AUTOMATIC LAUNDRY APPARATUS HAVING A SUPER WASH CYCLE


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5 Claims. (Cl. 65—12)

This invention relates generally to cleaning and laundering and more specifically relates to means for automatically laundering a batch of materials through a programed sequence of a cycle which is particularly characterized by exposure of the materials to a superwashing step involving the use of a concentrated laundry liquid, for example, subjecting the materials to a discrete period of agitation in the presence of a laundry liquid having a relatively high concentration of detergent.

It is an object of the present invention to provide a laundering machine including special means to improve the washability of normal automatic cycles.

Another object of the invention is to provide apparatus for automatically cycling a batch of materials through a series of sequenced steps wherein one of the steps involves subjecting the materials to a discrete period of agitation in the presence of a laundry liquid having a relatively high concentration of detergent.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the field from the following description and the accompanying sheets of drawings.

On the drawings:

FIGURE 1 is a front elevational view with parts broken away showing a so-called horizontal axis-type washer.

FIGURE 2 is a circuit diagram of one control system which may be employed with the present invention.

FIGURE 3 is a timer chart sequence depicting the program sequence followed by the sequential control means of the present invention.

As shown on the drawings:

A laundry machine is shown generally at 10 and includes a cabinet 11 which houses a tub 12 forming a treatment zone 13 in which a supply of liquid may be charged from a domestic supply. For example, there is shown a mixing valve 14 including a hot water inlet 16 and a cold water inlet 17 so that a supply of inlet water of selected temperature may be admixed within the body of the valve 14 and discharged through an outlet 18 connected to a conduit 19 communicating with the treatment zone 13 as at 20. The mixing valve 14 is motor operated to facilitate automatic control thereof during an automatically regulated cycle of a sequenced program which can be preset on a sequential control means shown generally at 21 and having a presettable control knob 22 at an accessible location on a control console or other suitable location on the cabinet 11.

Many domestic laundry machines have water level control features affected by either float valves or regulators, or by pressure sensitive devices which respond to varied water levels. In this particular machine, there is illustrated a water level control device 23 (shown diagrammatically) which is operatively connected as indicated at 24 to a water level sensor 27. The sensors 26 and 27 are operatively connected to the water level control device 23 which, in turn, is associated with suitable circuitry connected to the fluid system and the sequential control means 21 so the machine 10 may be fitted with a predetermined quantity of liquid to a high level as indicated by a line at 24 as determined by sequential control 21 in conjunction with water level control device 23.

The water level control device 23 has a wide reset differential. When the liquid level in the tub 12 rises to a predetermined high fill level such as at a level indicated at 42, the switch arm 65 moves from the contact 66 to the contact 67; however, when the liquid is removed from the tub 12, the switch arm 65 does not return to the contact 66 until the liquid quantity has been reduced to a lower predetermined level such as at a level indicated at 43. For instance, in an exemplary machine, the quantity of liquid for the high fill level 42 may be 40 gallons and the lower level 43 may be three and one-half gallons.

The fluid system of the machine 10 also includes a pump 28 driven by a drive motor 60 and having an inlet connected via a conduit 29 to the bottom of a sump 30 as at 31. The pump 28 discharges through a conduit 32 to which is connected drain conduit 34 and recirculating conduit 36. A motor operated valve 33 is placed in drain conduit 34 and another motor operated valve 35 is placed in recirculating conduit 36 to direct the flow from pump 28. The recirculating conduit 36 has one branch 37 which is directed upwardly and discharges through an additive dispenser 38. A second branch is shown at 39 and discharges through a nozzle shown generally at 40 arranged to direct the fluid into the interior of a perforated rotating drum 41 with tumbling baffles 15 located within the treatment zone 13 and by means of which the clothes being laundered or otherwise treated are subjected to agitation in the presence of a washing or rinsing liquid. The basket 41 is rotated by drive motor 60 through a variable speed pulley mechanism such as that disclosed in Patent No. 2,942,447 issued to Rickel et al. on June 28, 1960. The basket or receptacle 41 not only subjects the materials to washing and rinsing operations, but if the machine comprises a so-called combination washer-dryer, it will be appreciated that the receptacle 41 may be rotated at increased speeds to effect a centrifuging action and the machine may also be used as a dryer.

The sequential control means 21 of the present invention constitutes a stepping-type motor which is used to drive a series of cams 68 and each of the cams 68 is associated with circuits so that the machine may be automatically cycled through a series of washing and rinsing steps for a predetermined sequence of a scheduled program. Thus, it is contemplated that the sequential control means 21 may be provided to carry out the program or programs which are selectable on the timer switch circuit chart shown in FIGURE 3.

Referring to FIGURE 3, reference numerals 51 and 52 represent the two sides of an electrical power source used to energize the control circuit. To initiate the cycle, control knob 22 is manually advanced counterclockwise into the "fill" portion of the cycle thus closing cut-off switch 55, inlet valve switch 59 and drive motor switch 61. When the cycle is initiated, tub 12 is empty of liquid and switch arm 65 of the water level control 23 is in contact with contact 66; thus the circuit to water mixing valve 14 is completed. When the water level has reached the predetermined high level 42, approximately 7 gallons, switch arm 65 moves to contact 67 thus energizing timer motor 54. The materials within the drum or receptacle 41 will be tumbled for a discrete time which in the exemplary arrangement described herein amounts to one minute. This procedure adequately wets the materials and loosens the surface dirt contained thereon.

Next, drain valve switch 51 is closed energizing drain valve 35. Level by-pass switch 53 is closed at this increment and cut-off switch 55 and mixing valve switch 59 are simultaneously opened. The water will drain from the tub 12 until the lower predetermined level 43 is reached, leaving approximately 3½ gallons in the tub, at which time switch arm 65 moves to contact 66 de-energizing valve 35. At the end of this timer increment, which in the exemplary arrangement described...
herein is one minute, recirculate valve switch 51 closes energizing recirculate valve 35. The water is drawn from the bottom of tub 12, through conduit 29, through pump 28, through conduit 32 and the flow is divided between conduit 37 and conduit 39. The water flowing through conduit 39 is directed into rotating drum 41 through nozzle 49. The water flowing through conduit 37 is discharged through additive dispenser 38 which has been filled with a recommended charge of detergent or soap. A recommended charge of detergent or soap is considered to be that amount which the manufacturer recommends to obtain an optimum washing solution for a normal fabric load. Although various types of laundering cleaning agents can be used in the employment of this invention, the term detergent will be used hereafter in the description in reference to the additive used. The recommended amount is that amount which will give the desired detergent concentration with the full volume of water in the tub, in this arrangement, water level 42. The detergent concentration is commonly expressed by persons knowledgeable in the art by the weight relationship of the detergent to the liquid in which it is dissolved; thus, the detergent concentration is commonly expressed in percentages. The amount of detergent that the manufacturer normally recommends for a normal wash load usually results in a 0.20 to 0.25 percent detergent concentration.

In the case of exemplary arrangement described herein, the dispenser 38 would be filled with enough detergent to result in a 0.20 to 0.25 percent detergent concentration if dissolved in the high level 42 volume of water in the tub. However, the water level in the tub is at the lower level 43 and as the recirculated water is discharged through dispenser 38, the detergent is dissolved and admixed in the water to form a concentrated detergent solution of approximately twice the recommended concentration or, as expressed in percentages, 0.40 to 0.50 percent. The laundering of fabrics in a highly concentrated detergent solution for a short washing period often is referred to as a superwashing operation since the highly concentrated solution loosens and removes the more difficult dirt and stains from the fabrics. Since the fluid level of the concentrated solution is low and the time period of the concentrated solution is relatively short, the volume of soda that is generated is low; therefore, oversudsing does not become a problem as it would if the high detergent concentration was achieved at higher water level and for a long agitation or tumble period.

It is then contemplated by the present invention that the materials within the receptacle or drum 41 are agitated in the presence of the concentrated laundry liquid solution for a short washing period, for example, two to four units of time as determined by the sequential control means 21.

It will be understood then that during the washing operation, the pump 28 may recirculate the highly concentrated laundry solution drawn in from the bottom of the sump 30 at the inlet 31, through the conduit 32, the valve 33, the conduit 36 and the branch conduit 39, whereupon the concentrated liquid is discharged through the nozzle 49 and into the interior of the drum or receptacle 41 into contact with the clothes being washed and branch conduit 37 through additive dispenser 38.

If desired, the level of the laundry liquid within the machine may be controlled so that the materials within the drum are wetted or saturated with the concentrated liquid while being elevated in the drum and the wetted materials then fall from a point near the top of the drum 41 for impact against the drum wall near the bottom thereof so that the impact forces or flushes some of the laundry liquid out of the materials and conditions the materials to take on a new supply of laundry liquid during elevation.

It is also possible, of course, to have the liquid levels within the machine 10 controlled so that the drum or receptacle 41 will dip down into the supply of concentrated laundry liquid, thereby subjecting the materials within the drum to complete saturation in the concentrated liquid as a part of the washing process.

Thereafter, the tub 12 is refilled to a high water level by closing mixing valve switch 59 and as determined by adding fresh water from the domestic supply through the hot and cold water inlets 16 and 17 and through the mixing valve 14 until switch arm 65 of the water level control 23 makes contact 67 deenergizing mixing valve 14. By thus filling or refilling the tub 12, the laundry liquid solution is brought to a normally recommended detergent concentration which is generally considered to be 0.20 to 0.25 percent by weight.

The machine then enters into the so-called normal wash sequence, whereupon the materials within the drum or receptacle 41 are subjected to an additional tumble period in normally recommended detergent concentration.

Following the washing operation, the drum is elevated to increased speed and the laundry liquid is extracted, whereupon the clothes within the drum are subjected to a rinsing operation. Following rinsing, the materials can again be subjected to centrifugal extraction to remove the excess water in preparation of a drying cycle.

By providing a program of sequenced steps including the highly concentrated detergent wash portion, the re-deposition of dirt on the materials is significantly reduced and the washability performance of the machine 10 is greatly improved.

Although minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of my contribution to the art.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Apparatus for automatically laundring a batch of materials through a programmed sequence including finite washing and rinsing periods comprising, means forming a confined treatment zone, means including liquid level control means for charging said treatment zone with a normal quantity of liquid in which to launder a batch of materials, agitating control means for agitating the materials in the liquid in the zone, motor-operated drain control means for removing liquid from said zone, detergent control means for adding detergent to the treatment zone, and a presettable sequential controller having means regulating said liquid level control means to charge said treatment zone with water to a normal level, to actuate said agitator control means for a discrete period to wet the materials and loosen surface soil thereon, to actuate said drain control means to remove a quantity of the liquid confined in the zone, to actuate said detergent control means to add a supply of detergent to the reduced quantity of liquid in the zone to form a first relatively high concentrated detergent laundry solution equal to 0.40 to 0.50 percent of detergent by weight, to actuate said agitator control means to agitate the materials in said first concentrated laundry solution for a discrete period, to actuate said liquid level control means to add fresh liquid to said first concentrated laundry solution to establish a second laundry solution of a normally recommended detergent concentration equal to 0.20 to 0.25 percent of detergent by weight, and to thereafter operate said apparatus to complete a normal laundry sequence.
5 thereby minimizing redeposition of soil particles on the materials.

2. Apparatus for automatically laundering as defined in claim 1 and further characterized by said agitating control means comprising a drum rotatable on a horizontal axis.

3. Apparatus for automatically laundering as defined in claim 1 and further characterized by said drain control means comprising a pump to assist in removing liquid from the treatment zone.

4. Apparatus for automatically laundering as defined in claim 3 and further characterized by recirculating control means cooperateable with said pump to drive a recirculating stream of laundry liquid through the treatment zone during washing operations.

5. Apparatus for automatically laundering as defined in claim 1 wherein said means forming a confined treatment zone includes an extractor basket operable at centrifuging speeds to effect extraction of liquid from the clothes contained therein.

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