Jan. 29, 1963 J. R. JOHNSTON 3,076,107

TIMER APPARATUS FOR WASHING MACHINE

Filed July 22. 1960 3 Sheets-Sheet 1

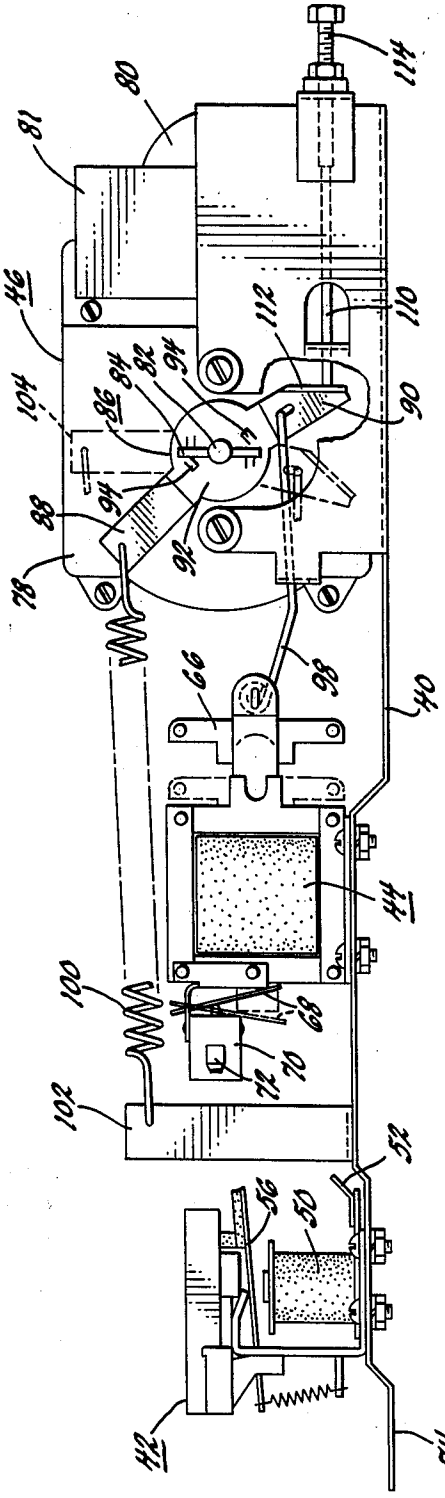


Fig. 2

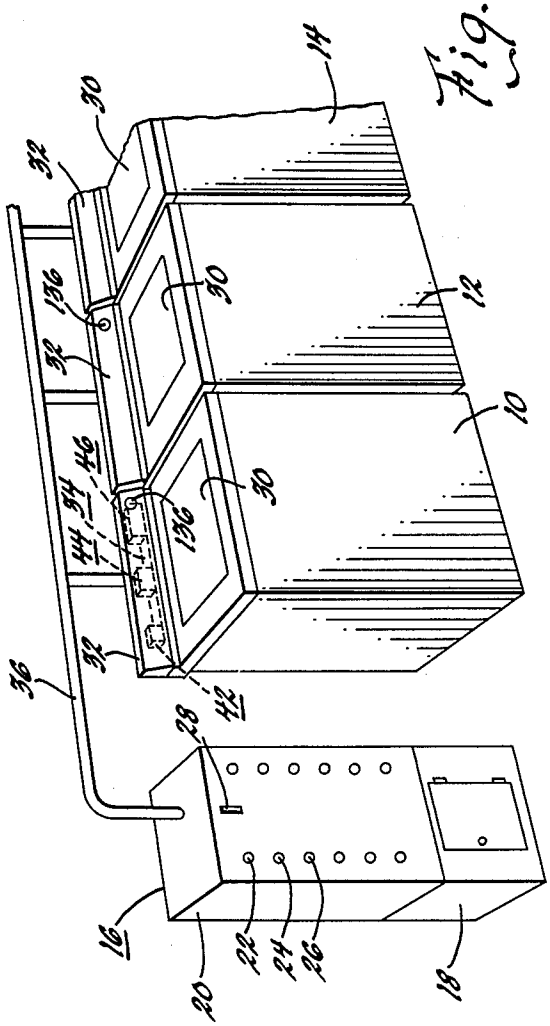


Fig. 1

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TIMER APPARATUS FOR WASHING MACHINE

Filed July 22, 1960 3 Sheets-Sheet 2

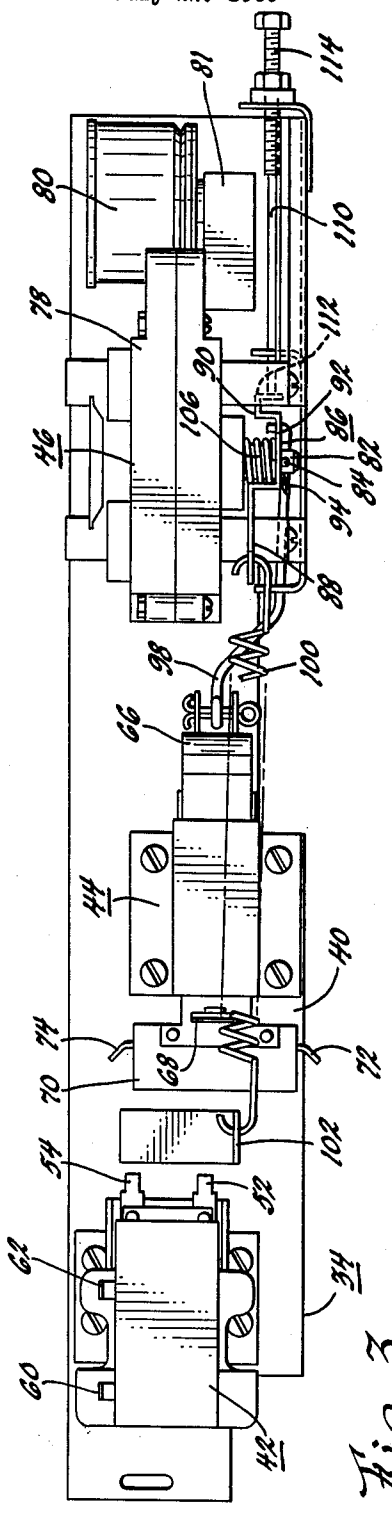


Fig. 3

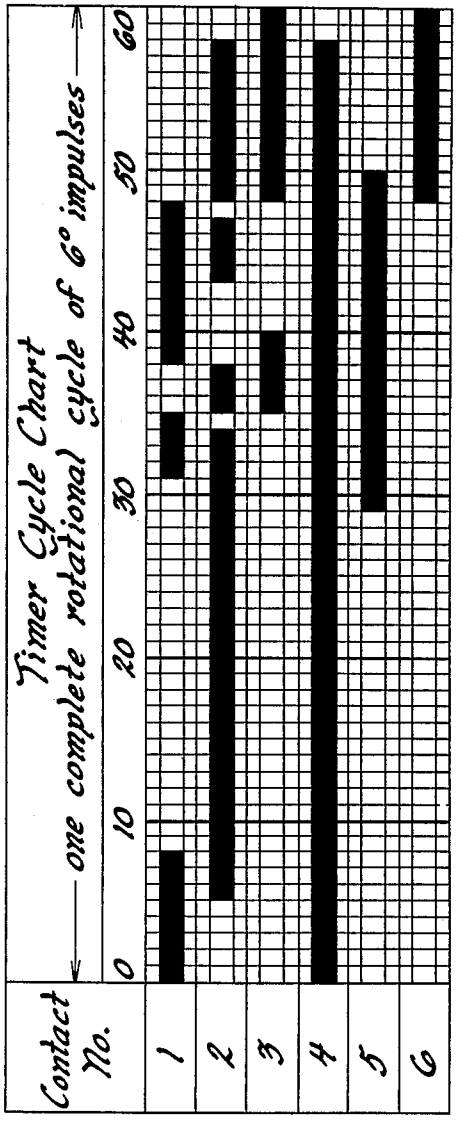


Fig. 5

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TIMER APPARATUS FOR WASHING MACHINE

Filed July 22, 1960 3 Sheets-Sheet 3

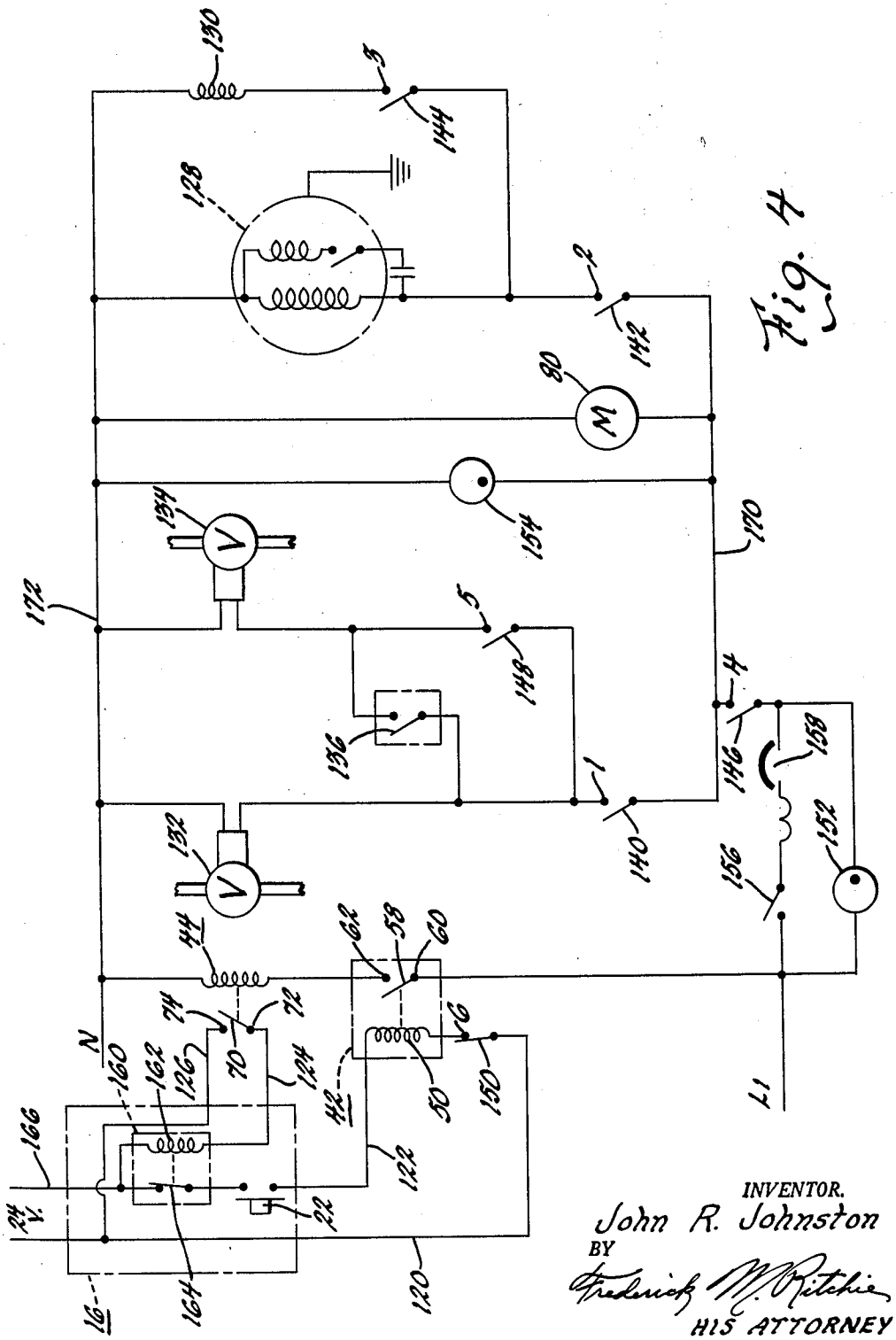


Fig. 4

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3,076,107

TIMER APPARATUS FOR WASHING MACHINE

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Filed July 22, 1960, Ser. No. 44,744
11 Claims. (Cl. 307—141.4)

This invention relates to a domestic appliance and more particularly to an improved control arrangement for commercial clothes washing machines.

The use of heavy duty domestic type clothes washers in commercial establishments has been gaining in popularity. In the prior art washers, coin boxes have been mounted on each of the machines installed in a clothes washing establishment—independent actuation of each machine being thereby provided. However, the provision of separate coin mechanism for each washer has been costly and a means of centralized control of a plurality of clothes washing appliances was developed. But prior central control systems required high voltage interconnecting circuits which actuated the washer timers directly. This invention is directed to a centralized control arrangement wherein a low voltage circuitry is established between a centralized control and the washing machine timers to energize the timers indirectly.

Accordingly, it is an object of this invention to provide an improved timer actuating arrangement for a commercial washer.

It is also an object of this invention to provide a low voltage control arrangement between a centralized control center and a plurality of appliances to be controlled.

It is a further object of this invention to eliminate a line switch in the sequence timer of commercial clothes washing machines.

A more general object of this invention is embodied in the provision of a timer for a commercial washer which is actuated by a centrally controlled spring biasing means.

It is also a general object of this invention to provide a spring loaded start actuation for a timer on a commercial washer.

A still further object of this invention is the provision of an improved operating cycle for a commercial washer to insure that the washer timer is conditioned at the start of final spin for a subsequent washing cycle.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a fragmentary perspective view of a centralized control arrangement for a plurality of commercial clothes washers;

FIGURE 2 is a side elevational view with parts broken away of a timer actuating arrangement in accordance with this invention;

FIGURE 3 is a top elevational view of the timer actuating arrangement shown in FIGURE 2;

FIGURE 4 is a schematic wiring diagram suitable for use with the timer actuating arrangement of this invention; and

FIGURE 5 is a timer cycle chart showing the condition of the contacts illustrated in FIGURE 4 throughout a clothes washing cycle.

In accordance with this invention and with reference to FIGURE 1, a plurality of clothes washers **10**, **12** and **14** are adapted to be initiated in their operation by a centralized control shown generally at **16**. The centralized control is of the type currently being marketed by the Temco Corporation and includes a bottom portion **18** which comprises a safe and an upper portion **20** which includes a plurality of start buttons **22**, **24** and **26** for controlling, respectively, the washers **10**, **12** and **14**. A coin slot **28** is provided which is used by each user of the washing machines to start his particular washer.

In general a user will select one of the machines **10**, **12** or **14**, open a lid such as **30** and deposit his clothes therein. Then he or she may go to the centralized control unit **16** and deposit the required fee in the slot **28**. When this is done, the button corresponding to the washer selected is then depressed and the timer of the selected machine is conditioned for a washing cycle. If the lid **30** of the washer remains open, the progress of the washing cycle is delayed until such lid is closed.

In the prior art devices coin actuating mechanism was attached to each of the washers. This not only required a duplication of equipment, but it also required a special mounting arrangement for the timer and a special console to accommodate the coin equipment. In the present invention a standard domestic washer console or control housing, such as **32**, is provided on the commercial washer and adapted to enclose a timer actuating arrangement shown generally at **34** in dashed line. No unsightly coin mechanisms or protuberances project to the front thereof and the overall appearance of the installation is enhanced. The timer actuating arrangement **34** is interconnected with the centralized control **16** by way of a conduit **36** which houses a plurality of low voltage bell wires depending on the number of clothes washers **10**, **12** or **14** which are to be controlled. Since the wiring interconnecting washer and central control is low voltage wiring, costly installations and inspections are eliminated.

Referring now to FIGURES 2 and 3, a clear and complete description of the washer timer actuating arrangement **34** will be set forth. This timer start arrangement is comprised of an elongated base member or plate **40** on which is mounted a pilot relay **42**, a timer starting solenoid **44** and a timer **46**. The pilot relay **42** is comprised of a low voltage (24 volt) solenoid coil **50** having electrical supply connectors or spades **52**, **54**. The solenoid **50** selectively attracts a spring-biased switch actuator lever **56** to close an enclosed switch blade **58** (FIGURE 4) between low voltage relay connector spades **60**, **62**.

The high voltage (115 volt) timer starting solenoid **44** includes an armature **66** which, when in its withdrawn or solenoid energized position, pushes a pin outwardly to bias a switch actuating lever **68** for a cancel switch blade **70** in the low voltage circuit. The cancel switch **70** includes low voltage connector spades **72** and **74** to which may be fastened low voltage wiring brought to the respective washers from the centralized control **16** by way of the conduit **36**.

The timer **46** is of the heavy duty type used in commercial washer application and includes a housing **78** for enclosing the various cam actuated switches in the washing cycle circuitry and a timer motor **80** for drivably positioning the enclosed cam actuated switches. Projecting out of the timer housing **78** is a rotatable timer shaft **82** which is adapted to be intermittently rotated or pulsed counterclockwise by the action of the timer motor **80** and an escapement or pulsing mechanism **81** of any suitable type which will facilitate the desired rotational impulses. A pin **84** is driven through and press-fitted into a port in the end of the timer shaft **82** and is utilized to drivably rotate the timer shaft from a position wherein the timer motor is deenergized to a position wherein the timer motor is energized and a washing cycle initiated, as will be described more fully hereinafter.

Relatively axially and rotatably movably carried on the timer shaft **82** is a timer actuating link **86** having an upper arm portion **88**, a lower arm portion **90**, and a central

portion 92. A pair of tangs 94 are struck out from the central portion of the lever 86 to provide for one-way drive of the timer shaft 82 through the pin 84. In order to interconnect the armature 66 of the starting solenoid 44 and the lower arm portion 90 of the link 86, a connecting link 98 is provided. It will be seen that the energization or leftward motion of the armature 66 will tend to rotate the timer actuating link 86 in a clockwise direction. Opposing the pull of the armature 66 is a timer start spring 100 fastened at one end to a fixed upstanding bracket 102 on the support base plate 40. The other end of the spring 100 is fastened to the upper arm portion 88 of the timer actuating link 86.

With this arrangement the solenoid 44 will, when energized, rotate the link 86 in a clockwise manner, the tangs 94 camming under the pin 84 until they reach the phantom line position 104 (FIGURE 2). Note that a spring 106 (FIGURE 3) circumscribes the timer shaft 82 to bias the timer actuating link 86 outwardly against the pin 84. Thus, the tangs 94 will be in position drivably to engage the pin 84 when the solenoid 44 is denergized and the stored energy in the stretched spring 100 released to rotate the timer shaft through the pin 84 in a counterclockwise position to the solid line position in FIGURE 2. Note that the timer is not driven by the action of the solenoid armature 66. This solenoid action acts only to store energy in the spring 100 by stretching. The timer 46 is actually energized by the slow, steady and smooth pull of the spring 100 on the actuating link portion 88. This overcomes the prior art problem whereby the repeated shocks of direct solenoid actuation damaged the timers.

With further reference to the structural arrangement shown in FIGURES 2 and 3, it should be noted that the rotational position (solid line) of the actuating link 86 is limited by a threadedly adjustable pin 110 bearing on a turned over flange 112 of the lower arm portion 90 of the actuating link 86. The longitudinal or lateral positioning of the link 110 relative to the base 40 by the adjusting portion 114 limits the amount of rotation to which the spring 100 may subject the actuating link 86 and thus the timer shaft 82. The adjustment at 114 is to regulate the amount of wash water fill for the washer. The further to the right the pin 110, the less the amount of time allotted to the wash water fill period. Since the timer 46 is built with a timed fill the amount of water will be reduced. Moving the pin 110 leftwardly will, of course, increase the fill of wash water at the start of the cycle. This will be understood more clearly in connection with the control cycle to be described next following. Suffice it at this point to say that the adjustment by the threaded portion 114 is made in accordance with water pressure available in various areas to effect the desired water fill.

Turning now to the control circuitry of FIGURE 4, an explanation of the low voltage circuitry will be set forth. The centralized control 16 is set forth in phantom outline and includes reference numerals which correspond to those given the centralized controller in FIGURE 1. Note that low voltage conduits 120, 122, 124 and 126 are the only wires leading from the centralized control 16 to each of the washers, such as 10. All other circuits in FIGURE 4 are embodied in the timer control arrangement 34 at the particular washer. The explanation of the following control circuitry as it applies to the clothes washer 10 is equally applicable to each of the other clothes washers in a multiple installation. For instance, the clothes washer 10 will include a prime mover or motor 128 for actuating an agitating and spinning mechanism. More particularly, a solenoid 130 is used in conjunction with the motor 128 to condition the motor operation for either agitation or spin. The mechanism may be of the type taught in the patent to Clark 2,366,236 issued January 2, 1945. The washer components will also include a hot water solenoid valve 132, a cold water solenoid valve 134, and a wash selector switch 136 which may be positioned in an open condition to secure a hot water fill and in a closed condition for a warm water fill. The timer motor 80 is included in the circuitry and adapted to position a plurality of timer switches, such as 140 on a timer contact 1, switch 142 on a timer contact 2, switch 144 on a timer contact 3, timer switch 146 on a timer contact 4, a switch 148 on a timer contact 5, and a timer switch 150 on a timer contact 6. Notice that all of the timer switches 140, 142, 144, 146, 148 and 150 are cam actuated in a conventional manner and such switches and their contacts are embodied in the timer housing 78.

Other circuit components include indicator lamps 152 and 154 which are energized to give visual evidence of clothes washer operation. Still further, for safety reasons the circuitry includes a lid switch 156 and a motor overload protector 158.

In addition to the start button 22 in the remote centralized controller 16, there is housed a cancel relay 160 which includes a solenoid 162 and a normally closed relay switch blade 164. Note that the remote controller 16 is supplied by a 24-volt power supply whereas the washing machine circuitry is supplied by a 115-volt power supply embodying the conductor L_1 and the neutral N.

In operation let us assume that a user enters a commercial laundry establishment and selects the clothes washer 10 for cleaning her clothes. She opens the lid 30 and places the clothing therein along with whatever washing agents are desired. She then moves to the centralized control 16 and deposits the required fee for using the clothes washer. Then she pushes the button such as 22 in accordance with the washer selected. Pushing the button 22 will establish a circuit from the line 166 through the relay switch 164, the push button 22, the line 122, the solenoid 50, the timer switch 150 and the line 120 to the other side of the 24-volt power supply. Instantaneously the solenoid 50 is energized closing the pilot relay switch blade 58 on the contact 62 to establish a 115-volt supply through the timer starting solenoid 44. Also instantaneously, the energization of the solenoid 44 will close the cancel switch blade 70 to energize the low voltage coil 162 in the cancel relay 160. The energization of solenoid 162 will open the switch 164 and the start circuit will be deenergized. However, when the timer starting solenoid 44 is energized, the timer start linkage 86 will be rotated by the link 98 in a clockwise manner—the lanced out tab portions 94 on the link camming under the pin 84 against the bias of the spring 106 until the lanced out tabs snap into position behind the pin 84. As soon as the start circuit is deenergized by the opening of the switch 164, the switch 58 in the washer circuitry is opened and the solenoid 44 is deenergized, thereby permitting the action of the spring 100 to withdraw steadily and easily on the upper extension 88 of the timer actuating link. As the link 86 is drawn in a counterclockwise movement, the pin 84 is biased and the timer shaft 82 rotated from its timer off position at the 58th timer increment mark (see FIGURE 5) to the starting point at the left-hand side of the timer cycle chart. Note that this timer shaft rotation closes the timer contact 4 to condition the washing machine circuitry for energization as soon as the lid 30 of the clothes washer is closed to close the lid switch 156. The timer motor 80 is now energized from L_1 through lid switch 156, the motor overload protector 158, the closed timer switch 146, the line 170, timer motor 80 and line 172 to N. At the same time, the spring manipulation of the timer shaft 82 will close the timer contact 1 to energize the hot water solenoid 132. In addition, if the manually operable water selector switch 136 is closed, the cold water solenoid 134 will also be energized to give a warm wash water fill. The duration of the timed fill will depend on the position of fill adjuster pin 110. For instance, assume that the timer shaft position of FIGURE 2 will cause the timed cycle to begin just at the zero start point of the timer

cycle chart (FIGURE 5). This will produce a full eight timer increments of water fill. Therefore if the pin **110** is moved farther to the right, the spring **100** will rotate the timer shaft **82** through one or more of the fill increments on the cycle chart and the amount of fill will be proportionately reduced.

Note that the timer contact **6** is closed at the beginning of the spin cycle or soon thereafter prior to the opening of timer contact **4**. This will guarantee that the circuitry is conditioned for a subsequent paid cycle even where the user terminates the washing cycle by opening the lid **30** in the middle of the final spin.

It should now be seen that an improved control circuitry has been provided for a plural installation of timer controlled commercial washers wherein a low voltage pulse or signal from a remote control center is utilized in conjunction with a spring-biased actuator to start each timer independently. The adaptation of spring-biased initiation improves over the prior art direct solenoid actuation for timers in that it extends the life of the timer by prohibiting timer damaging shock.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In combination with a washing apparatus operable through a timed sequence of operations, a timer shaft for controlling said apparatus for said sequence of operations, said timer shaft drivably connected to a timer motor and having a shaft actuated timer switch movable between first and second positions for energizing and deenergizing said timer motor respectively, a timer shaft actuating link unidirectionally relatively rotatably mounted on said timer shaft, solenoid means for rotating said actuating link relative to said timer shaft, and spring means operable after said solenoid actuated relative rotation to rotate said timer shaft through said actuating link, said timer shaft thereby actuating said timer switch from said second position to said first position to initiate said timed sequence of operations.

2. In combination with an appliance operable through a timed sequence of operations, a timer shaft for controlling said apparatus during said sequence of operations, said timer shaft being drivably connected to a prime mover and actuatingly connected to a timer switch movable between first and second positions for energizing and deenergizing said prime mover respectively, a timer shaft actuator undirectionally relatively movably connected to said timer shaft, first means for moving said actuator relative to said timer shaft, and second means operable after said relative movement to rotate said timer shaft through said actuator, said timer shaft thereby actuating said timer switch from said second position to said first position to initiate said timed sequence of operations.

3. The combination of claim 2 wherein said second means is conditioned for rotating of said timer shaft when said first means moves said actuator.

4. In combination with an appliance operable through a timed sequence of operations, a timer shaft for controlling said apparatus for said sequence of operations, said timer shaft being drivably connected to a timer motor and having a timer shaft actuated timer switch movable between first and second positions for energizing and deenergizing said timer motor respectively, a timer shaft actuating link connected to said timer shaft and adapted to drivingly disengage said timer shaft when moved in a first direction and to drivingly engage said timer shaft when moved in a second direction, solenoid means for moving said actuating link in said first direction, and spring means operable after said movement of said actuating link in said first direction to move said actuating link in said second direction to rotate said timer shaft, said timer shaft thereby actuating said timer switch from said second position to said first position to initiate said timed sequence of operations.

5. The combination of claim 4 wherein said solenoid means is controlled from a location remote from said appliance.

6. The combination of claim 4 wherein said spring means is conditioned for the movement of said actuating link in said second direction by the movement of said actuating link in said first direction.

7. In combination with a washing apparatus operable through a timed sequence of operations, a timer shaft for controlling said apparatus for said sequence of operations, said timer shaft being drivably connected to a timer motor and having a shaft actuated timer switch movable between first and second positions for energizing and deenergizing said timer motor respectively, a timer shaft actuating link connected to said timer shaft, clutch means between said actuating link and said timer shaft for effecting rotation of said timer shaft in one direction only by said actuating link, solenoid means for rotating said actuating link relative to said timer shaft, and spring means operable after said solenoid actuated relative rotation to rotate said timer shaft by said actuating link, said timer shaft thereby actuating said timer switch from said second position to said first position to initiate said timed sequence of operations.

8. The combination of claim 7 wherein said clutch means includes a pin on said timer shaft and a tang struck out from said actuating link for selectively drivingly engaging said pin to rotate said timer shaft.

9. A timer actuating arrangement comprising an elongated base, a timer on said base having a timer shaft generally perpendicular to the longitudinal axis of said base, said shaft having a pin affixed at right angles thereto and an arm unidirectionally relatively rotatably mounted on said shaft adjacent said pin and axially shiftable along said shaft relative to said pin, said arm having a pair of struck-out tangs movable with said arm between a first and second position, a timer starting solenoid mounted on said base and having an armature connected to one end of said arm, a spring connected between the other end of said arm and said base, whereby the energization of said solenoid rotates said arm and said tangs to said first position to condition said spring for the movement of said timer shaft to said second position by the energy stored in said spring.

10. A washing cycle start control circuit for a commercial washer timer comprising a first and second power source, a timer motor selectively connected to said first power source, a timer starting solenoid selectively connected to said first power source, a pilot relay switch in series with said timer starting solenoid, a pilot relay solenoid for actuating said pilot relay switch, a first timer operated switch in series with said timer motor and said first power source, a second timer operated switch in series with said pilot relay solenoid and said second power source and adapted for closing prior to the opening of said first timer operated switch, and means including said second power source for eletrically energizing said pilot relay solenoid to close said pilot relay switch and electrically energize said timer starting solenoid, thereby to close mechanically said first timer operated switch to electrically energize said timer motor to start said washing cycle.

11. A washing cycle start control circuit for a commercial washer timer comprising a first and second power source, a timer motor selectively connected to said first power source and having a timer shaft, a timer starting solenoid selectively mechanically drivably connected to said timer shaft and selectively electrically connected to said first power source, a pilot relay switch in series with said timer starting solenoid, a pilot relay solenoid for actuating said pilot relay switch, a first timer shaft operated switch in series with said timer motor and said first power source, a second timer shaft operated switch in series

with said pilot relay solenoid and said second power source and adapted for closing prior to the opening of said first timer shaft operated switch, and means including said second power source for electrically energizing said pilot relay solenoid to close said pilot relay switch and electrically energize said timer starting solenoid, thereby to close mechanically said first timer shaft operated switch

to electrically energize said timer motor to start said washing cycle.

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