Oct. 1, 1963 S. G. ESKIN ETAL 3,105,375

WASHING MACHINE HAVING MEANS FOR SELECTING WATER TEMPERATURE, WASH SPEED AND SPIN SPEED

Filed Dec. 17, 1957 4 Sheets-Sheet 1

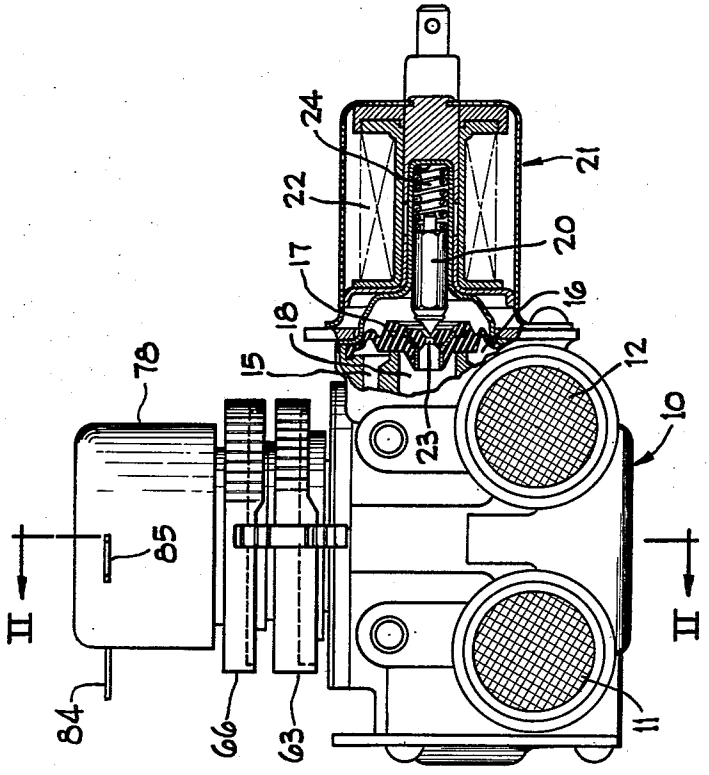


FIG. 1

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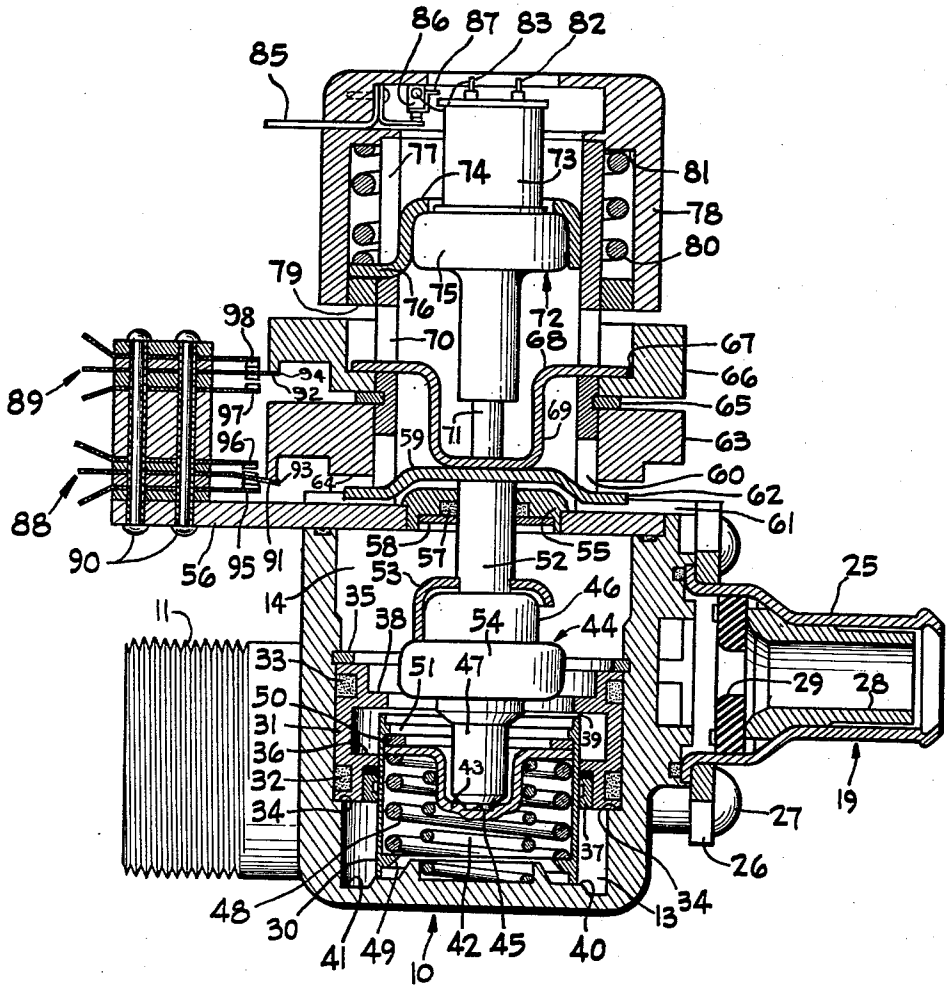


FIG. 2

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Filed Dec. 17, 1957 4 Sheets-Sheet 3

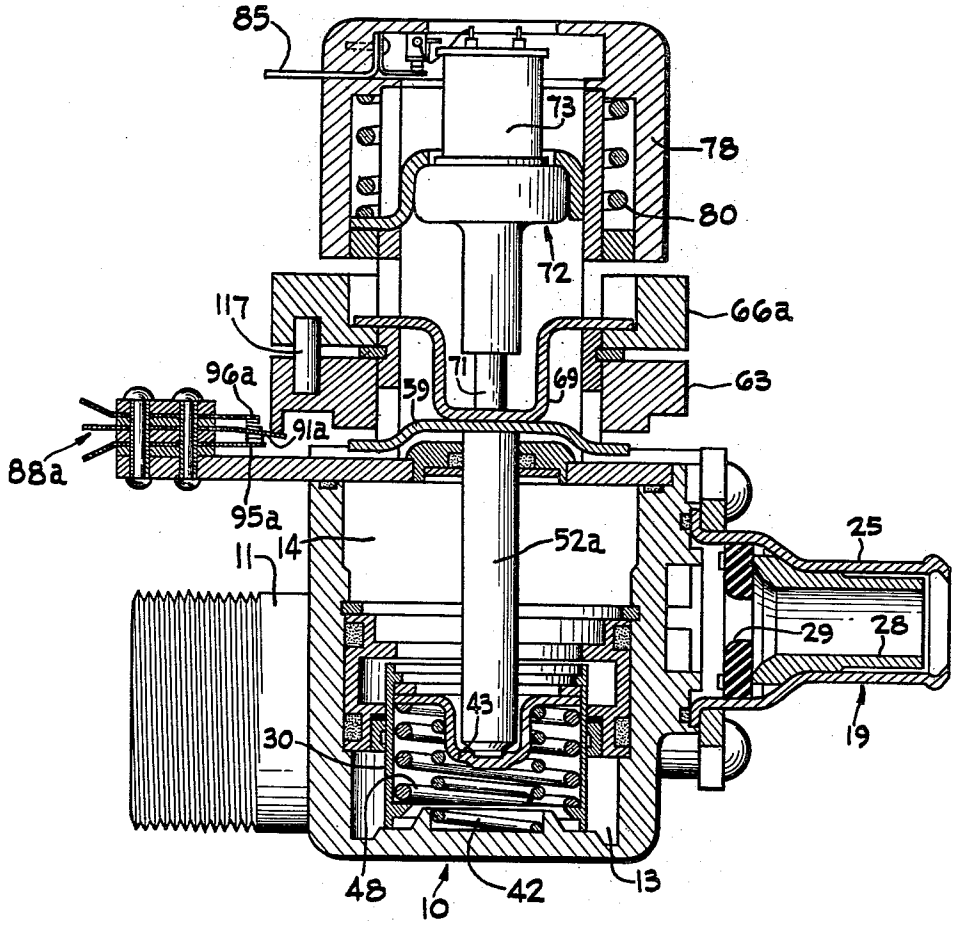


FIG. 3

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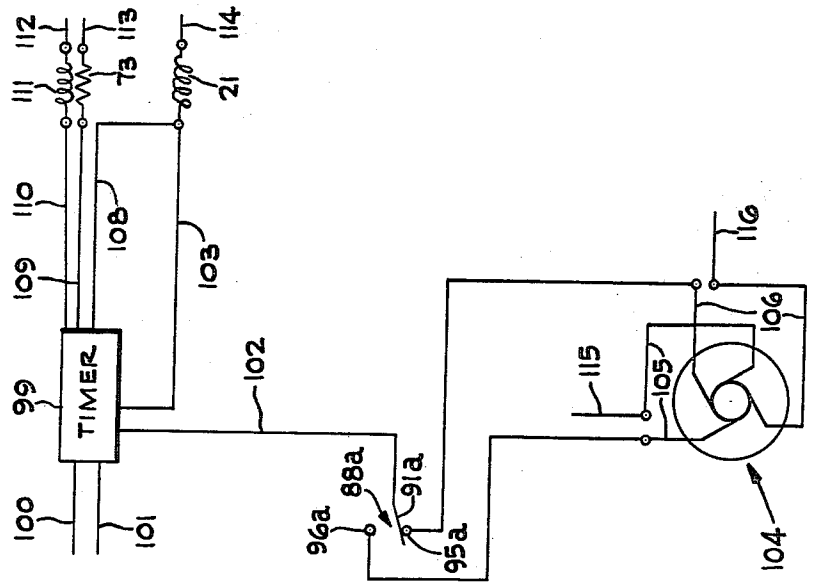


FIG. 5

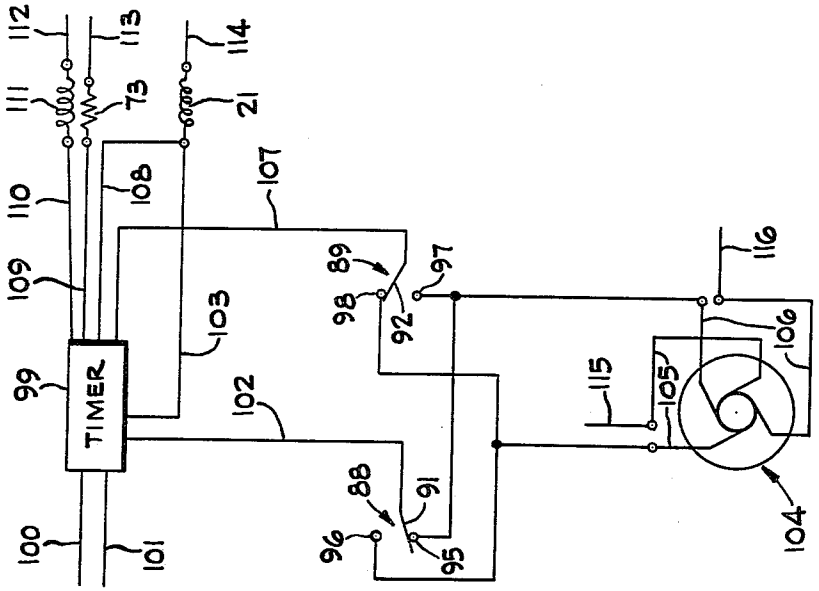


FIG. 4

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United States Patent Office 3,105,375 Patented Oct. 1, 1963

3,105,375

WASHING MACHINE HAVING MEANS FOR SELECTING WATER TEMPERATURE, WASH SPEED AND SPIN SPEED

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Filed Dec. 17, 1957, Ser. No. 703,374
4 Claims. (Cl. 68—12)

This invention relates to improvements in controls for household automatic clothes washing machines and more particularly relates to control means for preselecting the temperature of the water to be delivered to a machine through a mixing valve for wash and rinse operations and for preselecting the speed of wash and spin operations performed by the machine.

Early automatic clothes washing machines had means for selecting the temperature of the water for washing, but the temperature for rinsing and the speed of wash and spin operations were not adjustable and not suitable for certain fabrics. Improved machines now have means for selecting the temperature of the water for both washing and rinsing operations and for selecting the speed of wash and spin operations, it being possible to select any combination of warm to hot wash water temperature, cold to warm rinse water temperature, fast or slow wash speed, and fast or slow spin speed, so that now any type of fabric may be washed automatically just as well as by hand. Prior to our invention, however, the above four selections required checking and possibly resetting four different controls on the machine. In addition, the timer and possibly controls for other things such as automatic dispensers had to be set. With so many controls to be set, it is readily apparent that a housewife might become confused. Fewer controls to be set would simplify operation of the machine and also save time.

Therefore, a principal object of our invention is to reduce the number of separate controls required to be set on an automatic clothes washing machine in the selection of wash water temperature, rinse water temperature, wash speed, and spin speed.

Another object of our invention is to provide a combination control device for use in an automatic clothes washing machine wherein selection of the temperature of water to be delivered to the machine automatically also selects the speed of various operations to be performed by the machine.

A further object of our invention is to provide a combination adjustable hot and cold water mixing valve and electric switch, wherein adjustment of the mixing valve to select the temperature of mixed water to be delivered thereby also determines the operative position of the electric switch.

Still another object of our invention is to provide a combination control device including an adjustable hot and cold water mixing valve having two separate adjusting means for preselecting the temperature of mixed water to be delivered thereby during successive operations and two electric switches, wherein selection of the temperature of mixed water to be delivered by the valve for the first operation also determines the operative position of one of said switches, and selection of the temperature of mixed water to be delivered by the valve for the second operation also determines the operative position of the other of said switches.

Another object of our invention is to provide for an automatic clothes washing machine a control device including an adjustable mixing valve having means for preselecting the temperature of water to be delivered by the valve for a washing operation, means for preselecting the temperature of water to be delivered by the valve for a rinsing operation and means for automatically shifting from the preselected wash water temperature to the preselected rinse water temperature during the operation of the machine, wherein selection of the wash water temperature also determines the wash speed, such as the speed of an agitator, and wherein selection of the rinse water temperature also determines the spin speed.

A further object of our invention is to provide for an automatic clothes washing machine a control device including an adjustable mixing valve having means for preselecting the temperature of water to be delivered by the valve for a washing operation, means dependent on the selection of wash water temperature for determining the temperature of water to be delivered by the valve for a rinsing operation, and means for automatically shifting from the preselected wash water temperature to the dependent rinse water temperature during the operation of the machine, wherein selection of the wash water temperature also determines the wash speed and the spin speed, as well as the rinse water temperature.

Another object of our invention is to provide in a control system for an automatic clothes washing machine means for preselecting the temperature of the water to be delivered to the machine through a mixing valve for wash and rinse operations and for preselecting the speed of wash and spin operations which are simpler and more economical to manufacture than such means in former control systems.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

FIGURE 1 is a view in side elevation, partly in section, of a combination control device constructed in accordance with our invention;

FIGURE 2 is a vertical sectional view taken along section line II—II in FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2, but illustrating another embodiment of our invention;

FIGURE 4 is an electrical circuit diagram for the embodiment of our invention illustrated in FIGURE 2; and

FIGURE 5 is an electrical circuit diagram for the embodiment of our invention illustrated in FIGURE 3.

In the embodiment of the invention illustrated in FIGURES 1 and 2 of the drawings, the device is shown as comprising a mixing valve body **10**, having hot and cold water inlets **11** and **12**, respectively, leading through suitable passageways (not shown) into a metering chamber **13**, having a central aligned mixing chamber **14** in direct communication with one end thereof. The hot water inlet **11** communicates with the lower portion of chamber **13**, while the cold water inlet **12** communicates with the upper portion thereof.

The valve body **10** may be of cast metal or molded

thermoplastic material. Brass and nylon are satisfactory materials.

The inlets 11 and 12 are shown in FIGURE 1 as being provided with screens to strain out any large particles of matter, and may also be provided with check valves, as shown and described in U.S. Patent No. 2,620,133.

The valve body 10 has a passageway 15, communicating through a port (not shown) with mixing chamber 14, leading to an annular passageway 16 opening to one side of the valve body and closed by a solenoid controlled pressure operated diaphragm valve 17. When the diaphragm valve 17 is open, water from the mixing chamber 14 will flow through passageways 15 and 16 radially inwardly across the inner surface of diaphragm valve 17 to a passageway 18 leading to an outlet 19 from the valve body 10.

The valve 17 is a well known form of pressure operated solenoid controlled diaphragm valve in which an armature 20 of a solenoid 21 is slidably guided within a magnet coil 22 of the solenoid and is engaged with a central orifice 23 leading through the diaphragm valve by a spring 24. The diaphragm valve has a bleed passage (not shown) in the thinner portion thereof leading therethrough to pass water from one side of the diaphragm to the other and create a pressure differential on opposite sides of the diaphragm when the orifice 23 is closed by engagement with the armature 20, to maintain the valve closed by the pressure of the water acting on the outer face thereof. Upon energization of the magnet coil 22, the armature 20 will move out of engagement with the central orifice 23, relieving pressure from the outer side of the diaphragm valve 17 to effect opening of said diaphragm valve by the pressure of fluid on the inner side thereof.

The outlet 19 is shown in FIGURE 2 as being in the form of a metal fitting 25 sealed to the opposite wall of the valve body from the inlets 11 and 12 and retained in sealing engagement with the valve body by a yoke 26 engaging said fitting and secured to the valve body as by self-tapping screws 27 extending through said yoke and threaded within the valve body 10.

The fitting 25 is shown as having a generally tubular seating and passageway member 28 extending therealong, the inner wall of which forms the outlet 19 from the valve. The inner face of the passageway member 28 is shown as forming a seat for a resilient flow control device 29 for maintaining a substantially constant rate of flow through the outlet 19 regardless of variations in inlet pressure of fluid entering the valve body through the inlets 11 and 12, on principles clearly shown and described in Patent No. 2,454,929, which issued to Leslie A. Kempton on November 30, 1948, and forms no part of the present invention so not herein shown or described further.

A hollow piston valve 30 is provided to meter hot and cold water from the metering chamber 13 into the mixing chamber 14. The piston valve 30 is guided within a generally cylindrical insert 31 extending along the wall of the metering chamber 13 and apertured at its periphery midway of its length to accommodate the flow of cold water thereinto from the cold water inlet 12. The insert 31 is sealed to the wall of the chamber 13 by spaced seals 32 and 33 and is retained in engagement with shouldered portions 34 extending inwardly from the wall of the metering chamber by a retaining ring 35, which may be a snap-ring snapped into the wall of the chamber 13 in engagement with the outer end of insert 31. The insert 31 is provided with an inwardly extending flanged portion 36 extending from the inner end thereof and sealed to the wall of the piston valve 30, as by a sealing member 37.

The insert 31 is also provided with a flange 38 extending inwardly therefrom adjacent the outer end thereof and forming a seat for an annular end valve face 39 of the piston valve 30. The opposite end of the piston valve 30 is seated against an annular seat 40 shown as being formed integrally with an end wall 41 of the metering chamber 13.

A spring 42 seated at one end in the end wall 41 within the annular seat 40 and at its opposite end on a stirrup 43 for a thermal element 44 is provided to bias the piston valve 30 toward the face of the flange 38 and block the flow of cold water into the mixing chamber 14 and accommodate the flow of hot water thereinto and also to retract an extensible power member 45 of the thermal element 44 upon cooling of said thermal element.

The thermal element 44 is shown as being of the so-called power type of thermal element wherein a fusible thermally expansible material contained within a casting 46 of the thermal element extends the power member or piston 45 from a cylinder 47 of the thermal element as the temperature of water in the mixing chamber 14 approaches the fusion point of the thermally expansible material, as shown and described in Patent No. 2,368,181 which issued to Sergius Vernet on January 30, 1945, and forms no part of our present invention so not herein shown or described further.

The stirrup 43 against which the power member 45 of the thermal element 44 acts is maintained in position within the piston valve 30 by an overtravel spring 48 seated at one end on an annular rib 49 extending inwardly from the wall of the piston valve 30 and seated at its opposite end on the stirrup 43 and maintaining said stirrup in engagement with a snap-ring 50 engaging an annular rib 51 extending inwardly from the wall of the piston valve 30 adjacent the valve face 39 thereof.

The means for adjusting the operative position of the thermal element 44 to adjust the controlled temperature of mixed water in the mixing chamber 14 includes a shaft or pin 52 extending from a spider 53 encircling the casing 46 of the thermal element and engaging a clamping ring 54 of said thermal element.

The pin 52 extends through and is mounted for sliding movement along a sealing plate 55 carried in an end plate 56 suitably secured and sealed to the valve body 10 to close mixing chamber 14. A sealing ring 57 recessed within the sealing plate 55 has sealing engagement with the pin 52 and is retained in sealing engagement therewith as by a retaining ring 58.

The heating coil 73 includes a pair of terminals 82 and 83 which are respectively connected to a pair of terminals 84 and 85 extending through cap member 78. The terminal 82 is connected directly to the terminal 84, while the terminal 83 is connected to terminal 85 through a normally closed switch 86 mounted inside cap member 78 and having a switch arm 87 extending therefrom over the edge of heating coil 73 to be engaged thereby and open the contacts of switch 86 to deenergize heating coil 73 upon a predetermined travel of thermal element 72 against spring 80 after legs 68 have engaged cam surface 67.

An extension of end plate 56 serves as a mounting for a pair of two position single pole double throw switches 88 and 89 suitably fastened thereto as by rivets 90 and having switch arms 91 and 92 biased respectively into engagement with cam surfaces 93 and 94 formed on the underside of cams 63 and 66 at their peripheries. The switch arm 91 engages either contact 95 or contact 96 of switch 88, and the switch arm 92 engages either contact 97 or contact 98 of switch 89. While shown as leaf spring switches for ease of illustration and explanation, it is understood that preferably switches 88 and 89 should be of a snap acting type.

FIGURE 4 is a schematic wiring diagram illustrating one method in which the embodiment of our invention shown in FIGURES 1 and 2 may be used. A timer 99 for a washing machine is connected to a source of electrical power through power lines 100 and 101.

A motor for the washing machine is generally indicated at 104. As an example, the motor 104 may be a

two-speed motor and may alternately drive either the agitator of a washing machine for washing and agitated rinsing of clothes, or a perforated inner tub of a washing machine, for spray rinsing and spin drying of the clothes, all according to the operation called for by the timer at a particular time. The high speed windings for the motor **104** are indicated at **105**, and the low speed windings are indicated at **106**. It should be understood that provision of different speeds may be made by shifting of gears, clutches, belts, etc., rather than by a two-speed motor.

A line **102** from the timer is connected to the switch **88**, which controls the wash speed of the machine, or the speed at which the agitator is driven during washing and agitated rinse operations. The contact **95** of which **88** is connected to low speed windings **106** of motor **104**, and contact **96** of switch **88** is connected to high speed windings **105** of motor **104**. A line **103** from the timer is connected to solenoid **21** for energizing the coil **22** and opening valve **17** to admit water at the selected wash temperature to the machine for the washing operation.

For a washing operation, the position of pin **52**, and hence the operative position of thermal element **44** determining the temperature of mixed water to be delivered to the washing machine for the washing operation, is determined by the position of a cam follower **59** guided in slots **60** of a flanged cylindrical casing member **61** having its flanged end secured to end plate **56** in any suitable manner.

The follower **59** has oppositely projecting legs **62** extending through and beyond the slots **60** in casing member **61**. The legs **62** are normally in engagement with a cam surface **64** on the underside of a wash cam **63** to determine the operative position of thermal element **44** and the temperature of mixed water delivered to the washing machine for the washing operation. The wash cam **63** rotatably engages the outer surface of casing member **61** and is retained to said casing member as by a snap-ring **65** engaging the opposite face of said wash cam from the cam surface **64** thereof and separating said wash cam from a rinse cam **66**.

The rinse cam **66** is also rotatably mounted on the casing member **61** and has a cam surface **67** on the upper side thereof engaged by oppositely projecting legs **68** of a cam follower **69** to determine, through abutting cam follower **59** and pin **52**, the operative position of thermal element **44** and the temperature of mixed water delivered to the washing machine for a rinsing operation.

The legs **68** extend through slots **70** in casing member **61** and are normally out of engagement with cam surface **67**, but for the rinsing operation they are moved into engagement with cam surface **67** by an extensible power member **71** of a thermal element **72** mounted in casing member **61** and similar to thermal element **44** but having an electrical heating coil **73** mounted on the casing thereof.

The thermal element **72** is provided with a spider **74** mounted on a clamping ring **75** thereof and having legs **76** extending through slots **77** in casing member **61**. A hollow cap member **78** surrounds the upper portion of casing member **61** and is secured thereto through a ring **79**. An overtravel safety spring **80** for thermal element **72** surrounds casing member **61** and seats at one end on a shoulder **81** of cap member **78** and at the other end on legs **76** of spider **74**.

A line **107** from the timer is connected to the switch **89**, which controls the spin speed of the machine, or the speed at which a perforated inner tub is spun to wring water out of the clothes. The contact **97** of switch **89** is connected to low speed windings **106** of motor **104**, and contact **98** of switch **89** is connected to high speed windings **105** of motor **104**. A line **108** from the timer is connected to solenoid **21** for energizing the coil **22** and opening valve **17** to admit water at the selected rinse temperature to the machine for the rinsing operation.

A line **109** from the timer is connected to heating coil **73** for energizing the heating coil to shift the thermal element **44** and change from the wash temperature setting thereof determined by cam **63** to the rinse temperature setting thereof determined by cam **66**.

A line **110** from the timer is connected to a solenoid coil **111** for shifting the operative driving connection of motor **104** from the agitator of the machine to the perforated tub thereof for spinning water out of the clothes. It will be understood that a drain valve may be opened and a pump energized at the time of the spinning operation.

For ease of illustration, return connections have not been shown, but it is understood that lines **112**, **113**, **114**, **115**, and **116** are return lines connected to the return side of power lines **100** and **101**.

In the embodiment of the invention illustrated in FIGURE 3 of the drawings, explanation may most simply be made by comparison with the device of FIGURES 1 and 2. With the exceptions set forth below, the parts of the device of FIGURE 3 are identical with the parts of the device of FIGURES 1 and 2, and for this reason the parts of the device of FIGURE 3 are not separately described, and certain identical parts are numbered with the same numbers as in FIGURE 2.

The device of FIGURE 3 has been made non-thermostatic by replacing pin **52**, spider **53**, and thermal element **44** of the device of FIGURE 2 with a pin **52***a* extending from wash cam follower **59** all the way to stirrup **43**.

In the device of FIGURE 3, the switches **88** and **89** of FIGURE 2 have been replaced by a single switch **88***a*, and rinse cam **66** of FIGURE 2 with switch actuating cam surface **94** has been replaced by cam **66***a* having no lower peripheral cam surface and keyed to wash cam **63** by a pin **117**.

FIGURE 5 is a schematic wiring diagram for the device of FIGURE 3, and is identical with FIGURE 4 except for the removal of switch **89** and the connections thereto, it being understood that the switch **88***a* will control both the wash speed and the spin speed of the machine. However, in this case the wash speed and spin speed are not independent, both being either high or low according to whether switch arm **91***a* is in engagement with contact **96***a* connected to high speed windings **105** of motor **104** or contact **95***a* connected to low speed windings **106** of motor **104**.

In the operation of the device of FIGURE 2, the wash cam **63** is set to the desired temperature of water to be delivered to the machine for the washing operation. At this time, cam follower **59** is held in engagement with cam surface **64** by spring **42** acting through stirrup **43**, thermal element **44**, and pin **52**, and the cam surface **64** thus determines the operative position of the thermal element **44**. At the same time, cam surface **93** determines the operative position of switch arm **91** according to the selected temperature of the wash water. Normally switch arm **91** will engage contact **95** to effect a slow agitator speed for low wash temperatures and contact **96** to effect a high agitator speed for high wash temperatures, but cam surface **93** may be designed to give any desired correlation between agitator or wash speed and wash temperature. Similarly, the rinse cam **66** is set to the desired temperature of water to be delivered to the machine for the rinsing operation, and cam surface **94** determines the operative position of switch arm **92** according to the selected temperature of the rinse water. Normally switch arm **92** will engage contact **97** to effect a slow spin speed for low rinse temperatures and contact **98** to effect a high speed for high rinse temperatures, but cam surface **94** may be designed to give any desired correlation between spin speed and rinse temperature.

After the cams **63** and **66** have been adjusted to the desired settings, the timer is turned to start the machine. Solenoid **21** is energized by the timer through line **103** to open valve **17** and admit water at the selected temperature to the machine for the washing operation. If the mixed water passing through mixing chamber **14** is hotter

than the selected temperature, the thermal element 44 will be heated and piston 45 thereof will be extended to move piston valve 30 closer to seat 40 and away from flange 38 to reduce the amount of hot water available from inlet 11 and increase the amount of cold water available from inlet 12. If the mixed water passing through the mixing chamber 14 is colder than the selected temperature, the thermal element 44 will be cooled and spring 42 will move piston valve 30 away from seat 40 and toward flange 38 to increase the amount of hot water available from inlet 11 and reduce the amount of cold water available from inlet 12. After a predetermined amount of water has been admitted to the machine, solenoid 21 is deenergized and washing takes place at the wash speed determined by the wash temperature setting. After the washing operation, solenoid coils such as 111 are energized to open a drain valve, start a pump, and shift the driving connection of motor 104 from the agitator to perforated inner tub to spin the wash water from the clothes at the speed determined by the rinse temperature setting.

The washing machine and its particular sequence of operations are no part of the present invention, and are not herein shown or described in detail, but by way of example, suffice it to say that after the washing operation and discarding of the wash water, one or several rinsing operations will occur. At this time heating coil 73 will be energized to extend piston 71 from thermal element 72 and move wash cam follower 59 away from wash cam 63 and move rinse cam follower 69 into engagement with rinse cam 66 to change the operative position of thermal element 44, so that when rinse water is admitted to the machine by energization of solenoid 21 through line 108, the selected temperature of rinse water will be attained.

After cam follower 69 engages rinse cam 66, continued heating of thermal element 72 by heating coil 73 will cause it to back up against the spring 80 until it opens switch 86. Subsequent cooling permits spring 80 to return element 72 and again close switch 86. In this manner, overheating of element 72 is prevented.

After the rinsing operation or operations, the rinse water is spun from the clothes at the speed determined by the rinse temperature setting.

The device of FIGURE 3 will operate in a similar manner, except in this case only one setting need be made. The wash cam 63 is set to the desired wash water temperature, and at the same time the rinse water temperature will be determined by rinse cam 66*a* keyed thereto and the wash and spin speeds will be determined by switch 88*a*. The temperature of the mixed water for washing and rinsing operations will vary with the temperature of the hot and cold water entering inlets 11 and 12, since in FIGURE 3 the position of piston valve 30 is determined by pin 52*a* and no thermostatic compensation is provided.

It will be understood that various combinations of the devices of FIGURES 2 and 3 are possible. For example, the independent cams 63 and 66 and two switches 88 and 89 of FIGURE 2 might be combined with the non-thermostatic valve of FIGURE 3, or the thermostatic valve of FIGURE 2 might be combined with the dependent cams 63 and 66*a* and the single switch 88*a* of FIGURE 3. In addition, a single switch such as 88*a* in FIGURE 3 might be used with either a thermostatic or a non-thermostatic valve, with cams 63 and 66*a* of FIGURE 3 not keyed together by pin 117. In such a case, the rinse temperature would not be determined by the wash temperature, but the spin speed would be determined by the wash speed.

Various other modifications might be made without departing from the spirit and scope of the novel concepts of our invention. In the following claims, "wash speed" is intended to mean the speed of the washing action of any suitable mechanism, such as the speed of oscillation of an agitator in an agitator type machine, the speed of rotation of a tub in a tumbling type machine, etc. "Spin speed" is intended to mean the speed of rotation of a tub to extract water from clothes by centrifugal force.

We claim as our invention:

1. In a valve and switch assembly for delivering a regulated quantity of fluid at predetermined temperatures and supplying electrical energy to operate a device at different speeds in accordance with a selected temperature setting, a valve body having a chamber therein, hot and cold water inlets leading into said chamber, an outlet leading from said chamber, a shut-off valve associated with said outlet for controlling the flow of fluid therethrough, valve means in said chamber for metering the flow of hot and cold water thereinto from said inlets in accordance with the position thereof when said shut-off valve is open, a thermally responsive element in said chamber for operating said valve means and controlling the temperature of mixed water flowing through said outlet, manually adjustable means on the outside of said valve body having a first portion operatively associated with said thermally responsive element for adjusting the operative effect of said element on said valve means and preselecting the control temperature of mixed water to be furnished through said outlet for one operation and having a second portion independent of said first portion for adjusting the operative effect of said thermally responsive element on said valve means and determining the control temperature of water to be furnished through said outlet for a second position, means for shifting the operative temperature setting of said thermally responsive element from a temperature determined by said first portion of said adjustable means to a temperature determined by said second portion of said adjustable means, and switch means associated with said first and second portions of said adjustable means automatically selecting the speed of operation of the device to be operated in accordance with selected temperature settings for each portion of said adjustable means.

2. In a valve and switch assembly for delivering a regulated quantity of fluid at preselected temperatures and supplying electric energy to operate a device at different speeds in accordance with a preselected temperature setting, a valve body having a chamber therein, hot and cold water inlets leading into said chamber, an outlet leading from said chamber, a shut-off valve associated with said outlet for controlling the flow of fluid therethrough, valve means in said chamber for metering the flow of hot and cold water thereinto from said inlets in accordance with said position of said valve means when said shut-off valve is open, a thermally responsive element in said chamber for operating said valve means and controlling the temperature of mixed water flowing through said outlet, two temperature selector cams on the outside of said valve body operable to preselect the temperature of the fluid for different cyclic operations, means for shifting the operative temperature setting of said thermally responsive element from a temperature determined by said first cam to a temperature determined by said second cam, and speed control switch means associated with each of said cams for selecting different operative speeds of the device to be operated in accordance with the preselected temperature settings of said cams.

3. A valve and switch assembly in accordance with claim 2, wherein the temperature selector cams are annular and have inner cam surfaces preselecting the temperature of the fluid delivered through said outlet for different cyclic operations and wherein the cams have outer cam surfaces having operative engagement with said switch means for selecting an operative speed in accordance with preselected temperatures of fluid selected by said cams.

4. In a washing machine, a variable speed motor, means operatively connected to said motor and driven thereby for providing at least one of a plurality of wash speeds

and a plurality of spin speeds, a variable mixing valve for controlling the supply of hot and cold water to said machine and including adjustable means movable manually to a plurality of positions to vary the water temperature by varying the proportion of hot and cold water flowing through the valve, means for controlling the operation of said motor and including switch means for determining the speed of said motor, said switch means being operatively connected to said adjustable means and operable thereby.

References Cited in the file of this patent

UNITED STATES PATENTS

2,292,815	Bariffi	Aug. 11, 1942
2,425,788	Edwards	Aug. 19, 1947
2,447,848	Edwards	Aug. 24, 1948
2,489,896	Kempton	Nov. 29, 1949
2,548,651	Chace et al.	Apr. 10, 1951
2,657,859	Von Wagenheim	Nov. 3, 1953
2,841,003	Conlee	July 1, 1958