July 17, 1951 C. J. MAHOWALD 2,561,213

WATER LEVEL CONTROL MEANS FOR AUTOMATIC WASHING MACHINES

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Fig. 1.

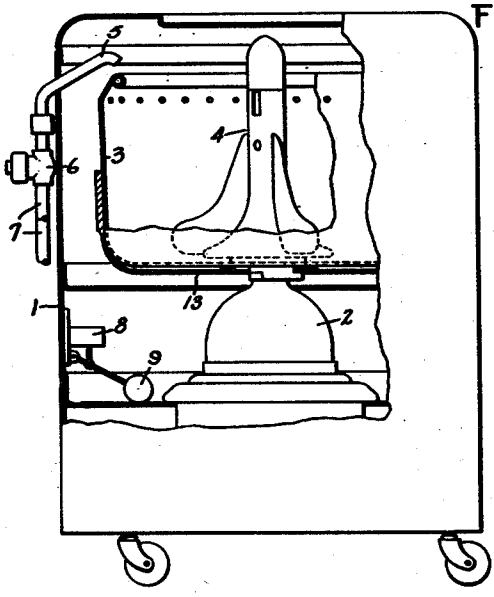


Fig. 2.

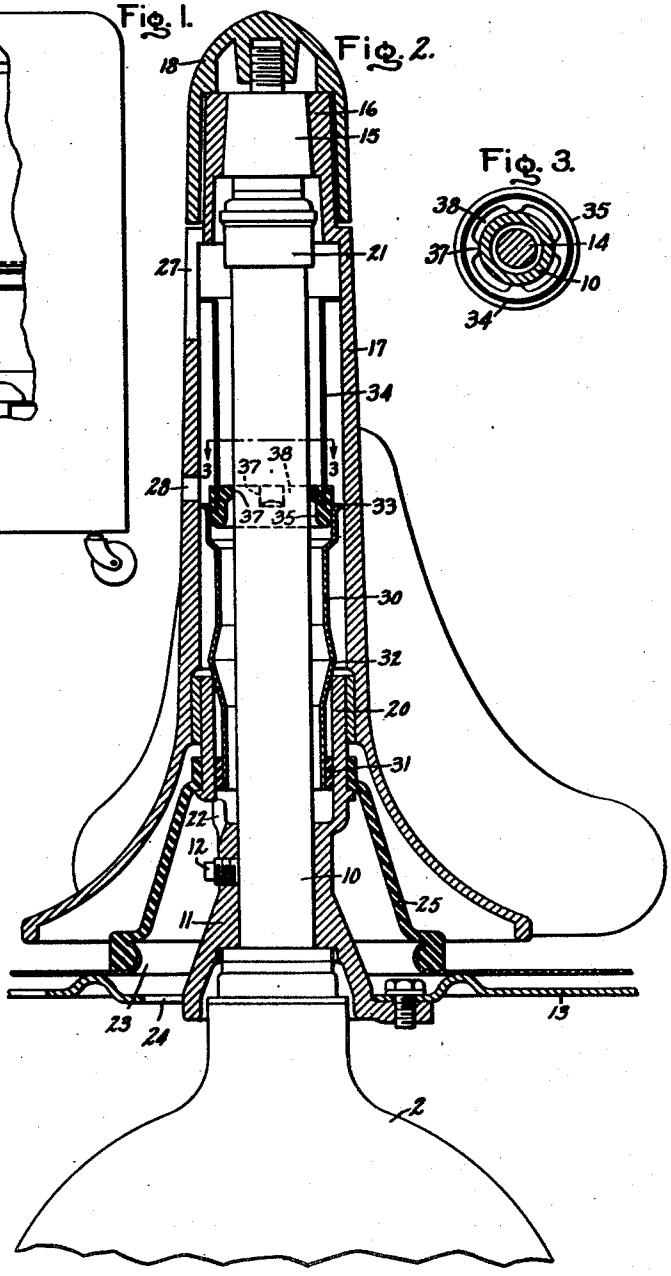
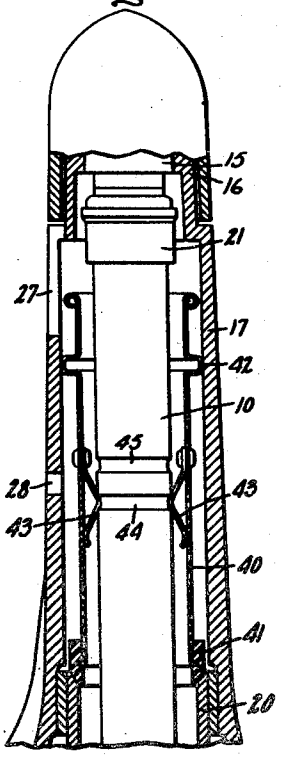


Fig. 3.

Fig. 4.



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WATER LEVEL CONTROL MEANS FOR AUTOMATIC WASHING MACHINES

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This invention relates to automatic clothes washing machines of the type in which a float switch operates to shut off a water inlet valve and to energize a time-cycle control mechanism to conduct the machine through a predetermined program of operations.

My invention has for a particular objective the provision of simple, manually controllable, means whereby the user may set the machine for operation on either of two water levels in the washing compartment, so as better to accommodate the machine to operation with wash loads of less than the rated maximum. My invention is particularly adaptable to a commercially well-known machine in which the clothes are washed and spin-dried in a single basket. Such a machine is shown in the Skinner, United States Patent No. 2,258,227 granted October 7, 1941, for "Washing Machine" and assigned to the assignee of this application; said patent shows also a method of accomplishing the objectives above stated.

In the present invention, as in Skinner, I provide a tubular agitator post with "half level" and "full level" apertures, but I provide an open-topped, tubular valve body having a positive plug type of valve to prevent operation of the machine at the lower water level when full level operation is required. When the tubular valve member is seated water must flow over the top of the valve body before it can pass to the water level responsive switch device; for operation at the lower level the operator manually lifts the valve body to unseat the valve and the lower level agitator ports become effective.

Other features and advantages of the invention will be apparent from the following detailed description of presently preferred embodiments, taken in connection with the accompanying drawing in which Fig. 1 is a representation, partly in section, of a washing machine embodying my invention; Fig. 2 is a vertical sectional elevation of the agitator post, showing one form of my invention applied thereto; Fig. 3 is a plan section taken on lines 3—3 of Fig. 2 to illustrate means for supporting the valve member in an unseated position; and Fig. 4 is a representation similar to Fig. 2 but showing a second form of the invention.

The drawings show so much of a commercially well known type of washing machine as is necessary for an understanding of the invention. The machine comprises a metal tub 1 in which is resiliently supported an operational unit com-

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prising a casing 2 housing the drive mechanism, a substantially imperforate basket 3, and an agitator or similar washing device 4. In machines of this type the clothes are placed within the basket 3 wherein they are washed by oscillation of agitator 4, the basket then being stationary, and then are spin dried after the removal of free water by rapidly rotating the basket. Water is introduced into the basket through a nozzle 5 controlled by any conventional solenoid operated mixing valve 6 into which hot and cold water is fed through suitable pipes 7.

The solenoid valve, as well as a time-cycle switch (not shown) which directs the machine through the series of operations including washing, rinsing, and spin drying, is under the control of a switch device 8 operated by a float 9 pivotally secured within the tub. The solenoid operated valve and the float switch are well known articles of commerce to which I make no claim of invention, and they have therefore been conventionally represented.

In the operation of the type of washing machine shown herein, assuming the clothes to be in the basket but the machine empty of water, the closing of a main control switch (not shown) completes a circuit through certain normally closed contacts of switch 8 to open the water valve 6. The water rises in the basket until a pre-established level is reached, whereupon the water flows down within the agitator 4 to discharge into the tub 1, raising the float 9 as it accumulates in the tub. After the tub contains an inch or two of water, the float opens the solenoid valve contacts to shut off the water and closes a second pair of contacts in circuit with the cycle control switch.

As shown in Figs. 2 and 3 the tubular shaft 10 projects from the casing 2 and carries the hub 11 to drive the same, said hub and shaft being mutually secured by means of a set screw 12 or equivalent. Hub 11 is affixed to the supporting framework of a balance ring 13 within which the basket 3 tightly fits. Within the shaft 10, and also associated within the mechanism within the casing 2, is a shaft 14 to the upper end of which is fixed a non-circular boss 15 which mates with a cooperatively shaped member 16 formed integral with the body post 17 of the agitator 4. Desirably the end of the boss 15 is threaded to receive the cap 18 which removably secures the agitator thereon. The lower portion of the agitator post may suitably be journaled on a hub extension 20. The tubular shaft 10 extends

to above the maximum water level in the basket and there is provided any suitable rotating seal assembly 21 to protect against the leakage of water into the shaft 10. During washing, the mechanism within the casing oscillates the agitator, the shaft 10 being held stationary by a brake within the casing; during the spinning cycle the shaft is free to be rotated.

The basket hub 11 is provided with one or more openings 22 which communicate between the interior of the agitator body post and an opening 23 at the center of the lower wall of the basket 3. Said opening communicates with the tub 1 through the one or more openings 24 provided by the balance ring framework. A flexible boot 25 serves to define the passage through which the water flows from the agitator post to the tub and, of course, prevents leakage of water from the basket directly into the tub.

The agitator post is provided with water inflow openings 27, 28 respectively defining full level and half level operating conditions. The openings 27 are preferably elongate and of relatively large area for the purpose later to be described.

In the embodiment of my invention shown in Fig. 2, I secure a tubular valve seat member 30 about the lower portion of the shaft 10, forming a water-tight seal with the hub extension 20 by means such as a rubber gasket 31. I may center the tube relative to the agitator by flaring the tube outwardly as at 32 so that it fits in tight engagement with the end of the extension 20 to be supported thereby and by the outwardly flaring lip 33 of the belled upper end of tube 30. Said lip extends closely proximate the inner wall of the agitator post 17. It will be noted from Fig. 2 that the rim 33 is immediately below the apertures 28. For cooperation with the tube 30 I provide a valve body tube 34 carrying at its lower end an annular valve plug 35 which is adapted to fit snugly within the valve seat provided by the belled mouth of tube 30. The upper end of tube 34 is outwardly flanged and when the valve 35 is in seated position extends sufficiently above the lower edge of the opening 27 to permit the operator to insert a finger through the opening below the flanged end to lift the tube 34. The operator may press downwardly against the flange in order to reseat the valve plug. In order frictionally to hold the valve body member 34 in raised position I form the annular plug member 35 with a plurality, for example four, of inwardly projecting fingers 37 which grip the sides of the shaft 10. Advantageously, the valve plug is of rubber or the like, to afford satisfactory resiliency of fingers 37 formed integral therewith. The spaces 38 between adjacent fingers provide ample flow passages for water entering the valve body 34 over its upper edge to pass downwardly through the tube 30 and through the openings 22 for discharge into the tub.

It is apparent that when the body tube 34 is raised to unseat the valve member 35 the water entering the basket cannot rise above the openings 28, the machine will operate in normal fashion, but with the lesser water content.

In the embodiment of Fig. 4 valve construction comprises a single tube 40 having an annular valve plug 41 at its lower end. The upper end wall of the cup-like hub collar 20 may be configurated to provide a valve seat. The upper end of tube 40 is flanged or beaded as shown to provide a surface to be engaged by a finger projecting through the agitator opening 27. Suitable guiding means for valve tube 40 may be provided by spinning out the wall as at 42 for slidable engagement with the inner wall of agitator post 17. For positioning the tube 40 I provide one or more spring fingers 43 on the inner wall of the tube for cooperation with annular grooves 44, 45 on the shaft 10, said grooves representing respectively the closed and open valve plug positions. It will be apparent that if found desirable the shaft 10 of Fig. 2 may be provided with equivalent positioning grooves.

While I have shown particular embodiments of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made; and I therefore contemplate by the appended claims to cover any such 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. In a washing machine, a tub, a basket therein in which the clothes are to be washed and spin dried, means for introducing water into the basket, an agitator in said basket, said agitator having a tubular post extending to above the maximum operational water level of said basket and having inflow ports at vertically spaced locations, means providing a water passage communicating between said tubular post and said tub, means defining a valve seat at the entrance to said water passage below the lowermost of said agitator postports, and a tubular valve element disposed within said agitator post for axial movement therein, said tubular element extending to the uppermost of said openings and having at its lowermost end an annular valve element seatable within said valve seat when it is desired to effect communication between said uppermost agitator port and said water passage and removable from said valve seat when the lower agitator port is to be rendered effective.

2. In a washing machine, a tub, a basket therein in which the clothes are to be washed and spin dried, a hub for supporting said basket on a shaft for rotating the same on a vertical axis, said hub including a cup-like member opening upwardly above the floor of the basket, an agitator having a tubular body post disposed about said shaft in spaced relation therewith, said post communicating with said hub member, a water passage communicating between said hub member and said tub, overflow passages in said agitator body post at a plurality of liquid levels in the basket, means on said hub member below the lowermost of said levels to define an upwardly facing valve seat, a tubular valve member disposed about said shaft in spaced relation therewith and extending to the uppermost of said overflow passages, and an annular valve disk member at the lower end of said tubular valve member for releasably seating on said valve seat, whereby with the valve unseated water will flow through the lower overflow passage into said tub, but when the valve is seated only the uppermost overflow passage is in communication with said water passage.

3. The combination according to claim 2, in which the tubular valve member is provided with means accessible through one of the overflow passages for lifting said member to unseated condition.

4. The combination according to claim 2, in which means are provided to releasably maintain the tubular valve member in unseated position.

5. The combination according to claim 2, in which means engaging the basket shaft are car-

ried by the tubular member to releasably maintain the said member in unseated position.

6. The combination according to claim 2, in which means cooperating between the valve disk member and the basket shaft are provided to releasably maintain the tubular valve member in unseated position.

7. The combination according to claim 2, in which resilient fingers are provided on the valve disk member to frictionally engage the basket shaft for releasably maintaining the tubular valve member in unseated position.

8. The combination according to claim 1, in which friction means are provided to releasably restrain the tubular valve element against axial movement.

9. The combination according to claim 1, in which the tubular valve element is provided with means accessible through said uppermost agitator port for lifting said element to unseated position.

CURTIS J. MAHOWALD.

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