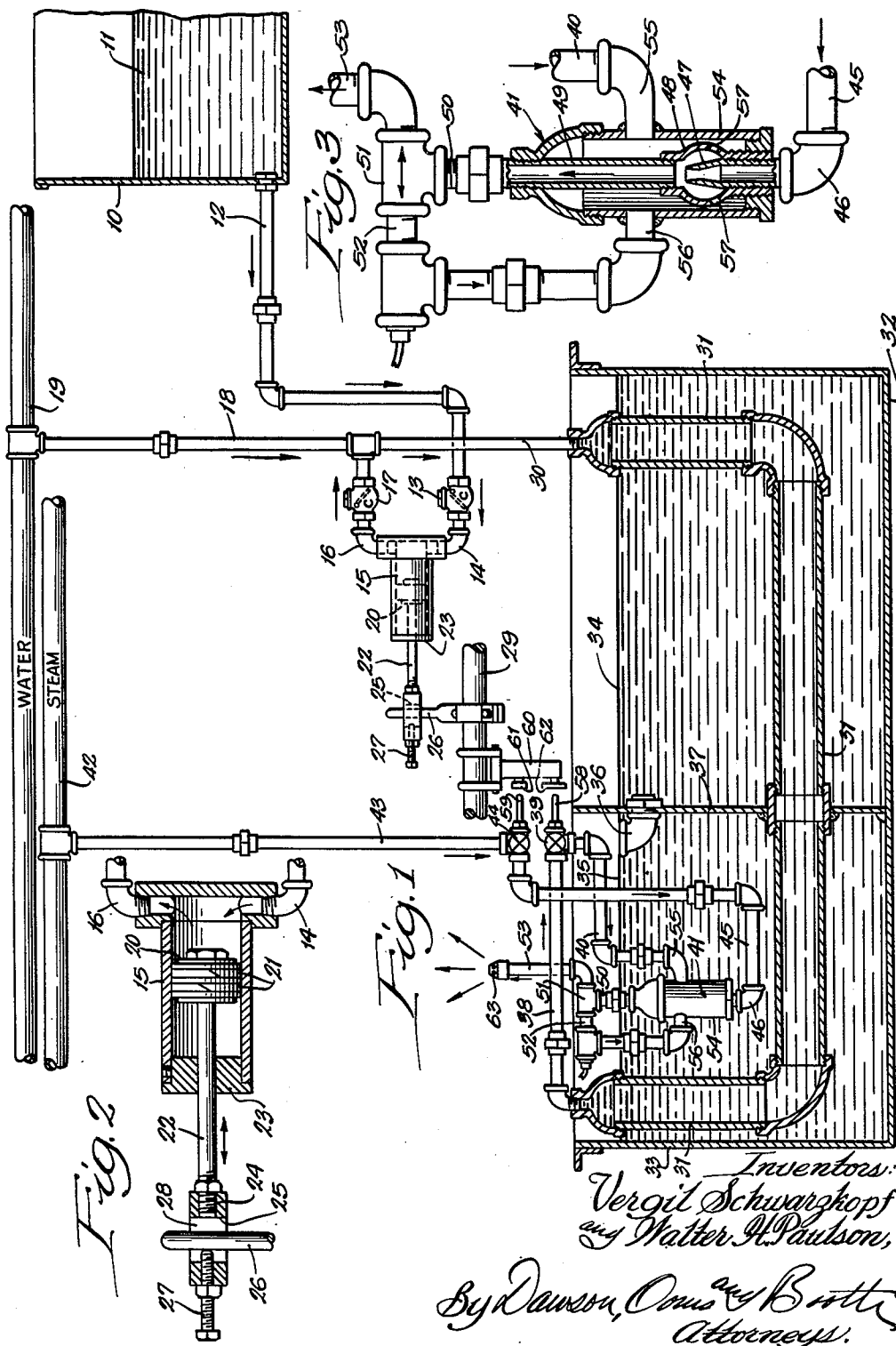


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WASHING OF CANS AND THE LIKE

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WASHING OF CANS AND THE LIKE

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This invention relates to the washing of cans and the like, and more particularly to a method for improving the washing and especially the rinsing of the surface of cans.

An object of the invention is to provide for the treatment of cans, such as milk cans and the like, with water at a relatively high temperature, such as water heated under pressure to a temperature above the normal boiling point thereof. Another object is to provide in the treatment of cans with water, a solution for preventing the precipitation of lime and other elements which would otherwise be precipitated in the hot water treatment. Still another object is to provide a solution which produces an improved rinsing or washing effect and at the same time prevents the precipitation of lime and other elements of hardness in the water. A further object is to treat water with a reagent which decreases the surface tension and increases the flow qualities of the water and at the same time prevents the precipitation from the water at elevated temperatures of lime and the like.

The invention is illustrated in the accompanying drawing, in which—

Fig. 1 is an elevational view partly in section showing the apparatus used in the invention; Fig. 2 is a longitudinal sectional view of the injection cylinder; and Fig. 3 is an elevational view partly in section showing the recycling apparatus used in the invention.

In the embodiment of the invention described herein, a tank 10 containing a solution 11 of the reagent with which the water is to be treated is provided with an outlet conduit 12 leading to a check valve 13 and a conduit 14 which communicates with a cylinder 15 for injecting the solution into a water stream. A conduit 16 extends from the cylinder 15 to a check valve 17 and thence to a conduit 18 leading from a water inlet 19.

The cylinder 15 is provided with a piston 20 having rings 21 fitting tightly within the cylinder. If desired, leathers may be used instead of the rings 21 to bring the piston 20 into tight engagement with the cylinder. The piston rod 22 extends through the closed end 23 of the cylinder and may be adjustably secured at 24 to a bracket 25 for engaging an upwardly-extending arm 26 of the drive mechanism. A thumb screw 27 may be used to adjust the position of the arm 26 within the recess 28 in the bracket 25.

The arm 26 may be mounted on a shaft 29

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which is reciprocated by mechanism (not shown) at predetermined intervals. Preferably, the shaft 29 is mounted on a conveyor mechanism for advancing cans which are to be washed and is synchronized in its movement with the movement of the conveyor mechanism so that each time a can is advanced one step along the conveyor mechanism, the piston moves to inject the solution into the water stream.

The rearward movement of the piston 20 away from the conduits 14 and 16 causes the solution to be drawn through the check valve 13 to the cylinder 15 while the check valve 17 prevents the flow of water into the cylinder. The forward movement of the piston, on the other hand, causes the solution to pass through the check valve 17 and to be injected into the water stream in the conduit 18, while the check valve 13 prevents the flow of solution to the conduit 12.

The reagent in the solution in the tank 10 may consist of any suitable water-miscible solution for preventing the precipitation of lime and the like from the water as the temperature of the water is raised and for improving the rinsing and cleaning qualities of the water. Thus, the solution may contain a suitable acid to decrease the alkalinity or provide a mildly acid reaction in the water and also a wetting agent for decreasing the surface tension of the water solution.

A suitable solution which may be employed includes, in addition to the water, gluconic acid or other suitable acid for imparting a definite acid reaction to the water or for at least decreasing the alkalinity of the water, and a wetting agent such as a sulphonated alcohol or sulphonated petroleum fractions. For example, such an aqueous solution may consist of .9% gluconic acid and .1% of the wetting agent sold under the trade name of "Santomer S." The acid may be present in sufficient quantity to provide a final water solution in which the alkalinity of the water is substantially decreased. Preferably, the rinse solution has a pH of between 6 and 8. The solution of the acid and wetting agent may be used in the tank in a concentration of approximately 1% to 2½%. The solution may be mixed with water according to the ratio of approximately 3% of a 1½% solution. Any suitable or desirable proportion of the reagent or solution may of course be used.

The conduit 18 carrying the stream of water and receiving the solution introduced from the conduit 16 and check valve 17 may lead through a conduit 30 to an enlarged pre-heating con-

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duit 31 extending through the tanks 32 and 33. The tanks 32 and 33 may contain heated water to the respective levels 34 and 35 so as to impart heat to the solution within the enlarged conduit 31 extending therethrough. The tanks 32 and 33 communicate through an overflow conduit 36 which permits heated water in the tank 33 to flow into the tank 32. A conduit 31 extends through the partition 37 between tanks 32 and 33.

From the enlarged conduit 31, the pre-heated solution passes through a pipe 38 to a valve 39 and thence to an inlet 40 for the recirculating system 41. Steam from the line 42 is passed through the conduit 43 through the valve 44 to an inlet 45 for the recirculating system 41.

As seen particularly in Fig. 3, the recirculating system 41 includes a steam inlet elbow 46 to which is threadedly secured a steam nozzle 47. The steam nozzle, in turn, threadedly engages a water inlet bulb 48 which communicates with a mixing chamber 49. An outlet 50 from the mixing chamber 49 communicates with a coupling 51 leading to a recycling pipe 52 and the heated water outlet 53.

The housing or casing 54 about the mixing chamber 49 communicates with a water inlet elbow 55 so that water may be introduced into the space about the mixing chamber. The conduit 56 communicating with the other side of the housing 54 provides an inlet into the housing for the heated water which is recycled through the conduit 52.

When water from the inlet 40 passes through the elbow 55 into the housing 54 and about the mixing chamber 49, it is permitted to flow toward the end of the housing having the steam nozzle therein, and passes through the ports 57 into the water inlet bulb and thence, with the steam, from the nozzle 47 into the mixing chamber 49, in which the water and steam are mixed. The mixture passes from the mixing chamber 49 through the outlet 50 to the coupling 51, and a portion of the mixture is then recycled through the conduit 52 and through the recycling inlet 56 into the housing 54. This portion of the highly heated water may flow through the ports 57 into the water inlet bulb 48 and thence to the mixing chamber 49.

Any suitable pressure may be used to obtain the desired temperature of the water. With a water pressure of approximately 23 pounds, a temperature of the liquid water of approximately 225° F. is obtained. The steam may be introduced into the chamber under a pressure which exceeds the water pressure in order that the steam may be readily introduced into the chamber and mixed with the water. Preferably, the steam pressure is substantially above the water pressure. This temperature of the steam, of course, is also substantially above that of the water which is being introduced and is also above the final temperature of the water. For example, if the water pressure is approximately 23 pounds, a steam pressure of approximately 40 pounds may be used. At this pressure, the temperature of the steam will be approximately 267° F. as compared with a final water temperature of 225° F.

The valves 39 and 44 are used to control the flow of the water solution and steam into the recycling apparatus 41. The valves which may be of any suitable or conventional type are provided with plungers, such as the plunger 58 on the valve 39 and the plunger 59 on the valve 44, which serve to control the valves. A depending

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member 60 on the shaft 29 may be provided with bosses 61 and 62 for engaging the plungers of the valves. The device may be readily synchronized so that the reciprocation of the shaft 29, which is synchronized with the movement of the cans in the washing machine, not only operates the injection cylinder 15 but also controls the valves 39 and 44.

From the outlet 53 of the recycling apparatus, the highly heated water passes through the nozzle 63 into the interior of the can. Although the water may be heated to a temperature in the neighborhood of 225° F., by reason of the presence of the reagent therein, no substantial precipitation of lime or other similar materials occurs.

The device is preferably used in the rinsing of cans which have already been subjected to a cleaning action. When the can to be rinsed is subjected to the spray of extremely hot water containing the reagent, the rinsing is quickly and efficiently accomplished. The water, by reason of the presence of the wetting agent, has a low surface tension and flows readily over the surface of the can. By reason of this, the film of water formed on the can after the rinsing operation is extremely thin, and at the temperature to which the can is raised by contact with the superheated water, is evaporated almost instantaneously.

With the present invention, the water may be heated to a temperature sufficiently high to dry the can to which the water is applied almost instantaneously when the water on the surface of the can is in the extremely thin film produced by the solution used. At the same time, despite the high temperature to which the water is heated, there is no precipitation of lime or other insoluble salts in the course of the treatment. Accordingly, a quick and effective high temperature rinse is obtained. Since the temperature of the can may be raised to a temperature slightly below the normal boiling point of water by contact with the superheated water from the nozzle, the treatment also serves to sterilize the can to which the solution is applied.

Although the invention has been described in connection with a specific embodiment, it will be apparent that modifications and changes may be made without departing from the spirit and scope of the invention.

We claim:

1. In a process for treating cans in which a can is supported above a pool of hot water and into which water employed in washing the can interior is discharged, the steps of mixing with water a reagent for preventing the precipitation of lime therefrom, said reagent also reducing the surface tension of the water, passing the water-reagent mixture in a confined stream through said pool of hot water to preheat the mixture, then further heating the mixture under super-atmospheric pressure to a temperature above the normal boiling point of water, and applying the solution to the surface of the can.

2. In a process for treating cans in which a can is supported above a pool of hot water and into which water employed in washing the can interior is discharged, the steps of mixing with water a reagent for preventing the precipitation of lime therefrom, said reagent also reducing the surface tension of the water, passing the water-reagent mixture in a confined stream through said pool of hot water to preheat the mixture, then further heating the mixture under super-

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atmospheric pressure to a temperature in the neighborhood of 225° F., and applying the solution to the surface of the can.

3. A method of treating a container, comprising mixing with water an organic acid for preventing the precipitation of lime and the like therefrom, heating the solution with steam under super-atmospheric pressure to a temperature in the neighborhood of 225° F., and applying such solution at a temperature not below the normal boiling point of water upon the container surface while substantially preventing the deposition of lime.

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