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CONTROL FOR AUTOMATIC WASHING MACHINES

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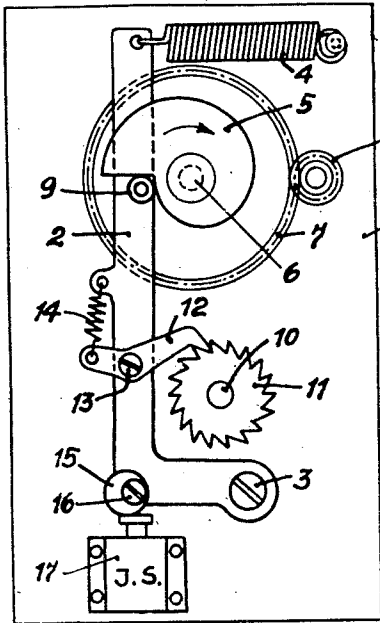


Fig. 1

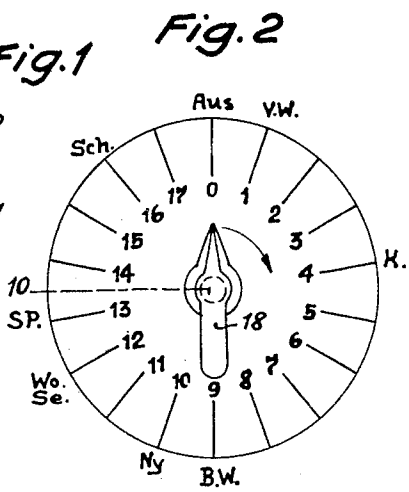
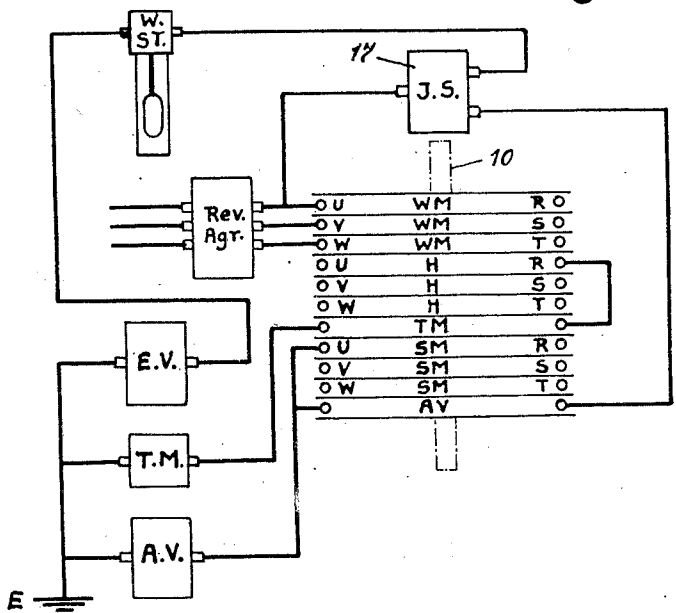


Fig. 2

Fig. 3



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CONTROL FOR AUTOMATIC WASHING MACHINES

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2 Claims. (Cl. 161—1)

In the devices which have become known, e. g. timers for fully automatic washing machines, contactors are used for the control of the heating elements, washing and swing motors. The use of contactors makes the switching device for the automatic process complicated and expensive.

The object of the present invention is to provide a device for the direct switching of polyphase A. C., in particular for use in washing machines with heating arrangement and A. C. motors. In this invention, a rotating multipole-switch for the entire load for heating and A. C. motors and an impulse switch for the control of the water inlet and outlet cocks are actuated by a mechanical indexing device. This device is operated by a cam disc rotating in any desired interval of time, driven by a motor and working against a spring. Before the rotating switch indexes to the next station, the impulse is transmitted to the group of switches of the rotating switch, which actuates the various functions of the process according to its actual position.

The drawing shows diagrammatically an example of a design of the object of the present invention, with a diagram of connections.

Fig. 1 shows a plan view of the automatic indexing device, with the indexing lever in the released position, immediately after the barrel switch has been indexed forward to a station,

Fig. 2 shows a plan view of the switch dial, with the knob of the barrel switch,

Fig. 3 shows the appropriate wiring diagram of a fully automatic washing machine.

The arrangement shown here, also called a timer, for the direct switching of polyphase A. C. comprises an indexing device which employs purely mechanical means and is assembled on a base plate 1 fixed immediately above the barrel switch inside the casing of the washing machine. The device is provided with an indexing lever 2, shaped like a hook and pivoting on a pin 3. The lever 2 is pulled by a spring 4, fixed to the free end of the lever, against a cam disc 5. The cam disc 5 is fixed to a shaft 6, and to which is also fixed a gear wheel 7. The gear wheel 7 meshes with a pinion 8, driven over reduction gearing by a timer motor "TM," e. g. by a synchronous motor. The indexing lever 2 presses a follower-roller 9 against the cam disc 5. The follower-roller is supported on a bolt through the lever 2. 10 denotes the shaft of a rotating barrel switch, to which an indexing ratchet wheel 11 with 18 teeth is fixed. The indexing ratchet 11 engages with a pawl 12, supported on a pin 13 of the indexing lever 2. The pawl 12 is pressed by a spring 14 against the indexing ratchet wheel 11. An eccentric cam 15 is supported on a bolt 16 at the knee of the hook-shaped indexing lever 2, so that the eccentric cam 15 can be turned and set to any position. The eccentric cam 15 functions as the actuating device for an impulse switch 17 ("J. S.") mounted on the base plate 1. The shaft 10 of the rotating barrel switch is taken through the casing of the washing machine and is provided outside the wall of the

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casing with the knob 18, which enables the barrel switch to be turned through 18 indexing stations. This will keep the single switches "T. M" and "AV" or the groups of switches "WM," "H" or "S" open or closed for short or long intervals, according to the shape and angular position of the switching cams of the shaft 10 of the barrel switch. Through the closed switches or groups of switches the current impulses of the impulse switch can be admitted to the switches "EV"—water inlet, "TM" timer motor and "AV"—outlet cock. Although the current impulses of the impulse switch 17 "JS" are emitted once during each straining motion of the indexing lever 2, they can be transmitted only through the closed switches or groups of switches of the barrel switch, so that a transmission is possible only in definite positions of the barrel switch through the group of switches.

The timer motor for the drive of the indexing device for the automatic indexing of the barrel switch can be switched on by turning the knob 18 (Fig. 2) from the position "0" to "1." At this point the cam disc 5 begins to rotate slowly and the indexing lever 2 is strained. During this phase the impulse switch 17 is closed, sooner or later, according to the position of the eccentric cam 15. At the end of the straining movement the indexing lever 2 drops at a high speed into its starting position, owing to the discontinuity of the spiral-shaped profile of the cam disc and to the strong pull of the spring 4 (Fig. 1). This return motion opens the impulse switch again and at the same time the indexing pawl 12 moves the shaft 10 of the barrel switch by one tooth of the indexing ratchet wheel 11 into position "2." Now again the indexing lever 2 slowly stretches its return-spring, closing the impulse switch 17 again, until the indexing lever finally drops back, opening the impulse switch and indexing the barrel switch forward into position "3." In this manner the actuations of the indexing device are automatically repeated until the switch has run through the 18 indexing stations in accordance with the number of indexing teeth, until it arrives again in the "0" position, when the timer motor is switched off, so that the automatic indexing device is stopped.

The working process is fully automatic, and it is determined by the shape and the relative angular positions of the switching cams on the shaft 10 of the barrel switch. The sequence of the various operations in the process is easily explained with the aid of the illustrations in Figs. 2 and 3. After the things which have to be washed, have been placed in the machine, the knob 18 is turned from "0" to "1," so that the washing machine is started, i. e. the washing motor, controlled by the three upper switches "WM" and the heating, controlled by three further switches "H" and the timer motor, controlled by the switch "TM," are started. The timer motor drives the automatic indexing device. During the outward movement of the indexing lever 2 the impulse switch 17 "JS" is closed. In this case the current impulse is transmitted through the water level switch "Wst" and the groups of switches to the switch EV for the water inlet cock, so that the water inlet is opened. The position "1" is designated by the letters "VW," "preliminary washing." By the opening of the water inlet cock the amount of detergent required for the preliminary washing is introduced into the tub. When the tub has been filled up with fresh water, the water level switch "Wst" interrupts the current impulse to the switch of the inlet cock, so that the water inlet cock closes. When the indexing lever 2 is in the fully strained position, the impulse switch is opened again and, at the same time, the barrel switch is indexed forward to position "2." When the barrel switch has reached position "3," the impulse switch will open the water outlet cock "AV" and then close it again. In position "4" the tub is filled again with fresh water by the action of a current impulse on the inlet cock, at the same time the

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detergent required for the boiling is admitted. When colored garments are to be washed, the knob is turned by hand, when it has reached position "BW," to position "13," rinsing ("SP") so that the heating is automatically switched off. With the next current impulse the water outlet cock "AV" will be opened and closed again, and when position "14" is reached, the tub is filled by the next current impulse, over the switch "EV" of the water inlet cock, with fresh water. When position "16" has been reached the washing motor "WM" is switched off and the swing motor "SM" is switched on. At the same time, the water outlet is opened by the next current impulse over from the impulse switch over the group of switches, and closed again after the tub has been emptied. The swinging-out of the washing is finished when position "0" has been reached; in this position all switches are switched off.

While the invention has been described in detail with respect to a now preferred example and embodiment of the invention it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended, therefore, to cover all such changes and modifications in the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A control system for electrical washing machine apparatus having a definite number of different circuit connections to be established in predetermined sequence whereby closure of each circuit connection controls actuation of a different operation of a plurality of successive operations of a washing machine, comprising: a stepping switch having an initial open circuited position and a number of subsequent circuit-controlling step positions, manually operable means for stepping said switch from said initial position to a first step position to close a circuit through a timer motor, mechanical stepping means controlled by said motor for stepping said switch

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through its successive circuit controlling positions as said motor rotates, at a rate determined by the speed of the motor, an impulse switch, mechanical actuating means operated by said motor for closing and opening said impulse switch once during each step of said stepping switch, circuit connections established through said impulse switch alone and other circuit connections established through said impulse switch in series with said stepping switch at predetermined positions of said switch to perform varied washing machine operations, and further circuit connections established through said stepping switch alone at predetermined positions of said switch to perform other washing machine operations, and means for opening all said circuits, including the timer motor circuit, when said stepping switch returns to its initial position, said stepping switch comprising a rotary multipole switch having a central shaft, said means for stepping the switch comprising a ratchet wheel fixed to said shaft, an oscillatory pivoted member carrying a pawl engageable with said ratchet wheel to step said wheel on successive oscillations of said pivoted member, a cam follower on said oscillatory pivoted member, and a cam driven by said timer motor against said cam follower for oscillating said pivoted member as the timer motor revolves, said means for opening and closing the impulse switch comprising an adjustable actuator on said oscillatory pivoted member for closing said switch during an adjustable portion of the oscillation of said pivoted member.

2. The invention according to claim 1, said adjustable actuator comprising an adjustable cam, and a cam follower fixed to said impulse switch.

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