March 27, 1962 J. E. RHODES 3,026,699

WASHING MACHINE

Filed Jan. 6, 1961 2 Sheets-Sheet 1

FIG. 1.

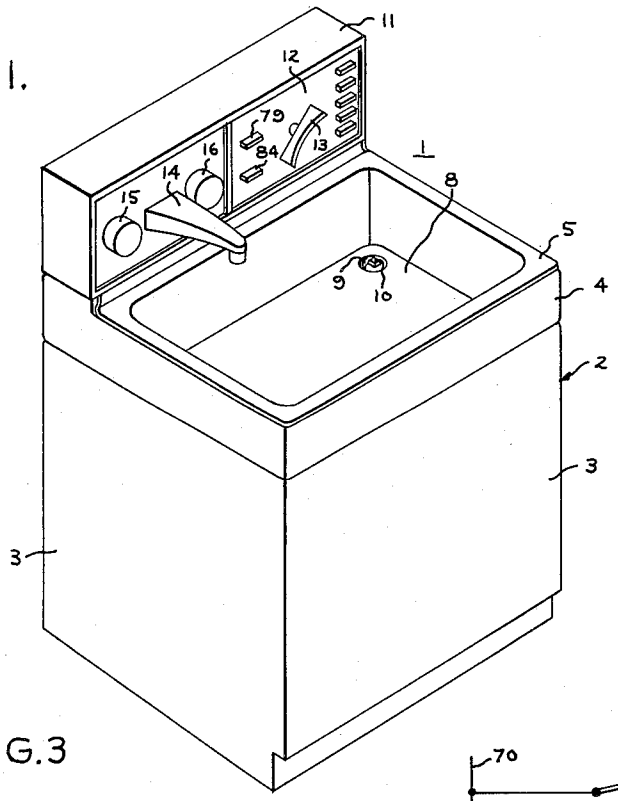


FIG. 3

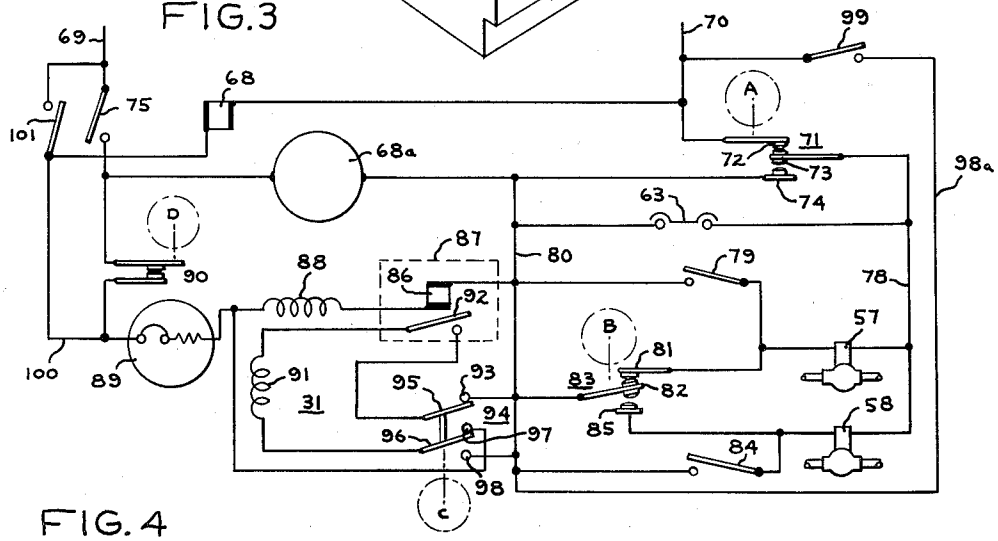
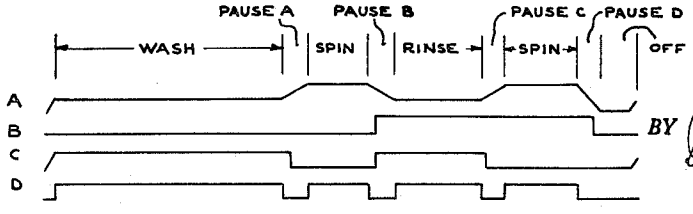


FIG. 4



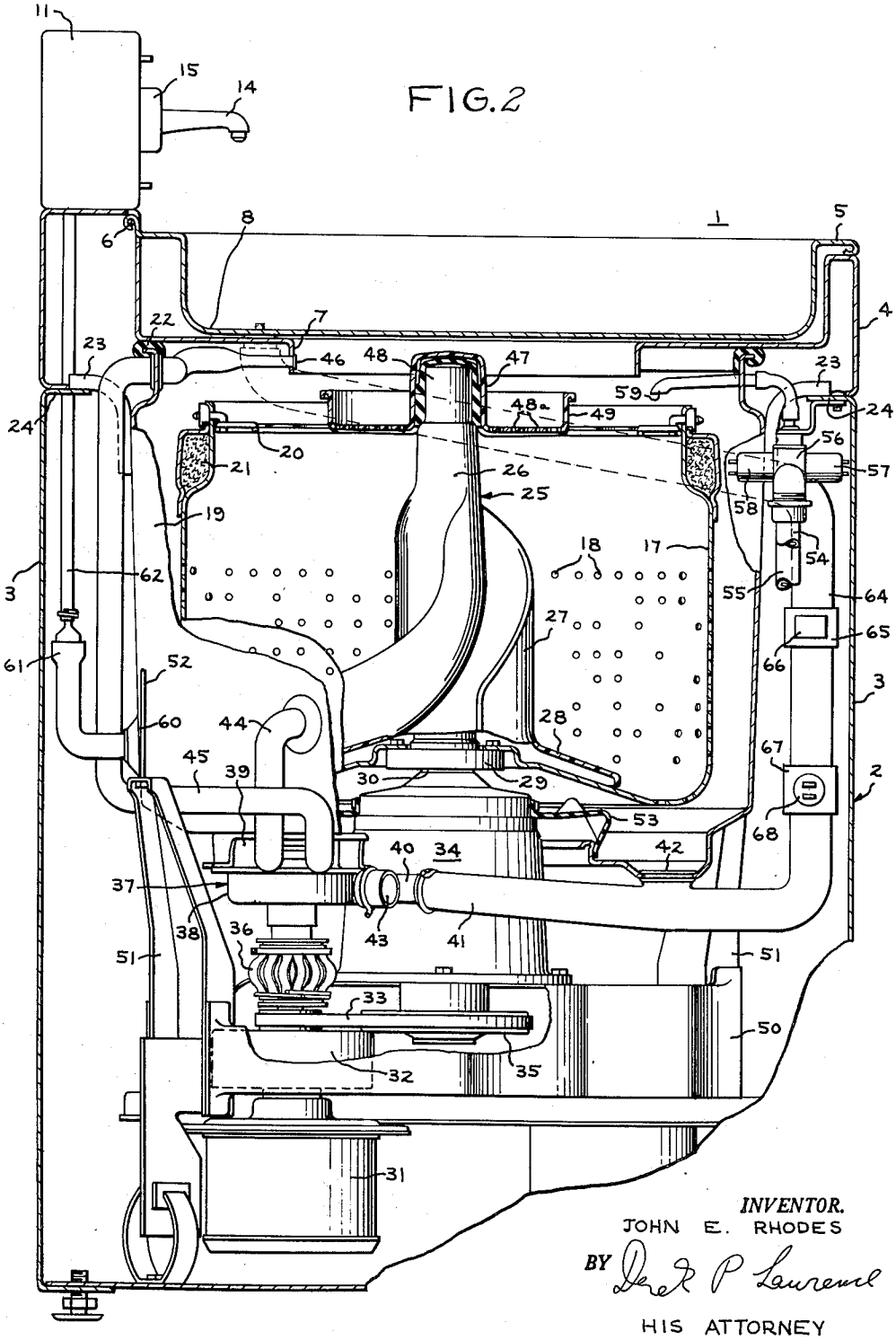
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WASHING MACHINE

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FIG. 2



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United States Patent Office

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3,026,699

WASHING MACHINE

John E. Rhodes, Louisville, Ky., assignor to General Electric Company, a corporation of New York

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7 Claims. (Cl. 68—12)

This invention relates to automatic clothes washing machines, and more particularly to an arrangement in such machines whereby the drain pump conventionally included for removal of vitiated water from the machine is adapted to be used also for the removal of water from vessels such as sinks or basins used in the same area as the machine.

Washing machines, as they are commercially available at the present time, normally include a liquid container, means in the container for washing clothes, suitable means to introduce liquid to the container, and suitable means for draining liquid from the container. The drain means normally includes a pump connected to the bottom of the container so that the liquid is forcibly removed at the appropriate time. With this type of structure, automatic washing machines may readily be used wherever desired in the home, including basement areas where the receptacle to which the drain of the machine discharges may be higher than the level of the machine. This occurs, for instance, where the washing machine is used in the basement of a home having a septic tank, and the machine drain is connected directly to a pipe leading to the septic tank. With this set of circumstances, the drain water from the machine actually is raised above the level of the septic tank by the pump so that it may flow thereinto from the machine.

While such circumstances present no problem with respect to automatic washing machines, they do present a substantial obstacle to the effective use of sinks, basins, stationary tubs, and the like in the basements of homes using septic tanks. If fact, where there is no sump or drain opening in the basement floor appropriate for use as a drain discharge from the sink or stationary tub, it has, in effect, been impossible to use sinks in the basements of such homes.

It is therefore an object of my invention to provide a washing machine in which the drain pump conventionally provided in such machines is, in addition, arranged so that it may be used to drain any basins, tubs or the like used in the same area as the washing machine.

A further more specific object of my invention is to provide a washing machine which includes, in its top surface, a basin which may be drained by the drain pump of the washing machine.

In one aspect of my invention I provide a washing machine which, in the usual manner, has a liquid container, means for washing clothes in the container, means for introducing water to the container, and a drain pump positioned below the container with an inlet connected to it so as to drain the container upon operation of the pump. In addition to this I also provide another conduit connected to the pump inlet, and this conduit is adapted to be connected to the drain of a basin positioned above the pump. Suitable means may then be provided to operate the drain pump so that it may be used either in its usual context in connection with the operation of the washing machine or for the independent purpose of draining the basin or the like to which the conduit is connected.

As a preferred construction, the basin to which the drain pump is connected is formed as an integral part of the washing machine in the top thereof. As another specific preference, the top basin part is pivotable so that

it actually forms a lid for providing access to the washing machine.

The subject matter which I provide as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. The invention itself, however, both as to its organization and method of operation, may best be understood by reference to the following description taken in conjunction with the accompanying drawings.

In the drawings, FIGURE 1 is a view in perspective of an improved washing machine incorporating my invention;

FIGURE 2 is a side elevational view of the clothes washing machine of FIGURE 1, the view being partially broken away and partially in section to illustrate details;

FIGURE 3 is a schematic diagram of an electrical control circuit incorporating my invention, which circuit forms a part of the machine of FIGURES 1 and 2; and

FIGURE 4 is a schematic view of a development of the surfaces of the cams shown in FIGURE 3, thereby indicating the operation of switches by the cams.

Referring now to FIGURES 1 and 2, there is shown therein a washing machine 1 which has an appearance cabinet 2 within which the components of the washing machine are mounted. The cabinet 2 includes conventional vertically extending side walls 3, a top section 4, and a lid 5 which may be pivotably secured on a pin 6 (FIGURE 2) so as to be pivotable upward to an open position to permit access to an opening 7 formed in top section 4 of the cabinet. The lid 5 includes a recessed portion 8 which serves as a water receiving basin or sink. In the conventional manner, an opening 9 may be provided at the bottom of the basin to permit draining of water therefrom, the opening 9 being closable by a suitable stopper member 10 which may be manually inserted into and removed from the opening 9.

Mounted so as to be supported on portion 4 and extend upwardly therefrom at the back of the washing machine 1 is a backsplasher portion 11 which, in the usual manner, contains the controls for the machine 1. Provided on the front portion 12 of backsplasher 11 there may be provided a suitable manually operable member 13 so as to permit an operator to manually initiate a sequence of operations in the machine 1. Also mounted on the backsplasher 11 is a faucet 14 which extends out over basin 8 so that water provided for the faucet serves to fill the basin. In the conventional manner, a pair of handles 15 and 16 may be used to control the flow of hot and cold water respectively through faucet 14. It will be understood that the usual provisions for connecting sources of hot and cold water to the faucet 14 through valves controlled by handles 15 and 16 respectively may be made, and are not shown herein because they are entirely conventional in nature.

Referring now to FIGURE 2 in particular, within the cabinet 2 of washing machine 1 there is a conventional basket or clothes receiving receptacle 17 provided over its side and bottom walls with perforations 18 and disposed within an outer imperforate tub or casing 19. Basket 17 may be provided with a suitable clothes retaining member 20 for preventing clothes from being floated over the top of the basket, and with a balance ring 21 to help steady the basket when it is rotated at high speed (as will be explained).

Tub 19 is rigidly mounted within appearance cabinet 2. As shown, a gasket 22 may be provided so as to form a seal between the top of tub 19 and portion 4 of the cabinet to prevent escape of moisture and moist air into the cabinet around the tub. The rigid mounting of tub 19 within cabinet 2 may be effected by any suitable

means. As a typical example of one such means, I provide strap members 23, each of which is secured at one end to an inturned flange 24 formed at the top of each wall 3 of the cabinet, the other end of each strap member being secured to the outside of the tub 19. As can be seen, the basket 17 is positioned within the tub 19 so that access may be had to the interior of the basket for inserting clothes thereinto and removing clothes therefrom through the opening 7 when lid 5 is raised.

At the center of basket 17 there is positioned a vertical axis agitator 25 which includes a center post 26 and a plurality of curved water circulating vanes 27 joined at their lower ends by an outwardly flared skirt 28. Both the clothes basket 17 and the agitator 25 are rotatably mounted. The basket is mounted on a flange 29 formed on a rotatable hub 30, and the agitator 25 is mounted on a shaft (not shown) which extends upwardly through the hub 30 and through the center post 26 and is secured to the agitator so as to drive it. During a typical cycle of operation of the machine 1, water is introduced into the tub 19 and basket 17, and the agitator 25 is then oscillated back and forth on its axis, that is, in a horizontal plane within the basket, to wash the clothes therein. Then, after a predetermined period of this washing action, basket 17 is rotated at high speed to extract centrifugally the washing liquid from the clothes and discharge it to drain. Following this extraction operation, a supply of clean water is introduced into the basket for rinsing the clothes and the agitator is again oscillated. Finally, the basket is once more rotated at high speed to extract the rinse water.

The basket 17 and agitator 25 may be driven through any suitable means as the specific transmission means is not a feature of the present invention. By way of example, I have shown them as driven from a reversible motor 31 through a drive including a clutch 32 mounted on the motor shaft. Clutch 32 allows the motor 31 to start without a load and then accept the load as it comes up to speed. A suitable belt 33 transmits power to a transmission assembly 34 through a pulley 35. Thus, depending upon the direction of motor rotation, pulley 35 of transmission 34 is driven in opposite directions.

The transmission 34 is so arranged that it supports and drives both the agitator drive shaft and the basket mounting hub 30. When motor 31 is rotated in one direction the transmission causes agitator 25 to oscillate in a substantially horizontal plane within the basket 17. Conversely, when motor 31 is driven in the opposite direction, the transmission rotates the wash basket 17 and agitator 25 together at high speed for centrifugal liquid extraction. While the specific type of drive mechanism used does not form part of the invention, reference is made to Patent 2,844,225 issued to James R. Hubbard et al. on July 22, 1958 and owned by the General Electric Company, assignee of the present invention. That patent discloses in detail the structural characteristics of a transmission assembly suitable for use in the illustrated machine.

In addition to operating the transmission 34 as described, motor 31 also provides a direct drive through a flexible coupling 36 to a pump structure indicated generally by the numeral 37, which may include two separate pumping units 38 and 39 both operated simultaneously in the same direction by motor 31. Pump 38 is a drain pump with an inlet 40 connected by a conduit 41 to an opening 42 formed at the lowermost point of tub 19. Drain pump 38 also has an outlet which is connected by a conduit 43 to a suitable drain (not shown). The pump 39 has an inlet connected by a conduit 44 to the interior of tub 19 and an outlet connected by a conduit 45 to a nozzle 46. The pumps are formed so that in the spin direction of rotation drain pump 38 draws in liquid from opening 42 through conduit 41 and then discharges it through conduit 43 to drain; in the other direction of rotation, pump 39 draws in liquid through conduit 44 and discharges it through conduit 45 and nozzle 46, each of the pumps being substantially inoperative in the direction of rotation in which it is not used.

Nozzle 46 is positioned to discharge into a filter pan 47 secured on the top portion 48 of agitator 25 so as to be movable therewith. With this structure, then, when the motor is rotating so as to provide agitation, pump 39 draws liquid through conduit 44 from tub 19 and discharges it through conduit 45 so that the liquid passes from nozzle 46 into filter pan 47, and then down through a number of small openings 48 provided in the bottom of the filter pan and back into basket 17. In this manner, the filter pan 47, with its small openings 48*a* and its upstanding side wall 49, causes lint which is separated from the clothes during the washing operation to be filtered out of the clothes and thus prevents it from being redeposited on the clothes. This type of structure is more fully described and claimed in Patent 2,481,979 issued to Russell H. Colley on September 13, 1949 and assigned to General Electric Company, owner of the present invention.

The motor 31, clutch 32, transmission 34, basket 17 and agitator 25 form a suspended washing and centrifuging system which is supported by the stationary structure of the machine so as to permit isolation of vibrations from the stationary structure. It will be understood that such vibrations occur primarily as a result of high speed spinning of basket 17 with a load of clothes therein as mentioned above. While any suitable suspension may be used, for illustrative purposes I show a suspension structure which includes a channel member 50 with transmission 34 mounted on top thereof and motor 31 mounted to the underside thereof. The channel member in turn is secured to upwardly extending rigid members 51, and each of the two upwardly extending members 51 is connected to a cable 52 supported from the top of the machine. While only a portion of the suspension system is shown in the drawing, such a vibration isolating system is fully described and claimed in application Serial No. 843,611 for Vibration Isolating System, now Patent No. 2,987,190, filed on September 21, 1959 by John Bochan and assigned to General Electric Company, assignee of the present invention.

In order to accommodate the movement which occurs between basket 17 and tub 19 without any danger of leakage between them, the tub 19 is joined to the upper part of transmission 34 by a suitable flexible boot member 53 which may be of any suitable configuration, many of which are known in the art, so as to permit relative motion of the parts to which it is joined without leakage therebetween. Hot and cold water may be supplied to fill tub 19 through conduits 54 and 55 which are adapted to be connected respectively to sources of hot and cold water (not shown). Conduits 54 and 55 extend into a conventional mixing valve structure 56 having solenoids 57 and 58 so that energization of solenoid 57 permits passage of hot water through the valve to an outlet 59, energization of solenoid 58 permits passage of cold water through the valve, and energization of both solenoids permits mixing of hot and cold water in the valves and passage of warm water through outlet 59.

The level to which the water rises in the basket and tub may be controlled by any suitable means. One typical way of doing this is to provide an opening 60 in the side of tub 19 adjacent the bottom thereof, the opening 60 being connected through a conduit 61 and a tube 62 to a conventional pressure sensitive device (shown only schematically, in FIGURE 3, by the numeral 63) which may be positioned within the backsplasher 11 of the machine 1. In the conventional manner, as the water rises in basket 17 and tub 19, it exerts increasing pressure on a column of air trapped in tube 62 and at a predetermined pressure level the column of air then trips the pressure sensitive mechanism to shut off whichever of solenoids 57 and 58 may be energized.

Returning now to the basin 8 formed in the lid 5 of machine 1, it is provided, as already stated, with a drain

opening 9. A conduit 64 extends down from the drain opening 9 and is joined at its lower end to the inlet 40 of the drain pump 37. This may be achieved, as shown, by causing the conduit 41 to serve to conduct liquid both from the tub 19 (through opening 42) and from the basin 8 (through conduit 64). In communication with conduit 64 I provide a flow responsive device 65 which, in response to flow within the conduit 64 serves to close an electrical switching assembly shown at 66. As will be explained herebelow, electrical switching assembly 66 is used for causing operation of the drain pump 38 so that when there is flow through conduit 64 the drain pump operates. It will be understood that the flow responsive assembly 65 may be of any conventional type, several such devices being commercially available at the present time.

In order to insure that back-up flow will not occur in conduit 64 during use of the washing machine, either because the machine is shut off during a cycle or because of a power failure during a cycle, I prefer to provide a suitable valve, generally shown by the numeral 67, controlled by the solenoid 68. The solenoid is energized to open the valve during flow from basin 8 through conduit 64 (as will be more fully described herebelow).

Referring now to FIGURE 3 of the drawing, there is shown a control circuit for the machine of FIGURES 1 and 2 which incorporates suitable features and connections for carrying out the purposes of my invention. In connection with the circuit of FIGURE 3, it will be understood that present-day washers often include various improvements such as control panel lights, bleach dispenser controls, lid switches, etc., which do not relate in any way to the present invention, and that to some extent these have been omitted for the sake of simplicity and ease of understanding.

In order to control the sequence of operation of the electrically operated components of the machine 1, the circuit includes appropriate sequence control means in the form of a timer motor 68*a* which drives a plurality of cams A, B, C, and D. These cams, during their rotation by the timer motor, actuate various switches (as will be described) causing the machine to pass through an appropriate cycle of operations, first introducing water and washing the clothes, next extracting water from them and passing the water to drain, then introducing clean water and rinsing the clothes in that clean water, and finally extracting the rinse water from the clothes and passing it to drain.

The electrical circuit as a whole is energized from a power supply (not shown) through a pair of conductors 69 and 70. Cam A controls a switch 71 which includes contacts 72, 73, and 74. When the cam has assumed the position where all three contacts are separated, the various electrically operated elements of machine 1 have been disconnected from the power source and are inoperative, with the single exception which will be described below in connection with the essence of my invention. When operation of machine 1 is initiated, as will be explained below, switch 71 is controlled by cam A so that contacts 72 and 73 are engaged.

A main power switch 75 may be closed by any suitable means such as, for instance, by axial motion of the control member 13 shown in FIGURE 1; when switch 75 is closed, it permits an operating circuit to be completed for machine 1.

An energizing circuit for one or both of the solenoids 57 and 58 is completed by virtue of the closing of switch 75 once the cams A, B, C, and D have been manually turned to the starting position in FIGURE 4, this being accomplished, for instance, by manual rotation of the member 13. From conductor 70 the circuit passes through contacts 72 and 73 and the conductor 78 to the solenoids 57 and 58. From solenoid 57 parallel paths extend, one of them through a manually operable switch 79 to a conductor 80, and the other through contacts 81 and 82 of a timer operated switch 83, and then also to conductor 80. Similarly, from solenoid 58 there are two parallel paths, one through a manually operable switch 84 to conductor 80, and the other through contacts 85 and 82 to the conductor 80.

Thus, when switch 82 is in the position shown at the start of wash, it will be seen that a circuit is completed to conductor 80 through contacts 81 and 82 of switch 83 regardless of whether switch 79 is closed. When the contact 82 is in its down position in engagement with contact 85 (during rinse, as shown in FIGURE 4), the circuit from conductor 78 to conductor 80 passes through the solenoid 58 regardless of whether switch 84 is closed. When either of the switches 79 and 84 is closed, the solenoid associated therewith may be closed regardless of the position of contact 82 of switch 83.

From the solenoids, then, the circuit extends to conductor 80, and from there through coil 86 of a relay 87, the main winding 88 of motor 31, a conventional motor protector 89, a switch 90 controlled by cam D, and through switch 75 back to conductor 69. The motor 31 is of the conventional type which is provided with a start winding 91. Winding 91 assists the main winding 88 during the starting of the motor and is energized in parallel therewith. When a relatively high current passes through relay coil 86, it causes the relay contact 92 to be closed; this permits an energizing circuit for the start winding to be completed in parallel with the main winding through a contact 93 of a switch generally indicated at 94 and which is controlled by cam C, contact arm 95, the relay contact 92, the start winding 91, contact arm 96, and contact 97 of switch 94. A circuit is also completed in parallel with motor 31 from conductor 80 through the timer motor 68*a*.

The relay coil 86 is designed to close contact 92 when the relatively high current demanded by the motor when the motor is rotating below a predetermined speed is passing through it. At other times, when there is no current passing through the relay coil 86 or when the current is below the required energizing level as is true in the running speed range of the motor, the contact 92 is open.

When the main winding 88 of motor 31 is in series with the valve solenoids 57 and 58 as described, a much lower impedance is presented in the circuit by the motor 31 than is presented by the valve solenoids. As a result, the greater portion of the supply voltage is taken up across the solenoids and relatively little across the motor. This causes whichever of the solenoids is connected in the circuit to be energized sufficiently to open its associated water valve. As a result, water at a suitable temperature is admitted to the machine through outlet 59, motors 31 and 68*a* remaining inactive. When water enters basket 17 and tub 19, as described above, it rises in both basket and tub at the same rate because of the perforations 18. As the head of water acting on the column of air trapped in tube 62 increases, the air pressure increases until it actuates the pressure sensitive switch 63 provided within backsplasher 11. When switch 63 closes, it then provides a short circuit across the solenoids directly from conductor 78 to conductor 80 so that, with the solenoids thus excluded from the effective circuit, they become deenergized and a high potential drop is provided across winding 88 of the motor 31. This causes the relay coil 86 to close contact 92 to start motor 31, while at the same time timing motor 68*a* starts so as to initiate a sequence of operations.

Completing the description of the circuit of FIGURE 3, it is to be observed that the switch 90 is in series with the main motor 31 but is not in series with the timing motor 68*a*. Thus, by the opening of this switch, the operation of motor 31 is stopped, but the timer motor 68*a* nonetheless continues to operate. This is a result of the fact that the timer motor is deliberately provided with an impedance much greater than that of the valve solenoids so that it takes up most of the supplied voltage

and continues in operation, leaving so little voltage across the solenoids that they do not operate their respective valves when switch **90** is open.

A further point of the circuit of FIGURE 3 is that when switch arms **95** and **96** are moved by cam C so as to engage contact **97** and a contact **98** respectively, the polarity of the start winding **91** is reversed. The circuit from conductor **80** then proceeds through contact **98**, contact arm **96**, the start winding **91**, relay contact **92**, contact arm **95**, contact **97**, and then through the protective device **89** and the switches **90** and **75** to conductor **69**. Thus, provided motor **31** is stopped or slowed down so that relay contact **92** is closed, the reversal of switch **94** is effective to cause the motor **31** to rotate in the opposite direction from that previously provided once the motor is started up again.

In order to energize the motor **31** independently of the water level of switch **63** and valve solenoids **57** and **58** when spin is to be provided, cam A is formed as mentioned so as to be effective to close all three contacts **72**, **73** and **74** of switch **71** during the extraction or spin step. This causes the power to be supplied directly through contact **74** to conductor **80** and the motors rather than through the water level switch or the valve solenoids.

Referring now to FIGURE 4 in conjunction with FIGURE 3, a suitable sequence of operation with the various components and circuitry described will be briefly set forth. Initially, the manual member **13** is set to a position wherein the cams A, B, C, and D are in "start" position to initiate a washing cycle, and then moving the member **13** axially so as to close the switch **75**. In the position in which the cams are arranged manually by this operation of the member **13**, contacts **72** and **73** of switch **71** are closed by cam A, and contact **82** of switch **83** engages contact **81**. The other timer switches are also in the position shown in FIGURE 3. This causes the valve solenoids to operate, as previously mentioned, with the timer motor and the main motor remaining inactive until the water level switch **63** is closed. At that time, the valve solenoids stop the introduction of water, the timer motor **68***a* starts to toll the sequence, and the main motor **31** starts rotating in the direction to cause operation of agitator **25** and recirculation of water by pump **39** through filter pan **47**.

This continues for an appropriate washing period (shown as "Wash" in FIGURE 4), after which the switch **90** is opened by cam D to deenergize motor **31** and provide pause A, the motor **68***a* continuing to operate as described. The continued operation of motor **68***a* causes the switch **94** to reverse the position of contact arms **95** and **96** so that they engage contacts **97** and **98** respectively. Also, cam A closes contacts **72** and **73** with contact **74**. As a result, when switch **90** is reclosed, the motor **31** starts operation, independently of the water switch **63**, in the reverse direction from its previous direction of operation. In this reverse direction of rotation, the basket **17** is spun at high speed to effect a centrifugal extraction operation, with the drain pump **38** being rotated in the direction which makes it effective to pull water from the tub **19** and pass it out to drain. This extraction operation continues for an appropriate period (marked "spin") and then the switch **90** is reopened to stop the motor again and provide pause B.

The timer motor again moves switches **94** and **71** back to their original positions, as shown in FIGURE 3, and also moves contact **82** of switch **83** down into engagement with contact **85**. As a result, when the switch **90** is closed once again, the solenoid **58** is energized to provide cold water unless switch **79** is closed, in which case warm water is provided. When an appropriate level is reached, switch **63** closes to cause motor **31** and motor **68***a* to start up again to provide a timed period of agitation and recirculation for a rinse operation. At the end of this, in the same manner as before, the motor **31** is stopped to provide pause C, the switch **94** is reversed, and then switch **90** is reclosed to provide a final spin. At the end of the final spin, switch **90** reopens to provide a brief pause D during which switch **71** is fully opened to end the cycle.

Thus, it can be seen that a fully automatic sequence of operations may be provided by the machine **1**, in response to setting of the member **13**, in order to wash and damp-dry clothes. It will further be seen that vitiated wash and rinse water is removed from the machine by the positive action of pump **38** as operated by the motor **31** during the spin extraction periods. In this connection, it is to be noted that at the end of an operating cycle, the switch **94** is in the position so that if motor **31** is energized it starts up in the direction effective to cause spinning of basket **17** and a drain action by pump **38**. Also, switch **90** is open.

As one means of effecting the purposes of my invention, I add to the circuitry shown in FIGURE 3 so as to permit the drain pump **38** of the machine to be used in connection with the emptying of a separate liquid-containing vessel, especially one of the type formed in the lid of the washing machine such as basin **8**. In accordance with this thought, I provide a conductor **98***a* which includes a switch **99** and which extends from conductor **70** directly to conductor **80**. In addition, I provide a second conductor **100** which includes a switch **101** and which in effect bypasses switch **90** and switch **75** to connect motor **31** to conductor **69**. Both switches **99** and **101** form part of the switch assembly **66** which, as stated in the description of the structure of FIGURE 2, is part of a flow responsive assembly **65**. When flow occurs through conduit **64** as a result of the emptying of basin **8**, it closes the switches **99** and **101** for as long as the flow lasts.

It will be observed that, when switches **99** and **101** are closed, an energizing circuit for motor **31** is completed, independently of timer motor **68***a* and its associated switches, from conductor **70** through conductor **98***a*, conductor **80**, the motor, and conductor **100** back to conductor **69**. With the switch **94** in the position to cause spinning of the basket and drain action by pump **38**, as is true during the Off portion at the end of a cycle, energization will accordingly cause operation of the motor in the direction to spin the tub and operate the drain pump **37**.

The open condition of switch **90** during Off periods of the machine is such as to prevent any energization of solenoid **68** (such as might otherwise result from a closed condition of switch **75**) until switch **101** closes, so that the valve **67** controlled thereby accordingly stays closed. As a result of this, the basin **8** may be appropriately filled by means of faucet **14** and used for whatever purpose is desired. Then, after its use, the stopper **10** may be removed to cause emptying of the basin. When the stopper is removed, the vitiated water from basin **8** flows down conduit **64** through open valve **67** causing flow responsive device **65** to close switches **99** and **101**. Closure of switch **101** energizes solenoid **68** independently of any other switches so that valve **67** is opened. Also, the closure of switches **99** and **101** energizes the motor **31** in the spin direction for as long as water continues to flow down conduit **64**. The water flowing down conduit **64** is thus pulled into the pump **37** through inlet **40**, and then is forced out to drain by the pump. In this manner, a positive pressure for removal of the drain water is obtained, and the drain water may be passed to any desired septic tank or sewer system, even though it be at a level above that of the basin, by virtue of the lifting action of the drain pump **38**. When water ceases to flow down conduit **64**, switches **99** and **101** open, and this accordingly closes valve **67** and deenergizes motor **31**. In this manner the drain pump **38** is effective both for use during the conventional operation of machine **1** and for use in connection with the emptying of basin **8**.

While a preferred emboiment of my inventive structure is illustrated, it will be understood that many modifications are possible. For instance, while a flow responsive control has been shown, many other control arrangements, including a manually operated timed operation of the drain pump would also be possible. In addition, the structure could readily be provided in a machine having a separate drain pump motor, as is true of some commercially provided machines. Also, it will be clear that the basin drain opening may, where the basin is formed in the top surface of the machine, be connected to the drain pump through the liquid receptacle of the machine instead of the separate conduit shown.

It will be understood, therefore, that while in accordance with the patent statutes I have described what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made herein without departing from my invention, and it is therefore aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A washing machine comprising: a liquid container; means for washing clothes in said container; means for introducing water to said container; a drain pump positioned below said container and connected thereto; motor means for operating said washing means and said drain pump; sequence control means for causing operation of said washing means, said introducing means and said drain pump in a predetermined sequence, said sequence control means including first switch means for enabling operation of said drain pump by said motor means and second switch means for energizing said motor means; cabinet means enclosing said container, said washing means, said introducing means, and said pump, said cabinet means including a top surface having a water retaining basin formed therein, said basin having an opening therein for draining of water therefrom; means for introducing water to said basin; means connecting said opening to said pump; and means for causing operation of said pump independently of said second switch means and in cooperation with said first switch means to empty said basin.

2. A washing machine comprising a liquid container, means for washing clothes in said container, means for introducing water to said container, a drain pump positioned below said container and connected thereto, motor means for operating said washing means and said drain pump, and sequence control means for causing operation of said washing means, said introducing means, and said drain pump in a predetermined sequence, said sequence control means including first switch means for enabling operation of said drain pump by said motor means and second switch means for energizing said motor means; a water retaining basin positioned above said pump, said basin having an opening therein for draining of water therefrom; means connecting said opening to said pump; and means for causing operation of said pump independently of said second switch means and in cooperation with said first switch means to empty said basin.

3. A washing machine comprising: a liquid container; means for washing clothes in said container; means for introducing water to said container; a drain pump positioned below said container and having an inlet connected to said container; motor means for operating said washing means and said drain pump; sequence control means for causing operation of said washing means, said introducing means, and said drain pump in a predetermined sequence, said sequence control means including first switch means for enabling operation of said drain pump by said motor means and second switch means for energizing said motor means; a conduit also connected to said pump inlet, said conduit being adapted to be connected to the drain of a basin positioned above said pump; and means for causing operation of said pump independently of said second switch means and in cooperation with said first switch means to empty said basin.

4. The apparatus defined in claim 1 wherein said top surface of said cabinet means is pivotable to an open position thereby to allow access to said liquid container for the placing therein and removal therefrom of clothes.

5. The apparatus defined in claim 2 wherein said means for operating said pump independently includes flow sensitive means positioned in said connecting means and arranged to operate said pump during flow of water from said basin down toward said pump and to shut off said pump when the flow of water ceases.

6. A washing machine comprising: a liquid container; means for washing clothes in said container; means for introducing water to said container; a drain pump positioned below said container and having an inlet connected to said container; sequence control means for operating said washing means, said introducing means and said drain pump in a predetermined sequence, said sequence control means including a switch assembly having first and second positions, said switch assembly in said first position enabling operation of said washing means, said switch assembly in said second position enabling operation of said drain pump, said sequence control means being effective to shut off said washing means, said introducing means and said drain pump at the end of said predetermined sequence with said switch assembly in said second position; a conduit also connected to said pump inlet, said conduit being adapted to be connected to the drain of a basin positioned above said pump; and means arranged in cooperative relation with said switch assembly and independently of all other parts of said sequence control means for causing operation of said pump between predetermined sequences to empty said basin.

7. A washing machine comprising: a liquid container; a clothes container rotatably mounted within said liquid container; means for washing clothes in said clothes container; means for introducing water to said clothes container; a drain pump positioned below said liquid container and having an inlet connected to said liquid container; a reversible drive motor; means connecting said drive motor to said clothes container, to said washing means and to said drain pump, said reversible motor operating said washing means in one direction of rotation, said reversible motor rotating said clothes container at centrifuging speed and operating said drain pump in the other direction of rotation; sequence control means including first switch means for controlling energization of said reversible motor and second switch means connecting said reversible motor for rotation selectively in said one or said other direction so as to operate said washing means, said clothes container, and said drain pump in a predetermined sequence; said second switch means connecting said motor for rotation in said other direction and said first switch means deenergizing said motor at the end of said predetermined sequence; a conduit also connected to said pump inlet, said conduit being adapted to be connected to the drain of a basin positioned above said pump; and means for energizing said motor between predetermined sequences independently of said first switch means and in cooperation with said second switch means to empty said basin.

References Cited in the file of this patent

UNITED STATES PATENTS

1,983,131	Hume	Dec. 4, 1934
2,274,500	Osuch	Feb. 24, 1942
2,434,199	Dyer	Jan. 6, 1948