United States Patent

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[54] **CONTROL CIRCUIT FOR AUTOMATIC WASHING MACHINE**
6 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **68/12**
[51] **Int. Cl.** **D06f 33/02**
[50] **Field of Search** 68/12, 235

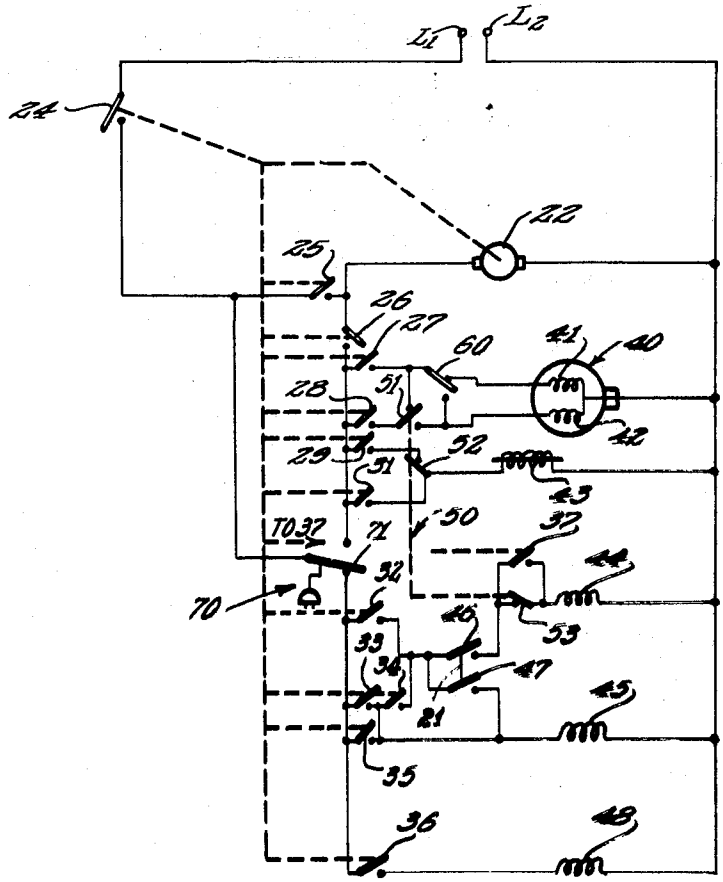
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ABSTRACT: An automatic washer or combination washer-dryer of the coin-operated type provides the operator with selection of a normal washing cycle or a permanent-press washing cycle through the expediency of a single manually operable multiposition switch. A timer establishes operating circuits for the electrically energized washer components on the basis of a single preset program while the multiposition switch prepares these circuits for completion in accordance with the selected washing cycle. In addition, a separate switch is included in the control circuit for selection of motor speed to provide additional flexibility of washing control.

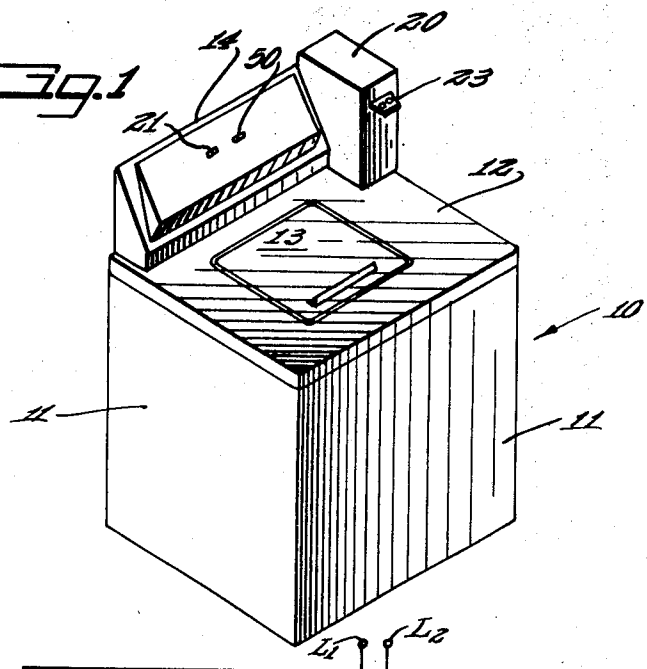


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SHEET 1 OF 2

Fig. 1



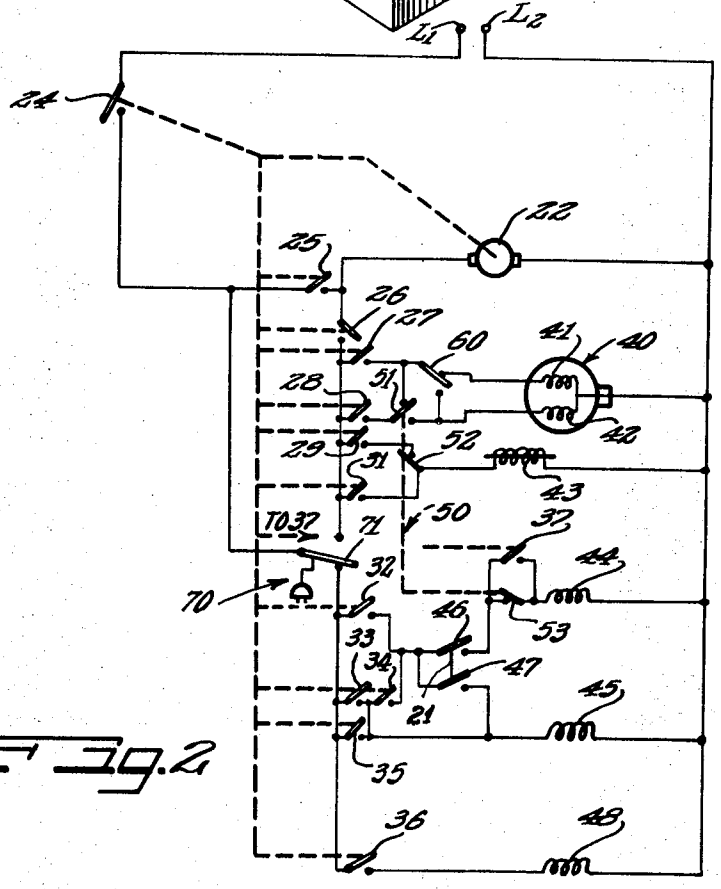


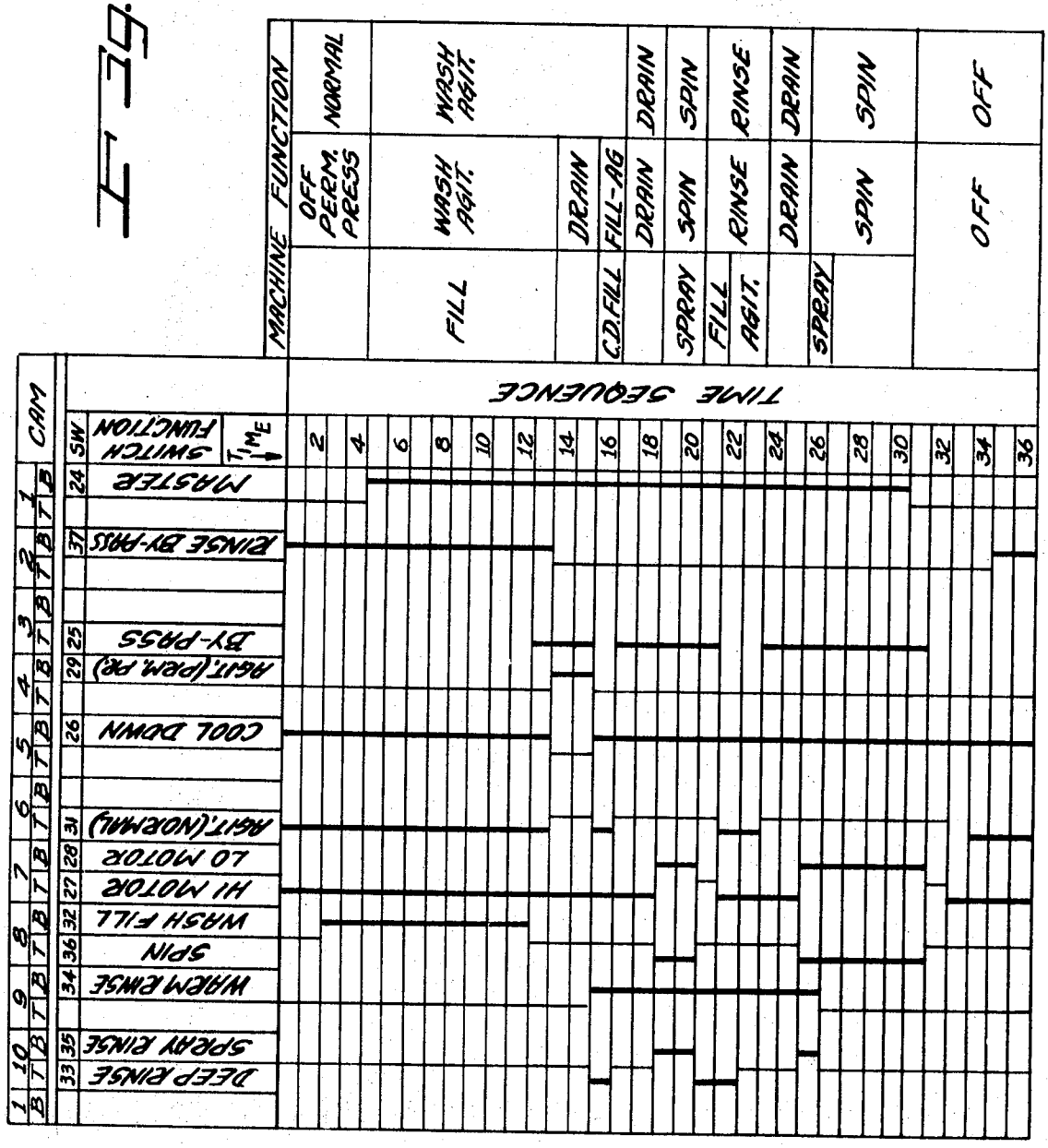
Fig. 2

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Fig. 3



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CONTROL CIRCUIT FOR AUTOMATIC WASHING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to apparatus for controlling the operation of an automatic washer, or combination automatic washer-dryer, of the coin-operated type, and more particularly to apparatus for providing operation of an automatic washer in either a normal or a permanent press washing cycle in accordance with the selective positioning of a cycle selection switch.

2. Description of the Prior Art

It is known in home laundry machines to provide a cool-down segment in a washing cycle prior to the spinning operation in order to prevent wrinkles from being set in wash and wear materials as the material is pressed against the side of the spinning tub and otherwise hot or warm washing liquid is centrifuged from the material. The prior art also recognizes the utilization of a timer for controlling the operation of an automatic washer wherein the timer includes an indicating dial which rotates through a single revolution for a washing cycle and a plurality of contacts which are operated in a preset sequence throughout the washing cycle. Commercial automatic washers, that is automatic washers of the coin-operated type, present selection and control problems not found in home laundry equipment. For example, the use of fabrics having a permanent press characteristic is becoming more prevalent, and such fabrics, however, have an undesirable attendant characteristic that wrinkles are set therein if hot water is centrifuged therefrom as the fabric is pressed against the side of the spinning laundry tub.

Home laundry equipment is provided with the selection of a plurality of washing cycles, including a permanent press cycle, through a plurality of cycle selection switches and a timer which is selectively set according to a desired cycle. While the individual housewife may become acquainted with the intricacies of her own machine and adept at operating the necessary switches for selecting the desired washing cycle, a coin-operated laundry machine is utilized by a great number of operators who are not familiar with the control thereof. Therefore, commercial machines should be as uncomplicated as possible so that instructions for operating such machines may be simple, few in number, and directed to as few control switches as possible. It is therefore desirable, and an object of the present invention, to provide commercial laundry apparatus which is as versatile in function as home machines, but which is easily operated.

SUMMARY OF THE INVENTION

Briefly, the present invention provides an automatic washer, or combination washer-dryer, of the coin-operated type having a plurality of washing cycles, including a permanent press washing cycle. Operational control of the machine is established by a timer which operates to provide a single program of possible machine washing functions. A manually operable cycle selection switch is interposed between the timer and the electrically energized washer components to transform the timer program into a desired washing cycle. This feature provides a cool down portion of a permanent press cycle to obviate the above-mentioned wrinkle problem. A speed selection switch is also included in the control circuit to provide high- or low-speed agitation and spinning at selected times during a washing cycle.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and features of the invention, its organization, construction and operation will be best understood from the following detailed description of an exemplary embodiment thereof taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a pictorial view of automatic laundry apparatus constructed in accordance with the principles of the present invention;

FIG. 2 is a schematic representation of a control circuit for the apparatus of FIG. 1; and

FIG. 3 is a schedule of operation for the circuit of FIG. 2 which relates timer operation and switch closure to machine function for various washing cycles.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings there is illustrated, generally at **10**, an automatic washer, comprising sides **11** and a top **12** including a door **13** for receiving and discharging laundry in association with a washing tub (not shown). A control console **14** is carried on the top **12** and houses some of the control circuit for the machine, including a timer, a cycle selection switch **50** and a temperature selection switch **21**. A coin mechanism **20** having a coin slide **23** is also mounted on top **12**.

More specifically, the timer is activated to initiate operation of the machine by inward movement of coin slide **23** upon receipt of coins of the proper denominations. The timer includes a timer motor **22** which upon energization will rotate a plurality of cams through one revolution. During this one revolution, timer motor **22** effects the operation of a plurality of cams to operate timer contacts **24–37** in a preset program to prepare, establish or open energizing circuits for the driving motor **40**, agitate solenoid **43**, hot water inlet solenoid **44**, cold water inlet solenoid **45** and spin solenoid **48** from the electrical power input at terminals L1 and L2.

A water pressure switch **70** is connected between the master timer contact **24** and contacts **32–36** to transfer operating power between the water control section and the motor section of the control circuit. The water pressure switch is closed to its top contact when the tub is full and to its bottom contact when the water level in the tub falls below a predetermined level. The water temperature switch **21** having contacts **46** and **47** is also included to manually select the desired water temperature.

Motor **40** includes a high-speed winding **41** and a low-speed winding **42** for operating the motor at selected speeds for agitating and spinning the laundry at selected times during a cycle under the control of the speed control switch **60**, the timer contacts **27** and **28**, and contact **51** of the cycle selection switch **50**.

The cycle selection switch **50** includes contacts **51**, **52**, **53** and **60** interposed between some of the timer contacts and the motor **40**, the agitate solenoid **43** and the hot water inlet solenoid **44**. Switch **50** is a multiposition switch which, in the particular embodiment illustrated herein, is operable to three positions. For a normal washing cycle having a high speed agitate and spin, the contacts of switch **50** are in the conditions shown in FIG. **2**. A normal cycle at low speeds finds contact **51** and **60** closed to the low-speed winding **42** of motor **40**. In the permanent press cycle contact **51** will be closed to winding **42**, contact **60** will be closed to winding **41**, contact **52** will be open so that the agitate solenoid derives operational control from timer contact **31** and contact **53** is open to provide control of the hot water supply solenoid **44** by the timer bypass contact **37** so that hot water is supplied only in the initial wash-agitate segment of the permanent press cycle.

To facilitate a better understanding of how the cooldown portion of the permanent press cycle is provided, reference is taken to FIGS. **2** and **3**, particularly to the schematic representation of the control circuit and the switch contact closures of the timer **20** with respect to machine functions of both the normal and permanent press cycles.

In operation, laundry is deposited in the tub through door **13**, the switch **50** is positioned to select the desired washing cycle, the water temperature switch **21** is operated to close contacts **46** and **47** for the desired water temperature, coins are deposited in slide **23** and it is moved inwardly to rotate the timer through a predetermined portion of a revolution to initiate operation of the machine.

Initial manual indexing of the timer (beginning at the 31st time interval) to the fourth time interval causes closure of program switch contacts **24**, **26**, **27**, **31**, **32** and **37** to place the machine in the wash-agitate portion of the program for both the normal washing cycle and permanent press washing cycle. Contacts **26** and **27** prepare an energizing circuit to the high-speed winding **41** of motor **40**; contact **31** prepares an energizing circuit to the agitate solenoid **43** which operably couples the agitator apparatus of the machine in driving engagement with motor **40**; contact **32** prepares operating circuits for the water inlet solenoids **44** and **45**; and finally contact **24**, the master switch, provides electrical power to the machine components from input terminals L1 and L2.

The permanent press washing cycle and the normal washing cycle are identical, wash-agitate, up to the 14th timer interval. At this time the machine will continue the wash-agitate segment of the cycle if switch **50** is positioned for a normal washing cycle. For permanent press operation, however, contact **52** of the cycle selection switch **50** is in an open condition placing the agitation solenoid **43** under the control of timer program contact **31**, which is an open during the 14th and 15th timer intervals. Contact **26** is open; however, the pressure switch contact **71** engages the motor section of the circuit thereby providing operating power to the motor **40**, and contact **25** is closed providing operating power to the timer motor **22**. Thus, the motor **40** and the timer motor **22** continue to operate.

The agitate solenoid **43** controls the agitation and pumping operation in the automatic washer. Energization of solenoid **43** engages the agitating apparatus with the driving motor **40**, as hereinbefore described, and further controls the recirculation or discharge of water from the pumping apparatus by operating a control lever of a directional flow control valve to recirculate filtered water to the tub or to drain water from the laundry tub. Energization of solenoid **43** in the 14th interval therefore causes draining of the tub during the 14th and 15th intervals.

The pressure switch **70** resets its contact **71** to the lower position during draining as the lowering water reaches a predetermined level which is selected to provide optimum cooldown while maintaining flotation of the laundry. Attention is invited that timer switch contacts may be provided to add cold water while the pressure switch contacts are closed to the upper side to facilitate additional cooling of the laundry as the pump is in operation, to drain the tub. During the 16th timer interval, contacts **26**, **31**, **33** and **34** close. Contact **26** cannot energize motor **40** since contact **25** is open after the tub has been filled with water the pressure switch **70** returns contact **71** to the upper position. This provides power to the motor **40** via contacts **27** and **60**; contact **31** provides an energizing circuit for the agitate solenoid **43**; and contact **33** provides energizing power to water inlet solenoid **44**. Since contacts **37** and **53** are both open no hot water can be admitted to the tub during this interval.

After the timer indexes to the 17th interval, the normal washing cycle and the permanent press washing cycle become identical and function to sequentially drain, spin, rinse, drain again and again spin the laundry as the timer indexes to the 31st timer interval where the machine turns off upon operation of contact **24**.

It is evident from the schematic diagram of FIG. **2** that the speed control switch contact **60** selects the high-speed winding **41** or low-speed winding **42** of motor **40**. In the permanent press cycle contact **51** of the cycle selection switch is closed to the low-speed winding **42** so that a low-speed spin is obtained upon closure of timer contact **28** at the 19th time interval.

Generally then, there has been described control apparatus for the coin-operated automatic washer, or combination washer-dryer, which provides a permanent press washing cycle in addition to a normal washing cycle. Neither the coin mechanism nor the preset program timer differentiates between the type of washing cycle: the operator simply operates a separate switch for selection of the desired washing cycle. Cycle selection is therefore simple and provides flexibility of the washing machine through a plurality of washing cycles for a variety of fabrics at a minimum manufacturing cost.

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. In a coin-operated automatic washing machine of the type operable through a preset program of washing, draining and spinning periods through the control of a sequential control means, and having temperature selection means coordinated therewith, the improvement comprising

means for modifying the preset program for treating permanent press materials including

manually operable switching means including

a plurality of switch contacts which are connected in circuit with said sequential control means and operable to interpose, between a first waterfill and agitation washing period at a first water temperature and a drain period, an intermediate drain period and an intermediate waterfill and agitation washing period at a lower temperature to prevent setting wrinkles in permanent press material during the first spin period.

2. A control circuit for controlling automatic laundry apparatus of the type having agitation means in a laundry treatment zone and a sequential control means for operation through a single programmed sequence of washing, draining, rinsing and drying periods, said control circuit comprising:

a timer including a plurality of program contacts operable in accordance with said preset program, a timer motor connectable to an electrical supply by way of a first set of said program contacts, said timer being manually operable to initiate said preset program and operable by said timer motor through the remainder of said preset program;

currency-receiving means latching said timer against manual operation and operable to unlatch said timer upon receipt of a predetermined amount of currency;

a washing-liquid-level-sensitive switch;

a motor for driving said agitation means, said motor connectable to an electrical supply by way of second and third sets of said program contacts and said washing-liquid-level-sensitive switch;

means for engaging said agitation means in driving engagement with said motor, said engaging means connectable to an electrical supply by way of fourth and fifth sets of said program contacts and said washing-liquid-level-sensitive switch;

means for supplying washing liquids at different temperatures to said treatment zone and connectable to the electrical supply by way of a sixth set of said program contacts and by way of said washing-liquid-level-sensitive switch; and

cycle switching means including a plurality of cycle selection contacts connected in circuit with said program contacts and their respective controlled elements, said cycle switching means being manually operable to operate said cycle selection contacts in a plurality of combinations to interpose into said single program between the programmed washing and draining cycles, a selected drain cycle followed by a washing cycle at a lower temperature than the programmed washing cycle.

3. The control circuit according to claim **2**, comprising manually operable speed control means connected in circuit with the motor, said second and third sets of said program contacts and the corresponding cycle selection contacts to provide manual selection of motor speed within a washing cycle.

4. The control circuit according to claim **2**, wherein said driving motor includes high- and low-speed windings and said plurality of cycle selection contacts includes a set of contacts

which are operable to transfer electrical power from said second and third sets of said program contacts selectively between high- and low-speed windings of the motor.

5. The control circuit according to claim 2, wherein said fourth and fifth sets of program contacts includes a plurality of contacts which are individually operable at predetermined times during said program and wherein said plurality of cycle selection contacts includes a set of contacts which are operable to selectively control the connection of said plurality of control contacts of said fourth and fifth sets of program contacts to the engaging means for the agitating means.

6. The control circuit according to claim 2, wherein the liquid supply means is of the type which includes means for supplying hot water, means for supplying cold water, and means for preselecting water temperature by controlling the respective amounts of hot and cold water delivered to the receptacle, and in said control circuit said sixth set of program contacts includes contacts individually connected to the respective hot and cold water supply means, and said cycle selection contacts includes contacts connected in circuit with the program contacts associated with one of the water supply means for controlling the water supplied to the treatment zone in accordance with the selected cycle.