

Dec. 18, 1951

G. W. DUNHAM

2,579,310

WASHING MACHINE

Filed Jan. 30, 1948

6 Sheets-Sheet 1

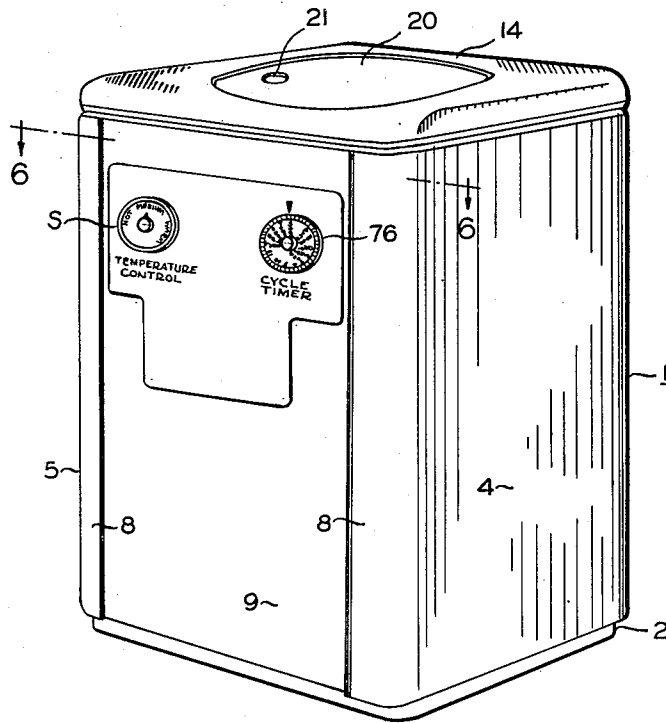


FIG. 1

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6 Sheets-Sheet 2

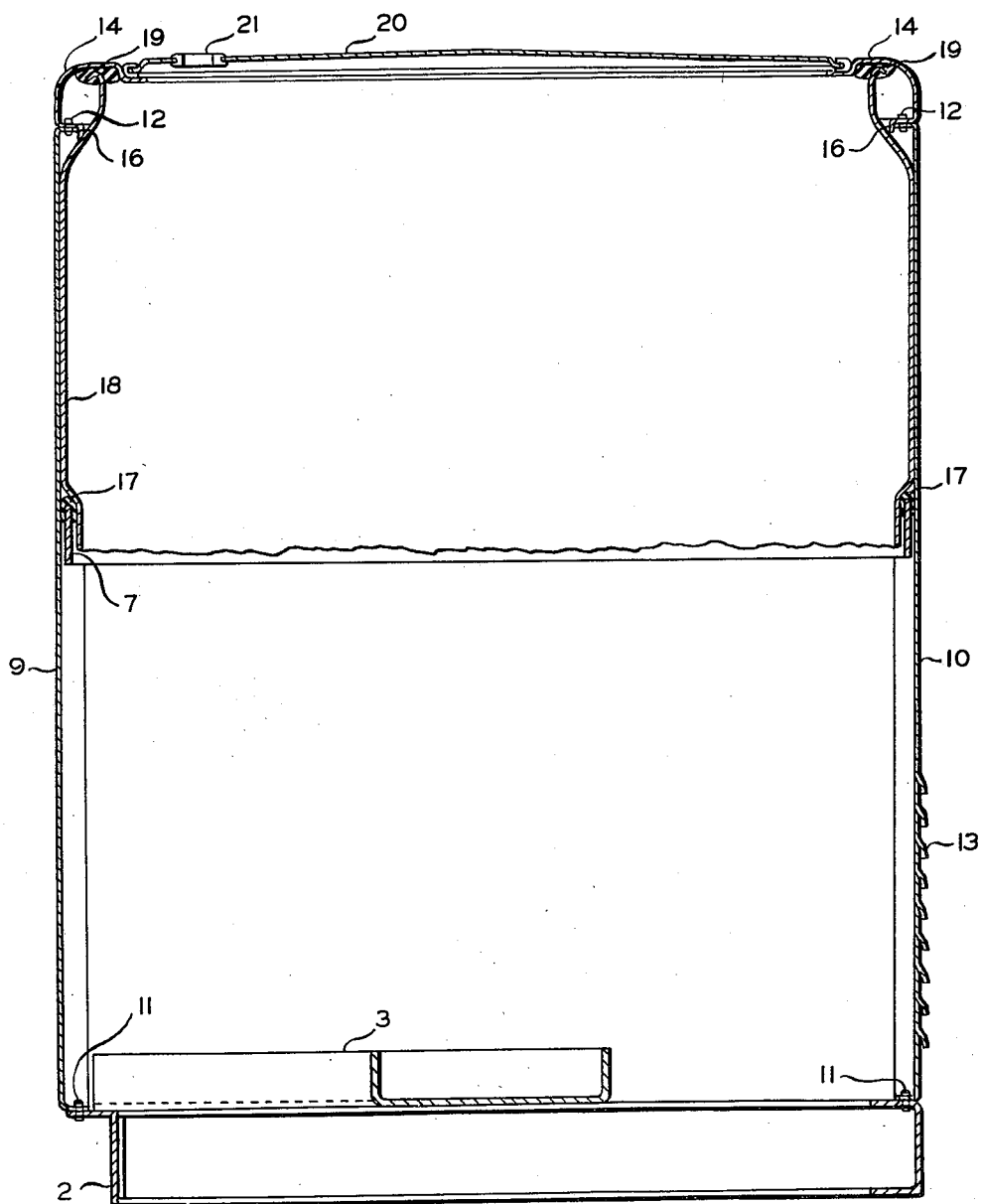


FIG. 2

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6 Sheets-Sheet 3

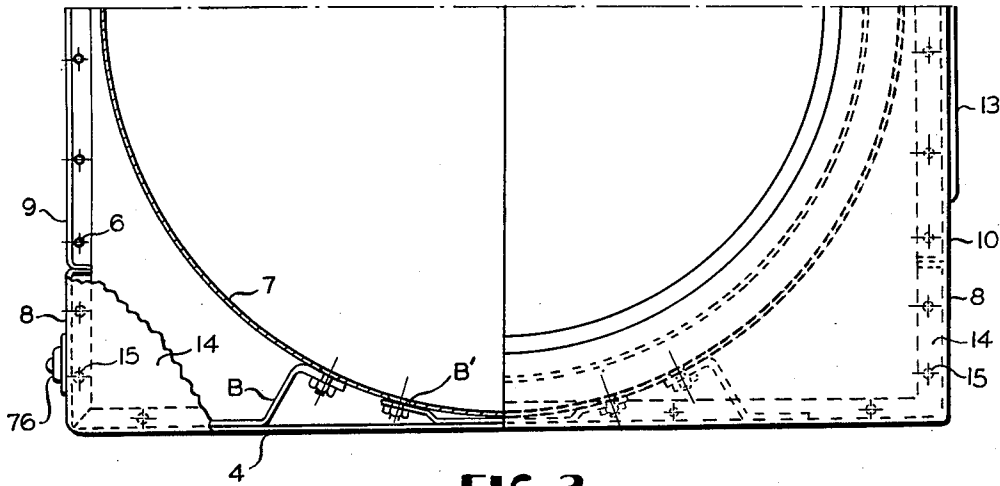


FIG. 3

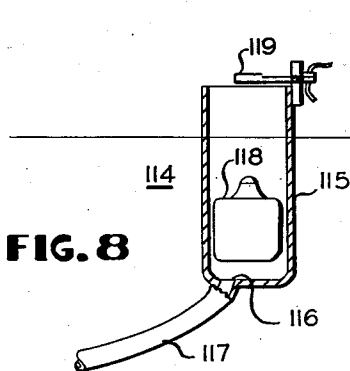


FIG. 8

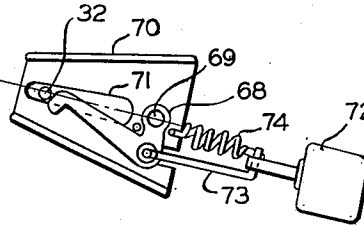


FIG. 9

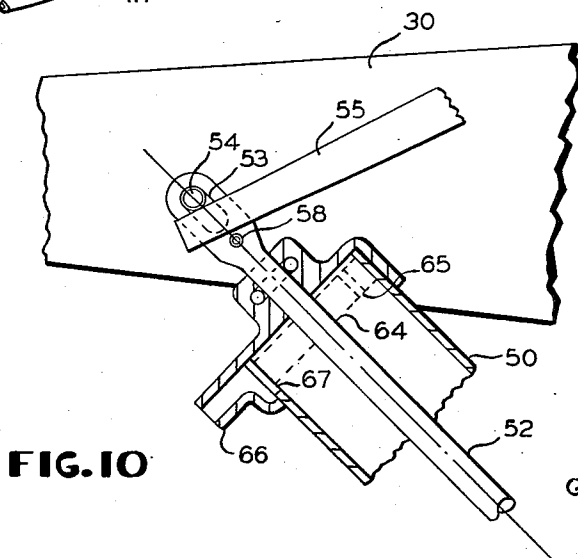


FIG. 10

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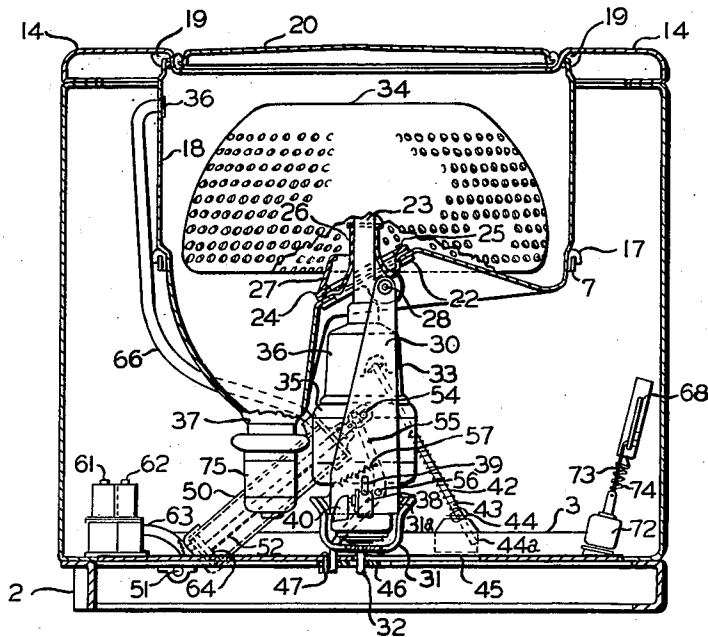


FIG. 4

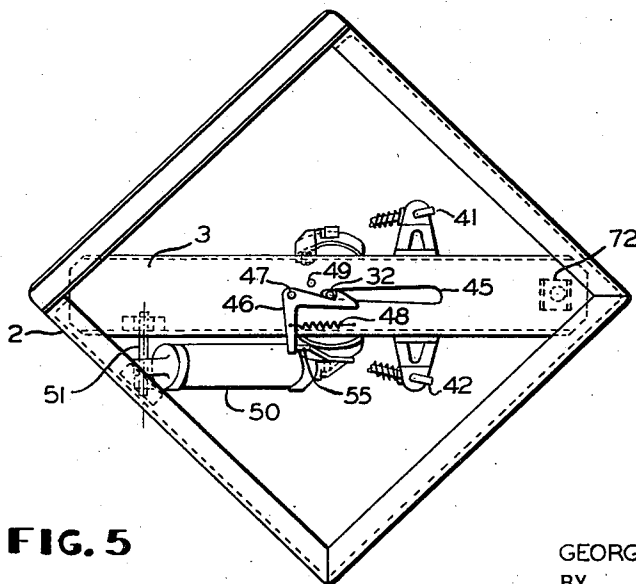


FIG. 5

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6 Sheets-Sheet 5

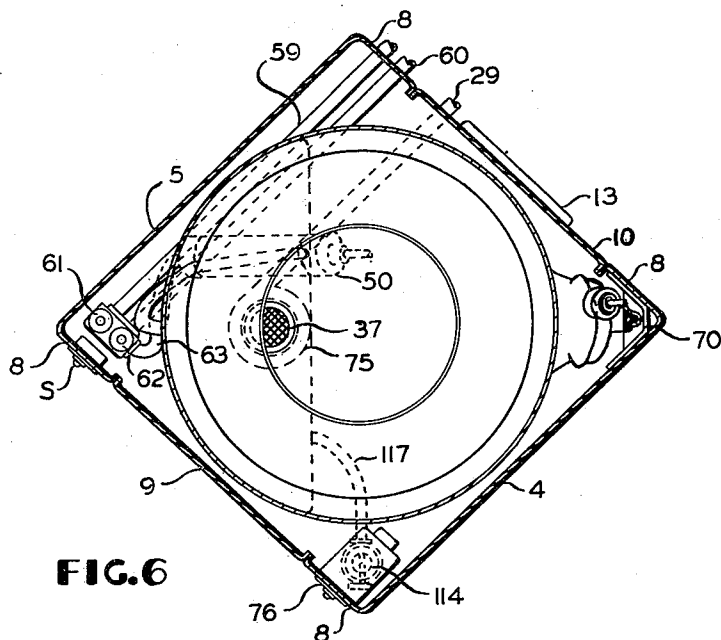


FIG. 6

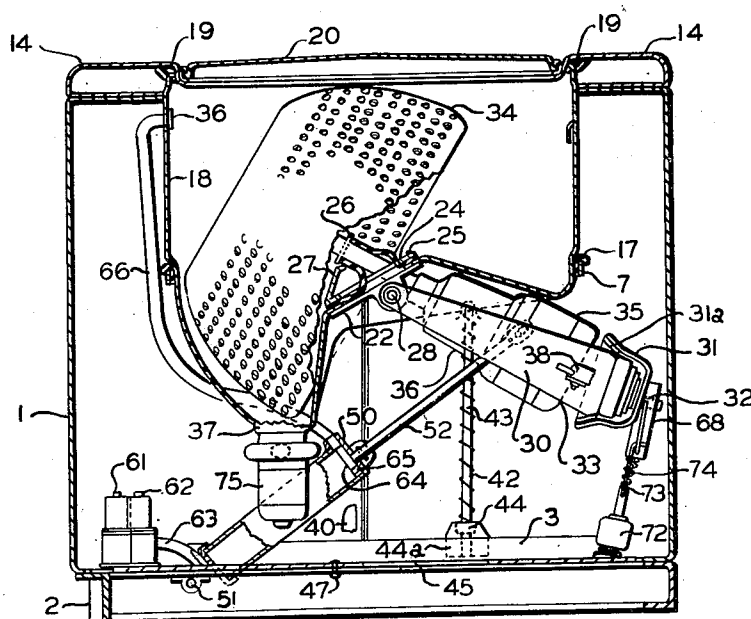


FIG. 7

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6. Sheets-Sheet 6

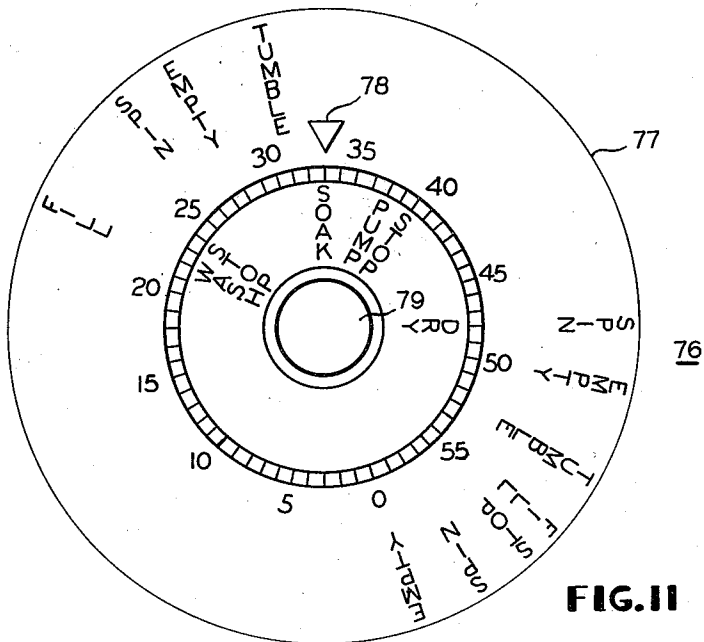


FIG. 11

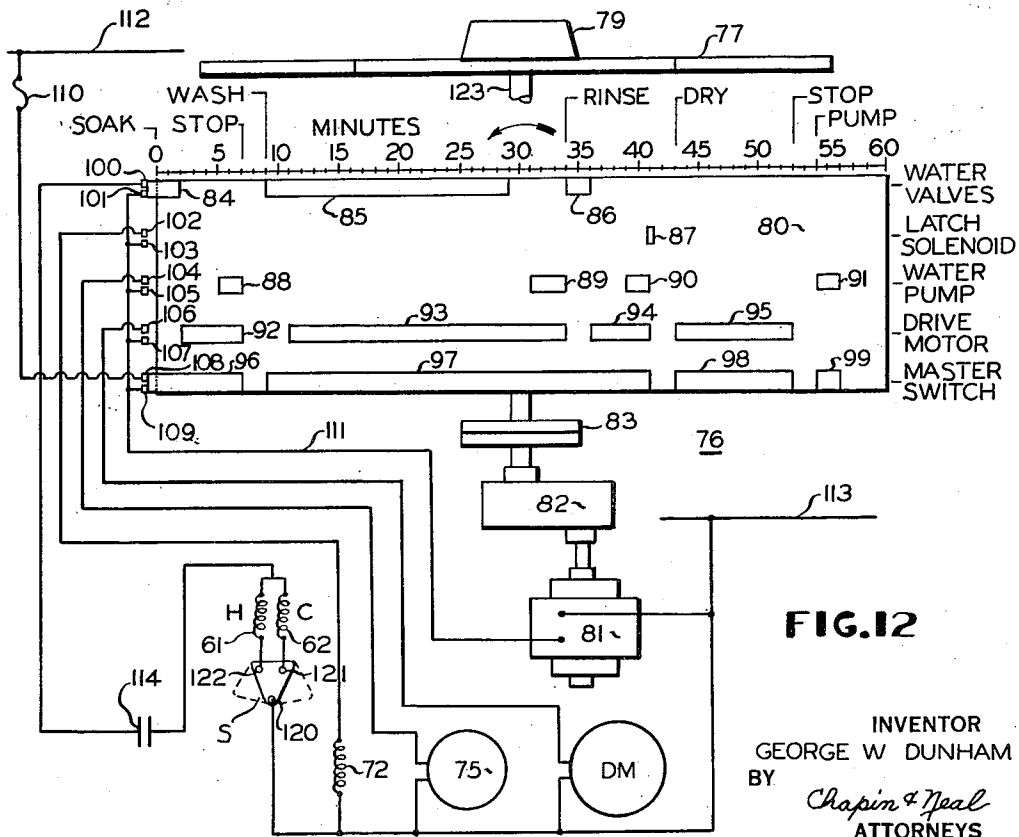


FIG.12

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UNITED STATES PATENT OFFICE

2,579,310

WASHING MACHINE

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Application January 30, 1948, Serial No. 5,383

8 Claims. (Cl. 68—25)

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This invention relates to improvements in domestic washing machines of the "home laundry type," and particularly to the class of these machines in which the washing, rinsing, and drying may be done automatically.

Machines of this class generally make use of centrifugal or centripetal force in their operation, and one type of these machines embodies the construction whereby a perforated clothes basket or container is so mounted as to permit it to be rapidly rotated about a vertical axis to centrifugally dry its contents or to be swung to an inclined or "tumbling" position to dip into the liquid of its containing tank and be revolved, comparatively slow, in the cleansing or rinsing fluid. It is to this latter type, an example of which may be found in my Patent 1,842,154, issued January 19, 1932, and in my copending application, Serial No. 736,295, that the present invention more particularly relates.

The general object of the invention is to provide an improved washing machine of the above mentioned type, and to obtain this end the invention has several purposes.

One purpose of the invention is to provide a hydraulic cylinder system as a new means for shifting the clothes basket and its driving mechanism into position for tumbling the contents of the basket.

Another purpose of the invention is to synchronize the position of the clothes basket with the tank filling operation by filling the tank through the hydraulic cylinder of the combination.

A further purpose of the invention is to obtain a slow shift of the clothes basket from its "tumbling" position to its "spin" position by the hydraulic cylinder system to aid in distributing the clothes for better balancing conditions.

Among the other purposes of the invention is the provision for releasing the latch holding the clothes basket in the "spin" position by lost motion in the linkage of the hydraulic cylinder system; the provision of a new and simplified operating cycle for the washing machine; and the provision of a novel and useful arrangement to save space and compactly mount the mechanical structure into a square cabinet small enough not only to save space but also to be of pleasing appearance.

These and other purposes are effected by the invention and will become evident by a consideration of the preferred embodiment of my invention, a full understanding of which is to be had in the following description and accompanying drawings, in which:

Fig. 1 is an orthographic projection of the axometric type illustrating the exterior appearance of a washing machine embodying my invention;

Fig. 2 is a sectional elevation of the cabinet structure alone;

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Fig. 3 is one-half of a plan view of the cabinet structure, partly in section, such plan view being substantially symmetrical about the center line;

Fig. 4 is a diagonal section of an elevation of the machine shown in Fig. 1;

Fig. 5 is a bottom view of the machine showing the retaining latch to hold the clothes basket and its driving mechanism in the vertical position illustrated in Fig. 4 and showing only the other parts of the machine which are directly related to the bottom diagonal member of the cabinet;

Fig. 6 is a cross section taken on line 6—6 of Fig. 1;

Fig. 7 is a view similar to that of Fig. 4 but showing the clothes basket and its driving mechanism in the oblique or tumbling position;

Fig. 8 is a diagrammatical section of the float switch indicated in the several views by the reference number 114;

Fig. 9 is a projected view of the retaining latch which holds the clothes basket and its driving mechanism in the position illustrated in Fig. 7 and which is indicated in said Figure by the reference number 68;

Fig. 10 is a cross sectional view of the upper end of the hydraulic cylinder generally referred to in the Figures by the reference number 50;

Fig. 11 is a plan view of the main control dial and setting knob for selecting the various timings of the different operations; and

Fig. 12 is a diagram of the electrical connections for the electrically operated devices used in the machine.

As shown in Figs. 1 to 6 the cabinet 1 of the machine consists of a base 2 of skeleton form, panels 4 and 5 both with inturned portions 8 (Fig. 6) panels 9 and 10 removably mounted between portions 8 of panels 4 and 5, by dowel pins 11 (Fig. 2) and spring catches 12, and top portion 14 (Fig. 4) carrying removable cover 20 (Fig. 2). The top portion 14 is bolted to panels 4 and 5 as by bolts 15 (Fig. 3) accessible through the openings normally covered by removable panels 9 and 10. A lip 16 is provided on top portion 14 (Fig. 2) to position panels 9 and 10 when the latter are set in place. The rear panel 10 has louvers 13 for ventilating the cabinet.

The diagonal member 3 of channel form (Figs. 2 and 5) is fastened to base 2, as by welding, and carries certain parts as will be described later, so as to utilize one corner of the substantially square cabinet as indicated in Fig. 7.

A ring 7 (Figs. 2 and 4) having a rubber cushion 17, is mounted in the cabinet to support the tank 18 of the machine. This tank (Fig. 4) has a resilient ring 19 on its top rim to provide a watertight joint with top portion 14 of the cabinet when such top portion is bolted in place by bolts 15 (see Fig. 3) to securely hold tank 18 of Fig. 4 down on cushion 17 of tank supporting ring 7. This ring 7 is supported in place by brackets B

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and B', as indicated in Fig. 3, which are welded to cabinet panels 4 and 5, at spaced supporting points around the ring 7 similar to the one point shown in Fig. 3. As there indicated, the ring is removably mounted on its brackets. The ring 7, fastened by brackets to panels 4 and 5, as well as the channel member 3, fastened diagonally across base 2, serve in addition to their main function to give strength and rigidity to the square cabinet made of the panels as described.

Top portion 14 of the cabinet 1 is so constructed as to provide an access opening and a retaining ledge for removable lid 20 covering said access opening. A grommated finger hold 21 (Fig. 2) facilitates the handling of lid 20.

Tank 18 is of the shape indicated in the diagonal cross section of Figs. 4 and 7. An inclined base ring 22 centrally located in the bottom of tank 18 provides radial clearance for the clothes basket driving shaft, inside sleeve 23, in the following manner. A clamping ring 24 secures the inner peripheral edge of the tank bottom to base ring 22 by means of screw studs 25. Clamping ring 24 also secures, for a water-tight seal, the lower edge of flexible rubber boot 26, the upper edge of which forms a water-tight connection around the clothes basket driving shaft inside sleeve 23. Boot 26 thus closes the radial clearance space between the base ring 22 and intersecting driving shaft sleeves 23 in all positions of said shaft. Projection or shoulder 27 (Fig. 4) formed integral with the clamping ring 24 provides an abutment for sleeve 23 in the inclined position shown in Fig. 7 and a limit ring against which sleeve 23 is stopped in case of excessive gyration of the shaft while spinning. Suitable holes or openings (not shown) in shoulder 27 prevent the accumulation of water within the enclosed space resulting from the shoulder.

A pair of bearing lugs are formed on the lower side of base ring 22 from which trunnions 28, one of which is seen in Fig. 4, are pivotally hung. These trunnions support a dependent hanging stirrup 30. The lower end of stirrup 30 is attached to member 31a which in turn is welded to sides of member 31 shaped as illustrated in Figs. 4 and 7 and carrying fixed thereto a downwardly projecting pin 32 which serves for retaining the stirrup 30 and its supporting parts in the two positions illustrated in Figs. 4 and 7.

The columnar unit 33 comprising clothes basket driving shaft inside sleeves 23 with revolving clothes basket 34 at the upper end thereof, motor and housing 35, and transmission and casing 36, form an assembly in axial symmetrical disposition below the basket, which will be understood without specific description of parts such as motor and transmission merely indicated by their casings. The construction of the kind of motor and transmission are shown in my copending application, Serial No. 736,295 as I plan to use them in this invention, and which I will refer to later on in the description as the preferred elements. The entire unitary structure as shown is preferably supported at its lower end in a resilient mounting, not shown, carried by member 31a attached to stirrup 30. Supporting columnar unit 33 as stated will permit limited gyration of the unit about its center of mass during the high speed operation of the clothes basket driving shaft in centrifuging. Such detail for this purpose is fully shown and discussed in said copending application and needs not be repeated herein.

As more completely described in my copending

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application, Serial No. 736,295, motor housing 35 preferably contains an electric drive motor of the reversible type (not shown) and on the upper end of housing 35 is fastened transmission casing 36 within which the transmission is mounted. The clothes basket driving shaft inside sleeve 23, and driven through the transmission, carries clothes basket 34 on its upper end, which basket is of the general kidney shape formation as disclosed in my patent previously referred to, and has the usual perforations in the side walls thereof. The construction and connecting and supporting structure of clothes basket 34 as well as the method of regulating the basket speed by the direction of rotation of the driving motor, is the same as that of my copending application and will be referred to in the description of Fig. 12.

Stirrup 30, carrying columnar unit 33 as described, is adapted to swing on its trunnions 28 from the vertical position of Fig. 4 to the inclined position of Fig. 7, and held in such positions by retaining means to be described. When columnar unit 33 is in the vertical position illustrated in Fig. 4 tank 18 is empty, and basket 34 is driven at relatively high speed for the spin dry centrifuging operation. The inclined position illustrated in Fig. 7 is the washing and rinsing position wherein basket 34 is substantially immersed in the liquid in tank 18, said liquid entering through inlet 36. A suitable drain 37 is provided in the bottom of tank 18 (Fig. 6).

Stirrup 30 has fixed to one of its arms a reversing switch 38 (Fig. 4) from which a cable connection 39 leads to the motor. Reversing switch 38 is of the conventional type having its spring pressed plunger biased to its outer position for closing circuits to operate the motor in one direction and when pressed to its inward position changing the circuits for reversing the motor. Stationary abutment 40 attached to diagonal member 3 serves to activate switch 38 and reverse the motor for higher speed operation when columnar unit 33 swings into the vertical position of Fig. 4 from the inclined position of Fig. 7. As stated above, the transmission mechanism to obtain the two speeds has been previously disclosed in my copending application and it should be understood that opening the motor circuit for reversing the motor is to allow the motor to at least slow down so the starting winding can bias it in the proper direction when the centrifugal starting winding switch closes. Thus braking is automatic, operating on the reversal of torque when the motor circuit is opened.

Counterbalancing compression springs 41 and 42 (Figs. 4, 5 and 7) substantially carry the weight of columnar unit 33 in shifting to the inclined position of Fig. 7 and impart a slight thrust upon the unit in moving it home to its vertical position of Fig. 4. Both springs are relatively neutral in the intermediate position between the illustrated positions. Springs 41 and 42 are of identical structure each encompassing a strut rod 43 pivoted at its upper end to stirrup 30 and having its lower end slidable through thimble 44 swivelly held in bracket 44a fastened to diagonal member or channel 3.

Columnar unit 33 is held in the vertical spinning position of Fig. 4 by the engagement of pin 32, projecting downwardly from member 31 at the lower end of stirrup 30, with slot 45 (Fig. 5) in diagonal member 3 and by locking latch 46. Locking latch 46 is pivoted at 47 on diagonal member 3 and held in locking position by spring

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48. Spring 48 on locking latch 46 biases the latch toward stop pin 49.

Water pressure applied through a hydraulic cylinder system is used to shift the columnar unit 33 from the vertical to the inclined position. Cylinder 50 is of a suitable diameter to provide the required force for shifting the unit with low water pressure. The lower end of cylinder 50 is pivoted to the cabinet base 2 (Figs. 5 and 7) by pin 51. Piston rod 52 works in cylinder 50 and has in its upper end a slot 53 (Fig. 10) which engages stud 54 on stirrup 30. Latch releasing lever 55 is fulcrummed on another stud 56 (Fig. 4) on stirrup 30 and is biased by spring 57 so that it engages pin 58 (Fig. 10) which is firmly set in the upper end of piston rod 52.

When there is no water pressure being exerted on piston rod 52, the piston rod is always in its inner position relative to stud 54, in which position the upper end of slot 53 engages the stud 54, and compression springs 41 and 42 bias the columnar unit's bottom pin 32 against the end of slot 45 in diagonal member 3 (Fig. 5). Pin 58 is of greater length than stud 54 so latch releasing lever 55 may be so mounted as to clear stud 54.

The lower end of latch releasing lever 55 extends down to engage the end of locking latch 46 (Figs. 4 and 5) which is pivoted on diagonal member 3 as described. Latch releasing lever 55 opens locking latch 46 in the tank filling operation, as will now be explained.

Water pipes 59 and 60 (Fig. 6) leading from the hot and cold supply sources respectively carry water to solenoid operated valves 61 and 62. A single line 63 (Fig. 4) from valves 61 and 62 carries water thermostatically controlled as to temperature (controls not shown) to the lower end of cylinder 50. Temperature regulating means such as manual valves, a thermostatically controlled valve or valves, or any suitable arrangement may be used to supply water of the required temperature to the conventional solenoid operated valves 61 and 62.

Water pressure against the bottom of piston 64 (Figs. 4 and 7) forces piston rod 52 upward. The initial movement of piston rod 52 causes latch releasing lever 55 (Fig. 4) to open locking latch 46, since the upper end of lever 55 abuts pin 58 on the piston rod (Fig. 10) and the opening of latch 46 allows columnar unit 33 to be shifted to the inclined position. During the movement of piston rod 52, some of the water escapes through bleeder hole 65 (Fig. 10) in piston 64 into the upper part of cylinder 50 where it is pushed out into the cylinder discharge conduit 66 as the piston progresses upward. Conduit 66 leads to tank inlet 36 (Fig. 4). When piston 64 moves up far enough to open the port 67 to the space below the piston at the entrance to conduit 66 (Fig. 10) water from line 63 (Fig. 4) flows directly through cylinder 50 into conduit 66 and to tank 18. The water level in tank 18 is controlled by a float switch as will be later described.

In the filling operation columnar unit 33 is forced past its inclined or tumbling position illustrated in Fig. 7 a small amount by piston rod 52 to insure latching with minimum conditions of water pressure, but bottom pin 32 of the columnar unit settles back against tumbling position latch 68 (Figs. 7 and 9) when the flow of water stops.

Tumbling position latch 68 is pivoted at 69 (Fig. 9) to latch channel bracket 70 mounted in one corner of cabinet 1 and containing slot

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71 to receive the columnar unit pin 32. Latch solenoid 72, attached to diagonal member 3, when energized retracts latch 68 by linkage arm 73, overcoming spring 74 which tends to hold latch 68 in its closed position.

To shift from tumbling or inclined position to vertical position, latch solenoid 72 is energized, opening the latch and allowing columnar unit 33 to fall by gravity, its velocity governed by the resistance piston 64 encounters in cylinder 50 acting as a dash pot. If there is no water in the cylinder, as in a new machine, the velocity will be greater but air in the cylinder will cushion the movement. In falling, after columnar unit 33 has passed the neutral point and as the gravity effect lessens due to the dash pot action of the cylinder, compression springs 41 and 42 act to bias the unit toward its vertical position with increasing force until it reaches its stop and latches.

Locking latch 46 (Fig. 5) may be released, for the columnar unit to be moved to its tumbling position, by means other than lost motion in the hydraulic cylinder linkage as described. A separate solenoid or a linkage (not shown) to the tumbling latch solenoid may be used. Or if held in position sufficiently by compression springs 41 and 42, no latch would be necessary.

Likewise, the tumbling position latch function could be obtained by providing springs 41 and 42 of sufficient strength to firmly bias the downwardly projecting pin 32 of the columnar unit 33 against its stop.

Tank 18 is emptied when pump motor 75 is energized (Fig. 7). A pump, integral with the pump motor structure, pumps the contents of the tank from tank drain 37 (Fig. 6) through drain conduit 29 out of the cabinet for disposal.

The washing machine disclosed may have its valves opened and closed and its motor started and stopped by hand controls, but it is particularly adapted for automatic operation to carry out a sequence of steps for a complete washing and drying cycle. For such automatic operation without manual attention, a conventional timer mechanism, generally indicated at 76 (Figs. 6 and 12) is used. The structure of the timer mechanism may be that of any conventional timer purchasable on the market and suitable for timing various washing operations. In general, such timers usually contain a series of cams mounted on a driven shaft, each cam of the proper contour to operate a contact at the desired time interval for opening and closing an electrical control circuit. For the purpose of more clearly explaining the timer's operation and the electrical connections between the timer mechanism and the various electrical translating devices, the timer mechanism 76 is diagrammatically illustrated as shown in Figs. 11 and 12. Timer mechanism 76 has a movable setting dial 77 calibrated and marked as shown in Fig. 11, and moved with relation to fixed pointer 78 by setting knob 79.

The timer mechanism 76 controls the circuits as shown in wiring diagram of Fig. 12, said circuits to be hereinafter tabulated and traced. Included in the timer mechanism 76 is an insulating drum 80 shown in development in Fig. 12 and driven in the direction of the arrow by a small synchronous motor, diagrammatically indicated at 81, through reduction gearing and a slip clutch, indicated diagrammatically at 82 and 83 respectively. Slip clutch 83 permits manual movement of the drum 80, which may be rotated by setting knob 79.

Insulating drum 80 is driven at a relatively slow, uniform rate of one revolution in 60 minutes. Carried on the drum and raised above its surface are a plurality of conducting segments 84 to 99, inclusive. When drum 80 revolves, the conducting segments engage stationary contacts 100 to 109 inclusive, as indicated in the drawing, opening and closing the various control circuits. Setting dial 77 is marked off with the various stations corresponding to the conducting segments on the drum 80. As mentioned above, dial 77 is moved by knob 79 and both are attached to shaft 123 on which drum 80 is fixed, thus providing a means of setting the drum to the desired starting station after which motor 81 can drive it to provide the automatic cycle.

The engagement of conducting segments 96 to 99 with stationary contacts 108 and 109 constitutes the master switch, the entire electrical system being inoperative when the master switch is open. Power is supplied through line conductors 112 and 113. To establish the master switch circuit, line 112 is connected through fuse 110 with stationary contact 108 and stationary contact 109 is connected to line 111 leading to timer motor 81. Since timer motor 81 is connected with line conductor 113, the master switch circuit to energize timer motor 81 is established when any one of the conducting segments 96 to 99, inclusive, conducts current between stationary contacts 108 and 109.

In like manner the driving motor DM for the washing machine located in motor housing 35 of columnar unit 33 is operated when its circuit is established by conducting segments 92 to 95, inclusive; power from line conductor 112 reaching stationary contact 107 through stationary contact 109 of the master switch circuit. Driving motor DM is connected to line conductor 113 and hence energized when any one of the conducting segments 92 to 95, inclusive, conducts current between stationary contacts 107 and 106.

Water pump motor 75, also connected to line conductor 113, receives power from line conductor 112 when conducting segments 88 to 91, inclusive, connect stationary contacts 104 and 105.

Latch solenoid 72, for releasing tumbling position latch 68, is energized when conducting segment 87 connects stationary contacts 102 and 103.

One terminal of each water valve solenoid 61 and 62 is connected with line conductor 113 through a manually operated switch S so that the circuit may be provided from switch terminal 120 to either terminal 121 or terminal 122, or both. By energizing water valve solenoids 61 and 62, which respectively control the entrance of hot and cold water to the machine, three graduations of temperature may be obtained; high, low and medium. The opposite terminal of each water valve solenoid is connected with stationary contact 100 through a float switch generally indicated at 114.

Float switch 114 may be any conventional float switch, a diagrammatic cross section of a suitable construction being illustrated in Fig. 8, in which a liquid holding receptacle 115, having a port 116, is filled and emptied through tube 117 connected to tank 18 of the washing machine. Float 118 in receptacle 115 rises with the increasing of the water level of tank 18 until it buoys up the switch actuating rod 119 and opens the switch 114 of Fig. 12, thus preventing over-filling of tank 18. When float 118 recedes, the weight of rod 119 closes the switch. Stationary contact 100

(Fig. 12) receives current from line conductor 112 when conducting segments 84, 85 or 86 connect it with stationary contact 101, stationary contact 101 being connected with stationary terminal 109 of the master switch. Operation of the water valve solenoids admits water to line 63 and cylinder 50, as has been described.

In the full automatic operation of the washing machine, timer mechanism 76 controls all washing and drying operations of the machine: the tank filling operation by energizing and deenergizing water valve solenoids 61 and 62; the tumbling operation by making and breaking the driving motor circuit; the emptying operation by starting and stopping the water pump motor 75; the spin drying operation by energizing and deenergizing the latch solenoid 72 to release columnar unit 33 from the tumbling or inclined position, and by the making and breaking of the driving motor circuit; and, on completion of the cycle, stops the washing machine by opening all circuits.

The cycle shown by the arrangement of conducting segments 84 to 99 on drum 80 of timer mechanism 76 is a new and simplified one. In the cycles of comparable prior machines there is a centrifuging step between the soaking operation and the washing operation and there is another such step between the washing and rinsing operations. This requires the shifting of the basket from the angular position to the vertical each time in this type machine. I have considered the cycles of comparable prior machines and by test have found that these two centrifuging steps to spin the clothes partially dry after each agitating operation may be omitted by using the cycle as herein described for the improved washing machine of this invention. It will be noted that they are omitted from the cycle as indicated in Figs. 11 and 12. With the simplified arrangement the clothes or contents of the basket are not spun after washing and the first rinse, if two or more rinses are desired, but only after the final rinse, thus eliminating the necessity of shifting the columnar unit back and forth. After the agitating operation, the tank is drained and the clothes are allowed to tumble for a short period. The tumbling washing action of the machine has an action tending to dissipate much of the water in the contents of the clothes basket as the contents tumble. This tumbling action in which the clothes are picked up and then dropped, much of the water being taken out in the dropping, eliminates the necessity of centrifuging between the soaking operation and the washing operation, and between washing and rinsing operations. In the new simplified cycle as disclosed, the washing process stops at the end of the rinse operation with the washing machine tank empty and the columnar unit is shifted manually into the spin dry position.

Various changes and modifications within the spirit of my invention are evident by reference to the preferred embodiment shown in the above specification. For this reason, it is desired that the invention have the full scope of the appended claims.

Having described my invention, what I claim is:

1. A washing machine, comprising a stationary tub and a washing receptacle movably mounted therein, driving means to drive said receptacle at two velocities, said driving means fixed to and suspended from the washing receptacle in axial alignment thereof and forming a columnar unit

therewith, a rectangular shaped cabinet to contain all of the washing machine mechanism, a supporting base member of said cabinet, a hydraulic cylinder diagonally disposed in said rectangular shaped cabinet and fixedly mounted on said supporting base member through which liquid may flow to fill said stationary tub, a piston contained in said cylinder and a piston rod, one end of which is fastened to said piston and the other end of which is slotted and movably fastened for initial lost motion to the above mentioned columnar unit to move, after said initial lost motion, the driving means of said unit toward a corner of the cabinet and tilt the washing receptacle in the stationary tub when the piston is displaced in the hydraulic cylinder during the stationary tub filling operation, a lock pin integral with and downwardly projecting from the base extremity of the columnar unit, a retaining slot in, and a retaining latch mounted on, the supporting base member of the cabinet to hold the columnar unit in vertical position, latch releasing mechanism comprising a linkage from the movably fastened end of the piston rod and the same pivoted to release said retaining latch by the initial movement of the piston and piston rod in the tub filling operation.

2. A washing machine including a tub, a perforated clothes container mounted within the tub, means to carry said container for rotation about either a vertical axis or an inclined axis, said means including a shaft depending from the container and passing to the outside of the tub, power means to rotate said shaft, a hydraulic cylinder apparatus comprising a cylinder and a conduit connecting with the tub to fill the latter through the cylinder, a piston and piston rod for the cylinder, link means operatively connecting said rod to said depending shaft to shift the clothes container from vertical to inclined position of rotation, the cylinder apparatus being operable as hydraulic power means to shift the clothes container to inclined position synchronously with the tub filling operation.

3. A washing machine including a tub, a perforated clothes basket tiltably mounted within the tub to put the axis of the basket in an inclined position for washing or a vertical position for drying, a hydraulic cylinder apparatus having a piston and piston rod, a drive shaft depending from said clothes basket and extending outside said tub, latch means to hold said clothes basket and drive shaft in their vertical position, link mechanism, operatively connecting said piston rod and said shaft, including a lost motion device between the piston rod and said shaft, for the piston rod to tilt the clothes basket to its washing position upon hydraulic power operation of the cylinder and its piston, said link mechanism also operatively connecting the piston rod and said latch means to release the latter during the lost motion movement of the link mechanism.

4. In a washing machine, a tank, a basket supporting structure therein, a perforated clothes basket tiltably and rotatably mounted on said supporting structure, a driving shaft and driving means suspended from the clothes basket for rotating it, the weight of said driving means tending to hold the clothes basket in vertical position, a hydraulic cylinder and conduit through which the tank is filled, a piston and piston rod in said cylinder, said piston rod linked to the clothes basket for tilting it into an inclined position during the tank filling operation through

the cylinder and for slowing down its return to vertical position by dash pot action of said piston, thus providing for better distribution of the contents of the clothes basket.

5. A washing machine including a rectangular cabinet, a stationary tank therein, a perforated washing receptacle tiltably mounted for rotation within said tank on an axis inclined in the diagonal plane of said cabinet for washing and on a vertical axis for drying, power driving means to rotate said washing receptacle fixed to and suspended from the receptacle, a water conduit for filling the tank, a receptacle shifting mechanism connected with said conduit and activated by filling water therefrom to shift said washing receptacle from its vertical to its inclined position as the tank is filled, yielding means tending to bias such receptacle in the inclined position, a stop to determine said position of the receptacle, a latch to releasably hold the receptacle in such position during the washing operation, and means to release the latch for gravitational return of the receptacle to its vertical position for the drying operation.

6. In a washing machine, a tank, a tilting clothes basket within the tank, a conduit to the tank for filling the same, a hydraulic device having a tilting mechanism connected with said tank conduit and said clothes basket, means in said device to restrict fluid flow from conduit to tank, said restrictive means being joined to said tilting mechanism and operable to tilt the basket on passage of fluid to the tank.

7. In a washing machine a tub, a movable washing receptacle mounted therein, said receptacle having two operative positions, a water filling and hydraulic shifting mechanism connected with said receptacle, means in said mechanism to restrict water flow to the tub and timing means associated therewith actuatable by the flow of water to shift the receptacle from one of its operative positions to the other on passage of water through said mechanism to the tub.

8. In a washing machine a tub, a movable and tiltable washing receptacle mounted therein, a filling water conduit, a filling water powered device to tilt the washing receptacle, said device being connected with said conduit and said tub, means in said device to restrict water flow from conduit to tub as the device is actuated by the filling water to tilt the washing receptacle, a retaining latch adapted to hold the washing receptacle in an inclined washing position, the aforesaid filling water powered device being operative to tilt the washing receptacle beyond its latching position and to hold it in such position until the tub is filled, said washing receptacle mounted so as to fall back into its latching position at the end of the power application.

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