

Oct. 13, 1942.

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2,298,905

WASHING MACHINE

Filed Sept. 19, 1940

2 Sheets-Sheet 1

FIG. 1.

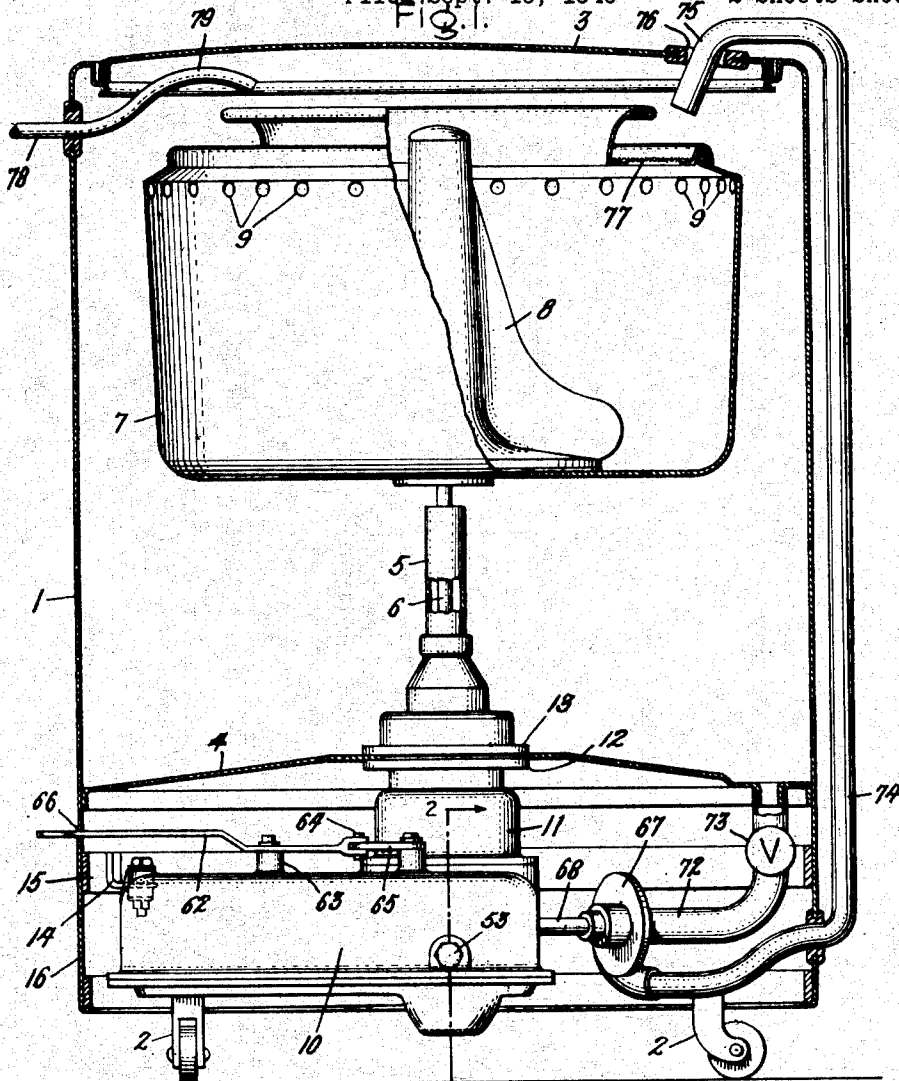
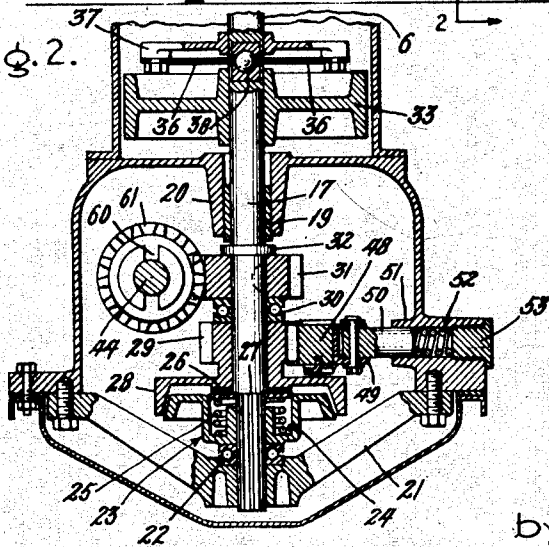


Fig. 2.



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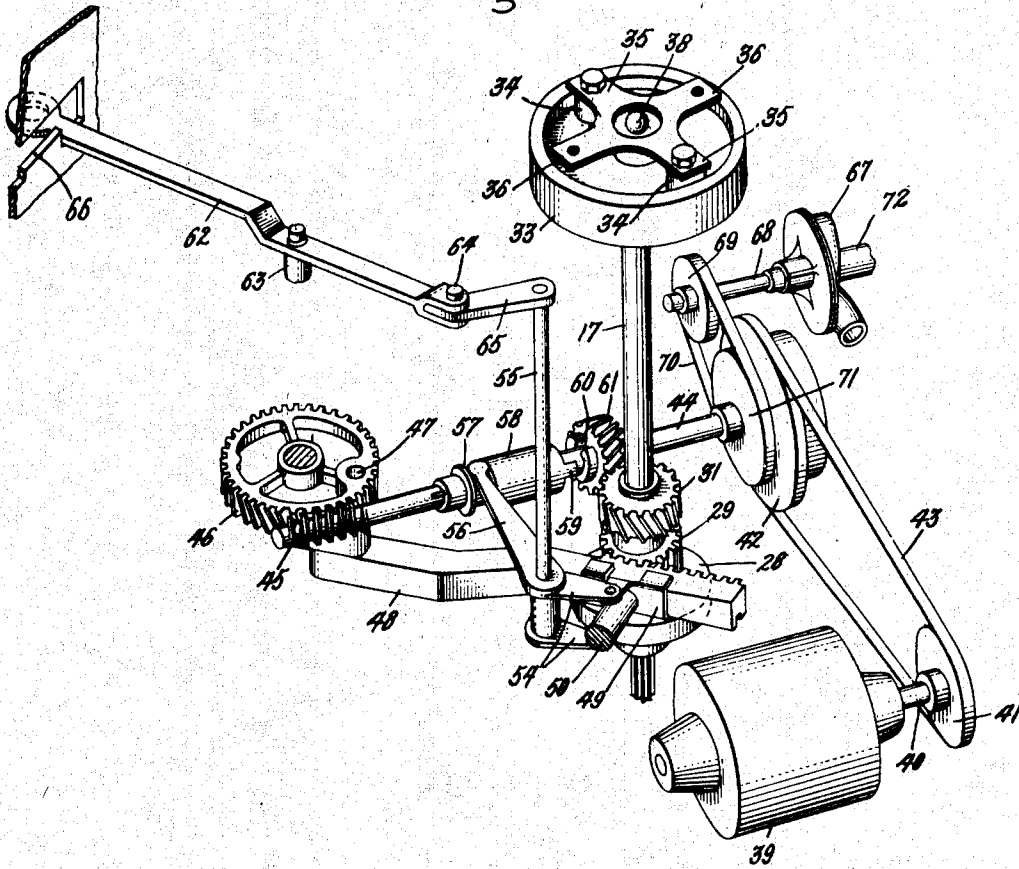
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Fig. 3.



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UNITED STATES PATENT OFFICE

2,298,905

WASHING MACHINE

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4 Claims. (Cl. 68—23)

The present invention relates to washing machines of the type in which clothes are washed and centrifugally dried in a rotatable receptacle.

In machines of this type it is desirable that the washing operation be started only after the receptacle has been filled with liquid to the proper level.

The object of my invention is to provide an improved construction and arrangement in machines of this type in which the weight of the receptacle and contents is used to control the start of the washing operation, and for a consideration of what I believe novel and my invention, attention is directed to the following description and the claims appended thereto.

In the accompanying drawings, Fig. 1 is a sectional elevation of a washing machine embodying my invention; Fig. 2 is a sectional view taken on line 2—2 of Fig. 1; and Fig. 3 is a perspective view of the driving mechanism.

Referring to the drawings there is shown a machine having an outer casing or tank 1 supported on casters 2 and having a cover 3. Fixed to the bottom wall 4 of the outer casing is a sleeve 5 through which projects a vertical shaft 6 on the upper end of which is a receptacle 7 having a bladed agitator 8 therein. In the upper part of the receptacle side walls are openings 9 which define the liquid level in the receptacle during washing and which serve as centrifugal discharge openings during drying. By a suitable arrangement, for example that shown in Patent 2,161,619, G. W. Dunham, the agitator 8 is oscillated for washing and the receptacle 7 is rotated for centrifugal drying by the vertical shaft 6. Below the bottom wall 4 of the outer casing is a gear case 10 housing the driving mechanism shown in Fig. 3 to the upper side of which is fixed a hollow post 11 having a flange 12 at its upper end engaging the lower side of the bottom wall 4 and fixed thereto by a clamping ring 13. The hollow post 11 serves as a support for one end of the gear casing. The other end of the gear casing is supported by a bracket 14 attached to a stiffening ring 15 fixed to the inner surface of a skirt 16 depending from the outer casing. Within the gear casing is a vertical shaft 17 slidably and rotatably carried in a sleeve bearing 19 in a boss 20 depending from the top wall of the gear casing. The lower end of the shaft 17 extends through a strut 21 carrying a ball thrust bearing 22 supporting a clutch member 23 splined to the shaft 17. The clutch member 23 is provided with an annular seat 24 for a coil spring 25 the upper end of which engages a thrust

washer 26 resting against a shoulder 27 on the shaft 17 and resiliently supporting the shaft 17 on the strut 21. Loose on the shaft 17 and resting on the thrust washer 26 is a clutch member 28 integral with a pinion 29. Above the pinion 29 is a ball thrust bearing 30 on which rests a spiral gear 31 keyed to the shaft 17. The shaft 17 has a collar 32 which engages the upper surface of the spiral gear 31. The weight supported by the shaft 17 is accordingly transmitted through the collar 32, the spiral gear 31, the thrust bearing 30, the clutch member 28, and the thrust washer 26 to the coil spring 25. If this weight is sufficient to compress the coil spring 25, the clutch member 28 will be moved into engagement with the clutch member 23, completing a driving connection to the shaft. Although the gear 31 and the pinion 29 move with the clutch member, the movement is not sufficient to interfere with the proper mesh of the gear teeth.

Fixed to the upper end of the shaft 17 is a brake drum 33 having diametrically opposed projections 34 which are connected to arms 35 of a universal joint. Intermediate the arms 35 of the universal joint are arms 36 which are connected to opposite ends of an arm 37 fixed to the lower end of the vertical shaft 6. The weight carried by the vertical shaft 6 is transmitted to the upper end of the vertical shaft 17 through a ball thrust bearing 38. The shafts 6 and 17 together with the universal joint connection therebetween constitute a two-part shaft which is axially slidable in the gear casing 10 and which assumes a position dependent upon the weight of the receptacle 7 and its contents and the strength of the spring 25. The spring 25 is of such strength that when the receptacle 7 is empty the clutch members 23 and 28 are separated. When the receptacle is filled with liquid to the proper level for washing, the additional weight of the liquid causes downward movement of the shafts 6 and 17 sufficient to move the clutch member 28 into engagement with the clutch member 23 and to thereby complete a driving connection to the shafts. The weight of the liquid is of the order of twenty times the weight of the clothes. The operation of the clutch member is substantially unaffected by the weight of the clothes.

The machine is driven by an electric motor 39 having a shaft 40 to which is fixed a pulley 41 driving a pulley 42 through a belt 43. The pulley 42 is fixed to a shaft 44 having a worm gear 45 cut therein meshing with a worm gear 46. The worm gear is provided with a socket 47 for receiving the crank pin of a rack 48. The rack 48

is slidable in a carrier 49 pivoted on the inner end of a plunger 50 slidably received in a boss 51 in the side walls of the gear casing. The plunger 50 is biased toward the pinion 29 by a compression spring 52 arranged between the plunger 50 and the inner end of a plug 53 threaded into the boss 51. The plunger 50 is pivotally connected to arms 54 fixed to a rock shaft 55 journaled in the gear casing. Upon rotation of the rock shaft 55 in a counter-clockwise direction, as viewed in Fig. 3, the rack 48 is moved into engagement with the pinion 29, causing oscillation of the pinion 29. Also fixed to the rock shaft 55 is an arm 56 having its free end loosely received in a groove 57 of a clutch member 58 slidably keyed to the shaft 44. Upon rotation of the rock shaft 55 in a clockwise direction, as viewed in Fig. 3, the clutch member 58 is moved to a position in which its teeth 59 engage socket 60 in a spiral gear 61 loose on the shaft 44. The spiral gear 61 meshes with the spiral gear 31 which is keyed to the shaft 17. Accordingly, when the clutch member 58 engages the spiral gear 61, the shaft 17 is rotated. The rock shaft is turned by a lever 62 pivoted on a boss 63 on the gear casing and having its inner end connected by a pin 64 to an arm 65 fixed to the upper end of the rock shaft 55 and having its outer end projecting throughout a slot 66 in the skirt 16. The lever 62 is shown in the position in which the rack 48 engages the pinion 29. Upon pivoting the lever 62 in a counterclockwise direction, as viewed in Fig. 3, the rack 48 is moved out of engagement with the pinion 49 and the clutch member 58 is moved into engagement with the spiral gear 61.

Adjacent the gear case 10 is a pump 67 having the shaft 68 to which is fixed a pulley 69 driven through a belt 70 by a pulley 71 integral with the pulley 42. The inlet of the pump is connected through a conduit 72 and a valve 73 to the bottom of the outer casing. The discharge of the pump is connected to a flexible hose 74 to a nozzle 75 which during washing may be inserted through an opening 76 in the cover 3 so as to discharge onto an annular filter 77 carried on the upper edge of the receptacle 7. The machine may be filled through a conduit 78 connected to a suitable water supply and having a nozzle 79 discharging into the receptacle 7.

In the use of the machine the control lever 62 is moved to the washing position shown in Fig. 3 in which the rack 48 engages the pinion 29 and oscillates the pinion at washing speed. Since the pinion 29 is loose on the shaft 17 and the clutch members 23 and 28 are separated, the agitator 8 remains stationary. The clothes and washing compound are placed in the receptacle which is then filled through the conduit 78 until the liquid overflows through the openings 9. As soon as the liquid level in the receptacle reaches a value which is safe for washing, the weight of the liquid is transmitted through the ball thrust bearing 38 to the shaft 17, causing a downward axial movement of the shaft 17 and bringing the clutch member 28 into engagement with the clutch member 23 which is splined to the shaft 17 and thereby completing the driving connection to the vertical shaft 6. This starts the oscillation of the agitator 8 for washing. The spring 25 is of such stiffness that washing cannot start until the receptacle is filled to a safe level. By opening the valve 73 the liquid overflowing to the bottom of

the outer casing through the openings 9 is circulated by the pump 67 onto the filter 77. When the washing is completed, the lever 63 is moved in a counterclockwise direction, as viewed in Fig. 3, turning the rock shaft 55 so as to move the rack 48 out of engagement with the pinion 29 and to move the clutch member 58 into engagement with the spiral gear 61. This completes a high speed driving connection to the vertical shaft 6, causing rotation of the receptacle 7 to centrifugally dry the clothes. During this operation the valve 73 is shut so that the liquid centrifugally discharged through the openings 9 is caught and stored within the outer casing, from which it may be returned to the receptacle to wash a succeeding batch of clothes.

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

1. In a washing machine, a vertical shaft, a rotatable receptacle on the shaft for receiving liquid and clothes to be washed, a frame in which the shaft is supported for axial movement, resilient means resisting axial movement of the shaft in the frame whereby the axial position of the shaft is responsive to the weight of the receptacle and contents, and mechanism for driving the shaft at its washing speed including clutch members respectively loose on and fixed to the shaft, said clutch members being positioned so as to be out of engagement when the receptacle is empty and in engagement when the receptacle is filled with liquid to the proper level for washing.

2. In a washing machine, a vertical shaft, a receptacle supported on the shaft for receiving liquid and clothes to be washed, a frame in which the shaft is supported for axial movement, resilient means resisting axial movement of the shaft in the frame whereby the axial position of the shaft is responsive to the weight of the receptacle and contents, and means responsive to the difference in the axial position of the shaft when the receptacle is respectively filled and empty for respectively making and breaking a driving connection to the shaft.

3. In a washing machine, a vertical shaft, a receptacle on the shaft for receiving liquid and clothes to be washed, a frame in which the shaft is supported for axial movement, resilient means resisting axial movement of the shaft in the frame whereby the axial position of the shaft is responsive to the weight of the receptacle and contents, and means including a clutch member movable axially with the shaft from a disengaged position when the receptacle is empty to an engaged position when the receptacle is filled for establishing a driving connection to the shaft when the receptacle is filled to the proper level for washing.

4. In a washing machine, a vertical shaft, a receptacle on the shaft for receiving liquid and clothes to be washed, a frame in which the shaft is supported for axial movement, resilient means resisting axial movement of the shaft in the frame whereby the axial position of the shaft is responsive to the weight of the receptacle and contents, a driven clutch member fast to the shaft, a driving clutch member loose on the shaft and movable axially with the shaft so as to be moved into engagement with the driven clutch member when the receptacle is filled to the proper level for washing, and means for driving said driving clutch member.

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