

Sept. 2, 1969

V. H. ZANE

3,464,437

OVERFLOW PROTECTION DEVICE

Filed Oct. 12, 1967

2 Sheets-Sheet 1

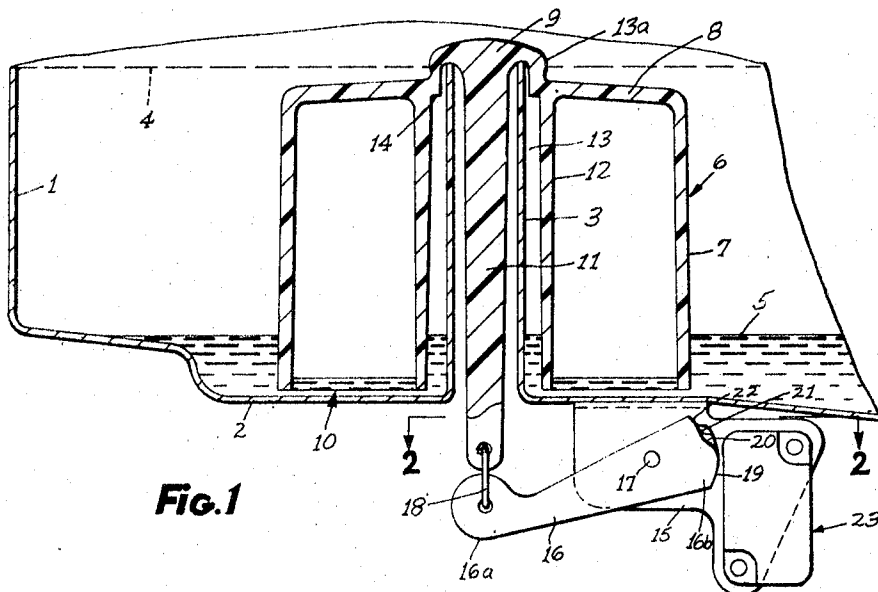


Fig. 1

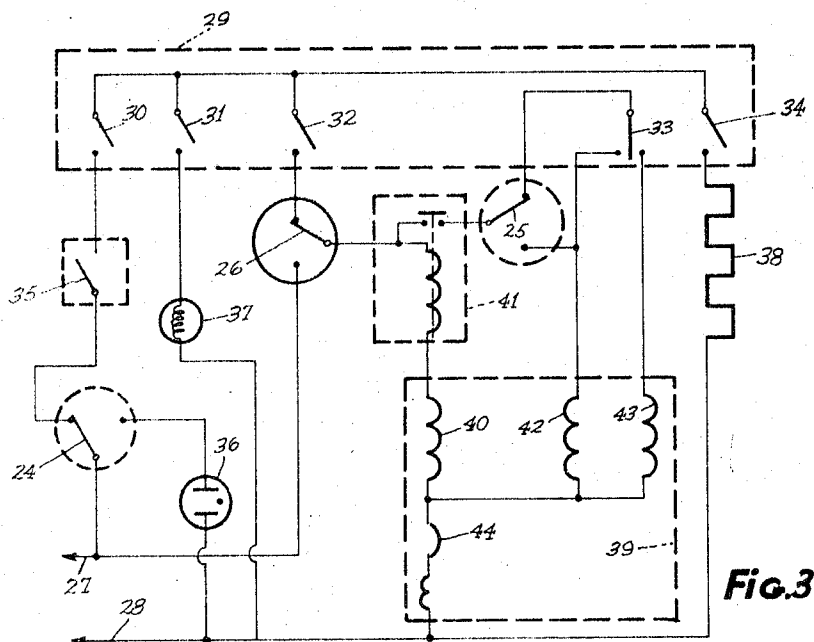


Fig. 3

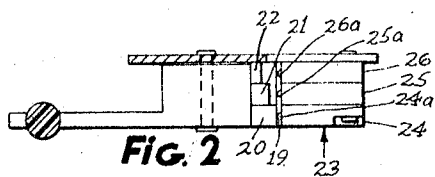


Fig. 2

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2 Sheets-Sheet 2

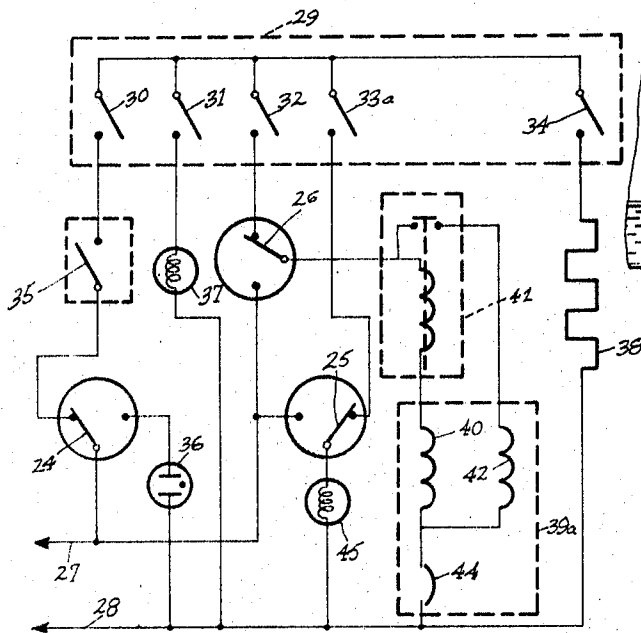


Fig. 5

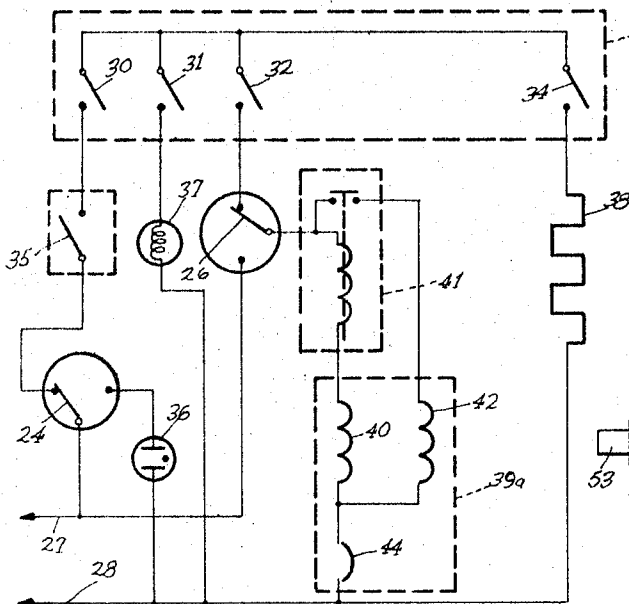


Fig. 4

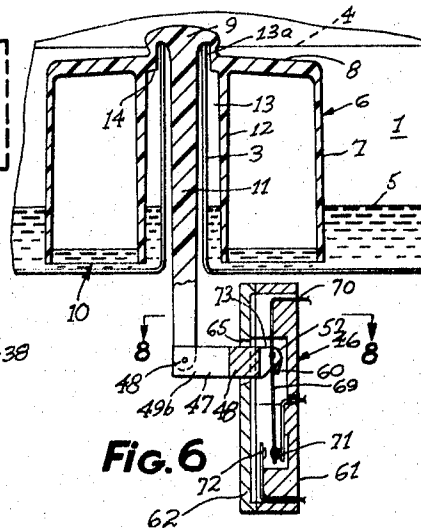


Fig. 6

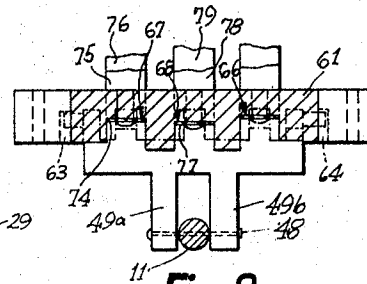


Fig. 8

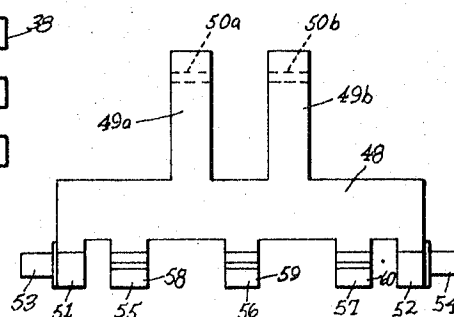


Fig. 7

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3,464,437

OVERFLOW PROTECTION DEVICE

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14 Claims

ABSTRACT OF THE DISCLOSURE

An overflow protection device for automatically controlled dishwashing or clothes washing machine of the type having electrically controlled valve means for the introduction of washing and rinsing fluids into the washing chamber and a fluid discharge means for the removal of washing and rinsing fluids from the washing chamber comprising a float mounted in the bottom of the washing chamber sump and encircling a stand pipe. The float has a central stem extending downwardly through the stand pipe and pivotally connected at its lowermost end to a lever having means in association therewith to close each of two or more switches sequentially as the float rises when the normal water level is exceeded. The first switch disconnects all electrical power to the washing machine; the second switch (or switches) actuates fluid discharge means, resulting in the discharge of fluid from the washing chamber.

BACKGROUND OF THE INVENTION

Field of invention

The invention relates to an overflow protection device, and more particularly to means for preventing the overfilling with washing or rinsing fluids of the washing chamber of a dishwashing machine, clothes washing machine, or the like.

Description of the prior art

For purposes of an exemplary showing, the present invention will be described as applied to dishwashing machines. It will be understood by one skilled in the art, however, that the device of the present invention is equally applicable to clothes washing machines and similar automatic appliances. The use of the term "washing machine," both in the specification and claims, is intended to encompass dishwashing machines, clothes washing machines and like appliances.

Automatic washing machines of the type described normally comprise a washing chamber with a sump in the bottom thereof. The washing chamber has an access opening and means for closing the access opening. Such washing machines are generally timer controlled, and are capable of performing a plurality of operations in sequence, the sequential series of operations usually being referred to as "cycles." An exemplary form of timer controlled dishwasher is described in U.S. Patent No. 3,310,243.

Normally, automatically controlled washing machines are provided with electrically controlled valve means for the introduction of washing and rinsing fluids (such as water) into the washing chamber. The valve means is actuated by the timing device, and is often used in conjunction with a flow metering device that restricts the rate of flow of fluid through the valve means within acceptable limits, regardless of minor fluid pressure variations.

Present day washing machines are generally provided with drain pumps for the removal of spent washing and rinsing fluids from the washing chamber. Often, a dual purpose motor is employed, which may, inter alia, drive a reversible pump of known character and so arranged that rotation in one direction will produce an agitation or

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spraying of a washing or rinsing liquid contained in the washing chamber, while rotation in the opposite direction will drain the fluid from the washing chamber.

It will be understood by one skilled in the art that washing machines of the type described will be provided with a plurality of additional operating instrumentalities. No attempt has been made to outline these additional operating instrumentalities, since they are well known in the art as comprising (without limitation) a safety door switch, a heater, solenoid operated means for injecting surface-active or other substances into the washing chamber at desired times, a general illuminant, an indicator assembly comprising a series of signal lights having connection with the switches of the timing device, a rapid advance motor connected to the timing device, and the like. For example, such instrumentalities and the circuitry therefore are described in detail in U.S. Patent No. 3,320,442.

The overfilling of the washing chamber of a washing machine can occur through any number of faulty conditions, such as failure of the timing device while the valve controlling switch is set for fluid entry into the washing chamber, wear or damage to valve parts causing malfunction, entry of fluid through the drain system (through external fault such as a blocked sewer line), or valve malfunction caused by sediment, minerals and the like contained in the metered fluid.

The use of drain pumps for the removal of spent washing or rinsing fluid from the washing chamber, precludes the use of simple overflows for overfill protection. Presently available washing machines depend upon overfill protection of two basic types. The first type comprises an electrical safety switch that senses an excessive fluid level in the washing chamber and interrupts the electrical circuit to the valve. The second type comprises the provision of two or more valves in series connection whereby failure of one valve will be compensated for by the proper functioning of the second valve.

The first type of overfill protection, although it is the most commonly used one, is of value only when overfilling is caused by an electrical failure. The second type of overfill protection is more expensive, and still offers only limited protection. With this type, should a valve fail to close for any mechanical reason, the operator would be unaware of it since the second valve would still operate properly. Where conditions are such that a valve is caused to malfunction due to the accumulation of sediment and the like therein, it would be probable that the second valve would be subject to the same accumulation of sediment and would malfunction shortly thereafter.

In accordance with the present invention, an overflow protective device is provided which will prevent overfilling of a washing chamber irrespective of the cause of the malfunction, and in such a way that the operator will be made aware of the malfunction.

SUMMARY OF THE INVENTION

The invention relates to an overflow protection device for dishwashing machines, clothes washing machines and similar appliances of the type having a washing chamber with a sump in the bottom thereof, a timing device, a timer actuated valve for introducing fluids into the washing chamber, and a timer actuated discharge pump for removing fluids from the washing chamber. In some washing machines, the discharge pump may be a separate, motor driven pump. In other washing machines, a dual purpose motor may be used to operate a reversing pump which is so designed as to act as a discharge pump in one direction of rotation only. No draining takes place when the motor is operated in the opposite direction of rota-

tion for other purposes. In yet other washing machines, a non-reversing pump may be used, having a discharge passage in the form of a modified "Y" with a solenoid actuated valve at the fork of the "Y." One leg of the "Y" leads to a fluid recirculation passage, the other leg leading to a drain or discharge passage.

The overflow protection device comprises a float mounted in the bottom of the tub sump. The float encircles a stand pipe and has a central stem extending downwardly through the stand pipe to a point below the bottom of the sump. A lever is pivotally mounted to a bracket beneath the sump. One end of the lever is operatively connected to the lowermost end of the float stem. In one embodiment, the other end of the lever has a multiple cam section. In another embodiment the other end of the lever is provided with a plurality of actuating means. A raising and lowering of the float will cause movement of the lever about its pivot point. The cam section of the lever (or the actuating means thereon) is so arranged as to operate each of two or more switches sequentially when the float is caused to rise by an increase beyond the normal of the fluid level in the washing chamber.

The first switch serves to disconnect all electrical power to the washing machine. If desired, the first switch may also power a signal, such as a light or buzzer, to indicate a malfunction.

The second switch connects the motor start relay contacts directly to the drain direction phase winding of the motor and assures that no power can be supplied to the opposite phase winding of the motor when a dual purpose motor is used in connection with the drain pump. This second switch may be eliminated in instances where a separate drain pump is used. When a non-reversing pump with a bypass valve is used, the second switch will energize the solenoid actuated valve to close off the recirculation passage and open the discharge passage.

Where a dual purpose motor is used in connection with the drain or discharge pump, a third switch serves to disconnect the motor start relay coil from the timer to preclude any feed back circuitry, and connects the relay coil (and hence the motor windings) directly to the power source. In instances where a separate discharge pump is used, or a non-reversing pump with bypass valve is used, the third switch will serve substantially the same purpose, i.e. it will disconnect the pump from the timer and connect it directly to the power source.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary cross sectional view illustrating the overflow protection device of the present invention.

FIG. 2 is a cross sectional view taken along section line 2—2 of FIG. 1.

FIGS. 3, 4 and 5 are schematic circuit diagrams for exemplary dishwashing machines equipped with the overflow protection device of the present invention.

FIG. 6 is a fragmentary cross sectional view illustrating another embodiment of the overflow protection device of the present invention.

FIG. 7 is a bottom view of the switch lever of the embodiment of FIG. 6.

FIG. 8 is a cross sectional view taken along the section line 8—8 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An exemplary embodiment of the overflow protection device of the present invention is illustrated in FIGS. 1 and 2. The washing chamber of a washing machine is fragmentarily illustrated at 1. The washing chamber has, at the bottom thereof, a sump 2. The sump is provided with a vertical stand pipe 3, the upper end of which extends above the spill-over level of the washing chamber. The spill-over level is indicated by broken line 4. The normal water level in the washing chamber is indicated at 5.

The overflow protection device of the present invention comprises a hollow float generally indicated at 6. While the exterior configuration of the float does not constitute a limitation on the present invention, for purposes of an exemplary embodiment the float is illustrated as comprising a cylindrical exterior wall 7, and a circular top wall 8 having a central upwardly extended portion 9. The bottom of the float is open, as is generally indicated at 10.

The float has a central downwardly depending stem 11 adapted to extend through the stand pipe 3 to a point below the sump 2. The float also has a downwardly depending cylindrical wall 12. The stem 11 and the cylindrical wall 12 define an annular opening 13 to accommodate the stand pipe 3. The annular opening 13 has a portion 13a of reduced diameter extending into the portion 9 of the float top and forming a circular shoulder 14.

As illustrated in FIG. 1, the float in its normal position is supported by the stand pipe 3. The upper end of the stand pipe abuts the inner surface of the portion 9 of the float top. In this position, the open bottom 10 of the float is spaced from the sump 2 to permit the passage of fluid under the hollow float.

A downwardly depending bracket 15 is affixed to the bottom exterior surface of the sump 2 by any suitable means such as welding or the like. A lever 16 is pivotally affixed to the bracket 15 by any suitable means such as pivot pin 17. One end 16a of the lever 16 is operatively connected to the lowermost end of the float stem 11. While any pivotal connection may be used, for purposes of an exemplary showing the lever end 16a and the lowermost end of the stem 11 are illustrated in FIG. 1 as connected by a link means 18.

The end 16b of the lever 16 terminates in a cam section. For purposes of an exemplary showing the cam section is illustrated as having four cam surfaces indicated at 19—22.

A multiple switch means (generally indicated at 23) is affixed to the bracket 15 adjacent the cam section end 16b of the lever. The precise nature of the switch means 23 does not constitute a limitation on the invention.

For purposes of an exemplary showing, the switch means 23 is illustrated as comprising a switch stack, which in turn comprises three two-position switches 24, 25 and 26, each having a plunger or button 24a, 25a and 26a respectively. The switches are so constructed as to be in their respective first positions when the buttons 24a—26a are depressed, and in their respective second positions when the buttons are extended. These switches should further be provided with means for urging the switch buttons to their extended positions. For example, the switch buttons may be spring loaded to their extended positions.

As will be evident from FIGS. 1 and 2, when the float 6 is in its normal position, the lever 16 will be so oriented as to cause cam surface 19 to maintain switch buttons 24a—26a in their depressed positions. Thus, when the float is in its normal position, switches 24—26 will be in their respective first positions.

Should the fluid in the washing chamber 1 for any reason begin to rise beyond the normal level, the float 6 will be caused to move upwardly. Upward movement of the float 6 will, in turn, cause a clockwise rotation of the lever 16 about the pivot pin 17 (as viewed in FIG. 1). When an abnormal water level is reached in the washing chamber the upward movement of the float and the consequent clockwise rotation of the lever 16 will be sufficient to cause cam surfaces 20, 21 and 22 to sequentially lie before switch buttons 24a—26a respectively. Thus, switch buttons 24a—26a will be sequentially released from their depressed positions so that switches 24—26 will sequentially assume their respective second positions. Thus, as the fluid level rises above normal, switches 24—26 will be caused to sequentially move from their respective first positions to their respective second positions.

FIG. 3 is a schematic circuit diagram for an exemplary washing machine employing the overflow protection de-

vice of the present invention. The leads 27 and 28 are the main power leads, extending to a source of electric power (not shown). A timing mechanism is diagrammatically indicated by the box 29 shown in dashed lines. The timer 29 may be of any well known type. Generally it will comprise a motor. In some instances the motor drives the device like a commutator which results in the sequential, and in some instances simultaneous, opening and closing of electric switches. In other instances the timer motor drives a rotating element which is provided with camming surfaces operating electric switches. The switch operating devices of some timers are arranged to be driven at constant speed during the operation of the washing machine. In other instances, the switch operating mechanism is arranged to be advanced or rotated stepwise through the action of the motor. All of these variants of timers are old and well known.

The circuit diagram of FIG. 3 represents a simple form of washing machine. As described above, washing machines may be provided with a plurality of operating instrumentalities, all of which are well known in the art. In the exemplary embodiment, these switches which are to be operated in sequence or simultaneously by the timing means are shown within the box 29 and are numbered 30-34 inclusive. Whether these switches are opened or closed will depend upon the position of the timing device itself.

Washing machines of the general type described as exemplary herein will usually be provided with an access opening or door and a switch operated by or in connection with the door in such a fashion that the mechanism of the appliance cannot be started until the door is closed. Such a switch is shown in FIG. 3 at 35. The door switch is connected to power lead 27 and to the timer through timer switch 30. Switch 24 of the overflow protection device is illustrated as being in series with the door switch and is shown in its first position (the position it will occupy when normal fluid levels are maintained within the washing chamber). It will be evident from the diagram that should switch 24 occupy its second position, all electrical power to the dishwasher will be disconnected. While switch 24 may be a single pole switch, if it is a two-position switch it may be used to complete a circuit containing an alarm or signal of any suitable type (diagrammatically indicated at 36).

The washing machine embodiment of FIG. 3 is illustrated as having an electrically actuated water valve 37 controlled by timer switch 31 and a heating means 38 controlled by timer switch 34. A pump motor is diagrammatically indicated by the rectangle 39 shown in dashed lines. For purposes of an exemplary showing, the pump motor is illustrated as being of the dual purpose type (described above). The main winding 40 of the pump motor 39 is connected to power lead 28 and is in series with the coil of a starting relay diagrammatically indicated by the rectangle 41 shown in dashed lines. The starting relay 41 senses the amount of current in the circuit. Since the current drawn is high when the motor is operating below normal speed, the relay 41 will be actuated so as to connect power to one or the other of motor windings 42 and 43, depending upon the closure of timer switch 33. The resultant energization of winding 42 or 43 (which may be regarded as starting windings for the motor 39) determines the direction of rotation of the motor and also serves to bring the motor to normal speed. At normal speed the current in the main motor winding 40 drops to a fixed lower level which allows the relay 41 to disconnect power to the previously energized starting winding.

The motor 39 may, inter alia, drive a reversible pump of known character (not shown) and may be so arranged that rotation in one direction will produce agitation or spraying of a washing or rinsing fluid in the washing chamber, while rotation in the opposite direction will drain the fluid from the washing chamber. Since, therefore, it is necessary to reverse the motor 39 between washing and drain-

ing operations, the starting relay 41 will be seen to be connected to windings 42 and 43 through dual position timer switch 33. As illustrated, winding 42 is the starting winding for motor 39 determining that direction of rotation resulting in draining of the washing chamber, while winding 43 is the starting winding for the motor 39 determining the direction of rotation of the motor causing agitation or spraying of the washing or rinsing fluid.

The starting relay 41 is connected to timer switch 33 through switch 25 of the overflow protection device. Switch 25 is illustrated in its first position (i.e. the position it will occupy when normal fluid levels are maintained in the washing chamber). It will be noted, however, that in its second position, switch 25 connects the motor relay directly to the winding 42, bypassing timer switch 33. The second position of switch 25 is that position which it will occupy when greater than normal fluid levels occur in the washing chamber.

The starting relay 41 for the motor 39 is connected to the power lead 27 through switch 26 of the overflow protection device (shown in its first position, normally occupied when proper fluid levels are maintained within the washing chamber), timer switch 32, timer switch 30, door switch 35 and switch 24. When switch 26 is in its second position, the starting relay is connected directly to lead 27, bypassing timer switches 30 and 32 and switches 24 and 35.

Overload switch or circuit breaker means may be provided for the motor 39. Such a means is diagrammatically indicated at 44.

The operation of the overflow protection device of the present invention may be described as follows. When proper fluid levels are maintained within the washing chamber, the float 6 and lever 16 will be in the positions shown in FIG. 1. Switches 24, 25 and 26 will be maintained in their respective first positions (as illustrated in FIG. 3) by virtue of the fact that switch buttons 24a-26a will be maintained depressed by cam surface 19. When such is the case, the operating instrumentalities of the washing machine are free to be controlled by door switch 35 and timer switches 30-34.

As described above, should the fluid level in the washing chamber begin to rise above that which is normal, switches 24-26 will be caused to sequentially assume their respective second positions through the agency of the float 6, the lever 16, cam surfaces 20-22 and switch buttons 24a-26a.

Referring to FIG. 3, it will be noted that switch 24, the first switch to be caused to move to its second position, will disconnect all electrical power to the dishwasher including water valve 37, and will power an alarm or signal (if provided).

Switch 25 is the second switch of the overflow protection device to assume its second position. Switch 25 thus insures that the current from the contacts of starting relay 41 will be conducted directly to the drain direction phase winding 42. Switch 25 further assures that no current can be supplied to winding 43.

Switch 26 of the overflow protection device, the last switch to be moved to its second position, disconnects the motor start relay 41 from the timer, precluding any feed back circuitry, and connects the relay (and hence motor windings 40 and 42) directly to power lead 27.

Should the overfilling of the washing chamber be due to an electrical failure, switch 24 provides all the protection that is necessary. Should the fault not be electrical in nature, the level will continue to rise, until switches 25 and 26 have assumed their respective second positions, at which time the motor 39 and the discharge pump will cause a draining of the washing chamber. Should the fault be an external one such as a blocked sewer line or the like, causing entry of fluid through the drain system, the motor 39 and pump will cause a pressure against fluid entering through the drain connection from the external source.

In the embodiment of FIG. 1, the float will remain in an elevated position even after the fluid level in the washing chamber has returned to normal. This is true by virtue of the fact that the spring loaded switch buttons 24a-26a will cooperate with the lever 16 to hold the float in its elevated position. A force greater than the weight of the float itself is required to rotate the lever 16 in a counter-clockwise direction to reset the switches to their normal positions. Thus, the draining operation will be maintained until the float is manually returned to the position shown in FIG. 1. In this way, the operator will be made fully aware that a failure has occurred.

It will be understood by one skilled in the art, that in a washing machine of the type having a separate motor and discharge pump assembly, the switch 25 may be eliminated. A circuit diagram for a washing machine so equipped is shown in FIG. 4. The diagram of FIG. 4 is similar to that of FIG. 3, and like parts have been given like index numerals. The diagram of FIG. 4 differs from that of FIG. 3 in that the pump motor 39a has only the single starting winding 42 and hence is unidirectional. As a consequence, switch 25 and timer switch 33 have been eliminated. In this embodiment, under normal operating conditions, the timer 29 is connected to a source of power through the switch 24 and door switch 35. At the appropriate point in the timer sequence, the timer switch 32 is closed and the motor 39a is energized through the switch 26 and the starting relay 41.

When the water in the washing chamber rises above the normal level, switch 24 will first be opened, or switched to its second position if a two-position switch is used. In the latter case, the switch 24 may be used to energize the alarm 36. The opening of switch 24, or the release of the switch to its second position will cut off all power to the washing machine, including power to the timer and to the water valve 37.

Should the water continue to rise, switch 26 will be released to its second position, directly connecting the motor 39a and the starting relay 41 to the source of power via lead 27. The motor 39a, connected to a discharge pump, will cause the water in the vat to be discharged.

FIG. 5 is a diagrammatic representation of the circuitry of a washing machine of the type having a non-reversing pump, the discharge passage of which may be connected either to a recirculation passage or a drain passage. A solenoid actuated valve (generally indicated at 45) normally closes the drain passage, and causes the pump to be connected to the recirculation passage. Upon energization of the valve 45, the recirculation passage is closed and the drain passage is opened. Energization of the valve 45 is normally accomplished through switch 25 (shown in FIG. 5 in its normal position) and timer switch 33a.

All of the elements illustrated in FIG. 5 function in the same manner as described with respect to FIG. 4 with the exception of the valve 45. In this embodiment, when the water within the washing chamber has reached a level greater than normal, the switch 24 will first disconnect the washing machine from the source of power. Should the water level continue to rise, switch 25 will be moved to its second position, connecting the valve 45 directly to the source of power via line 27. Connecting the valve 45 directly to the source of power will insure that the discharge passage is open and the recirculation passage is closed. Should the water level still continue to rise, switch 26 will be moved to its second position, and the pump motor 39a will be energized. Energization of the motor 39a will cause the pump to discharge the water from the washing chamber through the drain passage, by virtue of the valve 45.

As indicated above, the nature of switch means 23 (see FIG. 1) does not constitute a limitation on the present invention. In the embodiment described with respect to FIGS. 1 and 2, the cam surfaces on the lever 16 are so arranged as to release the switch buttons as failure occurs. It is within the scope of the invention to configure the cam surfaces in such a way as to cause the

switch buttons to be depressed as failure occurs. Such an arrangement is not preferred, however, due to the small amount of force available.

In the embodiment shown in FIG. 1, the switch buttons remain in their undepressed positions until the protection device is manually reset by pushing the float downwardly to its initial position as shown in FIG. 1. Such an arrangement gives constant drain operation. It is within the scope of the present invention to permit the float to return to its fully seated position by gravity, thus enabling a recycling of the motor with the float level variation which would rise and fall as the water entered slowly and was pumped out rapidly.

FIGS. 6, 7 and 8 illustrate another form of switch means (generally indicated at 46) which may be used in place of switch means 23 of FIGS. 1 and 3. As illustrated in FIG. 6, the washing chamber, sump, stand pipe and float may be identical to that shown in FIG. 1, and like parts have been given like index numerals.

As shown in FIGS. 6 and 8, the float stem 11 is pivotally affixed to one end of a switch lever 47 by any suitable means such as pivot pin 48. The lever 47 is most clearly shown in FIG. 7. The lever comprises a body portion 48, a pair of spaced rearward extensions 49a and 49b. The extensions 49a and 49b may be provided with coaxial perforations 50a and 50b respectively. The lowermost end of the float stem 11 is adapted to lie between the extensions 49a and 49b and the pivot pin 48 passes through the perforation in the float stem end and through the perforations 50a and 50b. At the ends of the body portion 48 of the lever there are forward extensions 51 and 52 bearing laterally extending shafts 53 and 54 respectively. The body 48 also has spaced forward extensions 55, 56 and 57 bearing downwardly depending actuating fingers 58, 59 and 60 respectively.

As illustrated in FIGS. 6 and 8, the switch means 46 comprises a housing with a base member 61 and a cover member 62. The base member 61 may be mounted beneath the sump by any suitable means, as for example a bracket depending from the sump bottom (not shown). The cover member 62 may be affixed to the base 61 in any suitable manner, as for example by screws or the like (not shown).

Opposite sides of the base member 61 are provided with opposed notches 63 and 64 adapted to receive the lever shafts 53 and 54 respectively, whereby the lever 47 is pivotally affixed to the base 61. The cover member 62 has a transverse slot 65 through which the rearward portion of the lever 47 extends.

For purposes of an exemplary showing, the switch means 46 is illustrated as having three two-position switches generally indicated at 66, 67 and 68. Switch 66 is most clearly shown in FIG. 6. Switch 66 comprises a spring arm 69, one end of which is connected to a rearwardly extending terminal 70. The spring arm 69 is movable between a first contact 71 having a rearwardly extending terminal and a second contact 72, also having a rearwardly extending terminal. The spring arm 69 is so configured as to normally engage the first contact 71.

The spring arm 69 has a perforation 73 therein, through which the extension 57 of the lever 47 extends. As shown in FIG. 6 the finger 60 on the extension 57 is adapted to engage the spring arm 69. Thus, should the float 6 and the float stem 11 be caused to move upwardly by an abnormal water level in the washing chamber 1, the lever 47 will be caused to pivot about the shafts 53 and 54 in a clockwise direction. This, in turn, will cause the finger 60 to move the spring arm 69 away from the first contact 71 and against the second contact 72.

Switches 67 and 68 are substantially identical to switch 66. Switch 67 comprises a spring arm 74, a first contact 75 and a second contact 76 (see FIG. 8). Similarly, switch 68 comprises a spring arm 77, a first contact 78 and a second contact 79. Spring arms 74 and 77 are adapted to be contacted by fingers 58 and 59 respectively of the switch lever 47.

It will be noted from FIG. 8 that the switch arms 69, 74 and 77 are mounted on the base member 61 at different levels. Consequently, as the lever 47 is caused to pivot in a clockwise direction (should the water level in the washing chamber exceed the normal), spring arms 69, 74 and 77 will be contacted sequentially by fingers 60, 58 and 59 respectively. Thus, switches 66, 67 and 68 will be caused to assume their second positions sequentially, switch 66 being first and switch 68 being last. For this reason, switches 66-68 may be equated to switches 26-26 of FIGS. 1 and 2, and may be made to serve the same function.

The switch means 46 of FIGS. 6, 7 and 8 may be used in any of the washing machines described in FIGS. 3, 4 and 5. In instances where any of the switches 66, 67 or 68 should be of the single position type, this may be accomplished by eliminating one of the two contact means in association therewith.

While the switch means 46 of FIGS. 6, 7 and 8 has been illustrated, for purposes of an exemplary showing, as having three switches in association therewith, it will be understood by one skilled in the art that the switch means 46 may be provided with any number of switches. It is only necessary to provide the lever 47 with an appropriate number of extensions and fingers, and to locate the spring arms of each switch at a different level on the base 61 so that the switches may be actuated by the lever 47 sequentially.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an automatic washing machine of the type having a washer chamber, a timer, timer controlled electric valve means for the introduction of washing and rinsing fluids into the washing chamber, a pump for removing fluids from said washing chamber, a timer controlled motor for actuating said pump, and circuitry for supplying power from a source to said timer and to said valve means and motor through said timer, an overflow protection device comprising a stand pipe extending vertically from the bottom of said washing chamber, a float, said float having a stem extending downwardly through said stand pipe to a position beneath the bottom of said washing chamber, said float and stem having a normal position when said washing and rinsing fluids below a predetermined level within said washing chamber, said float and stem movable upwardly when said washing and rinsing fluids exceed said predetermined level, at least a first and second switch means, means in association with said float stem to actuate said first and second switch means sequentially when said float and stem move upwardly, said first switch means being electrically connected to interrupt power from said source to said timer, valve means and motor when actuated, said second switch means being electrically connected to disconnect said motor from said timer and to connect said motor to said power source when actuated.

2. The structure claimed in claim 1 wherein said means for actuating said first and second switch means comprise a lever, means for pivotally mounting said lever, one end of said lever being operatively connected to said float stem, and means on the other end of said lever for sequentially actuating said first and second switch means when said lever is pivoted by upward movement of said float and stem.

3. The structure claimed in claim 2 wherein said means on said lever for sequentially actuating said first and second switch means comprises cam surfaces.

4. The structure claimed in claim 3 wherein said first and second switch means each have switch button actuating means, said switch buttons each having a depressed and an extended position, means for urging each of said push buttons to said extended position, said lever maintaining said push buttons in said depressed positions when said float is in said normal position, said cam sur-

faces on said lever being so configured as to sequentially release said push buttons to said extended positions when said lever is pivoted by upward movement of said float and stem, whereby to sequentially actuate said first and second switch means.

5. The structure claimed in claim 2 wherein said first and second switch means each have a contact arm movable between a first and second position, said contact arms normally occupying their respective first positions, said means on said lever for actuating said first and second switches comprising fingers, each of said fingers adapted to contact one of said contact arms, said contact arms being so arranged as to be sequentially moved from their respective second positions by said fingers when said lever is pivoted by upward movement of said float and stem.

6. The structure claimed in claim 1 wherein said first switch is electrically connected to energize an alarm when actuated.

7. The structure claimed in claim 1 including a first passage for recirculating fluids from said pump to said washing chamber and a second passage for conducting fluids from said pump to drain means, a second timer actuated electric valve means, said second valve when unactuated connecting said pump to said first passage, said second valve when actuated connecting said pump to said second passage, third switch means, means in association with said float stem to actuate said third switch means after actuation of said first switch means and before actuation of said second switch means, said third switch means being electrically connected to disconnect said second valve from said timer and to connect said second valve directly to said source of power when said third switch is actuated.

8. In an automatic washing machine of the type having a washing chamber, a timer, timer controlled electric valve means for the introduction of washing and rinsing fluids into the washing chamber, a timer controlled dual purpose motor and pump assembly capable of operating in a first and second direction of rotation and serving to remove fluids from the washing chamber to drain means when operated in said first direction of rotation, and circuitry for supplying power from a source to said timer and to said valve means and motor through said timer, an overflow protection device comprising a stand pipe extending vertically from the bottom of said washing chamber, a float, said float having a stem extending downwardly through said stand pipe to a position beneath the bottom of said washing chamber, said float and stem having a normal position when said washing and rinsing fluids remain below a predetermined level within said washing chamber, said float and stem movable upwardly when said washing and rinsing fluids exceed said predetermined level, first, second and third switch means, means in association with said float stem to actuate said first, second and third switch means sequentially when said float and stem move upwardly, said first switch means being electrically connected to interrupt power from said source to said timer, valve means and motor when actuated, said second switch means being electrically connected to connect said motor for said first direction of rotation when actuated, and said third switch means being electrically connected to disconnect said motor from said timer and to connect said motor to said power source when actuated.

9. The structure claimed in claim 8 including a starting relay for said motor, said motor being connected to said timer through said relay, said third switch means being electrically connected to disconnect said motor and starting relay from said timer and to connect said motor and starting relay directly to said power source when said third switch is actuated.

10. The structure claimed in claim 8 wherein said means for actuating said first, second and third switch means comprises a lever, means for pivotally counting

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said lever, one end of said lever being operatively connected to said float stem, and means on the other end of said lever for sequentially actuating said first, second and third switch means when said lever is pivoted by upward movement of said float and stem.

11. The structure claimed in claim 10 wherein said means on said lever for sequentially actuating said first, second and third switches comprise cam surfaces.

12. The structure claimed in claim 11 wherein said first, second and third switch means each have switch button actuating means, said switch buttons each having a depressed and an extended position, means for urging each of said push buttons to said extended position, said lever maintaining said push buttons in said depressed positions when said float is in said normal position, said cam surfaces on said lever being so configured as to sequentially release said push buttons to said extended positions when said lever is pivoted by upward movement of said float and stem, whereby to sequentially actuate said first, second and third switch means.

13. The structure claimed in claim 10 wherein said first, second and third switch means each have a contact arm movable between a first and a second position, said contact arms normally occupying their respective first

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positions, said means on said lever for actuating said first, second and third switches comprising fingers, each of said fingers adapted to contact one of said contact arms, said contact arms being so arranged as to be sequentially moved from their respective first positions to their respective second positions by said fingers as said float and stem move upwardly.

14. The structure claimed in claim 8 wherein said first switch is electrically connected to energize an alarm when actuated.

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