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CAN WASHING AND LIQUID FEEDING DEVICE

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Fig. 1.

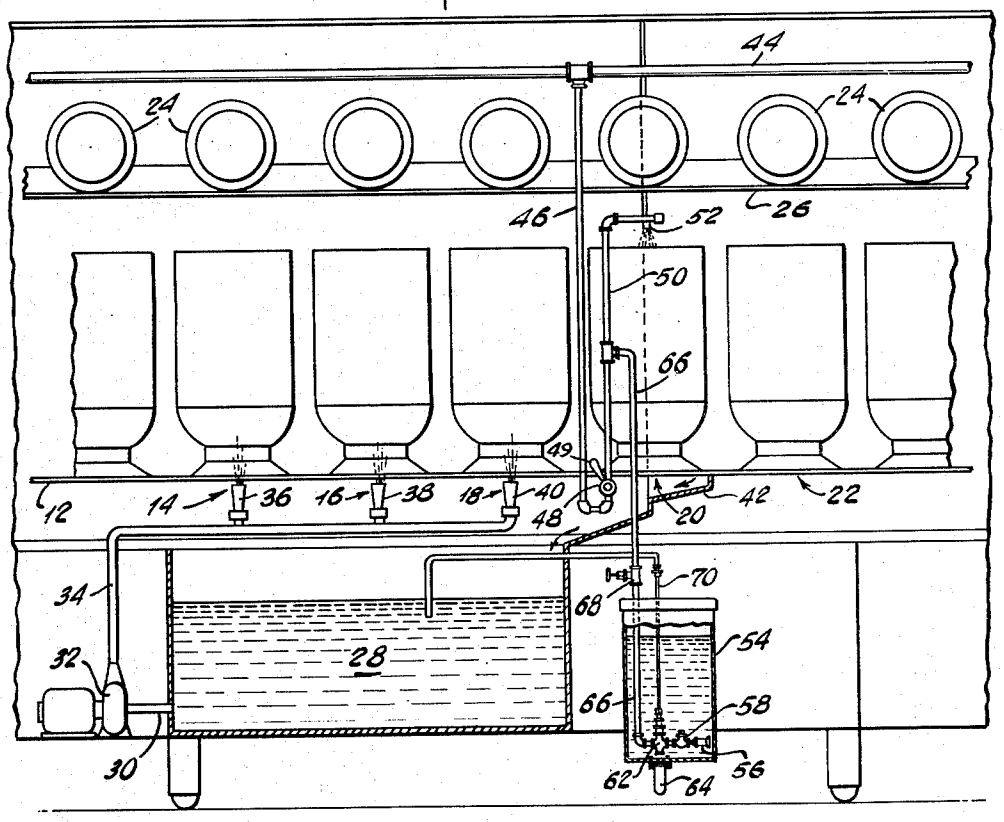
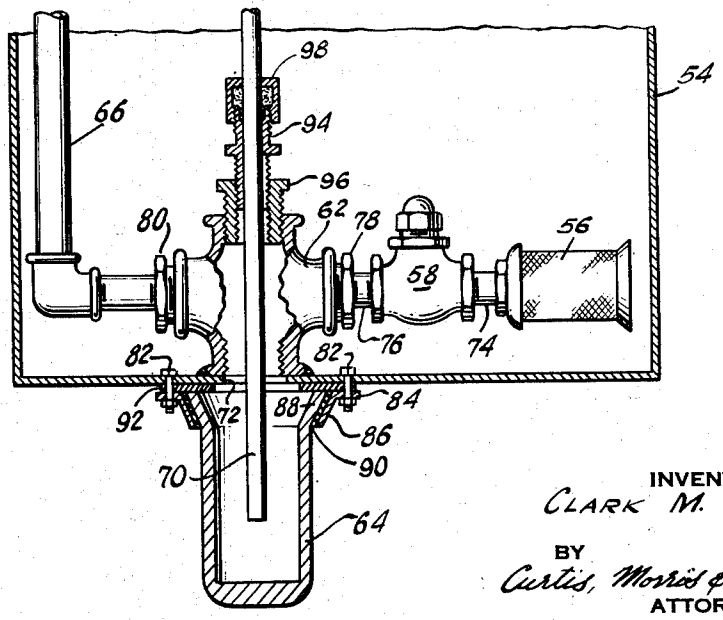


Fig. 2.



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CAN WASHING AND LIQUID FEEDING DEVICE

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4 Claims. (Cl. 134—49)

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This invention relates to feeding devices of the type adapted to feed discrete predetermined amounts of a liquid to a point of use.

It is an object of the invention to provide a device of this type that is simple in construction and reliable in operation. It is another object of the invention to provide a feeding device that is particularly useful for successively feeding predetermined amounts of a detergent solution to an article washing machine wherein a series of articles are automatically washed. It is still another object of the invention to provide a feeding device for intermittent feeding of discrete quantities or slugs of a detergent solution and wherein the size of the individual slug may be accurately predetermined and readily adjusted. It is a still further object of the invention to provide a detergent solution feed device which is adapted to be so connected to an article washing machine that the number of slugs of solution fed corresponds automatically with the number of articles supplied to the machine for washing. Other objects of the invention will be in part obvious and in part pointed out hereafter.

The many objects and advantages of the present invention may best be understood and appreciated by reference to the accompanying drawing which illustrates a preferred embodiment of the feeding device of the invention applied to a conventional milk can washing machine. As the description proceeds it will become apparent that the present feeding device is not limited in its application to a milk can washing machine but may be used with other types of washing machines, and in fact generally in situations where an intermittent feed of discrete quantities of liquid is required.

In the drawing:

Figure 1 is a diagrammatic elevation of a portion of a conventional milk can washing machine with the present feeding device operatively connected thereto; and,

Figure 2 is an enlarged elevation of the solution feeding mechanism in the lower part of the detergent solution storage tank, with certain of the parts being shown in section.

Referring particularly to Figure 1 of the drawing the conventional milk can washing machine there shown is of the type wherein the milk cans are carried by a conveyor 12 to successive stations designated 14, 16, 18, 20 and 22. The washing operation consists of a series of steps that are carried out at the successive stations of the washing machine. Only a portion of the can washing machine is shown in Figure 1. The machine normally includes a number of stations both before

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and after stations 16—22 at which operations are carried out that need not be described herein. As shown in Figure 1, the milk can covers 24 are carried on a conveyor 26 above the row of cans and are likewise subjected to certain washing operations.

The cans at stations 14, 16 and 18 are subjected to internal washing with a detergent solution which is stored in a reservoir 28. The washing solution is withdrawn from reservoir 28 through pipe 30 and pumped by pump 32 through pipe 34 to the sprays 36, 38 and 40, from which the solution is sprayed into the interior of the milk cans at the three stations respectively. (In some machines the outside of each can is also washed with the detergent solution.) It is apparent that as each can moves through the machine it is subjected to three spraying actions with detergent solution, i. e. at stations 14, 16 and 18 successively. After washing the interior surfaces of the milk can, the solution flows back into the reservoir 28. At station 20 each can is permitted to drain without further spraying and the drainage liquid flows down over a baffle 42 into the reservoir 28. At station 22 each can is rinsed and then moves on to other stations at which further operations are performed on it.

At station 20 the bottom of each can is subjected to the action of a steam spray. Steam for operating this spray is supplied from a high pressure steam header 44, shown at the top of Figure 1, and flows through branch pipe 46, to and through a valve 48 and pipe 50 to the spray 52, which is directed toward the bottom of the can. The valve 48 is a so-called "whistle valve" of conventional construction and is actuated to open position by movement of a can to station 20. Specifically the valve 48 is provided with an actuating arm 49 that is spring-urged toward valve-closing position and is engaged and moved by an approaching can to open the valve. Thus the valve 48 operates to supply steam to the spray 52 while each can is at station 20 and closes when each can leaves station 20.

Prior to the time the cans reach station 14 they have been internally washed with water and are wet. This water dilutes the detergent solution sprayed into the cans at stations 14, 16 and 18 and hence tends to reduce the washing effectiveness of the solution over a period of time. Also condensate from spray 52 flows into reservoir 28 and dilutes the solution therein. Moreover as the cans leave station 20 they carry with them a small amount of detergent solution. For these and other reasons it is necessary that the

detergent solution in reservoir 28 be replenished periodically. The total quantity of solution in the reservoir 28 is ordinarily maintained constant by adding water thereto under the control of a liquid level control valve. However it is also necessary to add detergent to the reservoir to maintain the desired detergent concentration therein and the feeding device of the present invention is particularly well suited to perform this function.

Still referring to Figure 1, the feeding device comprises a tank 54 adapted to contain a quantity of a stock detergent solution which may be an aqueous solution of alkaline silicates and phosphates. Located within the tank 54 near the bottom thereof are a screen 56, check valve 58 and pipe cross 62 interconnected in such manner that solution from the tank can flow by gravity successively through the screen, check valve and pipe cross and then downwardly into a measuring chamber 64. The pipe cross 62 is connected to pipe 50 on the discharge side of "whistle valve" 48 by a pipe 66 containing a needle-type regulating valve 68. As pointed out above the valve 48 is intermittently actuated to supply steam to pipe 50, and this intermittent steam pressure is used, as more fully described below, to periodically force detergent solution from measuring chamber 64 through a discharge tube 70 to the reservoir 28.

Referring now to Figure 2, the pipe cross 62 is fixed to the bottom of tank 54 in any suitable manner, such as by brazing or welding, and is positioned in registry with a hole 72 in the bottom of the tank. The screen 56 is connected by a pipe 74 to check valve 58 which is in turn connected by pipe 76 and bushing 78 to the right-hand opening of cross 62. The steam pipe 66 is connected through bushing 80 to the left-hand opening of cross 62. The connection of pipes 66 and 76 to opposite sides of the cross has been found advantageous because of the fact that the steam entering through pipe 66 exerts a pressure through pipe 76 that helps to ensure rapid closing of the check valve 58, thereby substantially diminishing back flow of detergent solution into the main body of solution in tank 54. It will be understood that the screen 56 functions to prevent suspended solids in the tank 54 from entering the measuring system.

The measuring chamber 64 is secured to the bottom of the tank 54 in registry with hole 72 by means of the bolts 82. The bolts engage an annular ring or flange 84 having a frusto-conical portion 86 that cooperates with an outwardly flared portion 88 of chamber 64 to urge it against the bottom of tank 54. A frusto-conical gasket 90 is interposed between the portion 86 of flange 84 and the flared portion 88 of chamber 64, and a second gasket 92 is provided between the top of chamber 64 and bottom of tank 54 to seal the parts against leakage. The chamber 64 is preferably made of glass so that the level of solution therein can be observed.

The discharge tube 70 is mounted in the upper opening of cross 62 and extends downwardly into the measuring chamber 64. As shown in Figure 2 the tube 70 is mounted in a compression fitting 94 of known type which is threaded into a bushing 96 that is in turn threaded into the upper opening of cross 62. The fitting 94 includes a packing nut 98 that may be taken up in known manner to provide a fluid-tight seal between the tube 70 and pipe cross 62 and prevent fluids from being discharged from pipe cross 62 otherwise than through chamber 64. The fitting 94 also provides a means whereby the height of the lower end of discharge tube 70 within measuring chamber 64 can be adjusted to vary as desired the size of each slug of solution i. e. the quantity of detergent solution delivered during each periodic operation of the feeding device. This adjustment of the position of the lower end of tube 70 can be effected either by loosening nut 98 or by initially so adjusting the nut as to permit frictional sliding movement of the tube 70 with respect to cross 62 so that the height of the lower end of the tube can be adjusted without further adjustment of the packing nut.

The operation of the feeding device should be largely apparent from the foregoing description. The stock solution may be made up in tank 54 by dissolving the solid detergent material in water therein. The stock solution is ordinarily made up in a concentration considerably stronger than that in the reservoir 28, for example, 30 times as strong. The solution thus prepared flows, as previously described, through the screen 56, pipe 74, check valve 58, pipe 76 and cross 62 to the measuring chamber 64 and fills the chamber. When a milk can moves to station 20 the whistle valve 48 is actuated and steam is supplied through pipe 66 to the top of the measuring chamber 64, thus closing check valve 58 and forcing liquid out through discharge pipe 70 to the reservoir 28 until the liquid level in chamber 64 has dropped below the bottom of discharge pipe 70, whereupon steam will flow through the discharge pipe but no further liquid will be discharged. It is thus clear that substantially the same amount of solution will be discharged each time the valve 48 is actuated. The needle valve 68 is adjusted to give the desired flow of steam through pipe 66. The continuing flow of steam through pipes 66 and 70 after each slug of liquid has been delivered to reservoir 28 serves to keep the discharge pipe 70 clean and free from deposits of detergent solids.

When each can moves away from station 20 whistle valve 48 closes and solution flows from tank 54 into measuring chamber 64. During the period that the whistle valve 48 is closed, a portion of the steam in pipes 66 and 70 and chamber 64 condenses thereby producing a partial vacuum within the system that assists in drawing liquid from tank 54 into the measuring chamber 64. As shown in Figure 1, the discharge end of tube 70 is preferably located somewhat below the liquid level in reservoir 28 to increase this vacuum refilling effect.

When another can moves to station 20 the above-described operation is repeated. Thus each time a can moves forward one station a slug of stock solution of predetermined size is discharged into the reservoir 28. The size of the slug is controlled, by adjustment of the height of the lower end of discharge pipe 70, to compensate for dilution of the solution in reservoir 28 due to such factors as water being carried by each can to the detergent spray stations, and water being added to the reservoir to maintain the total volume of detergent solution constant.

It should be noted that the present feeding device serves to inter-relate movement of the cans and replenishment of the solution in reservoir 28 in such manner that if, for example, the washing machine is stopped, the supply of stock solution to tank 28 is automatically interrupted. Also if the cans are irregularly fed to the washing machine, the detergent solution feeding de-

vice automatically takes this factor into account and supplies a number of slugs of make-up solution precisely corresponding to the number of cans washed, whether the cans are fed to the machine at regular or irregular intervals.

From the foregoing description it is apparent the present invention provides a simple and effective feeding device that is capable of keeping the concentration of the detergent solution in reservoir **28** substantially constant. While the present feeding device possesses special advantages when used in conjunction with a milk can washing machine of the type herein described, it is of course to be understood that the device may be used in other applications where intermittent feed of predetermined quantities of liquid is required or desirable. Also the structure illustratively described above may be modified in various ways without departing from the scope of the invention. For example, the whistle valve **48** may be replaced by a solenoid-operated valve and the desired intermittent flow of pressure fluid achieved electrically rather than mechanically. Also the check valve **58**, cross **62** and pipes **66** and **70** can be located outside tank **54** if desired. However the vacuum refilling effect referred to above has been found to be considerably more pronounced when these parts are located within tank **54** and hence more positive refilling of chamber **64** can be secured by using the apparatus specifically described herein. Other modifications within the scope of the invention and other useful applications of the present feeding device will occur to those skilled in the art.

I claim:

1. Apparatus for measuring and feeding predetermined discrete quantities of a detergent solution to the detergent reservoir of an article washing machine of the type wherein articles to be washed are moved to successive stations at which they are automatically washed with fluid including detergent solution from said reservoir, and a steam valve is mounted near at least one of said stations and is actuated by movement of one of said articles to said station to supply steam to said article, said apparatus comprising, in combination with said machine, a tank adapted to contain a body of said detergent solution, a measuring chamber positioned below the liquid level in said tank for measuring a predetermined quantity of said solution, a conduit for conducting solution from said body of solution to said measuring chamber, said conduit containing a check valve to prevent backflow of solution from said measuring chamber to said body of solution, a discharge conduit extending into said measuring chamber to a predetermined point between the top and bottom thereof and leading to said reservoir, and a third conduit connecting the discharge side of said steam valve with the top of said chamber, whereby a predetermined amount of solution within said chamber is periodically forced through said discharge conduit and to said reservoir, and thereafter said measuring chamber is refilled by flow from said tank.

2. Apparatus for measuring and feeding predetermined discrete quantities of a detergent solution to the detergent reservoir of an article washing machine of the type wherein articles to be washed are moved to successive stations at which they are automatically washed with fluid including detergent solution from said reservoir, and a steam valve is mounted near at least one of said stations and is actuated by movement of one of said articles to said station to supply steam to said article, said apparatus comprising, in combination with said machine, a tank adapted to contain a body of said detergent solution, a measuring chamber positioned below the liquid level in said tank for measuring a predetermined quantity of said solution, a conduit for conducting solution from said body of solution to said measuring chamber, said conduit containing a check valve to prevent backflow of solution from said measuring chamber to said body of solution, a discharge conduit extending into said measuring chamber to a predetermined point between the top and bottom thereof and leading to said reservoir, an adjustable connection between said chamber and discharge conduit to permit adjustment of the height of the end of said discharge conduit within said measuring chamber to vary the magnitude of said predetermined discrete quantity of solution, and a third conduit interconnecting the downstream side of said steam valve with the top of said chamber, whereby a predetermined amount of solution within said chamber is periodically forced through said discharge conduit to said reservoir, and thereafter said measuring chamber is refilled by flow of solution from said tank.

3. Apparatus for measuring and feeding predetermined discrete quantities of a detergent solution to the detergent reservoir of an article washing machine of the type wherein articles to be washed are moved to successive stations at which they are automatically washed with fluid including detergent solution from said reservoir, and a steam valve is mounted near at least one of said stations and is actuated by movement of one of said articles to said station to supply steam to said article, said apparatus comprising, in combination with said machine, a tank adapted to contain a body of said detergent solution, said tank having a discharge opening in the bottom thereof, a measuring chamber secured to the bottom of said tank in registry with said opening, a first conduit within said tank secured to the periphery of said opening for conducting solution to said measuring chamber, said first conduit including a check valve for preventing backflow of solution from said measuring chamber to said body of solution, a second conduit extending from a point within said measuring chamber through the body of solution in said tank to said reservoir, and a third conduit extending from the discharge side of said steam valve through the body of solution in said tank to the top of said measuring chamber, whereby a predetermined amount of solution within said chamber is periodically forced through said second conduit to said reservoir.

4. Apparatus for measuring and feeding predetermined discrete quantities of a detergent solution to the detergent reservoir of an article washing machine of the type wherein articles to be washed are moved to successive stations at which they are automatically washed with fluid including detergent solution from said reservoir, and a steam valve is mounted near at least one of said stations and is actuated by movement of one of said articles to said station to supply steam to said article, said apparatus comprising, in combination with said machine, a tank adapted to contain a body of said detergent solution, said tank having a discharge opening in the bottom thereof, a measuring chamber secured to the bottom of said tank in registry with said opening, a pipe cross vertically arranged within said tank with its bottom connection secured to the bot-

tom of said tank in registry with said discharge opening, a conduit connected to one of the side connections of said pipe cross, said conduit communicating with said body of solution and including a screen and check valve, a discharge conduit adjustably mounted in the top connection of said pipe cross, said discharge conduit extending from a point within said measuring chamber through the lower and upper connections of said pipe cross and said body of solution to said reservoir, and a pressure fluid supply conduit connected to the other side connection of said pipe cross and extending through said body of solution to the discharge side of said steam valve for conducting steam from the discharge side of said steam valve to the top of said measuring chamber, whereby a predetermined

amount of solution in said measuring chamber is periodically forced through said discharge conduit and thereafter said measuring chamber is refilled by flow of solution from said tank.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,042,106	Grant	Oct. 22, 1912
1,537,679	Killman	May 12, 1925
1,794,769	Hopkins	Mar. 3, 1931
1,972,711	Kendall	Sept. 4, 1934
2,101,468	Dale	Dec. 7, 1937
2,127,017	Walker	Aug. 16, 1938
2,197,602	Wolcott et al.	Apr. 16, 1940
2,395,968	Ornas	Mar. 5, 1946