump pressure during the active periods, said reservoir having a capacity sufficient to accommodate the superheated liquid supplied by the pump during the idling periods, and said second conduit and the openings formed therein having a capacity at least as large as that of the nozzle at similar pressures so as to add liquid from the reservoir to the stream delivered by the pump and thereby providing the full rate of flow through the nozzle during the active periods.

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