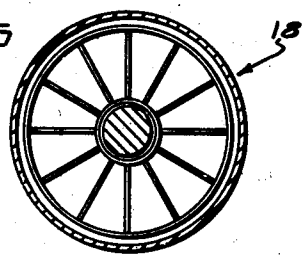
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CLOTHES WASHING AND EXTRACTING MACHINE

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Fig. 5



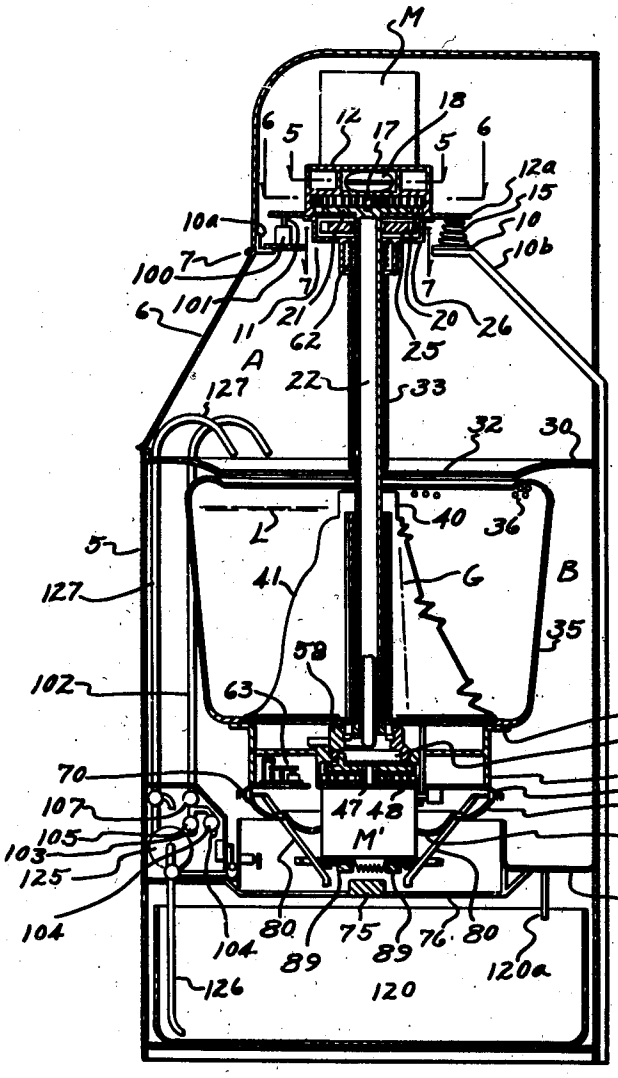


Fig. 3

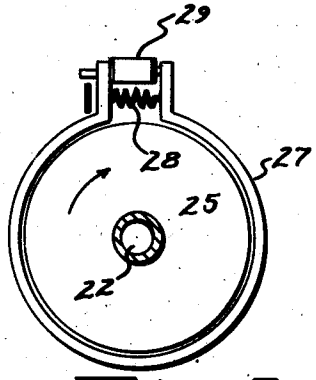


Fig. 7

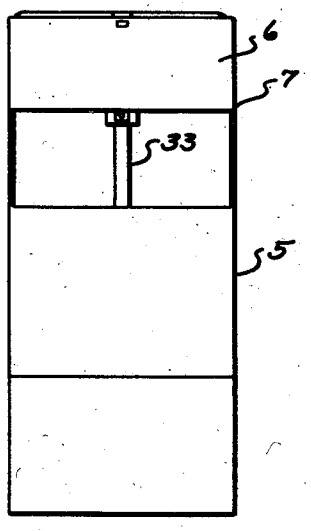


Fig. 4

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CLOTHES WASHING AND EXTRACTING MACHINE

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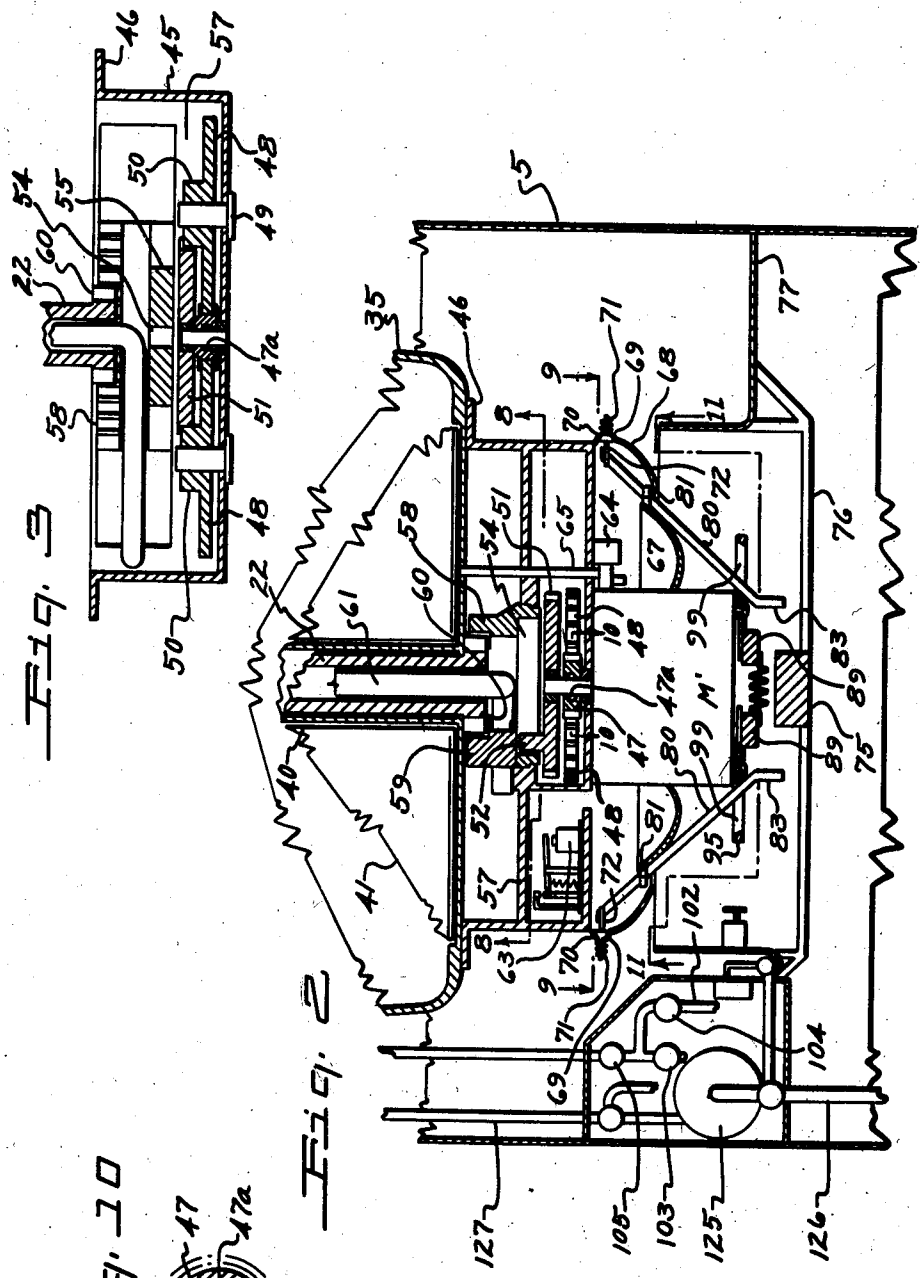


Fig. 3

Fig. 2

Fig. 10

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Fig. 9

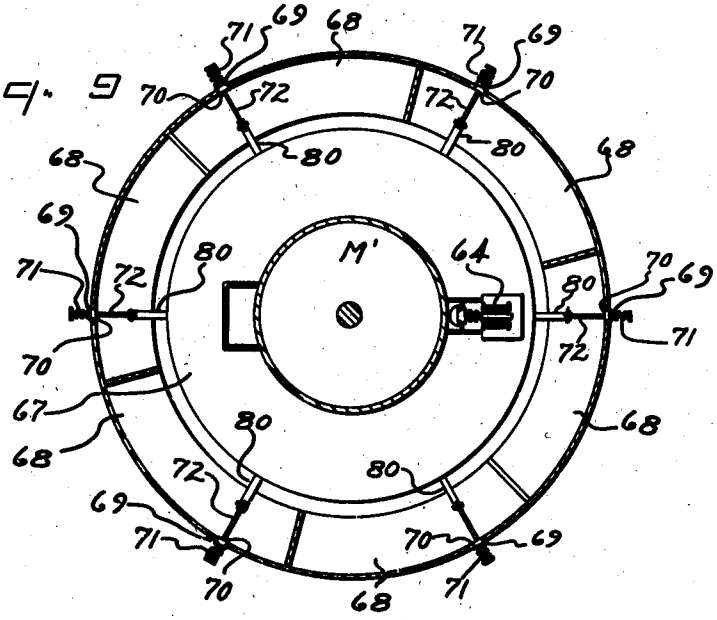
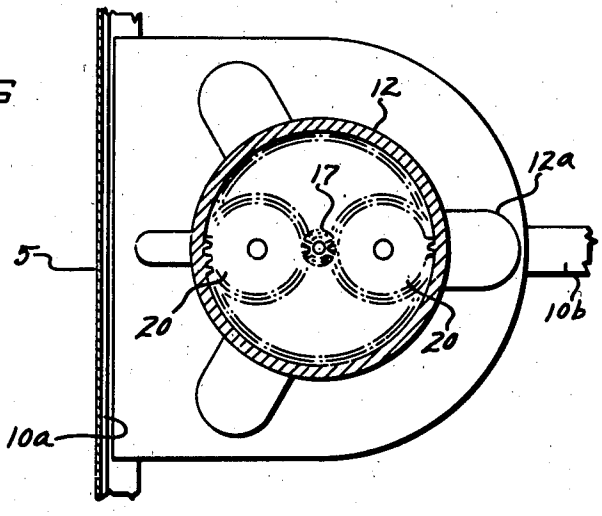


Fig. 6



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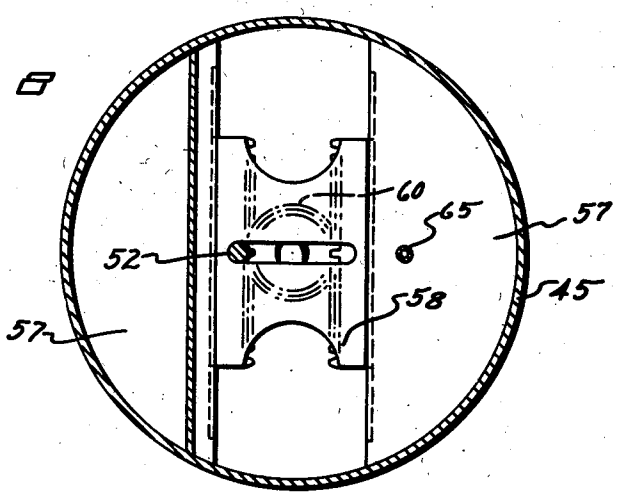
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Fig. 8



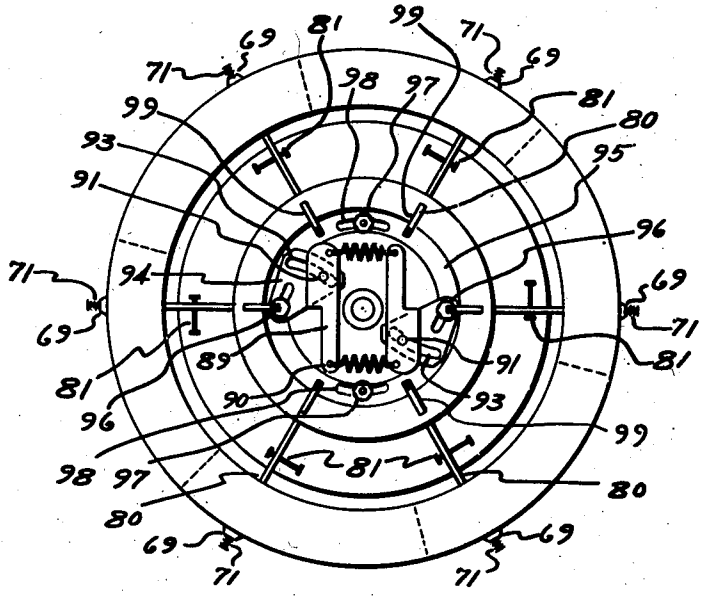


Fig. 11

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CLOTHES WASHING AND EXTRACTING MACHINE

Herbert E. Page, Alhambra, Calif.

Application July 11, 1944, Serial No. 544,347

6 Claims. (Cl. 68—23)

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This invention has to do with washing and cleaning machines and while it incorporates features which are useful for dry cleaning purposes, it is more particularly adapted for use in washing fabrics.

In conventional washing machines objectionable vibrations are set up due to the fact that unequal distribution of the wash loads in the machines interfere with the dynamic balance and it is therefore an object of my invention to provide in a washing machine novel means for automatically compensating for such unequal load distribution and for the automatic restoration of dynamic balance.

Another object of the invention is to provide a washing machine embodying novel vibration damping construction.

Another object is the provision, in combination, of a washing and extracting unit mounted to be suspended in a manner to find its own axis of rotation according to the load distribution, and means for compensating for unequal distribution in a manner to maintain its rotation about a substantially vertical axis.

My invention also has among its objects the provision of novel automatically operable safety features.

In some respects, my present invention relates to improvements in the apparatus shown in my issued United States Letters Patent No. 2,167,086.

My invention possesses still further objects and features of advantage which will become obvious from the following detailed description of a presently preferred embodiment, for which purposes I shall refer to the accompanying drawings, in which:

Fig. 1 is a medial vertical section, some parts being shown in elevation;

Fig. 2 is an enlarged fragmentary section of parts of Fig. 1.

Fig. 3 is an enlarged fragmentary section, taken on a line at right angle to the line of the section of Figs. 1 and 2;

Fig. 4 is a front elevation with the access door open;

Fig. 5 is an enlarged section on line 5—5 of Fig. 1;

Fig. 6 is an enlarged section on line 6—6 of Fig. 1;

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Fig. 7 is an enlarged section on line 7—7 of Fig. 1;

Fig. 8 is an enlarged plan section on line 8—8 of Fig. 2;

Fig. 9 is an enlarged plan section on line 9—9 of Fig. 2;

Fig. 10 is an enlarged cross section on line 10—10 of Fig. 2; and

Fig. 11 is a view taken on line 11—11 of Fig. 2.

In the drawings I show a casing 5 of squared cross section, having an access opening at its top front which is closed by a door 6 hinged at 7. A platform 10 is stationarily supported on brackets 10*a*, 10*b*, which brackets are in turn secured to the casing, the platform having an axial opening 11. A stationary ring gear 12 has an annular flange 12*a* which is resiliently supported from platform 10 by a plurality of coil springs 15, the springs having their lower ends secured to the platform and their upper ends secured to the flange so that the ring gear is held against rotation relative to the platform. I preferably use three symetrically arranged springs 15.

A drive motor M is secured to and supported on the top of the ring gear 12 and has its drive shaft operatively connected to a pinion 17 through a conventional hydraulic coupling 18 (Fig. 5). Planet gears 20 have their spindles journalled in a spider 21 carried by the top end of the drive shaft 22, which shaft is journalled at its top end in the bottom wall of ring gear 12.

A braking disc 25 is keyed on to the drive shaft and is rotatable in the housing 26 secured to the bottom cover of the ring gear 12. An external contracting brake band 27 encompasses the disc, said band being normally urged expanded by a spring 28 and being contractable against the action of the spring by means of a solenoid 29. The purpose of this brake is to arrest spinning movement of the drive shaft and its carried unit after the motor M is shut off when an extracting cycle is completed.

The casing 5 is divided into a loading chamber A and a work chamber B by means of a horizontal wall 30 which is provided with an axial opening 32.

So as not to be exposed, shaft 22 extends downwardly through a housing sleeve 33 and on its lower end rotatably carries a wash basket 35 which basket has perforations 36 adjacent its top inwardly and downwardly curved peripheral por-

tion. Thus, the basket will retain water to the level L during the washing operation but, when rotated during the extracting operation, the water will ride up the basket side wall and be thrown out through the perforations by centrifugal action.

An agitator 40 having radial blades 41 is secured to the shaft 22 within the basket so that the agitator may be oscillated by means of the mechanism now to be described.

Referring now to the agitator actuating means, I show a housing 45 which is secured by its annular flange 46 to the bottom of the basket, a motor M' being secured axially to the bottom of the casing.

The drive shaft of motor M' has secured on its top end a gear 47 which meshes with gears 48 secured respectively on shafts 49. The latter shafts have secured on their upper ends respectively gears 50 which mesh with the gear 51 which is rotatably mounted on the top end of the motor shaft. Gear 51 carries a pin 52 projecting from its upper face, which pin extends into a slot 54 in a plate or Scotch yoke 55. Plate 55 is slidable between ways provided by plates 57, and presents a rack portion 58 whose teeth engage a gear 60 at a point diametrically opposite a stationary toothed member 59. Gear 60 is secured on the lower end of shaft 22 so that as plate 55 is reciprocated by pin 52, the rack 58 oscillates gear 60, which in turn oscillates the agitator blades 41. Collector rings 62 convey current to the motor M', a relay 63 and a solenoid valve 64 through a cable 61. The relay is used for controlling the circuit to motor M'; when energized, motor M' is reversed so that during the extraction cycle it may set up a gyroscopic effect to counterbalance any dynamic unbalance, and when de-energized, it causes motor M' to drive gear 60.

The motor M' has an overrunning clutch 47*a* inside of gear 47 (see Fig. 10), which clutch allows the motor to operate the agitator 40 when operating in one direction as before described, and allows it to rotate freely in the opposite direction for gyroscopic balance when the relay 63 is in operation. The latter described operation is utilized only during the extraction cycle.

Solenoid valve 64 controls a conduit 65, which conduit communicates with the bottom of wash basket 35 and is utilized to drain water from the basket and allow it to pass into the annular collector cup 67 which is disposed around the motor M'.

Thus when the unit is operated during the extracting cycle, water in annular cup 67 will be thrown by centrifugal force into the separate cups 68 which are arranged in an annular row around cup 67. Six of the cups 68 are here shown.

As the unit rotates during the extracting cycle, the center of gravity of the wash load in the basket 35 will usually be located somewhere off center such as denoted by the dotted line G in Fig. 1, so that the unit would tend to revolve about this new center of gravity as an axis. Thus to restore dynamic balance by tending to shift the axis of rotation to a point more nearly approaching the true diametral center of gravity, I provide a mechanism which will now be described.

In the side wall of each of the cups 68 I provide a discharge opening 69 controlled by a valve 70 which is normally urged seated by a spring 71 acting upon the valve stem 72. A disc 75 is stationarily secured to a spider 76, which spider is in turn carried by the floor 77.

Each of the valve stems 72 has pivotally secured to its inner end a valve actuating rod 80, which rod is pivotally fulcrumed between its ends to the annular cup 67, as by bracket 81. The flanged lower ends 83 of the symmetrically arranged rods 80 will thus selectively engage the periphery of disc 75 as the unit tends to shift to an axis of rotation other than its true axis, which engagement causes the rod associated with the appropriate cup 68 to open the valve 70 of that cup, permitting the water carried therein to be thrown out by centrifugal action. The consequent reduction of weight at such point will tend to restore the true axis of rotation and thus restore dynamic balance. During the extraction cycle, and assuming that the basket 35 is rotated clockwise, if the center of gravity has shifted, say, to the point G, it will be found that the actual point of unbalance lags somewhat so that it is not in direct line phase with the load. To compensate for this lag, I secure to the bottom of the motor, by pins 90, a pair of oppositely swingable weights 89 whose free ends each present a pin 91 projecting into an arcuate slot 93 provided in a triangular plate 94. Plates 94 are each secured to a disc 95 by pins 96. Disc 95 is rotatably secured to the bottom of motor M' by screws 97 disposed through slots 98 in the disc. The disc 95 presents circumferentially spaced radial slots 99 through which slots pass the respective rods 80. Thus as the entire unit is rotated during the extraction cycle, the weights 89 are swung outwardly by centrifugal action, thus causing slight rotation of the disc 95 in the direction of rotation of the unit, which in turn compensates for the said lag by causing properly timed contact of the appropriate rod or rods 80 with disc 75.

A switch 100 is secured on platform 10 and has its spring-pressed contact plunger 101 disposed in position to be engaged by the flange 12*a* when the load in the basket 35 is sufficient to compress springs 15 to permit such contact. The plunger 101 is normally maintained in switch-closing position by its spring, but when the basket 35 is filled to above the level L, the load is sufficient to compress springs 15 to a degree which causes flange 12*a* to engage and press downwardly on the plunger 101 to open the switch.

Operation of the device is as follows: Clothes are first placed in the basket 35 and water is supplied to the basket through conduit 102, which conduit is supplied from hot water supply line 103 and cold water supply line 104 controlled by valves 105 and 106 and by thermostat 107—such a thermostat being desirable inasmuch as certain garments should be washed in water at rather critical temperatures. When the basket 35 is filled to the desired extent, the motor M' is started, which causes the agitator blades 41 to oscillate. When the washing operation is completed, the solenoid 64 is actuated to pass the wash water from the basket 35 into the collector cup 67 through conduit 65. Motor M is now energized to rotate the basket 35 together with the entire suspended unit, the water remaining in the clothes and basket being extracted by centrifugal action as the basket thus spins. To aid in maintaining balance, the relay 63 operates motor M' in the reverse direction as before described during this extraction operation.

A tank 20 is provided in the casing 5 to receive excess water overflowing from the cups 67 and 68 through conduit 120*a*.

If it is desired to immediately wash another

batch of clothes after completion of the above-described operation, a pump 125 driven by a motor, not shown, is started to refill the basket with the soapy water remaining in the tank 120 from the previous operation. The pump is connected by conduit 126 with tank 120 and by conduit 127 with the basket.

If, after any extraction cycle, it be desired to rinse the clothes, cold water valve 104 alone is opened to fill the basket 35 with fresh cold water, after which motor M' is started to agitate the clothes in the fresh water filled basket, in the same manner as during the washing cycle, and extraction of the water after the rinse operation is carried on in the same manner as before described for the extraction cycle.

I claim:

1. Washing apparatus comprising a casing, a drive shaft vertically disposed axially of the casing, means rotatably and resiliently suspending the shaft from the upper portion of the casing for lateral movement in the casing, a wash basket carried by and coaxial with the lower end portion of the shaft, drive motor means operatively connected with the shaft, an agitator secured to the shaft, a second motor disposed axially with the lower end of the shaft, means operatively connecting the second motor to the shaft, said means including a clutch permitting rotation of the second motor relative to the shaft in one direction, means suspending the second motor from the basket, liquid-containing cups arranged symmetrically around the second motor, means responsive to lateral movement of the shaft to selectively release liquid from the cups, and means causing the second motor to operate in a direction reverse to the first-mentioned motor when the shaft is being rotated by the first-mentioned motor.

2. Washing apparatus comprising a casing, a shaft journalled at its top end in the top portion of the casing for rotational movement about a normal axis vertically of the casing and for swinging movement laterally of the casing, a drive motor operatively connected to the top end portion of the shaft, a wash basket carried by the lower end portion of the shaft, an agitator in the basket, a second motor, means securing the second motor to the basket in position suspended axially therebelow, means operatively connecting the second motor to the agitator, and means causing the second motor to operate in a direction reverse to the first-mentioned motor when the shaft is being rotated by the first-mentioned motor.

3. Washing apparatus comprising a casing, a shaft journalled at its top end in the top portion of the casing for rotational movement about a normal axis verfically of the casing and for swinging movement laterally of the casing, a drive motor operatively connected to the top end portion of the shaft, a wash basket carried by the lower end portion of the shaft, an agitator in the basket, a second motor, means securing the second motor to the basket in position suspended axially therebelow, means including a Scotch yoke, a rack and pinion associated therewith and an overrunning clutch operatively connecting the second motor to the agitator in a manner to oscillate the agitator relative to the basket, and control means for actuating the second motor independently of the first-mentioned motor.

4. Washing apparatus comprising a casing, a shaft journalled at its top end in the top portion of the casing for rotational movement about a normal axis vertically of the casing and for

swinging movement laterally of the casing, a drive motor operatively connected to the top end portion of the shaft, a wash basket carried by the lower end portion of the shaft, an agitator in the basket, a housing secured to and suspended axially below the basket, actuating means including a second motor carried by the housing and operatively connected to the agitator, means providing an upwardly opening annular trough around the housing, a conduit providing liquid communication from the basket to the trough, valve means controlling said conduit, said trough being adapted to throw liquid therefrom by centrifugal action in response to rotation of the shaft, a row of liquid-collecting cups disposed annularly of the trough in position to catch liquid thrown from the trough, means responsive to lateral movement of the shaft to discharge liquid from selected ones of said cups, and means for operating the second motor independently of the first-mentioned motor.

5. Washing apparatus comprising a casing, a shaft journalled at its top end in the top portion of the casing for rotational movement about a normal axis vertically of the casing and for swinging movement laterally of the casing, a drive motor operatively connected to the top end portion of the shaft, a wash basket carried by the lower end portion of the shaft, an agitator in the basket, a housing secured to and suspended axially below the basket, actuating means including a second motor carried by the housing and operatively connected to the agitator, means providing an upwardly opening annular trough around the housing, a conduit providing liquid communication from the basket to the trough, valve means controlling said conduit, said trough being adapted to throw liquid therefrom by centrifugal action in response to rotation of the shaft, a row of liquid-collecting cups disposed annularly of the trough in position to catch liquid thrown from the trough, means responsive to lateral movement of the shaft to discharge liquid from selected ones of said cups, said last-named means including a discharge port in each of the cups, a valve controlling each of the ports, an actuating rod associated with each of the valves and a disc stationarily mounted in the casing axially below the housing in position to be engaged by selected ones of the actuating rods upon lateral movement of the shaft, and means for operating the second motor independently of the first-mentioned motor.

6. Washing apparatus comprising a casing, a shaft journalled at its top end in the top portion of the casing for rotational movement about a normal axis vertically of the casing and for swinging movement laterally of the casing, a drive motor operatively connected to the top end portion of the shaft, a wash basket carried by the lower end portion of the shaft, an agitator in the basket, a housing secured to and suspended axially below the basket, actuating means including a second motor carried by the housing and operatively connected to the agitator, means providing an upwardly opening annular trough around the housing, a conduit providing liquid communication from the basket to the trough, valve means controlling said conduit, said trough being adapted to throw liquid therefrom by centrifugal action in response to rotation of the shaft, a row of liquid-collecting cups disposed annularly of the trough in position to catch liquid thrown from the trough, means responsive to lateral movement of the shaft to discharge liquid from selected ones of said cups, said last-named means including a discharge port in each of the cups, a valve con-

trolling each of the ports, an actuating rod associated with each of the valves and a disc stationarily mounted in the casing axially below the housing in position to be engaged by selected ones of the actuating rods upon lateral movement of the shaft, and weight means movably carried by the housing and operable in response to rotational movement of the shaft to advance the point of engagement of the rods with the disc, and means for operating the second motor independently of the drive motor.

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