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AUTOMATIC CYCLE-CONTROL MECHANISM FOR WASHING MACHINES

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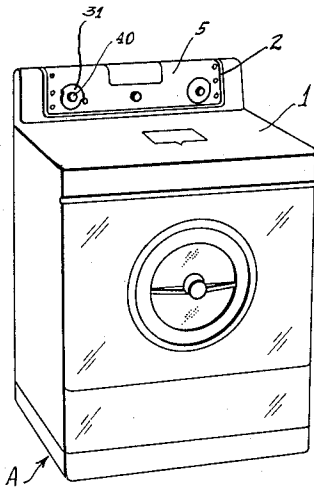


FIG. 1.

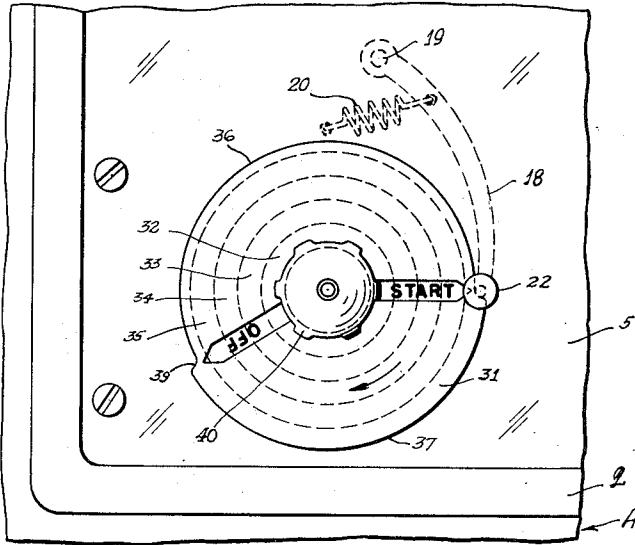


FIG. 2.

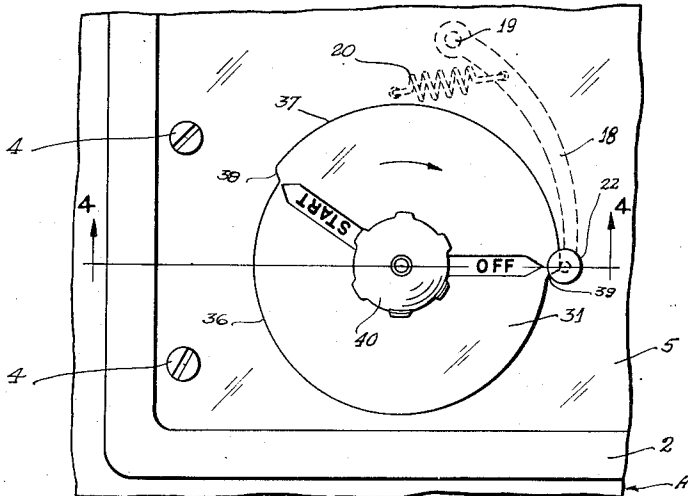


FIG. 3.

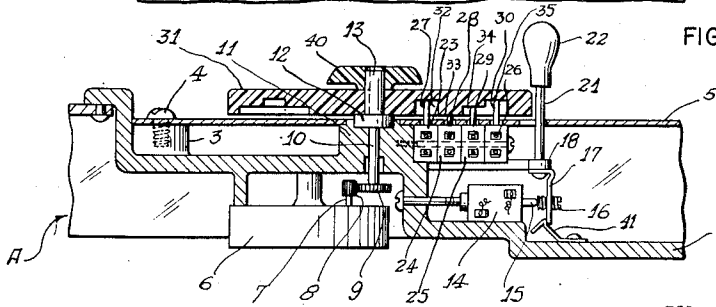


FIG. 4.

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AUTOMATIC CYCLE-CONTROL MECHANISM FOR WASHING MACHINES

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4 Claims. (Cl. 200—37)

This invention relates in general to certain new and useful improvements in automatic washing machines and, more particularly, to a removable fully automatic cycle-control mechanism for establishing a standardized sequence of operation for the washing machine with which it is associated.

Automatic washing machines of the type presently available embody timers which consist essentially of a series of cams mounted on a shaft turned by a synchronous electric motor having a fixed speed. The cams control the several successive operations of the machine, such as the soaking, washing, emptying, rinsing, and drying cycles. Ordinarily, a machine of the so-called automatic type will follow an established pattern of operations in successive order and for periods of time established by the relationship of the several cams. Thus, for each automatic washing cycle, a soaking period of a certain established duration is followed by a washing period of another established duration and the washing period is, in turn, followed by a draining period, a rinsing period, a spin-dry period, and several other successive rinsing and drying periods, all of established duration. These time periods are factory-set and can be varied only by manual adjustment of the timer control to shorten or skip any particular period. The usual household washing machine, therefore, is automatic only for one factory-established cycle, and such cycle is a compromise designed for washing cotton fabrics. Such cycles, however, are not suitable for woolens, heavy blankets, sheer materials and synthetic fabrics, such as nylon, Dacron, Orlon and the like.

In order to wash woolens and other materials, such as nylon, Dacron, Orlon and the like, it is necessary for the housewife to vary the washing cycle by circumventing the automatic operation of the timer control and follow a self-timed cycle by manually operating the timer and thereby following a sequence of operations having periods satisfactory for the particular fabrics being washed. This difficulty is clearly evident from a perusal of the manuals of instructions and other booklets or literature accompanying automatic washing machines. All of these instruction manuals and booklets contain repeatedly emphasized warnings against using the automatically timed cycle on many items, such as woolens and other fabrics. In fact, most of these manuals and booklets list various recommended manually imposed washing cycles for the various so-called "special" fabrics. Actually, there is nothing particular special about these various fabrics from the laundering point of view. They merely require washing cycles particularly suitable to the physical characteristics of the fiber involved. Practically any of these materials can readily be washed if the housewife is willing to stand over her machine and control the duration of the various washing and rinsing operations by manually operating the timer.

It is, therefore, the primary object of the present invention to provide an automatic timer mechanism for washing machines which can readily be modified in a

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simple and efficient manner to establish any desired sequence of washing operation and cause the washing machine to follow such sequence of operation automatically and without manual control.

It is a further object of the present invention to provide an automatic washing machine timer of the type stated which is capable of receiving a series of interchangeable disks, each of which will cause the machine to follow some established or desired sequence of washing and rinsing operations.

More particularly, it is the object of the present invention to provide a timing device for automatic washing machines capable of receiving a series of interchangeable disks, each of which is equipped with a plurality of annular cam grooves acting upon a series of switch plungers or other control elements to establish or control the sequence of operations of the washing machine.

With the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawing (one sheet)—

Figure 1 is a perspective view of an automatic washing machine equipped with a timing mechanism constructed in accordance with and embodying the present invention;

Figure 2 is a top plan view of the timing mechanism in its starting position;

Figure 3 is a top plan view of the timing mechanism in its final or "off" position; and

Figure 4 is a transverse sectional view taken along line 4—4 of Figure 3.

Referring now in more detail and by reference characters to the drawing, which illustrates a preferred embodiment of the present invention, A designates an automatic washing machine comprising the conventional rectangular housing in which the tumbling cylinder or other washing mechanism is located. Inasmuch as the present invention does not relate in any way to the particular type of washing mechanism employed, this mechanism is not illustrated or shown in detail.

The washing machine A is preferably provided at the rear portion of its top panel 1 with an upstanding control panel 2, which may be die-cast from an aluminum alloy or molded from a synthetic resin, as desired. The control panel 2 is provided around its margins with a plurality of bosses 3 for receiving screws 4, which, in turn, secure a thin decorative face panel 5. Rigidly mounted upon the under face of the panel 2 is an electric timer motor 6 preferably of the synchronous type having a drive shaft 7 extending outwardly therefrom and provided on its end with a driving pinion 8, which meshes with a driven pinion 9, which is keyed, pinned, or otherwise rigidly fastened to the inner end of the timer shaft 10, the latter being suitably journaled in, and extending through, an enlarged journal boss 11 formed integrally in the panel 2. At its outer end, the timer shaft 10 is provided with a diametrically enlarged collar 12 and an outwardly projecting axially slotted end portion 13.

Also rigidly mounted upon the panel 2, in laterally spaced relation to the timer shaft 10, is a main switch 14 having an outwardly projecting operating plunger 15, which is substantially radial with respect to the timer shaft 10 and bears against an adjustment screw 16 threadedly mounted in a depending leg 17, which is, in turn, rigidly mounted upon the free end of a pivoted actuating arm 18, the latter being rockably supported upon a pivot pin 19, which is in outwardly spaced parallel relation to the timer shaft 10. Hooked or otherwise fastened to the arm 18, intermediate its end, is a tension spring 20, which is, in turn, hooked or otherwise suitably fastened at its other end to the panel 2, so that the arm 18 is resiliently urged inwardly toward the timer shaft

10. Mounted on the free end of the arm 18 is an outwardly projecting rod 21, which is parallel to the timer shaft 10 and is provided at its outer end with a handle 22.

Similarly mounted upon the panel 2, in radial relation to the timer shaft 10, are four control switches 23, 24, 25, 26, having outwardly projecting plungers 27, 28, 29, 30, respectively, which are substantially parallel to the timer shaft 10 and extend freely through the face panel 5. The switches 14, 23, 24, 25, 26, are of conventional internal design and are, therefore, not described in particular detail. The switch 14, however, is connected to the main power line of the machine and operates as a main "on" and "off" switch. The switches 23, 24, 25, 26, respectively, control sequence operations, such as the rinsing cycle, washing cycle, drying cycle, and so on. Such switches may be conventionally connected through solenoid valves and relays (not shown) to the various operating components of the machine controlled thereby.

Removably mounted upon the end portion 13 of the shaft 10, by means of a key or tongue which fits into the slots thereof, is a timing disk 31 molded of some suitable synthetic resin, such as Bakelite or the like and provided upon its under face with a series of concentric annular cam grooves 32, 33, 34, 35, respectively located for operative engagement with the switch plungers 27, 28, 29, 30. The outer peripheral margin of the disk 31 is also provided with cam surfaces 36, 37, connected by cam risers or shoulders 38, 39, for operatively bearing against the rod 21. The disk 31 is removably held in place upon the end portion 13 of the timer shaft 10 by means of a knob 40, which is friction-fitted or otherwise releasably held in place.

The annular cam grooves 32, 33, 34, 35, have a sequence of risers and dwells which will cause the several switch plungers 27, 28, 29, 30, to shift up and down as the disk 31 is rotated by operation of the timer motor 6 and timer shaft 10 through engagement of the gears 8, 9. It will, of course, be understood that a series of different disks 31, having various different arrangements of risers and dwells in the annular cam grooves 32, 33, 34, 35, can be supplied to establish practically any desired sequence of washing operation and the housewife can, therefore, employ any desired automatic sequence of washing operations by simply interchanging the various disks 31. Thus, a disk 31 can be provided which will establish a washing cycle accurately suitable for washing cotton fabrics and another disk 31 having a washing cycle suitable for woolens. Other disks 31 having washing cycles for various synthetic fabrics can also be supplied. The housewife may then simply interchange the disks 31, depending upon what type of fabric she may desire to wash in the washing machine A.

The "on" and "off" operations are controlled by the arm 18, which is shifted inwardly and outwardly as the disk 31 rotates. In order to change the disk 31, the handle 22 is pushed outwardly until the lower end of the leg 17 engages a spring detent or catch 41, which serves to hold the arm outwardly away from the disk 31, as shown in Figure 4, so that the latter may be removed and replaced. Ordinarily, the disk 31 will complete a full cycle each time the machine is started, but if for any reason resetting back to "start" should be necessary, the disk 31 may be reset to "start" position by pushing the arm 18 out to restrained position where it is engaged by the catch 41 and merely lifting the timer shaft 10 and its associated elements until the pinions 8, 9, are disengaged. This can be accomplished simply by grasping the knob 40 and lifting the entire structure until the pinions 8, 9, are free of each other. Thereupon, the knob 40 and disk 31, together with the timer shaft 10, can be rotated until the disk 31 is in "start" position, as shown in Figure 2. Thereupon, the arm 18 can be manually pushed inwardly until disengaged from the detent or catch 41, whereupon, it will be urged inwardly

by the spring 20 until the rod 21 bears against the cam-edge 36 of the disk 31. In this latter position, the contact screw 16 will bear against the plunger 15 and force it inwardly, closing the circuit to the switch 14 and energizing the various components of the washing machine A, including the timer motor 6, which will then commence rotation. As the timer motor 6 rotates, it will drive the timer shaft 10 and the disk 31 carried thereby, and the rotation of the disk 31 will, in turn, operate the several switches 23, 24, 25, 26, to cause the washing machine A to perform its various washing operations in the particular sequence established by the pattern of the camming grooves 32, 33, 34, 35.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the automatic cycle-control mechanism for washing machines may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

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

1. A timer for automatic washing machines and the like, said timer comprising a timing motor, a timing shaft operatively connected thereto, a plurality of switches mounted in proximity to said shaft, each of said switches having an actuating plunger extending outwardly therefrom in spaced parallel relation to the shaft, said plungers being respectively located at different radial distances from the timing shaft, a plate interchangeably mounted on the shaft for rotation therewith, said plate being of such shape and size as to cover completely the upstanding ends of the plungers, said plate having a flat under face which is substantially perpendicular to the shaft, said plate being provided upon its under face with a plurality of concentrically spaced annular grooves having cam surfaces therein, each of which is actuatingly engaged with one of said plungers and a knob detachably mounted on the outer end of the shaft for detachably holding the plate upon the shaft for rotation therewith.

2. A timer for automatic washing machines and the like, said timer comprising a constant speed motor, a timer shaft operably driven by the motor and projecting outwardly therefrom, a plurality of switches mounted adjacent to the timer shaft and in spaced relation to each other, each switch being provided with spring biased actuating means which is operable in a direction parallel to the timer shaft, the several actuating means being located at different radial distances outwardly from the timer shaft, a plate covering the switch actuating means, said plate having a flat under face and a smooth peripheral edge, said plate being removably mounted on the timer shaft, means for detachably holding the plate on the shaft, a series of spaced cam surfaces formed upon the flat under face of the plate, each of which is located for operative engagement with a different one of the switch plungers for actuating said switch plunger as the plate rotates with the shaft, and a main switch also mounted adjacent to the shaft, said main switch being provided with switch actuating means bearing against a cam surface formed around the peripheral edge of said plate.

3. A timer for automatic washing machines and the like, said timer comprising a timing motor, a timing shaft operatively connected thereto, a plurality of switch means mounted in proximity to said shaft, each of said means having an actuating plunger extending outwardly therefrom, and a plate removably mounted on the shaft for rotation therewith, said plate being provided upon its under face with a plurality of concentrically spaced annular grooves having bottom faces provided with axially depressed cam surfaces, each of said plungers being respectively disposed endwise within one of such grooves with its end face abuttingly engaged against the cam surface thereof.

4. A timer for automatic washing machines and the

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like, said timer consisting of a housing at least one wall of which is exposed so as to be accessible to the user, a timer shaft journaled in the housing and having one end projecting outwardly through said accessible wall, a constant speed motor carried by the housing and drivingly connected to the shaft, a plurality of switches mounted in the housing in spaced relation to each other, each of said switches having a plunger-like actuator element which is parallel to the timer shaft and projects shiftably through said accessible wall, the several actuator elements being spaced outwardly from the timer at different radial distances therefrom, a disc slidably mounted on the projecting end of the timer shaft in completely overlying relation to the plungers, said disc having means for engagement with the timer shaft whereby the disc is rotated as the timer shaft rotates, said disc having a flat underface presented toward the accessible wall and being provided on such undersurface with a plurality of radially spaced annular cam surfaces each of which is located

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for operative engagement with a different one of the switch actuating elements for operating said switches in a programmed sequence as the plate rotates with the shaft, and means removably mounted on the outermost end of the shaft outwardly of the disc and switches for releasably holding the disc upon the shaft for rotation therewith.

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