ABSTRACT OF THE DISCLOSURE

This disclosure relates to a pneumatic control system for a washing machine wherein the speed of movement of the agitator thereof and the speed of spin of the washing compartment is controlled by the degree of vacuum directed to the spinning actuated actuator that sets the speed of the variable speed transmission means, the control system preventing the spinning of the washing compartment until the water level in the washing compartment has fallen below a predetermined level so that a high speed spinning operation cannot be provided until the water level is below a safe level for the spinning of the washing compartment.

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This invention relates to an improved system for controlling the operation of a domestic washing machine or the like.

In particular, it is well known that various washing machines are provided with a single electrical motor which, when its output shaft is rotated in one direction, operates the agitator of the washing machine and, when its output shaft is rotated in the opposite direction, spins the washing compartment of the washing machine.

According to the teachings of this invention, improved pneumatic control means are provided for controlling the speed of the spinning washing compartment in relation to the magnitude of a pneumatic signal.

In particular, means are provided for interconnecting the output shaft of the motor to transmission means for spinning the washing compartment. In addition, other means control the speed of the transmission means during the spinning operation. However, the last-named control means is only effective when the water level in the washing machine has fallen below a predetermined level.

Accordingly, it is an object of this invention to provide an improved washing machine system having one or more of the novel features set forth above or hereinafter shown or described.

Other objects, uses and advantages of this invention are apparent from a reading of this description, which proceeds with reference to the accompanying drawings forming a part thereof and where:

FIGURE 1 is a schematic view illustrating the improved control system of this invention.

FIGURE 2 is a flow diagram illustrating the sequence of operation of the system illustrated in FIGURE 1.

FIGURE 3 is an enlarged, fragmentary, cross-sectional view illustrating the main program member of FIGURE 1.

FIGURE 4 is a schematic view, partially in cross section, illustrating the means for controlling the speed of the transmission means of the washing machine of FIGURE 1.

FIGURE 4A is an enlarged, fragmentary, cross-sectional view illustrating one of the operating positions of the vacuum regulator of FIGURE 4.

While the various features of this invention are hereinafter described and illustrated as being particularly adaptable for providing a control system for a domestic washing machine or the like, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide a control system for other devices as desired.

Therefore, this invention is not to be limited to only the embodiment illustrated in the drawings, because the drawings are merely utilized to illustrate one of the wide variety of uses of this invention.

Referring now to FIGURE 1, the improved control system of this invention is generally indicated by the reference numeral 10 and includes an electrical motor 11 having an output shaft 12 which, when rotated in one direction, will, through suitable transmission means, operate the agitator of the washing machine 10 and, when rotated in the opposite direction, will, through suitable transmission means, spin the washing compartment of the washing machine 10.

The motor 11 has a running winding 13 and a starting winding 14, the running winding 13 having one side 15 thereof interconnected to a contact 16 by a lead 17 and the other side 18 thereof interconnected to power lead L1 by a lead 19. The starting winding 14 has one side 20 thereof interconnected to a contact 21 by a lead 22 and the other side 23 thereof interconnected to a contact 24 by a lead 25, the lead 24 having a capacitor 26 therein, as well as a centrifugal switch 28 which opens upon a predetermined speed of rotation of the output shaft 12.

A first electrical switch 26 is provided and has three switch blades 27, 28, and 29 interconnected together by means 30, the blade 27 being hinged at contact 23 to bridge the contact 23 with a contact 31, the switch blade 28 being hinged at the contact 21 and being adapted to bridge the contact 21 with contact 32, and the switch blade 29 being hinged at contact 33 and being adapted to bridge the contact 33 with a contact 34.

The means 30 of the electric switch 26 is interconnected to a pneumatic actuator 35, which, when receiving atmospheric conditions in the chamber thereof, holds the switch blades 27, 28, and 29 in the position illustrated in FIGURE 1. However, when the chamber of the actuator 35 is evacuated by being interconnected to a vacuum source or the like in a manner hereinafter described, the actuator 35 pulls the blade 27 to bridge the contact 23 with the contact 32 and pulls the switch blades 28 and 29 so that the same bridge the contacts 21 and 33 with a contact 36 for a purpose hereinafter described.

The contact 31 is in the lead 17 previously described and the contact 32 is interconnected to the power lead L1 by a lead 37. The contact 33 is interconnected to the lead 17 by a lead 38.

The contact 36 is interconnected to a contact 38 of another electrical switch 39 by a lead 40. The switch 39 includes a movable switch blade 41 hinged at a contact 42 and adapted to bridge the contacts 42 and 38, the contact 42 being interconnected to the power lead L1 by a lead 43.

The switch blade 41 is interconnected to a pneumatic actuator 44 which holds the switch blade 41 in the position illustrated in FIGURE 1 to bridge the contacts 41 and 38 when the chamber of the actuator 44 is at atmospheric condition. However, when the chamber of the actuator 44 is evacuated by being interconnected to a vacuum pump or the like, the actuator 44 by an interconnecting means 45 will move the switch blade 41 out of contact with the contact 38 for a purpose hereinafter described.

Another electrical switch 46 is provided and includes a switch blade 47 adapted to bridge a contact 48 in the lead 43 with the contact 16. However, the switch blade 47 is interconnected by means 49 to a pneumatically
operated actuator 50 so that when the actuator 50 has its chamber at atmospheric conditions, the actuator 50 holds the switch blade 47 in the open position, as illustrated in FIGURE 1. However, when the chamber of the actuator 50 is evacuated, being interconnected to a vacuum pump or the like, the actuator 50 pulls the switch blade 47 to bridge the contacts 38 and 16 for a purpose hereinafter described.

The power lead L7 is also interconnected to the contact 38 of the switch 39 by a lead 51, the lead 51 having a timer motor 52 disposed therein to cause movement of a main program member 53, FIGURE 3, over a reading head 54 for a purpose hereinafter described.

A vacuum pump 55 is provided and is placed across the power leads 43 and 51 by a lead 56, the vacuum pump 55 having the inlet side 57 thereof interconnected to the reading head 54 by a flexible conduit means 58 in a manner hereinafter described.

The reading head 54 has a reading surface 59 interrupted by a plurality of ports 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70 and 71, with the ports 60, 61, 63, 64, 65, 66, 67, 69, 70 and 71 being disposed in vertical alignment while the port 62 is disposed in horizontal alignment with port 61 and the port 68 is disposed in horizontal alignment with the port 67.

The flexible conduit 58 leading from the inlet 57 of the vacuum pump 55 is interconnected to the port 66 of the reading head 54, as well as to a port 72 of a water level control device 73, the water level control device 73 also having two other ports 74 and 75. The device 73 has a valve means 76 for fluidly interconnecting the ports 72 and 74 together when the water level in the washing machine 10 is below a predetermined level. However, when the water level in the washing machine 10 is above a predetermined level, the means 76 disconnects the port 72 from the port 74 and interconnects the port 75 to the port 74, the port 75 being interconnected to the atmosphere.

The port 74 of the water level control device 73 is interconnected to the port 63 of the reading head 54 by a flexible conduit means 77.

The program member 53 which moves over the reading surface 59 of the reading head 54 includes a flexible reading sheet 78 having a plurality of blister means 79 formed therein in a predetermined pattern to bridge various ports in the reading head 54 in the manner illustrated in FIGURE 2, as those particular blister means 79 pass over the reading head 54. In addition, the reading sheet 78 has a plurality of apertures 80 passing therethrough in a predetermined pattern to be aligned with various of the ports in reading head 54 to permit air to enter those aligned ports in the manner illustrated in FIGURE 2. The reading sheet 78 is interconnected to a rigid backing member 81 in any suitable manner and is spaced therefrom by a porous compressible material 82 whereby air is adapted to enter an aperture means 83 of the backing member 81 and be filtered by a material 82 as the same passes through an aperture means 80 of the reading sheet 78 into an aligned port in the reading head 74.

The program member 53 is adapted to move over the reading head 54 at a constant speed by the timer motor 52 previously described when the timer motor is energized in the manner hereinafter set forth to produce the cycle of operation illustrated in FIGURE 2.

A second reading head 84 is provided and has the reading surface 85 thereof interrupted by a plurality of vertically aligned ports 86, 87, 88 and 89. A program member 90 is adapted to selectively move over the reading surface 85 of the reading head 84 and the blister means 91, 92, 93, 94 and 95 formed therein in the same manner as the blister means 79 previously described to bridge certain of the ports in the reading head 84 when an indicator 96 of the program member 90 is disposed in a particular position WH, WW, WC, and CC, as illustrated in FIGURE 1 to select a water temperature of the water being directed into the washing machine by a water mixing valve 97.

The water mixing valve 97 has a hot water inlet 98 interconnected to a pneumatic actuator 99 by means 100 whereby when the actuator 99 is at atmospheric conditions the actuator 99 closes the hot water inlet 98. However, when the chamber of the actuator 99 is evacuated, the same opens the inlet 98 to direct water through the water mixing valve 97 to the outlet 101 thereof. Similarly, the water mixing valve 97 has a cold water inlet 102 controlled by a pneumatic actuator 103 interconnected thereto by means 104. Thus, when the actuator 103 is at atmospheric conditions, the same holds the cold water inlet 102 in its closed position, but when the chamber of the actuator 103 is evacuated, the same opens the cold water inlet 102.

The port 86 of the reading head 84, and the port 50 of the reading head 54 are interconnected to the chamber of the actuator 103 by flexible conduit means 105. The port 88 of the reading head 84 is interconnected to the chamber of the hot water actuator 99 by flexible conduit means 106. The port 61 of the reading head 54 is interconnected to the port 87 of the reading head 84 by a flexible conduit 107. The port 62 of the reading head 54 is interconnected to the port 89 of the reading head 84 by a flexible conduit 108.

The port 64 of the reading head 54 is interconnected to the chamber of the actuator 44 by a flexible conduit means 109. Similarly, the port 65 of the reading head 54 is interconnected to the chamber of the actuator 35 by a flexible conduit means 110. The port 67 of the reading head 54 is interconnected to the chamber of the actuator 50 by a flexible conduit means 111.

The port 68 of the reading head 54 is interconnected to a chamber of an actuator 112 by a flexible conduit means 113, the actuator 112 when evacuated, opening a switch blade 114 in the line 43 to terminate the cycle of operation of the system 10. However, the switch blade 114 is adapted to be disposed in a closed position by suitable start means 115 to start the cycle of operation selected by the program member 53.

The port 69 of the reading head 54 is interconnected to a chamber 116 of a vacuum regulator 117 by a flexible conduit 118, the vacuum regulator having the chamber 116 thereof also interconnected to the main vacuum line 88 by a vacuum line 119. The vacuum regulator 117 is controlled by a knob 120 whereby the magnitude of vacuum in the chamber 116 can be automatically controlled so that the magnitude of vacuum imposed on line 118 will be in accordance with that selected by the knob 119, the vacuum regulator 117 selecting the speed of operation of the agitator of the washing machine 10.

The port 70 of the reading head 54 is interconnected to a chamber as a pneumatic actuator 120 by flexible conduit means 121, the actuator 120 controlling the speed of the transmission means for either the agitator or the washing compartment in relation to the magnitude of vacuum imposed in the chamber thereof.

The port 70 of the reading head 54 is interconnected to a chamber 122 of another vacuum regulator 123 by a flexible conduit means 124; the chamber 122 of the regulator 123 also being interconnected to the port 74 of the water level control device 73 by means of a flexible conduit means 124 leading to the port 65 of the reading head 54.

The vacuum regulator 123 has a control knob 125 which will select the magnitude of vacuum being imposed on the line 124 to be utilized for controlling the spin speed of the washing compartment of the washing machine 10.

The pneumatic actuator 120 is illustrated in FIGURE 4 and comprises a bellows construction or the like having a fixed wall 126 and a movable wall 127. The movable
wall 127 of the actuator 120 is interconnected to an end 128 of an L-shaped arm 129 pivotedly mounted at the elbow 130 thereof by a pivot pin 131 for a purpose hereinafter described. A tension spring 132 is provided and has one end 133 fixed to suitable stationary structure and the other end 134 thereof secured to the end 128 of the arm 129 to tend to rotate the arm 129 in a clockwise direction in FIGURE 5.

The electrical motor 11 has a variable pitch pulley arrangement 135 carried on the output shaft 12 thereof and comprises a pair of pulley sheaves 136 and 137, the pulley sheave 136 normally being urged toward the pulley sheave 137 by a compression spring means 138. A belt 139 is looped around the pulley arrangement 135 and is also looped around a driven pulley 140 which drives a transmission means 141. When the belt means 139 is driven in one direction by the motor 11, the driven pulley 140 drives the transmission means 141 in such a manner that the same operates the actuator of the washing machine 10. However, when the belt means 139 is driven in the opposite direction by the motor 11, the driven pulley 140 drives the transmission means 141 in such a manner that the same operates the actuator of the washing machine 10.

The other end 142 of the arm 129 carries an idler roller 143 about which the belt means 139 passes.

Thus, as long as the bellows construction 120 is at atmospheric conditions, the tension spring 132 overcomes the force of the compression spring 138 and tends to separate the sheave 136 relative to the sheave 137 so that the belt means 139 will be driven by the pulley means 135 at its lowest speed. However, as the movable wall 127 of the actuator 120 moves toward the wall 126 thereof upon a vacuum being interconnected to the chamber of the actuator 120, the arm 129 is moved in a counterclockwise manner according to the magnitude of the vacuum imposed on the actuator 120 whereby the force of the compression spring 138 moves the sheave 136 towards the sheave 137 to increase the pitch of the pulley arrangement 135 so that the belt means 139 moves outwardly on the pulley 135 to drive the driven pulley 140 at a faster speed.

Since the vacuum regulators 117 and 123 are identical in structure, only the regulator 123 is illustrated in detail in FIGURES 4 and 4A and will now be described, it being understood that such details also apply to the regulator 117.

As illustrated in FIGURE 4, the regulator 123 includes a pair of housing means 144 and 145 suitably secured together and sandwiching an outer periphery 146 of a flexible diaphragm 147 therebetween, the diaphragm 147 dividing the housing means 144, 145 into two chambers 122 and 124. The chamber 122 is interconnected to the atmosphere by an aperture means 149 passing through the housing means 144.

The flexible conduit 124 which leads to the ports 71 of the reading head 54 is interconnected to a port 150 of the housing means 145, the port 150 being interconnected to the chamber 122 thereof.

The passage means 124 leading to the port 63 of the reading head 54 as well as to the port 74 of the water level control device 73 is interconnected to a tubular member 151 projecting into the chamber 122, the tubular member 151 having an open end 152 adapted to be opened and closed by the diaphragm 147.

The diaphragm 147 has an aperture 153 passing therethrough and being off center relative to the end 152 of the tube 151.

A vent hole covering member 154 is provided and is normally urged against the diaphragm 147 by a compression spring 155, the cover member 154 having an aperture 156 passing therethrough and loosely receiving the tube 151.

The control knob 125 has a threaded portion 157 threaded in a threaded opening 158 of the housing means 144, the end 159 of the threaded portion 157 bearing against a plate 160. A compression spring 161 is disposed between the plate 160 and the diaphragm 147 for a purpose hereinafter described.

The control knob 125 is adapted to be rotated relative to the housing 144 to select the desired magnitude of vacuum in the chamber 122 and, thus, being directed by conduit means 124 to the speed control actuator 120 in a manner hereinafter set forth.

In particular, when the knob 125 is set at a selected speed, and the vacuum source is interconnected to the conduit 124 in a manner hereinafter described, the force of the compression spring 155 is greater than the force of the compression spring 161 and moves the cover member 154 and diaphragm 147 upwardly to uncover the end 152 of the tube 151, the cover member 154 completely closing the aperture 153 in the diaphragm 147. As the degree of vacuum in the chamber 122 builds up, the vacuum in the chamber 122 tends to pull the diaphragm 147 downwardly and when the magnitude of vacuum in the chamber 122 equals that set by the control knob 125, the degree of vacuum in the chamber 122 and the force of the compression spring 161 acting in opposition to the force of the compression spring 155 causes the diaphragm 147 to close off the end 152 of the tube 151 in the manner illustrated in FIGURE 4. Should the degree of vacuum in the chamber 122 be greater than that set by the control knob 125, the increased degree of vacuum in the chamber 122 further pulls the diaphragm 147 downwardly in the manner illustrated in FIGURE 4A whereby the cover member 154 is also moved downwardly to uncover the port or aperture 153 in the diaphragm 147 to permit atmosphere from the chamber 145 to pass into the chamber 122 and reduce the degree of vacuum therein until the same is at the selected degree whereby the regulator 123 will then assume the position illustrated in FIGURE 4.

Thus, it can be seen that the regulator 123, as well as the regulator 117, is adapted to maintain a selected magnitude of vacuum in the chamber means 150 by the above manner to impose that vacuum on the speed control actuator 120 for a purpose hereinafter described.

The operation of the system 10 will now be described.

Assuming that the operator desires to do a regular fabrics wash cycle, as illustrated between the "0" minute increment and "24" minute increment of movement of the program member 53 as illustrated in FIGURE 2, with a hot wash water temperature and a warm rinse water temperature, the operator moves the program number 90 so that the indicator 96 thereof points to position HW whereby the blister 91 thereof bridges the ports 87 and 88 for a purpose hereinafter described. Also, the operator selects the desired agitator speed by the knob 119 and the desired spin speed by the knob 125.

With the program member 53 disposed in the "0" position thereof, the operator pulls out on the lever 115 to close the switch blade 114 whereby the vacuum pump 55 and timer motor 52 are placed across the power leads L1 and L2 because the switches 26, 39 and 46 are disposed in the position illustrated in FIGURE 1, whereby the program member 59 begins to move relative to the reading head 54 under the influence of the timer motor 52. At the "0" increment of movement of the program member 53, it can be seen that a wide blister 79A, FIGURE 2, will simultaneously bridge the ports 61, 62, 63 and 64 of the reading head 59 and, since the water level in the washing machine 10 is below the predetermined level, the control device 73 interconnects the vacuum line 58 with the port 74 so that vacuum is at the port 63. With vacuum at the port 63, vacuum is fed from port 60 through line 107 to port 87 of the reading head 84 and is interconnected to the port 88 by the blister 91, so that the hot water actuator 99 is evacuated to open the hot water inlet 98 to direct hot water through the outlet 101 of the mixing valve 97 into the washing machine.

Since the blister 79A also bridges the ports 63 and 64 of the reading head 54, vacuum is imposed on the actuator.
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44 of the switch 39 to open the switch blade 41 so that current cannot flow from L1 to the contact 36 of the switch 26.

Also, at the "0" increment of movement of the program member 53, it can be seen that a plurality of vertically aligned blisters 79B serially bridge the ports 65 and 66 whereby the vacuum at the port 65 is interconnected to the port 62 and, thus, to the chamber of the actuator 35 through the line 110 whereby the switch blades 27, 28 and 29 are pulled downwardly in the manner previously described, so that the switch blade 27 bridges the contacts 23 and 33 and the switch blades 28 and 29 interconnect the contact 36 with the contacts 33 and 24.

As long as the switch blade 41 is opened by the actuated actuator 44, no current can run through the starting winding 14 of the motor 11, so that the motor 11 is inoperative during the water filling operation until the water level has reached a predetermined level in the washing machine 10.

In particular, when the water level in the washing machine 10 reaches a predetermined level, the member 76 of the water level control device 73 disconnects the vacuum port 72 from the port 74 and interconnects the atmosphere port 75 with the port 74 whereby atmosphere is now interconnected to the port 63 of the reading head 54. Since atmosphere is at the port 63 of the reading head 54, the blister member 79A interconnects that atmosphere to the ports 61 and 64 so that the actuators 99 and 44 are interconnected to atmosphere. Since the actuator 59 is now interconnected to the atmosphere, the same closed the hot water inlet 98 so that no more water is fed into the washing machine by the mixing valve 97.

Similarly, the deactivating actuator 44 causes the switch blade 41 thereof to bridge the contacts 42 and 38 so that current from power line L1 will flow through line 40, contact 36, switch blade 28, contact 21 and line 22 through the starting winding 14 of the motor 11, contact 23, switch blade 27 contact 32 and line 37 to power lead L2 to cause the output shaft 12 of the motor 11 to operate in the proper direction for operating the agitator of the washing machine 10.

After the motor 11 has been started by current flowing through the winding 14 thereof, the current flowing through the winding 13 continues to operate the motor 11 even though the centrifugal switch 25 is subsequently opened by the speed of rotation of the output shaft 12. In particular, current flows from power lead L1 through line 40, contact 36, switch blade 29, contact 33, line 33', and line 17 through the winding 13 to the line 19 leading to the power lead L2.

It can be seen that the motor 11 is now operated in a manner to cause movement of the agitator of the washing machine 10 from the time the water level in the washing machine 10 has reached the predetermined level determined by the water level control 73 until the "14" minute increment of movement of the program member 53.

Also, it should be noted that a series of vertical blisters 79C bridge the ports 69 and 70 to interconnect the controlled vacuum in the line 118 with the speed control actuator 120 to cause the transmission means being driven by the motor 11 to operate the agitator at the speed selected by the knob 119.

In particular, since the control knob 119 of the vacuum regulator 117 has been set at a selected speed of operation of the agitator, and, should that speed be greater than the minimum speed provided by the transmission means 135, the degree of vacuum in the chamber 116 of the regulator 117 is imposed on the actuator 120 to pull the movable wall 127 thereof toward the fixed wall 126 to increase pitch of the pulley 130 so that the motor 11 will drive the belt 139 at a faster speed than when the same is disposed in the position illustrated in FIGURE 4.

At the "14" minute increment of movement of the program member 53 relative to the reading head 54, it can be seen in FIGURE 2 that a suitable aperture 80 of the reading sheet 59 comes into alignment with the port 65 of the reading head 54 to permit atmosphere to return to the chamber of the actuator 35 to move the switch blades 27, 28 and 29 back to the position illustrated in FIGURE 1 to turn off the motor 11 and terminate the operation of the agitator.

Also, at the "14" minute increment of movement of the program member 53 relative to the reading head 54, a series of vertical blisters 79D bridged the ports 66 and 67 to interconnect the vacuum pump 55 to the chamber of the actuator 59 so that the same pulls the switch blade 47 to close the contacts 48 and 16 to operate the motor 11 in a manner to spin the washing compartment of the washing machine.

In particular, current now flows from lead L1', to line 43, contact 48, switch blade 47, contact 16, line 17, contact 31, switch blade 27, contact 23, line 24, capacitor 25', centrifugal switch 25 and starting winding 14, lead 22, contact 21, switch blade 28, contact 32 and line 37 to power lead L2' to cause the starting winding 14 to operate the shaft 12 in the opposite direction to drive the transmission means which spins the washing compartment, the starting winding 14 having the current therethrough terminated when the centrifugal switch 25 opens due to the speed of rotation of the output shaft 12. However, current now flows through the running winding 13 of the motor 11 by means of lead 17 from power lead L2 to lead 19 leading to power lead L2 whereby the motor 11 spins the washing compartment as long as the actuator 59 is evacuated.

Simultaneously, it can be seen that other blisters 79E of the program member 53 are bridging the ports 70 and 71 to interconnect the controlled vacuum in line 124 to the speed actuator 120 to cause the transmission means for the spinning operation to spin the washing compartment at the speed selected by the control knob 119 of the vacuum being directed to the chamber 122 of the washing machine when the water level control device 73 is in the full line position illustrated in FIGURE 1 caused by the water in the washing machine being pumped out below the predetermined level by a pump driven by the motor 11 when the output shaft 12 thereof rotates in the direction to spin the washing compartment.

Thus, it can be seen that the spin speed regulator 133 will not increase the speed of spin of the washing compartment above the minimum speed thereof until after the water level in the washing compartment has fallen below the predetermined level set by the wiper level control device 73. In this manner, undue forces are not placed on the motor 11 to spin the washing compartment at a relatively high speed when a high water level is in the washing machine.

However, once the water level in the washing machine has fallen below the predetermined level, the member 76 of the water level control device 73 interconnects the port 72 with the port 74 whereby the inlet 57 of the vacuum pump 55 is now interconnected to the port 63 of the reading head 54 and, thus, to the line 124 leading to the chamber 122 of the vacuum regulator 123.

In this manner, the regulator 123 now controls the magnitude of vacuum being imposed on the speed control actuator 120 to set the desired speed of operation of the transmission means 141 during the spinning operation in the manner previously described.

Therefore, it can be seen that the washing machine 10 is controlled by the program member 53 in such a manner that the same will provide a cycle of operation as illustrated in FIGURE 2 in the above manner, with the actuators 35, 50 and 44 controlling the motor 11 in such a manner that the motor 11 will not operate the agitator of the washing machine until the water level in the machine has reached a predetermined level. Further, the control system of this invention will cause the motor 11 to have the output shaft 12 thereof driven in the proper direction to spin the washing compartment.
Accordingly, it can be seen that this invention provides an improved control system for a washing machine or the like.

What is claimed is:

1. In a washing machine having a washing compartment and motor means for spinning said compartment, the improvement comprising pneumatically operated actuating means for varying the speed of spin of said compartment, said motor means including a variable speed transmission means having movable lever means for setting the speed thereof in relation to the position of said lever means, said actuating means being operatively interconnected to said lever means to position the same in relation to the degree of actuation of said actuating means, a pneumatic source, passage means for interconnecting said source to said actuating means, and a water level control device for sensing the level of water in said machine, said device being adapted to interconnect said source to said passage means when the water level in said machine is below a predetermined level.

2. In a washing machine as set forth in claim 1, said water level device being adapted to interconnect atmosphere to said passage means when the water level in said machine is above said predetermined level.

3. In a washing machine as set forth in claim 1, program means operatively disposed in said passage means between said water level device and said actuating means and being adapted to open and close said passage means.

4. In a washing machine as set forth in claim 1, said source being a vacuum pump.

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