

Oct. 20, 1959

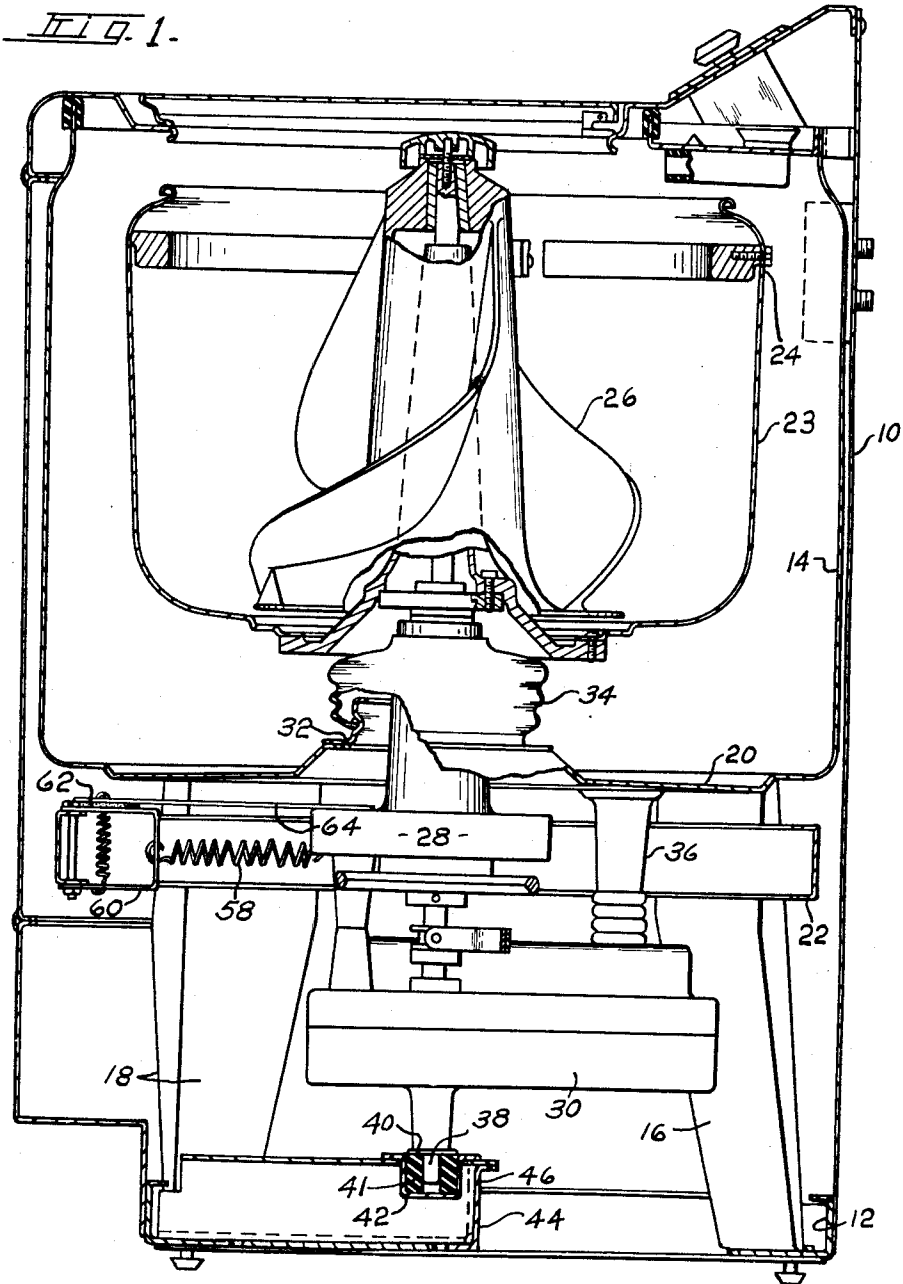
H. K. LEACH

2,909,050

AUTOMATIC CLOTHES WASHING MACHINE WITH WATER LEVEL CONTROL

Filed Sept. 28, 1954

4 Sheets-Sheet 1



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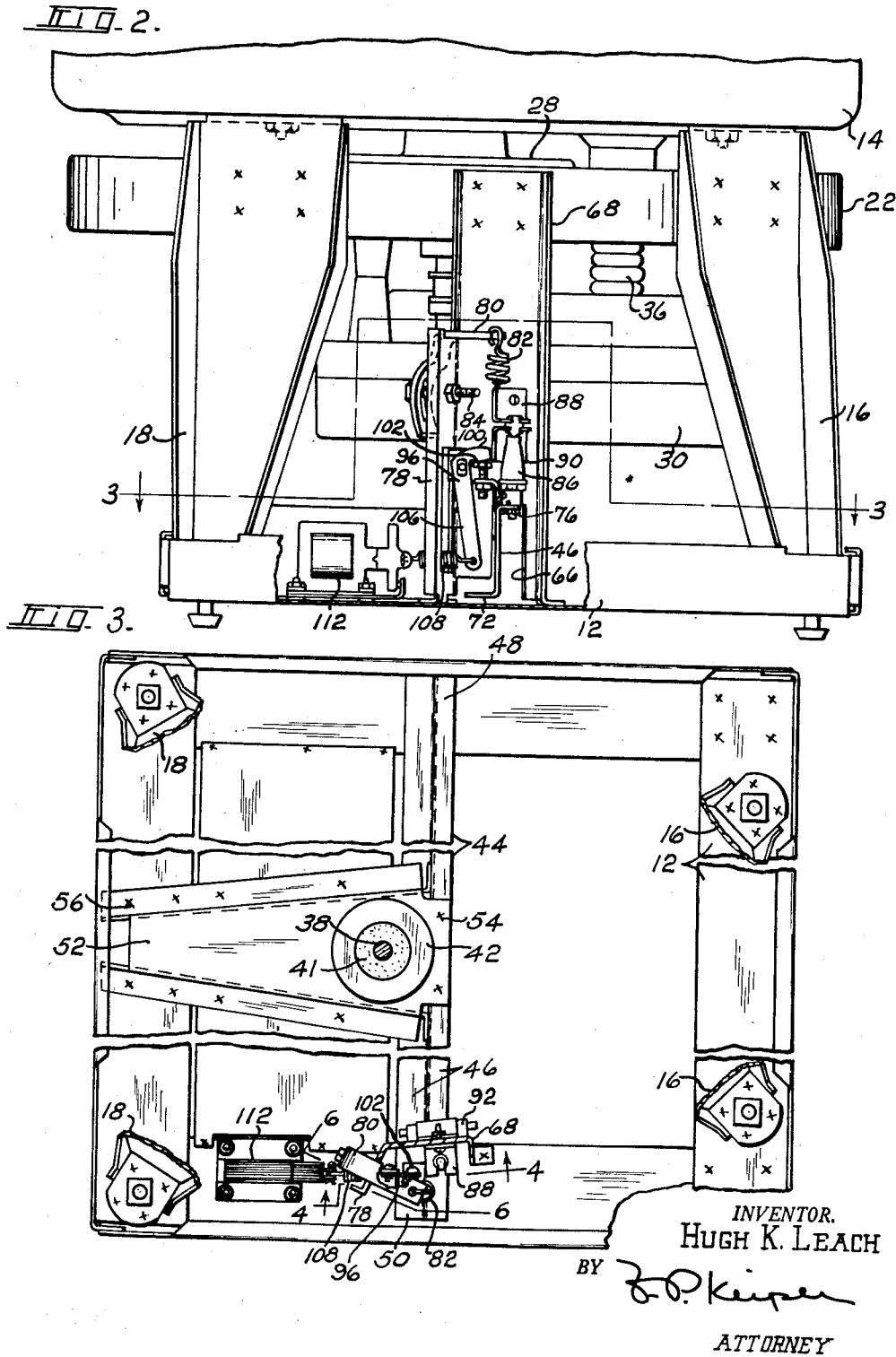
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AUTOMATIC CLOTHES WASHING MACHINE WITH WATER LEVEL CONTROL

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4 Sheets-Sheet 2



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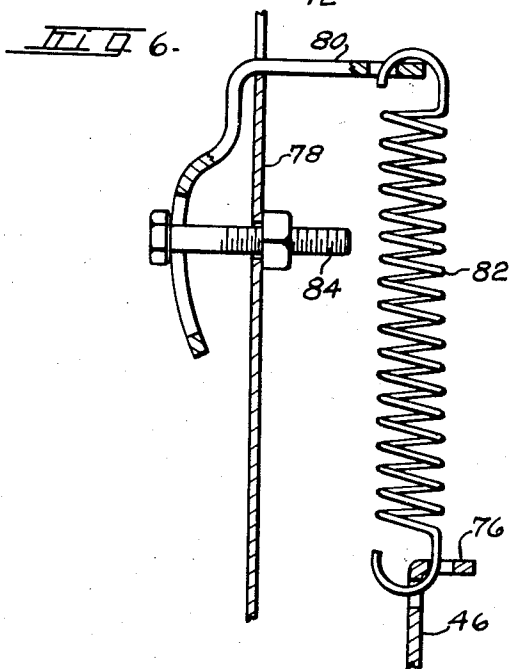
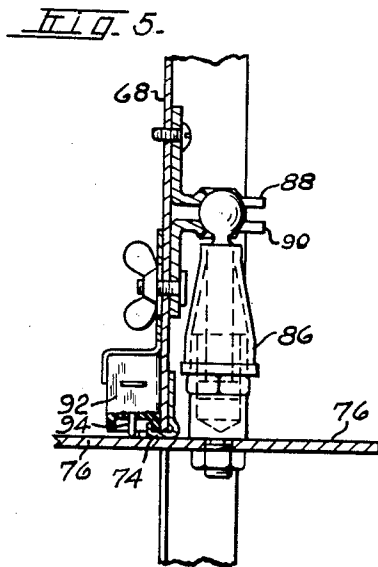
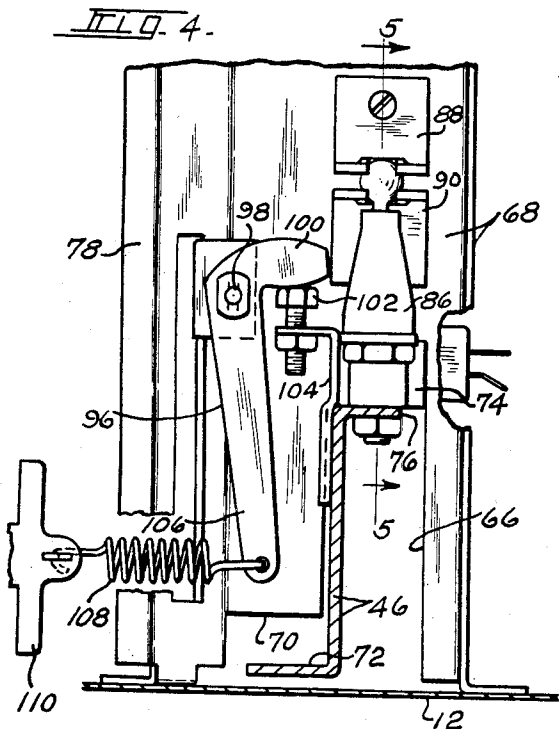
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4 Sheets-Sheet 4

Fig. 7.

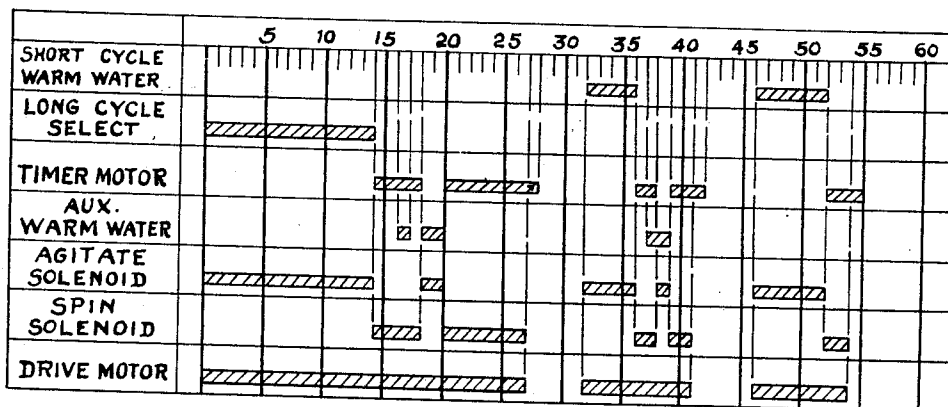
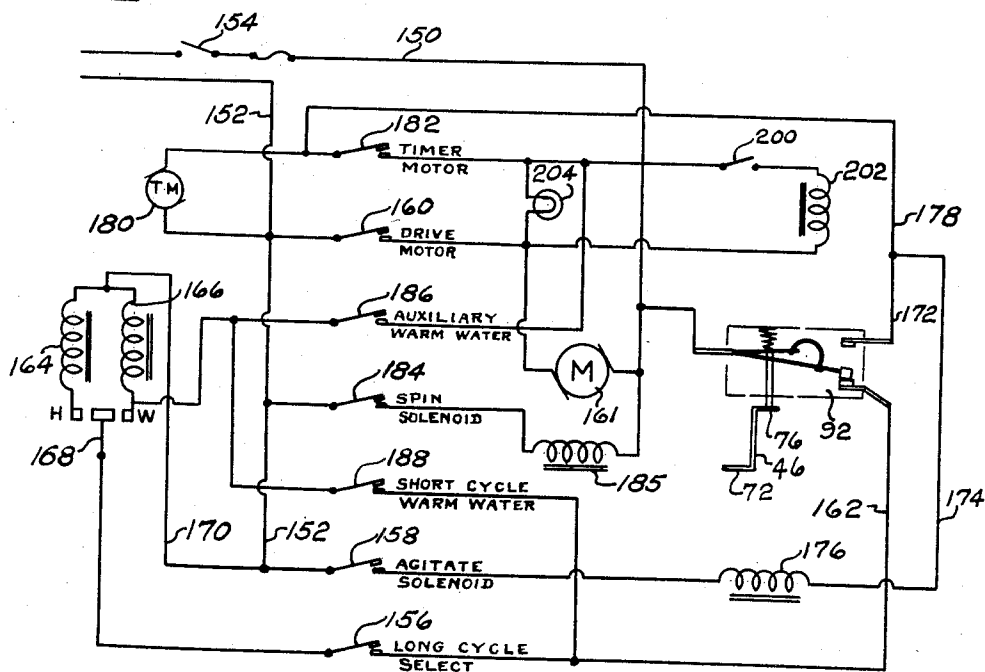


Fig. 8.



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2,909,050

AUTOMATIC CLOTHES WASHING MACHINE WITH WATER LEVEL CONTROL

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Application September 28, 1954, Serial No. 458,798

14 Claims. (Cl. 68—12)

This invention relates to automatic washing machines and more particularly to a machine having a provision for controlling the water supply by weight and for varying the quantity at will for varying size wash loads.

In a copending application, Serial No. 359,100, filed June 2, 1953, now Patent #2,813,413, issued Nov. 19, 1957, there is shown a vertical axis automatic washing machine in which, prior to commencement of the washing action, the tub is filled with water, and weight-responsive means is employed for starting the wash action when the tub has been filled to the correct level. The present invention is directed to an improvement thereover, wherein provision is made for partially filling the tub for smaller wash loads than a capacity load and in which provision is made for starting the washing action when such lesser quantity of water has been introduced into the tub. The arrangement is such that the operator may at will select the lesser quantity for a light load, or the quantity required for a capacity load. Such selection may be made at any time during the filling of the tub with the exception that if the tub is filled above the light load amount but not to the capacity load amount, washing operation will immediately start on making a belated selection change from the capacity load to the light load. A further feature of the invention resides in stabilizing the weight sensitive mechanism by damping action combined with an over-center switch whereby once the wash action has commenced, such action will continue regardless of variations in effective weight of the tub due to agitator action or overflow spillage.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description, when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

Figure 1 is a vertical sectional view through a washing machine to which the weight fill control has been applied;

Figure 2 is a side elevation of the lower portion of the machine, with the cabinet removed and parts shown in section;

Figure 3 is a broken horizontal section taken through the lower portion of the machine substantially on the line 3—3 of Figure 2;

Figure 4 is an enlarged fragmentary view of the control mechanism shown in Figure 2, with parts in section and taken substantially on the line 4—4 of Figure 3;

Figure 5 is a fragmentary view taken substantially on the line 5—5 of Figure 4;

Figure 6 is a sectional detail view of the spring balance mount taken substantially on the line 6—6 of Figure 3;

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Figure 7 is a time chart showing the sequence of operations of the machine; and

Figure 8 is an electrical wiring diagram for effecting the selecting operation of the machine.

Referring to Figure 1, there will be seen a cabinet structure 10 mounted upon a base 12 and within which is an outer splash tub 14 supported upon legs 16 and 18, extending from the base 12 to the bottom 20 of the tub 14. Such legs, there being four in number, are rigidified by an annular channel ring 22.

Within the tub 14 there is positioned a wash tub 23 generally imperforate save for drain ports 24 located on a circle above the normal water level. Disposed within the tub is an agitator 26. Such tub and agitator are mounted upon a pedestal assembly generally indicated at 28 which comprises as a part thereof, transmission mechanism 30 adapted to oscillate the agitator 26 or cause the tub 23 to rotate, for centrifugal extraction, the agitator being free to rotate with the tub. The pedestal projects through an enlarged flanged opening 32 in the bottom 20 of the tub 14, and a corrugated annular boot 34 is provided between the pedestal and flanged opening 32, to prevent water from escaping from the tub 14 upon the transmission mechanism located therebelow. The tub 14 is continually open to drain through a drain conduit 36.

The lower end of the pedestal is provided with a center pin and shoulder 38 and 40, bearing upon a resilient sleeve 41, the latter being supported in a flanged cup 42 carried upon a supporting beam structure generally indicated at 44 in the transverse member 46 extending from one side of the base as at 48, where the member is secured to the frame. The other end of the member 50 is located above the base 12 on the other side and has limited up and down movement as will hereinafter appear. Such beam structure 44 also comprises a tapered hat section member 52, one end of which is secured to the Z member 46 as at 54, and the other end of which is secured to the frame 12 as at 56. The cup 42 is mounted in the hat section member 52 immediately adjacent the Z member 46.

The pedestal assembly 28 is allowed to rock or gyrate in order to permit uneven load distribution within the tub 23 to find its center, and is normally held upright by one or more centering springs such as 58 extending between the pedestal assembly and the channel ring 22. The springs 58 are connected to bracket members 60 attached to the channel ring 22 and such bracket members provide friction surfaces against which friction pads 62 bear, such friction pads being carried on leaf springs 64 radiating from the pedestal structure. The friction damping mechanism coacts to stabilize the pedestal assembly and tub during operation.

The free end 50 of the transverse Z member 46 projects through an aperture 66 in an upright channel member 68 extending from the base 12 to the channel ring 22, to each of which the upright member is secured. The aperture 66 is of substantially rectangular section and is provided with a lateral step 70 to provide clearance for the lower flange 72 of the member 46. The upper end of the aperture 66 is provided with a stop abutment member 74 adapted to engage the upper flange 76 of the member 46 whereby the upward movement of the member 46 is limited. The upright channel member 68 is provided along one edge with a wide flange 78, over the upper edge of which is pivotally mounted a bent lever 80, the outer end being connected by a calibrated spring 82 extending to the outer end of the member 46 (see Figures 2 and 6). The lever is provided with an adjustment bolt 84 whereby the tension on the spring 82 may be varied. The tension on the

spring 82 is such that when the tub 23 is filled to a proper level for a normal wash load, the spring supported end 50 of the member 46 is allowed to move downwardly so that the flange 72 rests upon the base 12.

Movement of the member 46 in response to weight within the tub is damped by a dash pot link 86 connected between the flange 76 and bracket members 88 and 90 secured to the upright 68. The link 86 comprises a cylinder having a piston therein, the former being filled with a highly viscous substance such as a silicone so that gradual movement of the piston is permitted as the tub fills. However, rapid movement such as might result from the oscillating action of the agitator will be prevented and any attempt by an operator to depress the tub will be resisted.

Mounted on the upright 68 is a single pole, double throw, over-center switch 92, the actuating member 94 of which bears against the flange 76 of the member 46. When the member 46 moves to its lower position, the switch is actuated to close one circuit, and when the member is in the position, shown for example in Figure 5, the switch is actuated to establish a different circuit. Thus it will be seen that such switch is adapted to be utilized to commence the washing operation when the tub is filled to the desired level and may also be used to establish circuits for rinsing and extraction when the tub is empty.

In order to render it possible to partially fill the tub 23 and wash a partial load of laundry thereby saving substantially in the quantity of hot water required, there is provided a mechanism for securing a preloading effect upon the weight of the tub 23 and pedestal assembly. Such mechanism comprises a bell crank lever 96 pivoted upon the upright 68 as at 98, the lever having a horizontal portion 100 adapted to bear against an adjustable abutment 102 carried on a bracket 104 on the member 46. The downwardly extending portion of the lever indicated at 106 is connected through a calibrated coil tension spring 108 to a solenoid armature 110, the solenoid 112 being rigidly mounted upon the base 12.

When the solenoid is energized there is a tendency to rock the lever 96 in a clockwise direction, thereby exerting a downward force on the abutment 102. The force may be adjusted to represent the weight of a quantity of water in the tub 23 so that when the tub 23 is filled to a level approximately two-thirds of its normal capacity, the added force gives the effect of a full tub. Thus the member 46 is moved downward by the combined weight of the water in the tub and the force exerted by the lever 96, and further introduction of water into the tube is stopped and washing commences. The spring 108 yields to permit the armature 110 to be moved to the closed position and the yielding effect of the spring 108 functions to provide the biasing loading on the abutment 102 referred to. In other words, when the solenoid 112 is energized, the spring 108 is tensioned a predetermined amount, whereas when the solenoid is de-energized the spring 108 is relaxed.

In Figures 7 and 8, there is disclosed a time and cam diagram, and control circuit adapted to utilize the water weight indication of the switch 92. Such circuit includes a 7-cam timer driven by a clock motor, the timer cams being moved through fixed angular increments at regular intervals. A timer of the general type described is shown in Patent Nos. 2,227,133 and 2,313,064, issued December 31, 1940, and March 9, 1943, respectively.

In the diagram of Figure 7, the vertical lines indicate the spaced instances at which the cam shaft and cams are substantially instantaneously advanced by the timer motor, and the spaces between adjacent vertical lines indicate the time interval or dwell between successive advances. The diagram is based on a cam shaft that moves 6° at a time, or $\frac{1}{60}$ of a revolution. The time spacing between impulses, for discussion purposes, will be 45 seconds. The various horizontal bars represent the

cam portions effective to close the circuit controlled by the particular cam. For example, the short cycle warm water cam closes its circuit for four intervals, or 3 minutes, commencing when the cam is advanced at time line 32 and ending at time line 36.

The cam contours from line 0 to line 28 are adapted to provide a long wash cycle commencing as soon as the tub is properly filled with hot or warm water, as desired. Such cycle includes a maximum washing period of 10½ minutes, a wash water extraction period of 3 minutes, with a three-fourths minute period of spray rinse, occurring during the extraction period, and commencing after 1½ minutes thereof, a warm water refill period of indefinite duration commencing immediately after the timer advances to line 28, the timer motor being de-energized by such advance until re-energized by the filling of the tub to the level required to operate switch 92. At this time, the timer motor restarts, advancing the cams after 45 seconds, and after each 45 second interval thereafter, as before. When the water level required is reached, and the timer motor restarts, an agitated rinse of 1½ minutes is effected. During the entire period of such rinse, water continues to flow into the tub, overflowing the same through the apertures 24 to remove soapsuds, scum, etc. At the end of the agitated rinse, as indicated at line 20, extraction takes place for a period of 5¼ minutes, after which all cam switches are opened to end the cycle, except the timer circuit, which continues for 45 seconds and then opens when the position at line 28 is reached.

The long cycle uses up to 21 minutes of cam movement, or 168° of the cams. It is understood, however, that the actual wash time includes in addition two fill periods of indefinite duration depending on the time taken for filling. The same cams may be cut to provide a short cycle in a portion of the remaining 192° not used by the long cycle. Such short cycle, as shown, commences at cam advance line 32, and ends at 42, using 60° of the cam, or a cam operating time of 7½ minutes. A blank space of 4 intervals or 24° between lines 28 and 32 is provided to suitably separate the long and short cycles. The short cycle is essentially the same as the long cycle, except the initial fill uses warm water only and shortened periods are used, and the warm water spray rinse continues to the end of the spin rinse period. Again, it will be understood that the actual wash time is lengthened by the two fill periods.

The foregoing long and short wash cycles use 252° of the cam, leaving 108°, in which there is provided an additional soak cycle. Such cycle commences operation as soon as the tub is filled, with warm water, and agitation continues six periods or 4½ minutes, after which the tub is spun to remove the water for 1½ minutes, the timer continuing for an additional ¾ minute to line 55, after which all circuits are opened.

It will be seen that the cam shaft will always stop at line 28, or 42 or 55 at the end of the long or short or soak cycle. It will also stop during the rinse water fill period, at 28 and 38 during the long and short cycles, respectively.

To start the washing operation, the cam shaft is advanced manually from the termination line 28 or 42 or 55 of the previous wash conducted, to the position at 0, if a long cycle wash is desired, or to line 32 if a short cycle wash is desired or to line 46 if a soak cycle is desired. If a shortened wash period be desired, in either cycle, the cam shaft is manually advanced beyond the position at 0, for example to 5, if the long cycle wash period is to be decreased ¾ minutes to a wash period of 6¾ minutes, or for example, to the position at line 34, if the short cycle wash period is to be shortened by 1½ minutes to a 1½ minute wash period. Thus, any period less than the maximum of 10½ minutes for the wash period of the long cycle or 3 minutes for the short cycle can be initially selected, or in fact selected at any

time during the initial fill period, or during the wash period. Similarly the soak period can be shortened by $\frac{3}{4}$ minute intervals, if desired.

Upon the manual advance of the timer cams to the position representing the wash period time desired, the timer motor is not energized, until the tub is filled with the correct weight of water as indicated by the switch 92. At this time, the agitator clutch solenoid is energized by cam switch 158, and the timer motor energized by the water weight switch 92. When the manual advance for starting is made, the motor starts, and idles until the agitator clutch solenoid is energized. Also, the cam switch 156 controlling the solenoid fill valves is closed. The hot or warm water switch 168 may be in either position, or changed at will during the fill period to obtain an intermediate temperature between hot and warm.

Referring to the circuit of Figure 8, there is shown the corresponding cam switches whose operation is indicated in Figure 7. Such circuit discloses line wires 150 and 152, the former having an over-all cut-out switch 154. When it is desired to commence the water fill and subsequent washing cycle, the cams are manually advanced to position 0, or any succeeding position short of position 14, depending upon the length of wash period desired. Should a 6 $\frac{1}{4}$ minute wash period be desired, the timer cams would be advanced to the position indicated at line 5. The manual movement of the cams to the position shown closes switches 156, 158 and 160. It will be seen that closing of the switch 160 starts the drive motor 161 which runs continuously through the initial water fill period to the end of the complete wash cycle. With the tub 23 empty and the switch 92 in the empty position as shown, there is established a circuit from lead 150 through lead 162, and long cycle select cam switch 156 to either one of the solenoid-operated hot or warm water valves 164 and 166, respectively, depending upon the position of the manual selector switch 168. Such solenoid water valves are provided with a common return lead 170 connecting with the line 152. Thus the tub 23 will commence to fill, and when the predetermined quantity of water has been introduced into the tub 23, the switch 92 will break the connection from the lead 150 to the lead 162, and establish a connection between lead 150 and lead 172, one branch 174 of which energizes an agitator clutch solenoid 176. Such solenoid is connected through the cam switch 158 to the return lead 152. The other branch 178 establishes a circuit to the timer clock motor 180, whereupon the cams are subsequently advanced periodically each 45 seconds through the fixed 6° increments previously referred to. The agitator solenoid 176 when energized, causes the motor to drive the agitator, oscillating the same for a wash period.

At the end of the wash period, the timer motor cam switch 182 is closed, providing a direct connection to the timer motor 180 from the lead 150, so that the timer motor will continue operation in advancing the cam regardless of the position of the switch 92. When the wash period is ended, the agitator solenoid 176 is de-energized by the opening of the cam switch 158. At the same time, the spin clutch solenoid cam switch 184 is closed, energizing spin clutch solenoid 185, thereby causing the motor to accelerate the tub for centrifugal extraction. As the tub accelerates, the wash water within the tub is thrown out through the discharge apertures 24 and the wash water eliminated from the tub.

After a period of time, while the tub is spinning, an auxiliary warm water cam switch 186 is closed, causing warm water to be introduced into the tub during the spinning operation. Such water introduced into the tub rinses the soapsuds from the laundry contained in the tub, and is discharged from the tub centrifugally through the discharge apertures 24. When the extraction period is finished, the spin solenoid is de-energized by the opening of the cam switch 184 and at the same time, the cam

switch 182 to the timer motor is opened. At this time there is no water within the tub 23 except that entrained in the damp clothes contained therein, so that the weight switch 92 has assumed the empty position as shown. Thus, the timer motor is temporarily stopped until such time as the tub is again filled and the weight switch indicates that fact.

Thereupon, the switch 92 recloses a circuit to the timer motor through the lead 178. The cams will thus be advanced 45 seconds thereafter, and will periodically advance as a result of the re-energization of the timer motor, as before. Cam switch 186 is closed at the same time that the timer motor is stopped to fill the tub. When the water weight switch closes, the cam switch 186 remains closed for one and one half minutes to admit further water over and beyond the quantity normally introduced as measured by the water weight switches for the initial wash, and water continues to flow into the tub for such period as indicated. At the same time, the agitator cam switch is closed, re-energizing the agitator clutch solenoid 176.

Simultaneously with the opening of the auxiliary warm water cam switch 186, the timer motor cam switch 182 is closed, so that thereafter the timer motor will continue to function to periodically advance the cam shaft by direct connection through the cam switch 182, rather than the weight switch 92. At the close of the agitation rinse period, the agitator solenoid cam contact 158 is opened, and the spin solenoid cam switch 184 closed. Thus, at this time, acceleration of the tub is effected, and the rinse water is centrifugally extracted, and the tub allowed to spin for a period of five and a quarter minutes to damp dry the clothes. At the end of the 5 $\frac{1}{4}$ minute period at position 27 as indicated in Figure 7, the spin solenoid and drive motor cam-operated switches 184 and 160, respectively, are opened, and the tub allowed to decelerate and 45 seconds thereafter the timer motor cam switch 182 opens. The wash cycle at this point has been completed, the cam shaft advanced 6° beyond line 27, and the timer motor de-energized so that the switch cams do not further advance until advanced manually. By advancing the timer 6° beyond line 27, provision is made for preventing accidental reclosing of the switches 184 and 160, by any manual attempt to effect retrograde movement of the cam shaft, as might be possible in the event of slight lost motion, it being understood that a one-way brake, ordinarily prevents retrograde rotation.

The short cycle operates in the same manner as the long cycle, with the exception that warm water is initially introduced into the tub instead of providing a choice of hot or warm water, and the spray rinse water is allowed to flow to the end of the spray rinse period at line 38, and continues to flow without interruption to fill the tub, after which the agitated rinse commences with the flow continued to provide overflow. This is effected by the closing of the cam switch 188, which will be seen to be in circuit with the warm water solenoid 166 and the lead 162 extending to the water fill switch. Such circuit is energized during the fill period and is de-energized when the correct weight of water in the tub is established and switch 92 actuated.

It will thus be seen that an operator may select either a long wash cycle for ordinary wash or a short cycle for washing fragile garments, and that the length of the actual wash period in either cycle may be shortened by $\frac{3}{4}$ minute increments as desired. It will also appear that the length of the wash period may be varied at any time prior to the end thereof, either in the long cycle operation or the short cycle operation by manually advancing the timer.

It will appear that the soak cycle operates in substantially the same manner as the initial position of the short wash cycle, the tub first filling with warm water after which agitation takes place for the entire soak period of

4½ minutes, or such shorter period as has been selected, following which agitation stops when time line 52 is reached. Thereafter spinning takes place for a minute and a half. During the spinning, no rinse water is introduced, at time line 54 the spin solenoid and drive motor are de-energized, and 45 seconds thereafter, the timer motor is de-energized.

When it is desired to wash a light load, it is also desirable to conserve hot water by providing for a partial fill, following which washing proceeds in the usual manner. For this purpose, a manually controllable switch 200 in circuit with the coil 202 of solenoid 112 is connected to the line 150, and motor cam actuated contacts 160, so that the switch 200 and solenoid coil 202 are in effect in parallel with the motor 161. When the switch is closed, and whenever the motor 161 is energized, the solenoid 112 acts to bias the calibrated spring 82, by tensioning the biasing spring 108, thus causing the tub to lower to the agitator start position, thereby operating switch 92, as soon as the tub fills to the lower level for which adjustment is made, the agitated rinse commences operation as soon as the reduced water level is reached. The additional inflow of water thereafter may reach the overflow level, but since such water is warm rather than hot, the amount of hot water used is not great.

An indicator light 204 connected in parallel with the motor 161, is energized whenever the motor is running.

It will appear that the method of using the water weight within the tub to determine the quantity of wash water makes it possible to be certain of an exact amount, regardless of water pressure, and the circuit provides that once the quantity of water desired has been obtained, no further water may be added except for example, as in the rinse fill where the cam provides for an additional flow of 1½ minutes in the long cycle and the continued flow of ¾ minute in the short cycle. Such time is adequate under almost any variation of water pressure to cause overflow, and thus remove soapsuds and scum floating on the surface. Further, during the operation of the agitator, the frame member 46 when held down upon the base 12, is held against relative motion by the dash pot 86, thus protecting against unnecessary otherwise possible actuation of the water weight switch 92. Such switch, being sensitive to a specific weight, would during this period be likely to be operated by any loss of water, or as a result of the agitator movement, or both, and the dashpot damping feature in combination with the overcenter switch 92 effectively prevents such a contingency. When the tub is empty, the support member 46 is in its upper position, and the switch 92 is spared from any possible flutter, and the dashpot further assists in preventing unwarranted movement.

Although a single embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a clothes washer, a tub for holding the clothes, a concentric oscillatory washing member within the tub, means for spinning the tub, mechanism for alternately oscillating the washing member and for spinning the tub, a timer arranged to control said mechanism, means for supplying the tub with water, resilient supporting means connected with the tub acting to give the tub a lower position when full than empty, mechanism between the tub and the timer acting to start the timer when the tub reaches its lowest position, including a switch closed by movement of said tub to the lower position, and means external of the tub for partially biasing said resilient supporting means by loading whereby said tub assumes said lower position upon being partially filled with water

to establish a fractional load water level, and means for at will selecting full tub or fractional load operation.

2. In a washing machine, a frame, a wash tub adapted to hold a quantity of wash liquid, means for mounting said tub on said frame, including a member movable relative to said frame in response to tub weight and liquid contained therein, means for filling said tub with liquid, including a valve, means responsive to movement of said member upon the filling of said tub to a normal full load level with a predetermined weight of liquid to close said valve, means external of the tub for exerting a downward force upon said member equivalent to the weight of a portion of said predetermined weight of liquid whereby to close said valve upon a partial filling of the tub to establish a fractional load level, and means for manually and at will selecting one level or the other.

3. In a washing machine, a frame, a tub, means for mounting said tub upon said frame, including a member movable with respect to the frame in response to the weight of the tub and contents therein, means for agitating laundry within the tub, means for supplying water to said tub, including a valve, means for closing said valve in response to movement of said member upon filling said tub to a normal full load level with a predetermined quantity of water, means external of the tub for exerting a downward force upon said member equivalent to the weight of a portion of said predetermined weight of liquid whereby to close said valve upon a partial filling of the tub to establish a fractional load level, and means for manually and at will selecting one level or the other.

4. In a washing machine, a frame, a tub, means for mounting said tub upon said frame, including a member movable with respect to the frame in response to the weight of the tub and contents therein, means for agitating laundry within the tub, means for supplying water to said tub, including a valve, means for closing said valve in response to movement of said member upon the filling of said tub to a normal full load level with a predetermined quantity of water, means responsive to operation of the valve closing means for initiating operation of said agitating means, means external of the tub for exerting a downward force upon said member equivalent to the weight of a portion of said predetermined weight of liquid to operate said valve closing means and initiate operation of said agitating means upon a partial filling of said tub to establish a fractional load level, and means for manually and at will selecting one level or the other.

5. In washing machine control apparatus, in combination, a wash tub having agitating means and extraction means, a timer motor including cam switches actuated thereby, one of said cam switches being adapted to energize said timer for predetermined periods, and other cam switches for establishing a wash period followed by an extraction period, first means responsive to the filling of said tub to a normal wash level for a capacity wash load for setting said timer motor in operation and initiating said wash period, means responsive to said first-named cam switch for maintaining timer motor operation immediately prior to and during said extraction period, and means for rendering said first responsive means effective for setting said timer motor in operation and initiating said wash period in response to the filling of said tub to a level substantially less than the normal wash level, whereby to accommodate partial wash loads.

6. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by said lever in response to the weight of said tub and a predetermined quantity of water therein, means for applying a force

upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, and a valve in said water supply means adapted to be closed on actuation of said switch.

7. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by said lever in response to the weight of said tub and a predetermined quantity of water therein, means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, and agitator means for said tub adapted to be rendered operative upon actuation of said switch.

8. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by said lever in response to the weight of said tub and a predetermined quantity of water therein, and means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, a valve in said water supply means adapted to be closed on actuation of said switch, and agitator means for said tub adapted to be rendered operative upon actuation of said switch.

9. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by said lever in response to the weight of said tub and a predetermined quantity of water therein, and means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, a valve in said water supply means adapted to be closed on actuation of said switch, agitator means for said tub adapted to be rendered operative upon actuation of said switch, and a timer energized by actuation of said switch adapted to render said agitator means inoperative after the lapse of a timer-controlled period of time.

10. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by said lever in response to the weight of said tub and a predetermined quantity of water therein, said switch being of the overcenter biased type, means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, and a valve in said water supply means adapted to be closed on actuation of said switch.

11. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a

switch mounted on said frame and adapted to be actuated by movement of said lever in response to the weight of said tub and a predetermined quantity of water therein, said switch being of the overcenter biased type, means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, and agitator means for said tub adapted to be rendered operative upon actuation of said switch.

12. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by movement of said lever in response to the weight of said tub and a predetermined quantity of water therein, said switch being of the overcenter biased type, damping means having a viscous liquid for restricting said lever to gradual movement in response to water flowing into said tub, means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, and agitator means for said tub adapted to be rendered operative upon actuation of said switch.

13. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by movement of said lever in response to the weight of said tub and a predetermined quantity of water therein, damping means for said lever to restrict said lever to gradual movement, means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, a valve in said water supply means adapted to be closed on actuation of said switch, and agitator means for said tub adapted to be rendered operative upon actuation of said switch.

14. In a clothes washing machine, a frame, a lever pivoted on said frame, a tub, a support for said tub bearing on said lever, resilient means associated with said lever and frame for counteracting the weight of said tub and support, supply means for introducing water into said tub to vary the weight of said tub, a switch mounted on said frame and adapted to be actuated by movement of said lever in response to the weight of said tub and a predetermined quantity of water therein, damping means having a viscous liquid for restricting said lever to gradual movement in response to water flowing into said tub, means for applying a force upon said lever equivalent to the weight of a fraction of the predetermined quantity of water, whereby to actuate said switch on a partial fill, a valve in said water supply means adapted to be closed on actuation of said switch, agitator means for said tub adapted to be rendered operative upon actuation of said switch, and a timer energized by actuation of said switch adapted to render said agitator means inoperative after the lapse of a timer-controlled period of time.

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