

Aug. 10, 1943.

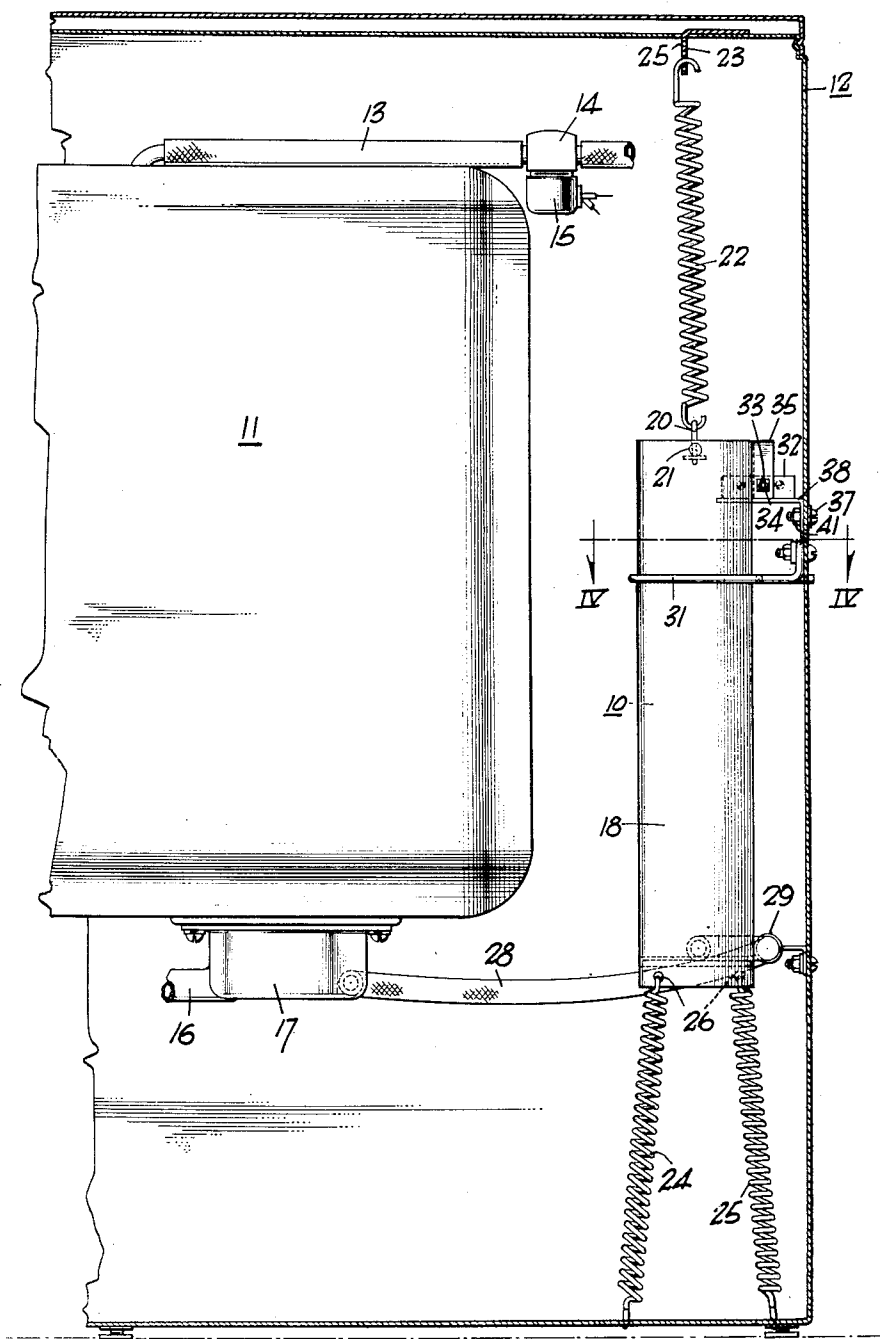
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2,326,208

CONTROL MECHANISM

Filed Dec. 1, 1941

2 Sheets-Sheet 1



WITNESSES:

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FIG. 1.

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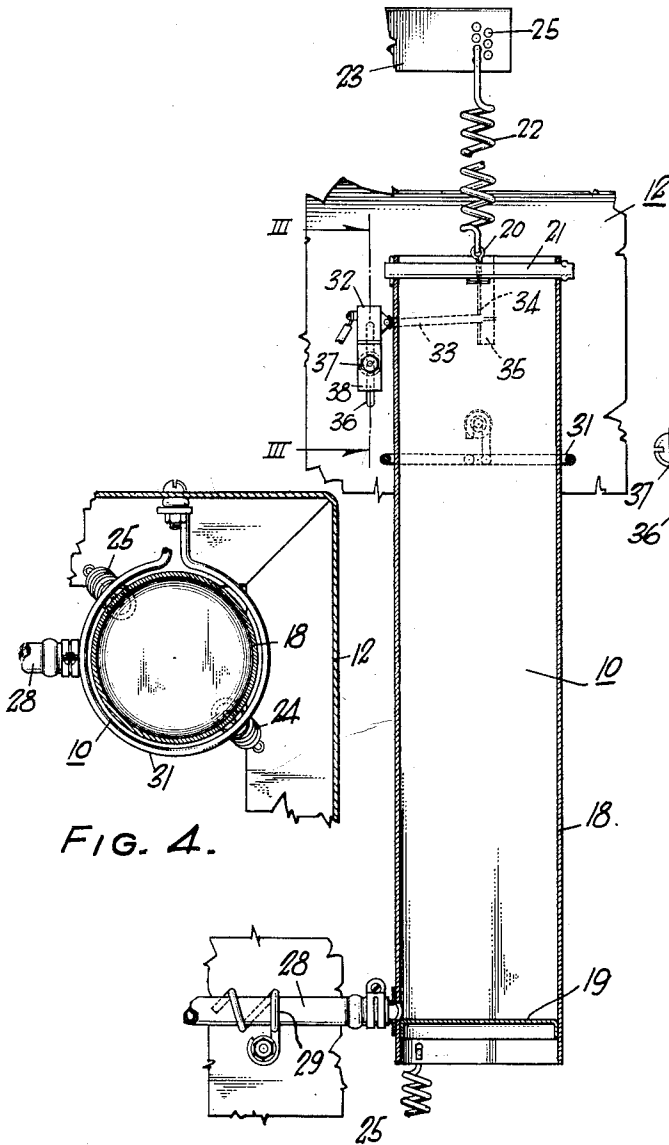


FIG. 4.

FIG. 2.

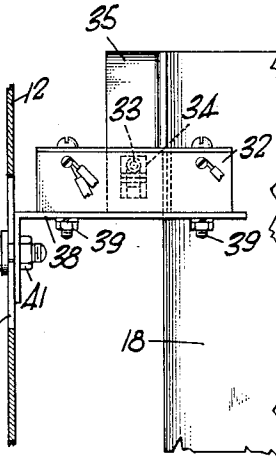


FIG. 3.

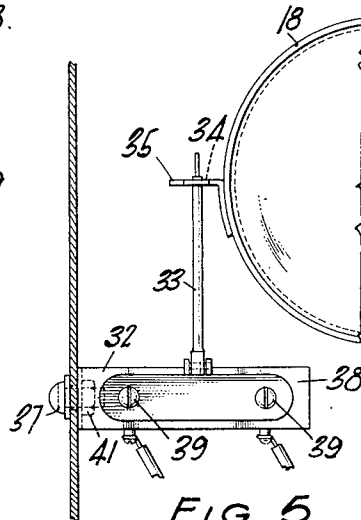


FIG. 5

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CONTROL MECHANISM

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Application December 1, 1941, Serial No. 421,203

4 Claims. (Cl. 200—85)

My invention relates to a mechanism for controlling the level of a liquid and has for its object to provide an improved controlling mechanism of this kind.

A further object of my invention is to provide an improved mechanism responsive to the weight of liquid contained therein for operating a control device.

It is a further object of the invention to preclude binding or sticking in a control mechanism of the character set forth caused either by contaminated liquid admitted to the mechanism or by vibratory forces imparted thereto.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a view, partially in section and partially in elevation, of my improved control mechanism applied to a washing machine;

Fig. 2 is an enlarged sectional view of the control mechanism shown in Fig. 1;

Fig. 3 is a section taken along the line III—III of Fig. 2;

Fig. 4 is a section taken along the line IV—IV of Fig. 1; and

Fig. 5 is a plan view of the apparatus shown in Fig. 3.

Reference will now be had to the drawings wherein I have shown my improved controlling mechanism, generally indicated at 10, applied to a washing machine, the water-containing tub of which is generally indicated at 11. As shown, the tub 11 is mounted within an enclosing casing 12 in any well-understood manner. Water is admitted to the tub 11 through a conduit 13 having a solenoid-operated valve 14 connected therein. As the construction and operation of valves of the type shown at 14 are well understood in the art, no description of the same is deemed necessary other than to state that, as the solenoid 15 thereof is energized, the valve is opened, and, conversely, as the solenoid 15 is deenergized, the valve is closed. Vitiated water is discharged from the tub 11 through a drain conduit 16 which is connected to a sump 17 disposed on the bottom side of the tub 11.

The controlling mechanism 10 includes a cylindrical vessel 18 having a bottom wall 19; the upper end of the cylindrical vessel 18 being open, as best shown in Fig. 2. A pin 21 extends diametrically across the vessel 18 adjacent the open upper end thereof and is fixed to the vessel in any suitable manner. The vessel 18 is supported

from the casing 12 by a tension spring 22, the upper end of which is carried by a bracket 23 forming a part of the casing structure 12. The lower end of the spring 22 engages the eye of a cotter pin 20 that extends through an opening in the pin 21.

The vessel 18 is positioned within the casing 12 by means of tension springs 24 and 25 which are attached at their bottom ends to the casing 12 and at their upper ends to circumferentially-spaced portions of the vessel 18. As shown, the vessel 18 is provided with openings 26 for receiving the respective upper ends of the springs 24 and 25. The springs 22, 24, and 25 position the vessel 18 vertically within the casing 12 and the springs 24 and 25, being connected to circumferentially-spaced portions of the vessel 18, prevent twisting or turning of the vessel about its vertical axis. The vertical position of the vessel 18 within the casing 12 may be adjusted by varying the bias of the spring 22 and, to this end, the bracket 23 is provided with a plurality of vertically-spaced openings 25 for receiving the upper end of the spring 22.

From the foregoing, it will be apparent that the vessel 18 is free to move downwardly and upwardly as water is admitted to and discharged from the vessel 18, as described hereinafter. Furthermore, the supporting springs permit some movement of the vessel, generally in a horizontal direction. In other words, the vessel 18 is free to move in any mode. In this connection, vibratory movements which may be imparted to the casing 12 during the operation of the washer are not transmitted to the vessel 18 because of the resilient support afforded by the springs 22, 24 and 25.

Water is conveyed to and away from the vessel 18 by means of a flexible conduit 28, which communicates at one end with the vessel 18 and at its other end with the sump 17, the latter defining the lowermost point of the water-containing tub structure 11. The conduit 28 may be supported intermediate its ends by means of a spring clip 29 which is secured to the casing 12 and which resiliently supports the flexible conduit 28. In order to prevent excessive lateral or horizontal movement of the vessel 18, a ring 31 supported by the casing 12 is provided. The ring 31 is spaced concentrically from the vessel 18 and limits the amount of sidewise motion of the vessel 18 due to vibration during operation of the washer 11 or during handling and shipment of the apparatus.

Upward and downward movement of the ves-

sel 18 is employed for actuating a control device, shown by way of example as an electric switch 32, which, in the present embodiment, is connected in circuit with the solenoid 15, and, therefore, controls the admission of water through the conduit 13 in response to the amount of water contained within the tub 11 and vessel 18. The switch 32 includes an operating lever 33 which extends within an opening 34 in a bracket or ear 35 carried by the vessel 18. The switch 32 is preferably of the well-known snap-acting, tumbler type in which the contacts are rapidly opened when the arm 33 is moved downwardly and are rapidly closed as the arm 33 is moved upwardly. The sides of the opening 34 are properly spaced from the switch lever 33 to afford some limited vibratory movement of the vessel 18 relative the switch structure during operation so that the switch structure 32 is not subjected to any alternating vibratory forces.

In order to properly position the switch 32 relative the vessel 18, so that the switch opens and closes at predetermined elevations of the vessel 18, an adjustment between the switch 32 and the casing 12 is provided. This adjustment preferably includes a vertical slot 36 formed in a side wall of the casing 12 and a screw 37 which may be moved upwardly and downwardly in the slot 36. The screw 37 supports a bracket 38 upon which the switch 32 is secured by means of screws 39. By loosening the screw 37, the bracket and switch 32 may be moved upwardly and downwardly, and when the proper position is attained, a nut 41 may be drawn tight upon the screw 37 for securing the bracket 38 in its proper position.

During periods when the tub 11 and vessel 18 are devoid of water, the latter is maintained in a predetermined elevated position by the springs 22, 24, and 25. At this time the switch lever 33 is in its upper position so that the switch 32 is closed. Accordingly, the solenoid 15 may be energized to admit water to the tub 11 at this time. As water is admitted to the tub 11, a portion flows through the flexible conduit 28 and into the vessel 18, so that the water in the vessel 18 is maintained at the same level as water in the tub 11 at all times. When a predetermined weight of water is contained within the vessel 18, the latter moves downwardly in opposition to the bias of the spring 22. During downward movement of the vessel 18, the upper side of the opening 34 engages the switch lever 33 and moves the same downwardly. When the vessel 18 has been moved to a predetermined lower position by the admission of a predetermined weight of water to the vessel 18, the switch 32 snaps to its open position for deenergizing the solenoid 15, and, therefore, terminating the admission of water to the tub 11. As water is drained from the tub 11 and vessel 18 through the discharge conduit 16, the vessel 18 moves upwardly as the amount of water therein is reduced. When the vessel 18 is substantially devoid of water, it will have moved upwardly sufficiently to actuate the switch 32 to a closed position, as is well understood. Closing of the switch 32 conditions the circuit of the solenoid 15 for energization.

The control mechanism which I have shown and described is extremely sensitive because of the particular resilient support I employ for supporting the vessel 18. The tension springs 22, 24, and 25 have a low spring constant so that the

range of movement of the vessel is relatively large for a small capacity vessel. In order to provide for stability of the vessel when using low constant springs, the latter may be initially

- 5 stressed when applied to the vessel. The stressed springs not only properly position the vessel vertically but the lower springs 24 and 25, being connected to circumferentially spaced portions of the vessel, resist twisting or turning of the vessel.
- 10 Adjustment of the tension of the spring 22 varies the amount or weight of liquid in the vessel necessary to operate the switch. Adjustment of the bias of spring 22 is effected, of course, by moving the upper end of the spring from one of the
- 15 vertically-spaced openings 25 to another.

The spring support for the vessel 18 and the connection between the vessel and the switch lever 33 provide a substantially frictionless device so that the mechanism is very sensitive in operation. Furthermore, vibrations of the casing during operation of the washer are substantially isolated from the vessel 18 because of the resilient support which I employ. This feature is particularly advantageous where the control mechanism is applied to a laundry machine which operates at high speed for centrifuging fluid from the fabrics being cleaned because of the high frequency vibrations set up in the machine during such operation.

- 30 While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire,
- 35 therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In a control mechanism, the combination of
40 a vessel for containing liquid, flexible conduit means for conveying liquid to and from said vessel, spring means biasing the vessel upwardly and downwardly and positioning the vessel vertically, said spring means affording downward and upward motion of the vessel as liquid is admitted to and discharged from the vessel, means for adjusting at least a portion of the spring means for adjusting the vertical position of the vessel, a
45 switch actuated by the vessel as the latter moves upwardly and downwardly to predetermined positions, a support for the switch and means for adjusting the switch upwardly and downwardly relative the support.

2. In a control mechanism, the combination of
50 a vessel for liquid, flexible conduit means for conveying liquid to and from the vessel, a tension spring biasing the vessel upwardly, a second tension spring biasing the vessel downwardly in opposition to the first spring, said spring positioning the vessel and providing for movement thereof in all modes, a switch, means connecting
55 the vessel and the switch for actuating the switch to first and second controlling positions as the vessel moves to predetermined upper and lower positions, said connecting means providing for limited movement of the vessel relative the switch in generally horizontal directions whereby the transmission of vibrations between the vessel and the switch is prevented and means for limiting
60 vibratory movements of the vessel in generally horizontal directions.

3. In a control mechanism, the combination of
65 a vessel for containing liquid, a flexible conduit for conveying liquid to and from the vessel, a tension spring biasing the vessel upwardly, a

second tension spring for biasing the vessel downwardly, said tension springs positioning the vessel and providing for downward and upward movement of the vessel as liquid is respectively admitted to the vessel and discharged therefrom, 5 means for adjusting the bias of at least one of said springs, a support, a switch carried by the support and having a lever for operating the switch, means for adjusting the switch upwardly and downwardly on said support and a bracket 10 carried by the vessel and movable therewith, said bracket having an opening therein for receiving said switch lever, said opening having its sides spaced from the lever for affording limited vibratory movement of the vessel and bracket relative the switch. 15

4. In a control mechanism, the combination of

a generally cylindrical vessel for containing liquid, a flexible conduit for conveying liquid to and from the vessel, a tension spring biasing the vessel upwardly, a plurality of tension springs for biasing the vessel downwardly and connected to circumferentially-spaced portions of the vessel, said tension springs positioning the vessel and providing for downward and upward movement of the vessel as liquid is, respectively, admitted to and discharged from the vessel, means for adjusting the bias of at least one of said tension springs, a support, a switch carried by the support and having a lever for operating the switch, and means connecting the vessel and said lever for imparting movement of the vessel to the switch.

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