

Jan. 16, 1962

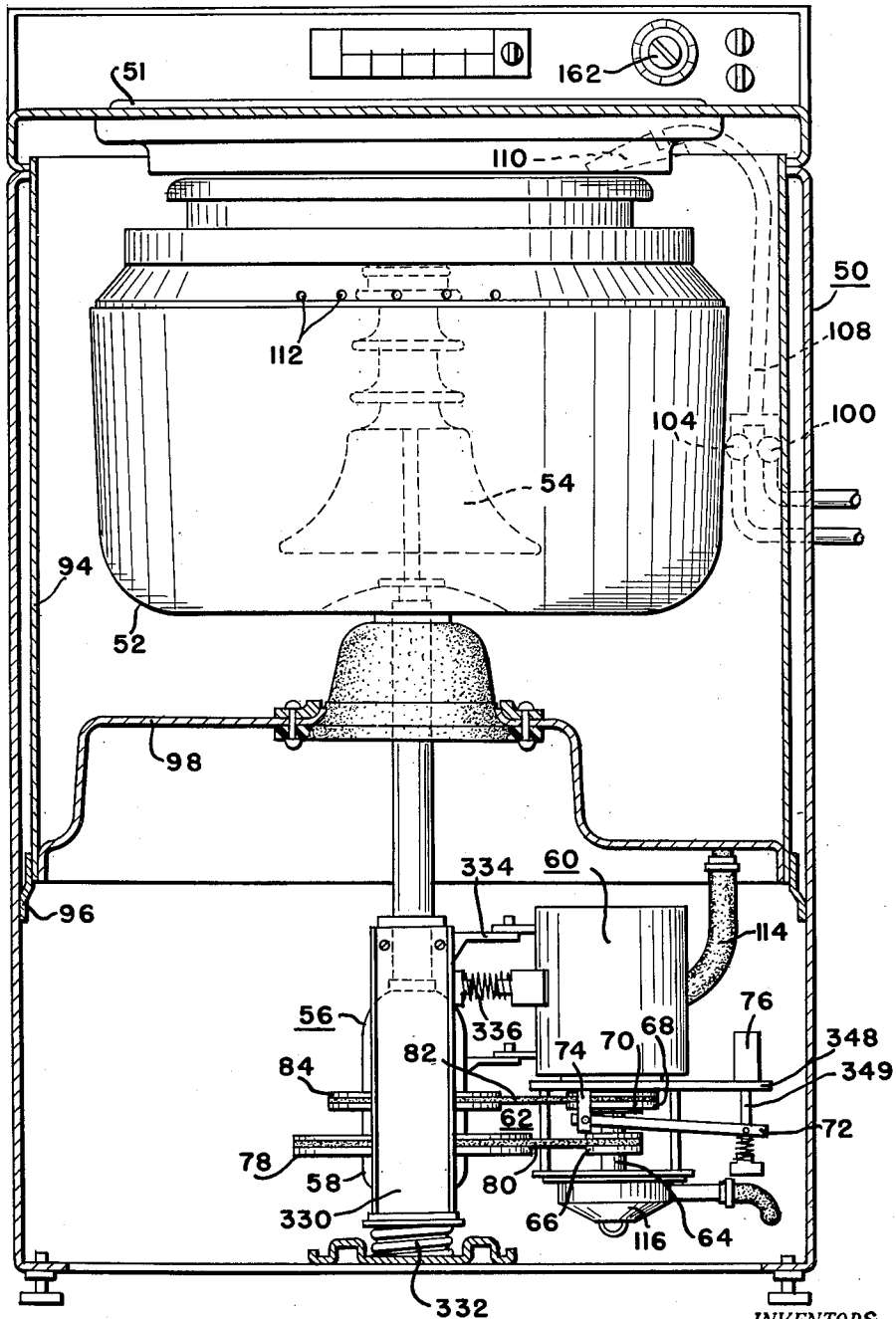
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3,017,030

DOMESTIC APPLIANCE

Filed Jan. 19, 1959

4 Sheets-Sheet 1



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DOMESTIC APPLIANCE

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4 Sheets-Sheet 2

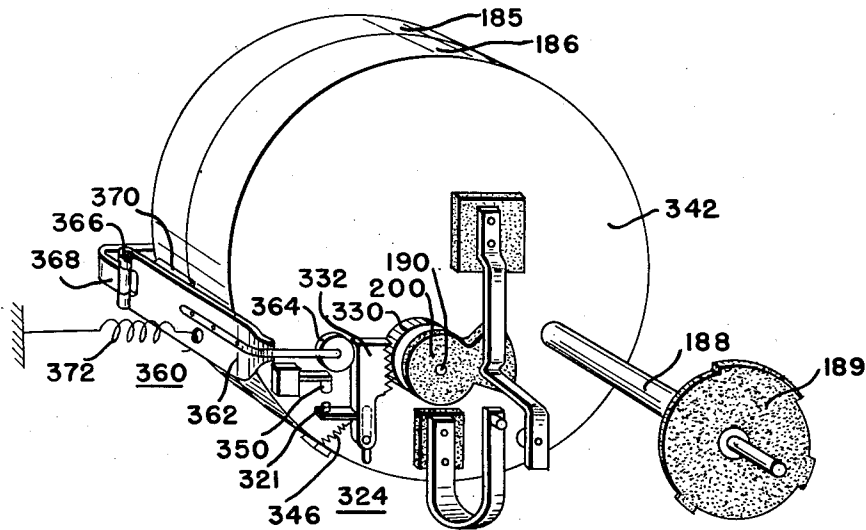


Fig. 2

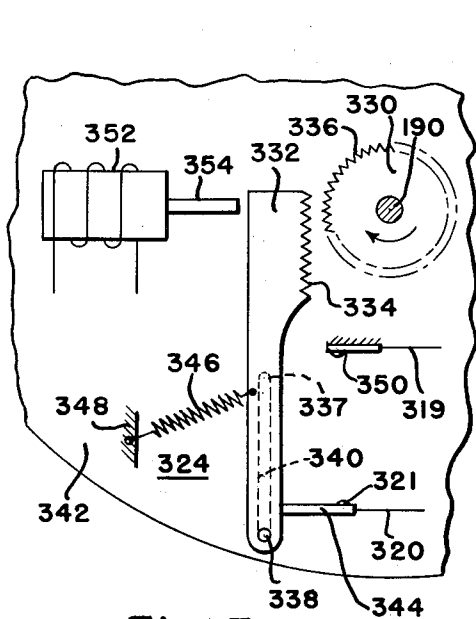


Fig. 3

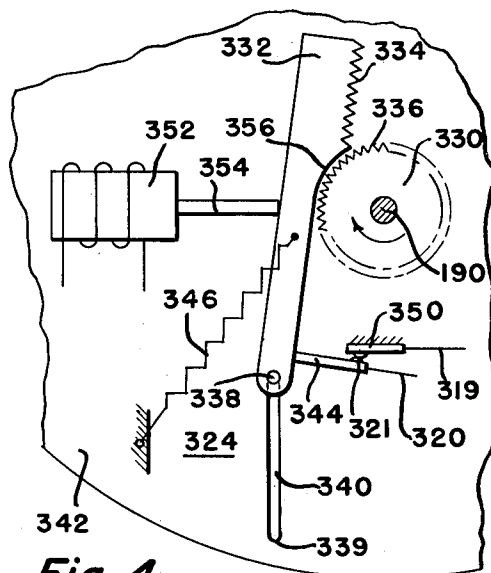


Fig. 4

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4 Sheets-Sheet 3

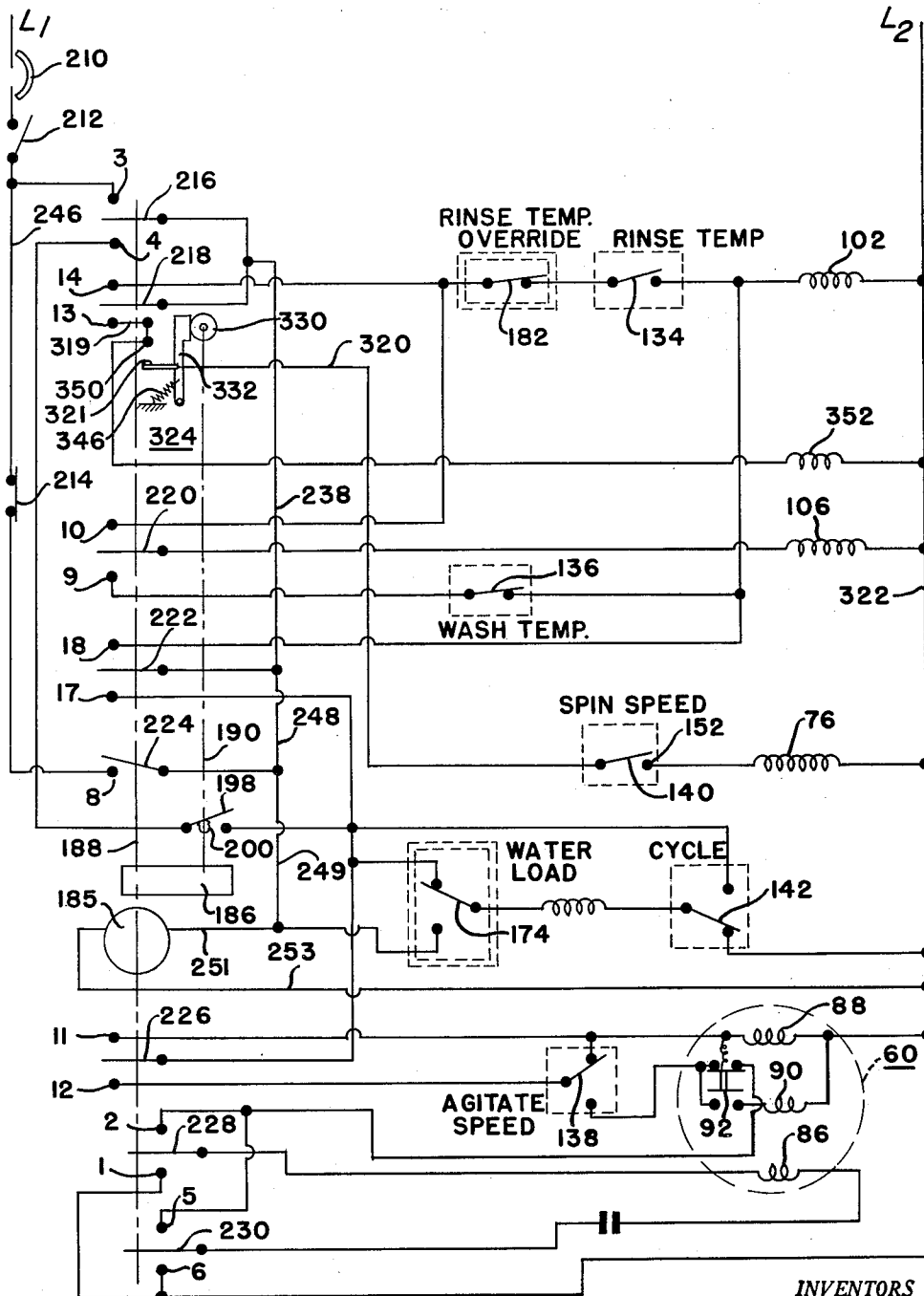


Fig. 5

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4 Sheets-Sheet 4

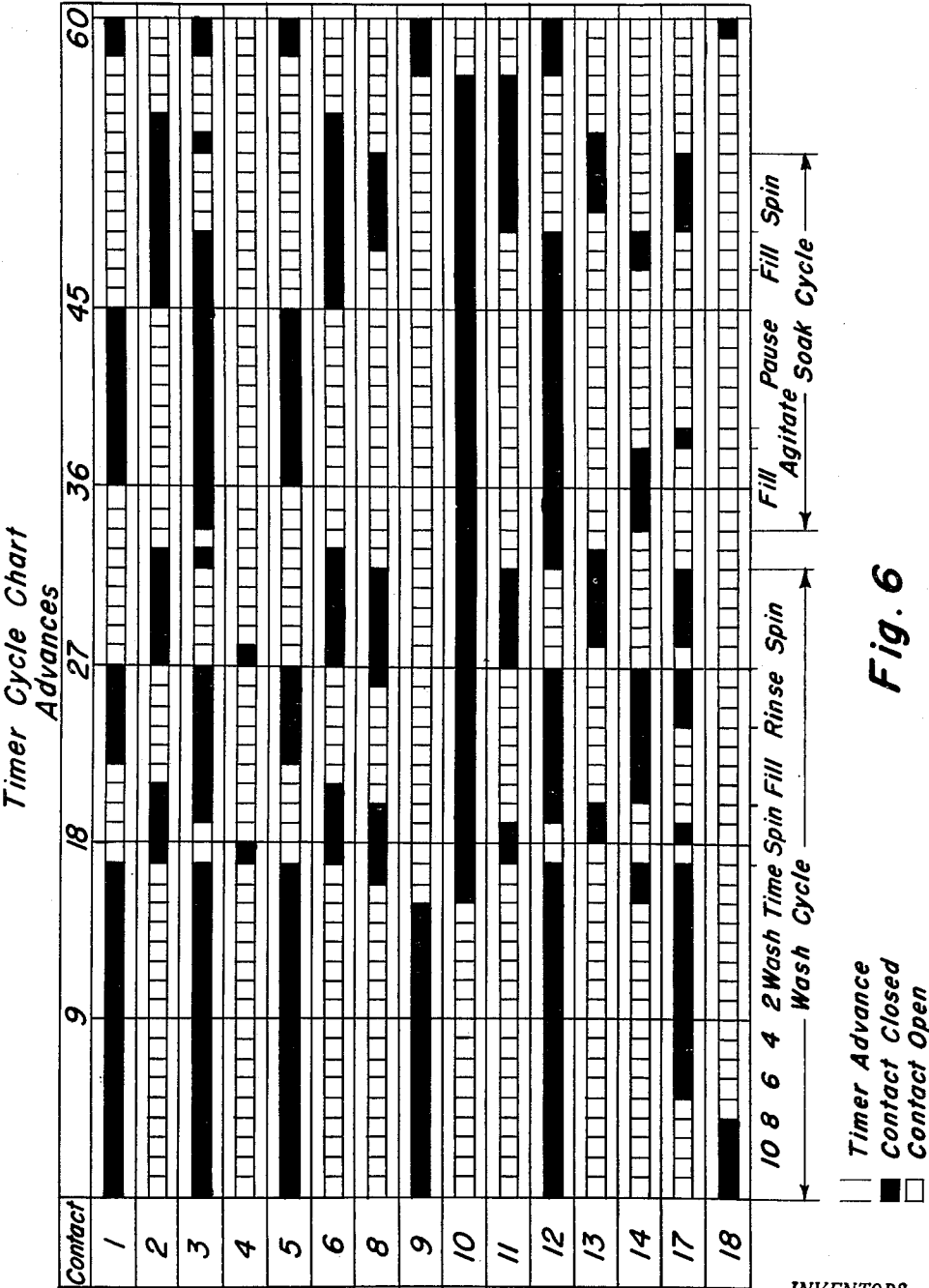


Fig. 6

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1

3,017,030

DOMESTIC APPLIANCE

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Filed Jan. 19, 1959, Ser. No. 787,764

13 Claims. (Cl. 210-138)

This invention relates to a domestic appliance and more particularly to an improved operational cycle for a clothes washing machine.

The advancement of the washing machine art has been directed to multi-speed mechanisms wherein the centrifuging or spinning operation is accomplished at more than one speed and wherein different speed changing or gear ratios are provided to effect the different speeds. Since one motor may be utilized to spin the tub selectively at high and low speeds it is desirable to use a circuit design which will permit the use of a motor which is inexpensive and dependable. The most severe task which the motor is called on to perform is in accelerating the washing machine tub from a standing start to high speed spin, the tub being filled with water and clothing. This job requires motors which need heavier windings and more insulation to effectively accommodate the heat produced in such acceleration. It is the purpose of this invention to overcome this difficulty by preventing an acceleration of the tub and motor from zero to high speed in one operation and by taking advantage of a lower gear ratio during such acceleration from a standing start.

Accordingly it is an object of this invention to provide a control cycle for an automatic washing machine which will prevent the initiation of a high speed spin for a delayed period.

It is a more specific object of this invention to incorporate a predetermined delay in an appliance timer which will be activated automatically whenever the appliance is energized for high speed spin.

It is also an object of this invention to utilize a constant speed cam on a timer to regulate a delay in a circuit selectively energized by said timer.

A more specific object of this invention relates to the use of a constant speed gear in conjunction with a selectively actuated rack for closing a circuit after a predetermined interval.

Also a more specific object of this invention relates to the use of a constant speed gear in a timer in conjunction with a solenoid actuated rack for closing a clothes washer high speed spin circuit a predetermined time after initiation of said high speed spin.

A further object of this invention relates to the utilization of the stray coil magnetism of a timer motor for closing a circuit whenever said motor is energized.

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

In the drawings:

FIGURE 1 is a fragmentary sectional view of a clothes washing machine suitable for use with this invention;

FIGURE 2 is a schematic perspective view of a timer provided with the teachings of this invention;

FIGURE 3 is a fragmentary schematic view of a rack and constant speed timer gear on a timer for controlling an automatic washing machine in accordance with the concepts of this invention, the rack and gear in this view being disengaged to maintain an open high speed spin circuit;

FIGURE 4 is a fragmentary schematic view of the aforementioned rack and constant speed timer gear with the rack and gear engaged to close a high speed spin circuit after a delay;

FIGURE 5 is a schematic wiring diagram for control-

2

ling an automatic washing machine in accordance with the concepts of this invention; and

FIGURE 6 is a timer cycle chart showing the open or closed condition of the identically numbered timer contacts in FIGURE 5.

In accordance with this invention and with reference to FIGURE 1, a clothes washer 50 having a clothes loading door or lid 51 is adapted to include a rotatably mounted spin basket 52 and an agitator 54 therein. An agitating and spinning mechanism, shown generally at 56, is utilized to vertically reciprocate the agitator 54 when a rotatable housing portion 58 is rotated in one direction, and to rotate the spin tub 52 in a centrifuging operation when the housing 58 is rotated in a reverse manner. This agitating and spinning mechanism 56 is more fully taught in the patent to Sisson 2,758,685, issued August 14, 1956, and in a copending application to Sisson S. N. 738,362, filed May 28, 1958, for an improvement to the Sisson mechanism. A prime mover or motor 60 may be a 4-pole, 6-pole, 2-speed reversible motor adapted to rotate selectively the mechanism housing portion 58 through a belt-and-pulley arrangement, shown generally at 62. More specifically, the motor 60 is provided with a shaft 64 on which are relatively rotatably mounted a small agitate/spin drive pulley 66 and a larger spin drive pulley 68. A selector clutch 70 is interposed between pulleys 66 and 68 and keyed against relative rotation to the shaft 64, but with relative axial movement permitted. A yoke 72 is pivoted on a bracket 74 by a high speed spin solenoid 76. When the solenoid 76 is deenergized, the selector clutch 70 is biased downwardly and is effective to transmit rotational motion from shaft 64 to the pulley 66 by means of a dogged engagement therewith. The energization of solenoid 76 lifts yoke 72 and causes clutch 70 to frictionally drive pulley 68.

With the motor in a 6-pole arrangement and thus operating in low speed, the pulley 66 will effect a slow speed agitation by rotating housing 58 through a driven pulley 78 affixed thereto and a V-belt 80. With the motor 60 still energized for low speed operation, but in reversed fashion, the pulley 66 will drive pulley 78 to rotate housing 58 in effecting a slow speed spin of tub 52. Fast reciprocation of agitator 54 is accomplished in a 4-pole motor arrangement for operation of motor 60, still driving housing 58 through pulley 66 with solenoid 76 deenergized. Driving pulley 68 is selected by clutch 70 solely for high speed spin operation when solenoid 76 is energized to lift yoke 72 and engage clutch 70 with driving pulley 68. Thus, a high speed spinning or centrifuging operation is effected by way of motor shaft 64, selector clutch 70, driving pulley 68, V-belt 82 and driven pulley 84. For the purposes of this application, the foregoing description is believed to suffice. However, for a more complete disclosure of the components for this multi-speed driving arrangement, reference may be had to a copending application to Sisson et al. S.N. 738,330, filed May 28, 1958.

The motor 60 is provided with a 4-pole start for phase winding 86, a fast speed 4-pole main winding 88 and a slow speed 6-pole main winding 90 (FIGURE 5). The motor 60 includes also a centrifugal switch 92 operable in conventional manner to drop out the phase winding 86 after the motor 60 has accelerated to a predetermined percentage of the selected running speed.

Surrounding the spin tub 52 and spaced therefrom is a water container 94 mounted to the outer casing of the washing machine 50 by brackets 96. A partition or bulkhead 98 closes the lower open end of the water container 94, thereby to separate in water-tight fashion the water-containing area above partition 98 from the driving mechanism disposed therebelow. Water is supplied to the interior of tub 52 through a hot water valve 100 actuated

by a hot water solenoid 102 and a cold water valve 104 actuated by a cold water solenoid 106 (FIGURES 1 and 5). A mixing conduit 108 carries the tub water fill at a temperature determined by the positioning of water valves 100 and 104 to a water chute 110 overlying the top opening of spin tub 52. The spin tub, in conventional fashion, is provided with a plurality of outlets 112 for exhausting water therefrom during each spinning operation of the tub. A drain conduit 114 selectively removes the water collecting above the partition 98 in accordance with the operation of a pump 116 disposed at the end of and operated by motor shaft 64.

The agitating and spinning mechanism 56 is supported at its lower end by a bracket 330 resiliently snubbed at 332 to the base of the washer 50. The motor 60 is pivoted at one side of the bracket 330 as shown schematically at 334 in FIGURE 1. In order to maintain the tension on belts 80, 82 a compression spring 336 is interposed between the bracket 330 and the motor 60 (at the opposite side of the bracket 330 from the pivot point 334). The pivotal mounting of the motor 60 in conjunction with the spring 336 serves to pivot the motor outwardly. The high speed spin solenoid 76 shown schematically in FIGURE 1 is carried on a motor support bracket 348, its armature 349 extending through the bracket to actuate the yoke 72 and thus the shifter clutch 70 connected thereto.

Reference may now be had to FIGURE 5 wherein a general description will be given for the primary components of the washing machine control circuit schematically there shown. The circuit includes a conventional motor overload switch 210 and a master on/off switch 212. For sequentially controlling the washing cycle a timer shaft 188 is arranged to actuate a plurality of timer switches 216, 218, 220, 222, 224, 226 and motor reversing timer switches 228 and 230 for controlling the direction of rotation of motor 60. A timer motor 185 serves to rotate the shaft 188 in sequentially positioning the timer switches. The wash circuit may include a rinse temperature switch 134 and a rinse temperature override switch 182. Water temperatures may be controlled through a wash temperature selector switch 136 and the water load or quantity of fill is manually controllable through a switch 174. A long or short cycle for the washing machine wherein the timer shaft 188 is pulsed or incrementally rotated at either 40-second or 60-second intervals is programmed by the selective positioning of a cycle switch 142. Either fast or slow agitate for agitator 54 is manually programmed with a switch 138 and the high and low speed spin is controlled by the closed or open position of a spin speed selector switch 140 respectively. The timer cycle chart, FIGURE 6, depicts the open or closed position of the various timer contacts in FIGURE 5 and carries identical numbering for ease of reference. This general description is believed sufficient for a complete understanding of the invention here taught. For additional details as to the operation and function of the various components of this washing machine circuit, reference may be had to a copending application to Sisson et al. 748,412, filed July 14, 1958.

The improved circuit of this invention includes a spin operation which always starts in a low 330 r.p.m. tub spin speed until the second timer pulse interval of the spin cycle. Thus, at the beginning of the spin period which is initiated shortly after the start of the 18th and 28th timer advance, the spin cycle will be initiated at a slow speed of 330 r.p.m. for spinning the tub 52 in removing most of the water therefrom. This one timer interval delay permits most of the water to be spun, from the tub 52 before initiating high speed spin, thereby minimizing the strain on the motor 60. At the 19th and 29th timer advance the timer contact 13 is closed by timer switch 218 to condition the high speed spin circuit for energization and to place the spin speed selector in the circuit, the spin speed being determined by the position-

ing of the spin selector switch blade 140. If closed on fast or high speed spin contact 152, the spin solenoid 76 may be energized to lift the shifter fork 72 and thus the selector clutch 70 into engagement with drive pulley 68, thereby accelerating tub 52 to a fast or 850 r.p.m. spin. Without the energization of solenoid 76, the spin will remain 330 r.p.m., the motor shaft 64 driving pulley 66 through the selector clutch 70 and thus rotating the mechanism housing 58 by way of driven pulley 78. Since the speed change ratio is greater in transmitting power from motor 60 through large pulley 68 to the rotatable housing 58 than through the smaller pulley 66, it would appear desirable to accelerate the tub 52 through the most advantageous ratio, i.e. through pulley 66. This too is accomplished by preceding high speed spin with low speed spin. As aforesaid a more particular description of the prime moving arrangement for rotating the mechanism 56 in either a spin direction or an agitate direction is more fully taught in the copending application S.N. 738,330 cited hereinbefore.

One aspect of this invention is directed to providing an operational cycle which will insure that a high speed spinning operation will be started in or preceded by low speed spin. As seen in the timer cycle chart of FIGURE 6 the timer contact 11 is closed at the beginning of the 18th and 28th timer advance and the motor 60 is energized to effect a low speed spinning operation, the clutch 70 being dogged to pulley 66 and the motor 60 energized for 4-pole operation. One timer advance later or at the beginning of the 19th or 29th timer interval respectively, contact 13 will be closed by timer switch 218 to energize the spin circuit. Under normal operation where the washing cycle is permitted to proceed normally from start to finish the delay of one timer advance is always included to permit the tub 52 to spin first in low speed until most of the water is spun from the tub by means of ports 112. Thereafter, when contact 13 is closed, the spin circuit is energized for high speed spin, the solenoid 76 is energized to lift the clutch 70 into driving engagement with high speed spin pulley 68 and the tub 52 and the clothing therein are spun at high speed. However, there are certain ways in which the operator may avoid this built-in timer delay when the appliance is lacking in the teachings of this case and it is to this possibility that one aspect of the present invention relates.

Without this invention, one situation in which the operator can avoid the one timer advance delay of high speed spin is to open the lid 51 during a high speed tub spin, i.e., when the spin speed selector switch blade 140 is closed on contact 152. When the lid 51 is open, lid switch 214 is also opened. This lid opening will deenergize the motor 60 and cause the tub 52 to coast to a stop. Thus the reclosing of the lid 51 and consequently the lid switch 214 will set up an immediate energization of the prime moving means for high speed spin. With reference to FIGURE 1 high speed spin is accomplished by the energization of solenoid 76 which lifts the clutch 70 by means of yoke 72 into frictional driving engagement with the drive pulley 68. In this fashion driven pulley 84 affixed to the mechanism housing 58 is rotated at high speed thereby imparting a high speed spin to the tub 52. Accelerating tub 52 from zero r.p.m. to 850 r.p.m. imparts severe strain to the motor 60 and requires additional insulation on the windings thereof to offset the added heat loss from such rapid acceleration. This liability is overcome by the teachings of this invention.

Another way in which the user may avoid the high speed spin delay built into the timer cycle is to manually advance the timer by rotating the timer knob 162 and the shaft 188 attached thereto through the 18th or 28th timer advance which is designed into the timer cycle as a high speed spin delay. This rotation of shaft 188 repositions the cam actuated switches 218, 222 and 226 to cause the prime moving means to be energized immediately for high speed spin. The addition of a delay means to the high

speed spin circuit in accordance with the teachings of this invention overcomes both of the aforementioned operational possibilities and insures that a low speed spin will always precede a spin of high speed.

With reference to FIGURE 5 the high speed spin circuit may be described as from L₁, a motor overload switch 210, on/off switch 212, line 246, lid switch 214, timer switch 224, line 248, line 238, timer switch 218, timer contact 13, line 319, line 320, spin speed selector switch blade 140, high speed spin contact 152, high speed spin solenoid 76 and line 322 to L₂. To insure that solenoid 76 will not be energized until the motor 60 is energized first for low speed spin drive through pulley 66, a timed delay device 324 is added to the circuit. This delay provides time for the driving mechanism to rotate the tub 52 in low speed spin before the solenoid 76 is energized. For purposes of clarity low speed spin may be described with reference to FIGURE 1 wherein the deenergization of high speed solenoid 76 permits the dogged engagement of clutch 70 with drive pulley 66, thereby driving the rotatable housing 58 of the agitating and spinning mechanism 56 to effect a low speed spin of the tub 52.

The time delay device 324 is included in the high speed spin circuit for eliminating any possibility of initiating the prime moving means for high speed spin without having first preceded high speed spin with low speed. Of course it should be obvious that the delay features of this invention may be adapted to any timed circuit wherein a delayed circuit closing is desired. Schematic FIGURES 3 and 4 may be referred to with this in mind. The delay device 324 may be incorporated on a timer (FIGURE 2) having a motor portion 185 and an escapement or speed-change mechanism portion 186. In response to the operation of motor 185 and the escapement mechanism 186, the timing or pulsing shaft 188 is caused to pulse or rotate intermittently to position the timer switches 216, 218, 220, 222, 224, 226, 228 and 230 in accordance with the bias of timer cams such as 189 carried on the shaft 188. The escapement mechanism 186 is designed with a second or constant speed shaft 190 which rotates at a predetermined speed so long as the motor 185 is in operation. Thus, we see a timer device wherein a shaft 188 is pulsed or rotated incrementally at predetermined intervals while a shaft 190 is rotated continuously at a predetermined rate of speed in synchronization with the movement of shaft 188. As set forth more particularly in the copending application 748,412, the constant-speed shaft 190 may carry a cam 200 for performing another circuit function such as reversing the motor 60 in a time interval less than one timer advance as explained more fully in the just cited copending application.

In accordance with the concepts of this invention the constant-speed shaft 190 is provided also with a gear or pinion 330 attached to the shaft 190 and rotating therewith. Cooperating with the gear 330 and in coplanar relationship thereto is a rack element 332. The rack 332 is formed with teeth 334 which mate with teeth 336 on gear 330. At the end of the rack 332 opposite the teeth 336 a pin 338 is carried and adapted to pivot and slide axially within a groove or slot 340 in a wall 342 of the timer. The rack element 332 carries also in fixed relationship thereto a contact arm 344 which moves with the rack 332. It may now be seen that rack 332 is able to pivot on the rack affixed pin 338 which also may slide in slot 340 to an upper end 337 and a lower end 339. A spring 346 is attached at one end to the rack 332 and at its opposite end to any fixed surface such as 348. The spring 346 is effective to bias the rack 332 in two directions—away from the gear 330 and downwardly so that pin 338 returns to the bottom 339 of slot 340. Since the purpose of this invention is to close a circuit after a predetermined period, the rack carried arm 344 has a contact 321 which is arranged to meet a fixed contact 350 when the rack 332 is raised. In order to engage the rack

element 332 with the constantly rotating gear 330, a solenoid 352 may be utilized. The solenoid 352 includes an armature 354 which is extended selectively to push the rack 332 into engagement with the gear 330. With the solenoid 352 energized and the gear 330 in rotation the rack 332 will be lifted to close a circuit between contacts 321 and 350.

The design of the gear 330 and the rack element 332 may be such as to program any predetermined delay into a circuit connected through contacts 350 and 321. Specifically, let us assume the gear 330 is rotating at a given speed and that a desired operation depends on the completion of a circuit through contacts 321 and 350. All that need be done in this instance is to energize the solenoid 352 which will force the rack 332 and the teeth 334 thereof into engagement with teeth 336 of gear 330. The rotation of the gear 330 will cause the rack 332 to rise and thereby bring the contact 321 into engagement with the contact 350. At the instant of such contact a circuit will be completed. Any desired delay may be built into such circuit simply through the selective design of the rack 332 and the gear 330 and the speed of rotation for the gear 330. FIGURE 4 may be referred to as an illustration of a completed circuit through contacts 321 and 350 with the solenoid 352 energized. It may be seen that the rack element 332 is formed with a curved portion 356 complementary to the outer periphery of the gear 330. With the rack 332 in the position of FIGURE 4 the gear 330 merely continues to rotate without altering the position of the rack 332 or the contacts 321 and 350. At this point the spring 346 is extended and will serve to return the rack 332 to its lower position with pin 338 at the bottom 339 of a slot 340 whenever the solenoid 352 is deenergized (see FIGURE 3). A delay device of this type may be utilized in any circuit arrangement wherein it is desired to start one operation subsequent to the energization of a second operation. One need only to wire a delay device actuator, such as a solenoid 352, in parallel with the second operation. Then the energization of the second operation will initiate the delay device 324.

When the delay device 324 is applied to the clothes washing machine circuit of FIGURE 5, it is possible to effect a delay in the energization of high speed spin. In the washing cycle as evidenced by FIGURES 5 and 6, the timer motor 185 is deenergized each time the power supply to the circuit is interrupted. Such circuit interruption occurs whenever the timer is advanced manually through parts of the programmed cycle and whenever the tub spinning or centrifuging operation is manually halted, such as by lifting the lid 51. For instance, in order to advance the timer shaft 188 manually into the spin cycle subsequent to the 18th and 28th timer advance, it is necessary to withdraw axially the timer shaft 188 by grasping and pulling on the timer knob 162. This conventional arrangement serves to interrupt a main line on/off switch 212, thus interrupting power supply to the entire circuit including the timer motor 185. Operation of the timer motor 185 is also interrupted with the opening of lid 51 during any wash cycle spinning operation. During the spin cycle, timer switch blade 216 is in engagement with timer contact 4, thereby causing all power supply for the washing machine circuit to pass through a lid switch 214. When the lid 51 (and thus lid switch 214) is opened, the timer motor 185 is deenergized. In view of these two control circuit situations—manual advancement of timer shaft 188 and manual opening of lid 51—which deenergize the timer motor 185, it is possible to place the solenoid 352 in parallel with the timer motor 185 to insure operation of the delay device 324 each time the timer motor 185 is reenergized, assuming, of course, the timer is programmed for high speed spin with timer switch 218 on timer contact 13.

In the particular application to which the delay concepts of this invention are directed, the washing machine

control circuit of FIGURE 5 may be referred to. As aforesaid it is desired to insure that the washing machine 50 will not be energized for high speed spin until the tub 52 thereof is permitted to accelerate with the prime moving means, including motor 60, energized for low speed spin. Thus the delay device 324 may be included in the high speed spin circuit which consists of that portion of the circuitry from L₁, motor overload switch 210, on/off switch 212, line 246, lid switch 214, timer contact 8, timer switch blade 224, line 248, line 238, timer switch blade 218, timer contact 13, line 319, line 320, spin speed selector switch blade 140, high speed spin contact 152, high speed spin solenoid 76, line 322 to L₂. Between the timer contact 13 and the high speed solenoid 76 the time delay device 324 may be installed as shown schematically in FIGURE 5. In the same fashion as was described in connection with FIGURES 3 and 4 the gear 330 may be rotated at a constant speed on timer shaft 190. The rack element 332 in juxtaposition to the gear 330 is adapted to carry a moving contact 321 which engages a fixed contact 350 after a predetermined period during which the rotation of gear 330 raises the rack 332. When the contacts 321 and 350 are in engagement the high speed spin circuit described immediately hereinabove is completed and the solenoid 76 will be energized, depending of course on the closed condition of switch blade 140.

Since the shaft 190 depends on the operation of the timer motor 185, the timer motor is energized as follows. During spin, the motor 185 is energized from L₁, motor overload switch 210, on/off switch 212, line 246, lid switch 214, timer contact 8, timer switch blade 224, line 249, line 251, timer motor 185, line 253, line 322 to L₂. During periods other than spin the timer motor is energized from L₁ switch 210, on/off switch 212, timer contact 3, timer switch blade 216, line 238, line 248, line 249, line 251, timer motor 185, line 253, line 322 to L₂. The delay device 324 is, of course, unworkable without the operation of the timer motor 185 and its constant speed shaft 190. Further, it is desired to make the delay device 324 operative only during that portion of the washing machine cycle during which a high speed spinning cycle may be selected. For this reason a solenoid 352 for actuating the rack 332 into engagement with the gear 330 is connected across the line from the fixed contact 13 of the delay device 324 to L₂. Thus whenever the timer switch blade 218 closes on timer contact 13 to condition the high speed spin circuit for energization, the solenoid 352 is energized. Conversely, whenever the timer switch 218 is not in contact with timer contact 13, i.e. non-spin portions of the cycle, the solenoid 352 is deenergized. This arrangement contemplates the operation of solenoid 352 each time timer switch 218 closes on contact 13. That means that the solenoid 352 and thus the delay device 324 will work during the 19th, 20th, 29th, 30th, 31st, 32nd and 33rd timer advances, regardless of whether high speed spin has been called for by switch 140. Therefore, it should be seen that such unnecessary cycling of solenoid 352 and delay device 324 may be avoided by placing the high speed spin selector switch 140, 152 in the line 319 ahead of the solenoid and delay device. In this relationship the solenoid 352 will be energized only when high speed spin has been selected on switch 140.

In operation let us assume a washing machine cycle is in progress in accordance with the programmed cycle shown in FIGURE 6. Should the operator withdraw timer knob 162 to advance manually the timer shaft 188 the master on/off switch 212 is broken. With the failure of the power supply, the timer motor 185 is deenergized. If the operator advances the timer shaft 188 into either spin portion of the washing cycle and pushes in the knob 162 to close the on/off switch 212 the circuit will be immediately energized for spin at the speed designated by the positioning of the spin speed selector switch blade 140. However, simultaneously therewith the closing of

timer switch blade 218 on contact 13 (to condition the high speed spin circuit for energization) will energize solenoid 352, the armature 354 of which will force the rack 332 into engagement with the constant speed gear 330. As the gear 330 rotates the rack 332 will rise until the contacts 321 and 350 are in engagement. At this time the high speed spin circuit is complete up to the spin speed selector. If the high speed spin switch blade 140 is closed on the high speed spin contact 152, solenoid 76 will be energized to lift the yoke 72 and the clutch 70 into engagement with the high speed spin pulley 68. In the period of time during which the rack 332 was rising the motor 60 is driving the tub 52 by means of the clutch 70 in dogged engagement with small pulley 66. During this time the major portion of water is spun from the tub 52 through apertures 112, the tub 52 is being accelerated at the more advantageous speed changing ratio through pulleys 66 and 78 and the motor 60 is thus able to accelerate the tub 52 from the 330 r.p.m. low speed spin to the 850 r.p.m. high speed spin without undue strain.

Secondly, if during a spinning operation the lid 51 is opened, the circuit will be broken at lid switch 214. This circuit deenergization will disconnect the timer motor 185 and the solenoid actuator 352. Thus the armature 354 of the solenoid 352 is no longer urging the rack 332 into engagement with the gear 330 and the spring 346 will return the rack to its lower position. Then, if the lid 51 is reclosed (thereby closing lid switch 214) in the middle of a high speed spin cycle, the motor 60 will again be permitted to accelerate the tub 52 in low speed before energization of solenoid 76 and high speed spin. In this instance the delay device 324 will function as described hereinbefore. Briefly the reenergization of the high speed spin circuit will also reenergize solenoid 352 to engage the rack 332 with gear 330. Since the timer motor 185 is energized, gear 330 will rotate at a constant speed to raise the rack 332 in engaging contacts 321 and 350.

In the production of appliances for mass marketing the addition of the solenoid 352 may add undesirably to the cost of the appliance. Therefore one aspect of this invention is directed to eliminating the need for the actuating solenoid 352. In this regard cognizance is taken of the fact that the timer motor 185 is deenergized each time that the operator interrupts the high speed spinning cycle. Thus the interruption of timer motor operation is utilized to actuate the time delay device 324 in the high speed spin circuit. It is further recognized that a considerable amount of stray magnetism exists around a motor winding coil when the motor is energized. One aspect of this invention is therefore directed to utilizing the stray magnetism of a motor winding coil to actuate a device during those periods in which the motor is energized.

Reference may now be had to FIGURE 2 wherein the same general type time delay device 324 is seen mounted on one wall 342 of a timer mechanism 186. This is substantially the same as was disclosed schematically in connection with FIGURES 3 and 4. However in this instance the delay device actuating solenoid 352 has been replaced by a mechanical actuator shown generally at 360. The actuator 360 consists of an L-shaped actuating bar 362 on the end of which is located a roller 364 in juxtaposition to the rack 332. The actuator bar 362 is pivoted at its opposite end 366 to a bracket 368 fixed in relationship to the motor 185. A metal block element 370 which is attracted by magnetism is affixed to the actuator bar 362 adjacent the motor 185. In order to facilitate the automatic disengagement of rack 332 from gear 330 a spring 372 serves to withdraw the roller 364 from the rack 332, while the spring 346 forcefully retracts the rack 332 from the gear 330 and returns the rack to its lowermost position. Here again the purpose of the delay device is to connect the contacts 350 and

321 a predetermined period after the engagement of the rack 332 with the gear 330.

With the device just described in the washing machine circuit of FIGURE 5 the metal block or element 370 will be attracted by the magnetism of the timer motor 185 each time the motor is energized. This magnetic attraction will cause the bar 362 to pivot about its end 366, thereby forcing the rack 332 into engagement with the gear 330. It should be obvious that the delay device in the arrangement of FIGURE 2 will be actuated each time the timer motor 185 is actuated. However it will be effective to complete a circuit only during high speed spin, when the spin speed selector switch 140 is closed on high speed contact 152. During the time that the timer motor 185 is energized in the balance of the washing machine cycle the rack 332 will assume a position as shown in FIGURE 4—the gear 330 merely idling in the curvature 356 of the rack.

It should now be seen that an invention has been taught whereby a high speed spinning operation in an automatic washing machine cycle is always preceded by a low speed spin of predetermined time. This permits the gradual acceleration of a tub full of water and clothes without placing undue strain on the driving motor. Further this invention teaches a means whereby the periodical operation of a motor in an appliance circuit may be utilized to actuate an auxiliary arrangement in conjunction with the motor due to the stray magnetism from the motor.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A control circuit for a centrifuging device having a container, prime moving means for rotating said container at high and low speeds comprising, a power supply, a timer, a timer motor, a speed selector switch, a rack and gear delay device associated with said speed selector switch, means for energizing said prime moving means for low speed rotation, and means for energizing said device to delay high speed rotation when said speed selector switch is set for high speed.

2. The control circuit of claim 1 wherein said means for energizing said device includes an electrical actuator in parallel with said timer motor.

3. The control circuit of claim 1 wherein said means for energizing said device is magnetically actuated by said timer motor.

4. A control circuit for a washing machine having a tub, means for rotating said tub at high and low speeds, a constant speed means, and means including a fixed contact and a movable contact for controlling said rotating means so that a high speed rotation of said tub will be preceded always by a low speed rotation, said movable contact being actuated selectively by said constant speed means.

5. A control circuit for an appliance having a tub comprising, means for selectively spinning said tub at high and low speeds, and control means for said high speed spinning means to initiate said spinning at low speed, said control means including a fixed contact and a movable contact for completing a circuit with said high speed spinning means after a predetermined time interval.

6. A control circuit for a centrifuging device having a container, a lid for said container and prime moving means for rotating said container at more than one speed comprising, a power supply, a timer, a lid switch in series with said timer when said lid is closed, a speed selector switch, a time delay device in series with said speed selector switch and said lid switch, said delay device including a fixed contact and a movable contact, means in said timer for energizing said prime moving means for

one of said speeds, and means in said timer for moving said movable contact to delay rotation at another of said speeds when said speed selector switch is set for said another of said speeds.

7. A control circuit for a centrifuging device having a container, a lid for said container and prime moving means for rotating said container at more than one speed comprising, a power supply, a timer, a lid switch for connecting said timer to said power supply when said lid is closed, a speed selector switch, a time delay device in series with said speed selector switch and said lid switch, said delay device including a rack, a gear and at least two contacts, means in said timer including a timer shaft for energizing said prime moving means for one of said speeds, and means in said timer including a constant speed shaft for energizing said delay device to delay rotation at another of said speeds when said speed selector switch is set for said another of said speeds.

8. A timer for an automatic cycle having a plurality of sequentially operated circuits comprising, a timing shaft for sequentially actuating one of said circuits, a predetermined speed shaft, means to motivate said timing shaft and said predetermined speed shaft, and means periodically associated with said predetermined speed shaft for delaying the sequential actuation of said one of said circuits.

9. The combination of claim 8 wherein said delay means is initiated by the energization of said motivating means.

10. A timer for sequentially controlling a plurality of circuits comprising, a timing shaft for closing one of said circuits, a constant speed shaft, means including a motor for pulsing said timing shaft and rotating said constant speed shaft, first and second contacts in said one of said circuits, delay means operated by said constant speed shaft for connecting said first and second contacts to complete said one of said circuits after a predetermined interval, and means motivated by the magnetism of said motor for selectively engaging said delay means with said constant speed shaft.

11. A timer for an automatic cycle having a plurality of sequentially operated circuits comprising, a timing shaft for sequentially actuating one of said circuits, a predetermined speed shaft, means including a motor for motivating one of said shafts, and means associated with said predetermined speed shaft and responsive to the magnetism of said motor for delaying the sequential actuation of said one of said circuits.

12. A timer for an automatic cycle having a first and second circuit comprising, a timing shaft for energizing and deenergizing said first circuit, said second circuit having a second circuit closing means, means including an electric motor in said first circuit for motivating said timing shaft, and means responsive to the stray magnetism of said motor when said first circuit is energized for actuating said second circuit closing means.

13. A timer for an automatic cycle having a plurality of circuits comprising, a timing shaft for sequentially actuating one of said circuits, an electromagnetic device energized coincidentally with the operation of said timing shaft, and means magnetically responsive to the energization of said electromagnetic device for actuating another of said circuits.

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