May 8, 1951 J. B. MACGREGOR 2,552,197

WASHING MACHINE

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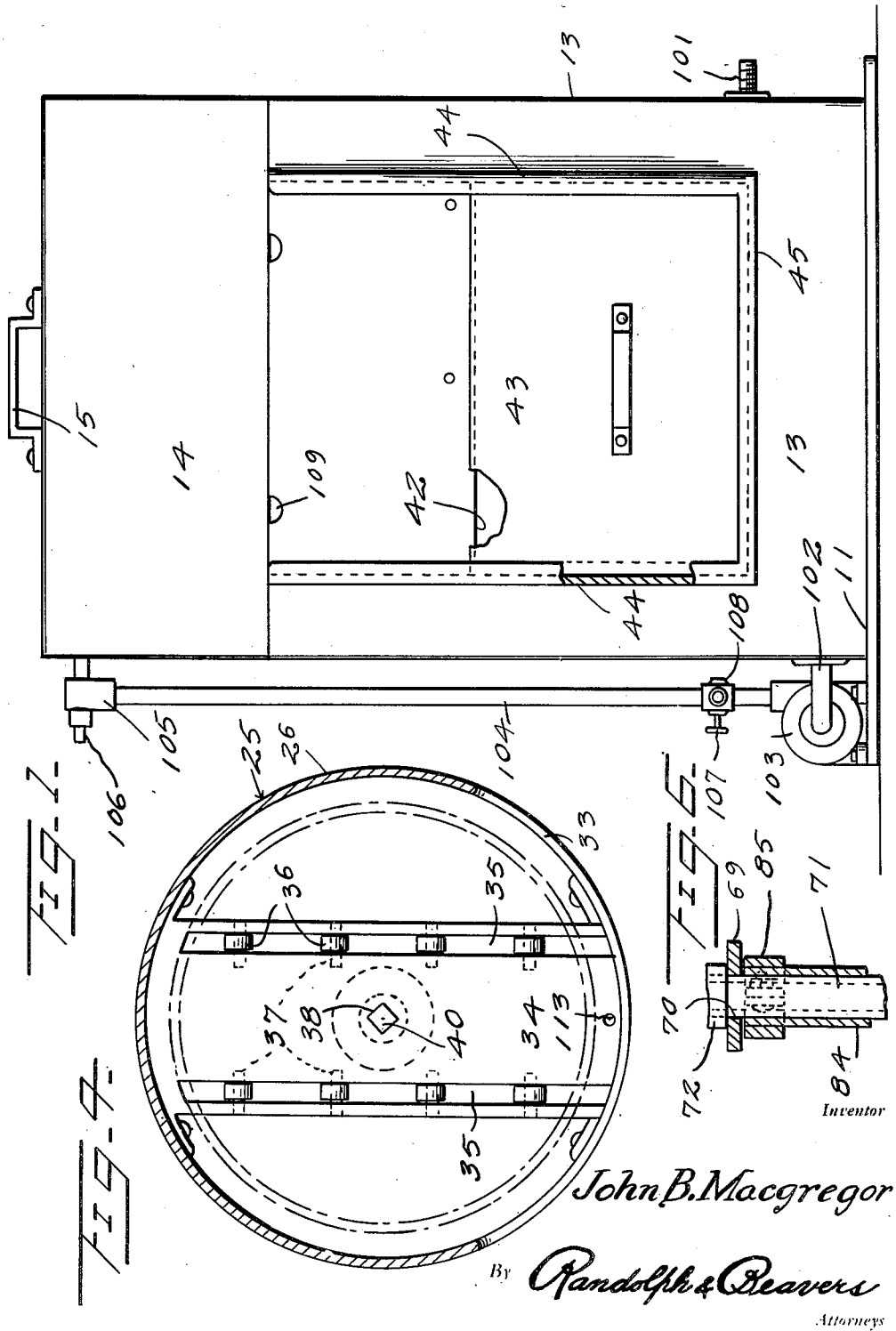


FIG. 1.

FIG. 2.

FIG. 4.

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WASHING MACHINE

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Fig. 2.

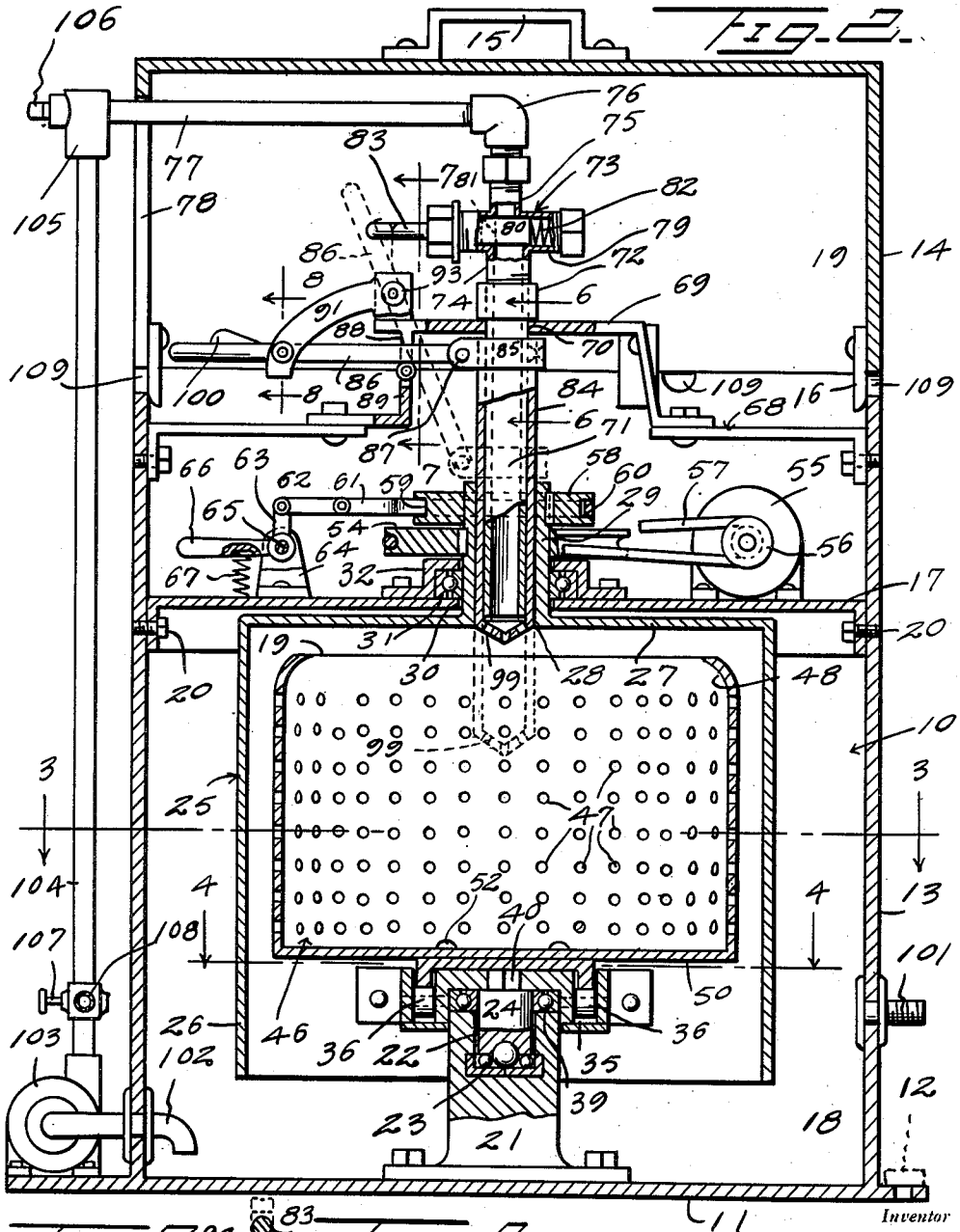


Fig. 7.

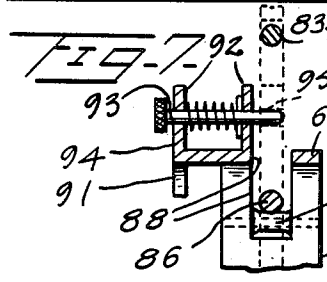
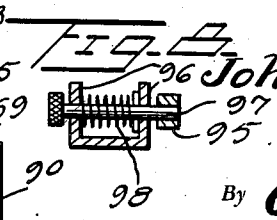


Fig. 4.



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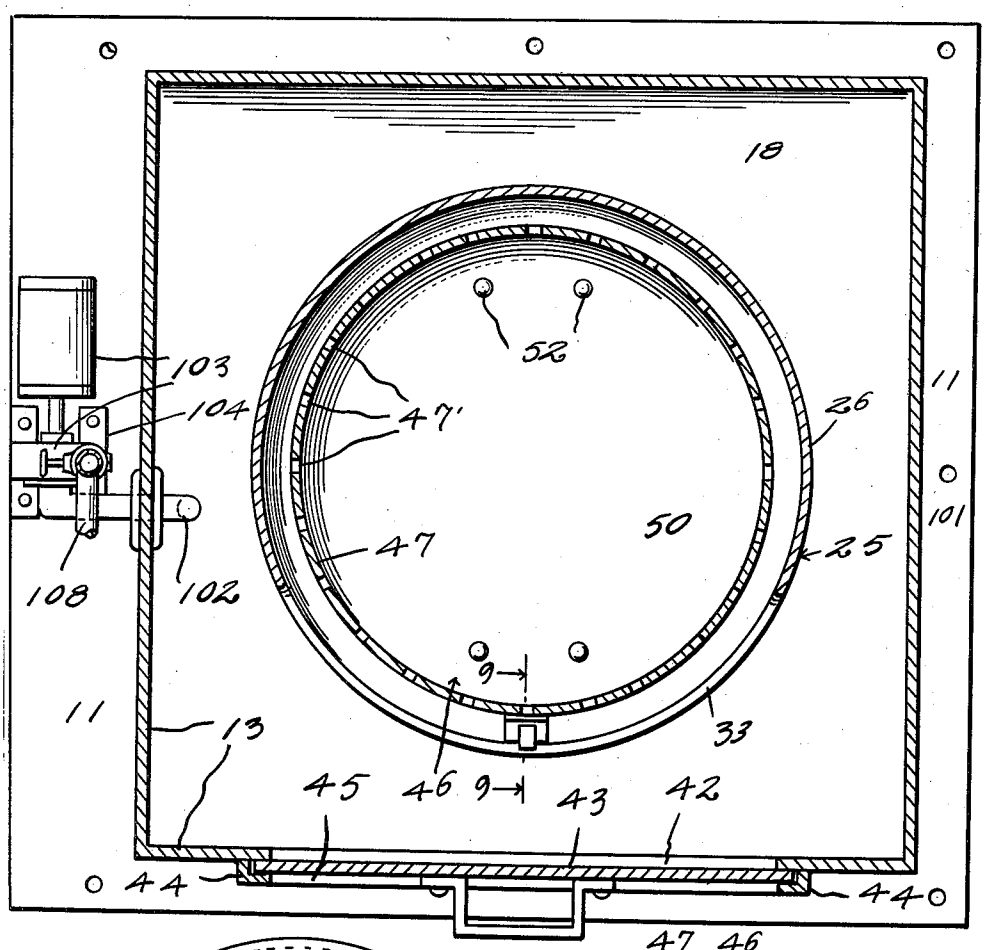
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FIG. 3.



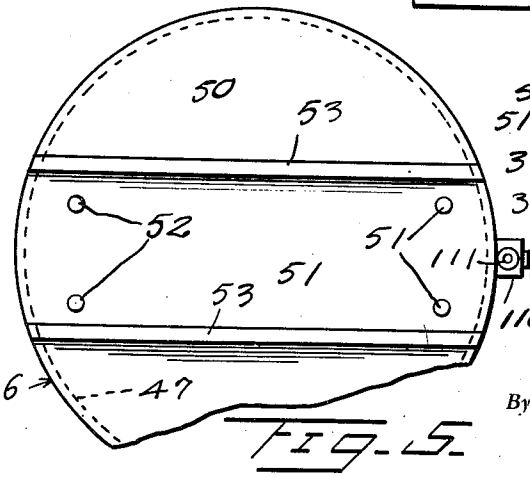


FIG. 5.

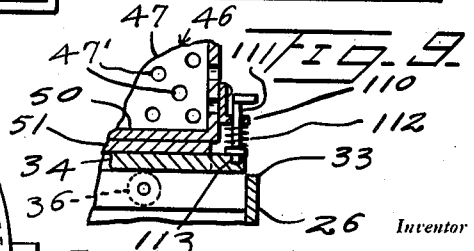


FIG. 4.

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UNITED STATES PATENT OFFICE

2,552,197

WASHING MACHINE

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Application February 14, 1947, Serial No. 728,582

11 Claims. (Cl. 68—23)

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This invention relates to an improved construction of washing machines and more especially to a machine which is constructed and arranged for supplying water and/or a cleaning solvent or solution substantially centrally to a container of clothes to be washed and for extracting the liquid centrifugally therefrom whereby to remove the dirt or grime from the clothing with the cleaning liquid as it is extracted therefrom by centrifugal force.

More particularly, it is an object of the present invention to provide a washing machine of relatively simple construction and which employs a fluid system by means of which a cleaning liquid may be supplied to the central portion of a container of clothes and extracted centrifugally therefrom and thereafter pumped back to a position to be again discharged centrally into the mass of clothing whereby the clothing will not be submerged in the liquid thus permitting dirt and foreign matter to be more readily removed therefrom by centrifugal force.

Still another object of the invention is to provide a washing machine having a circulatory system for the cleaning liquid and by which fresh cleaning liquid or a rinsing liquid can be selectively discharged into the mass of clothing or all flow of the liquid interrupted for drying the clothing, after washing and rinsing, by centrifugal extraction of the moisture from the mass of clothing.

Still another object of the invention is to provide a washing machine having novel means for the loading and unloading thereof and which is especially useful for establishments where washing machines are maintained in substantially constant operation due to the fact that only momentary interruptions of operation is required to unload and reload the machine.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a preferred embodiment thereof, and wherein:

Figure 1 is a front elevational view of a preferred embodiment of the washing machine;

Figure 2 is an enlarged transverse substantially central sectional view, partly in side elevation, thereof;

Figure 3 is a horizontal sectional view of the machine taken substantially along a plane as indicated by the line 3—3 of Figure 2;

Figure 4 is a horizontal sectional view taken

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substantially along a plane as indicated by the line 4—4 of Figure 2;

Figure 5 is a fragmentary bottom plan view of the clothes container or basket;

Figure 6 is a longitudinal sectional view taken substantially along a plane as indicated by the line 6—6 of Figure 2;

Figures 7 and 8 are transverse vertical sectional views taken substantially along the planes as indicated by the lines 7—7 and 8—8, respectively, of Figure 2, and

Figure 9 is a sectional view taken along line 9—9 of Figure 3.

Referring more specifically to the drawings, the washing machine in its entirety is designated generally 10 and includes a substantially flat base 11 which is adapted to be secured by bolts or other suitable fastenings 12 to a suitable supporting surface. The base 11 is provided with an upstanding wall 13 which is preferably square in cross section and which combines with the base 11 to form a housing having an open top closed by a hood 14 provided with a handle 15 and with depending lugs 16, secured to the inner side of the hood 14 and which depend below the bottom edge thereof for engaging portions of the inner sides of the walls 13 to prevent lateral displacement of the hood 14, when applied thereto.

A horizontal partition 17 extends across the housing, below the upper edges of the walls 13 for dividing said housing into a lower compartment 18 and an upper compartment 19, the latter being partially formed by the hood 14. The partition 17 is provided with a depending flange at each side thereof secured by fastenings 20 to the sides of the walls 13 for detachably positioning the partition within the housing.

A pedestal 21 is bolted or otherwise fastened to the upper side of the base 11 substantially centrally thereof and rises therefrom within the housing 11, 13 and is contained in the compartment 18. The pedestal 21 is provided with an upwardly opening recess 22 containing anti-friction means 23 in the bottom thereof forming a thrust bearing for a shaft 24 which is journaled therein and which rises to above the upper end of the pedestal 21.

A cage or shield, designated generally 25, is disposed in the compartment 18 and includes a substantially cylindrical wall 26 which is open at its bottom and which is provided with a substantially flat top wall 27 which is closed except for a centrally disposed opening 28, defined by an upwardly extending annular flange 29 which

preferably forms an integral part of the top wall 27 and which extends loosely through a central opening 30 in the partition 17 and is journaled in a bearing 31 disposed thereabove and supported in a retaining unit 32 which is mounted on the upper side of the partition 17 and around its opening 30. The cylindrical wall 26 of the shield or cage 25 is provided with a relatively large opening 33 which extends from adjacent the top wall 27 downwardly to approximately the level of the upper end of the pedestal 21, said opening 33 extending circumferentially through an arc approximately 150° in length, for a purpose which will hereinafter become apparent.

As best seen in Figure 4, the shield or cage 25 is provided with a relatively wide cross bar 34 which extends diametrically thereof and which is secured to the cylindrical wall 26 at its ends and below the bottom level or edge of the opening 33, said bar 34 being equally spaced from the ends of the opening 33. The bar 34 is provided with upwardly opening guide channels 35 adjacent the side edges thereof which extend longitudinally of the bar 34 from adjacent the end thereof, located remote to the opening 33, through the end located adjacent said opening. Each of the channels or grooves 35 contains a plurality of rollers 36 which are journaled therein on pins 37, which extend transversely through said channels. The rollers 36 have their upper portions disposed below the level of the upper surface of the bar 34. The bar 34 is provided with a centrally disposed polygonal-shaped opening 38 which opens outwardly of the upper side thereof and into an enlarged annular recess 39 in the under side of said bar, which is likewise centrally disposed and adapted to engage loosely over or around the upper end of the pedestal 21, as seen in Figure 2. The shaft 24 is provided with a restricted upper end 40 which is likewise polygonal in cross section to non-rotatably engage in the opening 38 for keying the bar 34 and the shield or cage 25 to the shaft 24. A portion of the bar 34, around the opening 38, rests on the upper end of the shaft 24 for supporting the bed of the annular recess 39 above and spaced from the upper end of the pedestal 21 to form an annular chamber for receiving a bearing 41.

As best seen in Figure 1, one of the sides of the housing walls 13 is provided with an opening 42 closed normally by a vertically sliding door or closure 43 which slidably engages vertical guide channels 44 which are disposed, one on either side of the opening 42 and which connect at their lower ends with a bottom channel 45 which is disposed beneath the opening 42 and which forms a stop for normally holding the door or closure 43 in a closed position.

A clothes container or basket, designated generally 46 comprises a perforated side wall 47 which is preferably cylindrical and has an inwardly flared annular upper portion 48 defining the restricted open upper end of said container 46, designated 49. The basket or container 46 is provided with a substantially flat bottom 50, as best seen in Figure 5, to the under side of which a relatively wide bar or strip 51 is secured by fastenings 52. The bar or strip 51 extends diametrically across the bottom 50 and is provided with down turned side edges 53 forming ribs or rails which are properly spaced to slidably engage in the channels 35 and which bear on the rollers 36. The cylindrical side wall 47 is perforated by means of a series of apertures or small openings 47' extending therearound and from substantially the bottom to adjacent the top thereof.

The annular flange 29 which extends through and is journaled in the bearing 31, as seen in Figure 2, forms a hollow shaft to which a belt pulley 54 is keyed above and adjacent the bearing 31. An electric motor or other suitable source of power 55 is secured to the upper side of the partition 17 and is provided with a driven belt pulley 56 which is connected to the belt pulley 54 by an endless belt 57 for revolving the shield or cage 25 when the motor 55 is energized.

A brake drum 58 is keyed to the hollow shaft 29 above the belt pulley 54 and is provided with a groove 59 in the periphery thereof for loosely receiving an arcuate brake shoe 60 having an extension 61 at one end thereof which projects in a direction substantially radially from the brake drum 58 and which is pivotally connected to one end of a link 62, the opposite end of which is pivotally connected to a lever 63. A bifurcated bearing 64 is secured to and rises from the partition 17 and has a shaft 65 journaled therein to which the lever 63 is keyed. A lever arm 66 is keyed to the shaft 65 and extends therefrom at substantially a right angle to the lever 63 and is normally disposed in a horizontal position or parallel to the partition 17 and supported, thus disposed, by a spring 67 of the expansion type which is interposed between the lever arm 66 and said partition 17.

A frame 68 is detachably fastened across the housing above the partition 17 and below the hood or cover 14 and is provided with an upwardly offset intermediate portion 69 which is disposed above the walls 13 and normally within the portion of the compartment 19 formed by the cover 14. Said upwardly offset frame portion 69 is provided with an opening 70 through which extends a pipe 71 having a collar or coupling 72 on its upper end and which rests on the upper side of the frame portion 69.

A fitting 73 has a depending conduit portion 74 which is detachably secured in the coupling 72 and an opposite upwardly extending conduit portion 75 which connects with one end of an elbow coupling 76, the opposite end of which is connected to a pipe 77 which extends outwardly through a slot 78 in a portion of the depending flange of the cap or cover 14. The fitting 73 also includes a transverse portion 79 interposed between the conduit portions 74 and 75 and forming a valve casing for a reciprocably mounted valve body 80 having a port 81 for registry with the conduits 74 and 75 and which is normally held out of registry therewith for closing said valve by a spring 82 which is interposed between the right hand end of the housing 79 and the adjacent end of the valve body 80, as seen in Figure 2, for urging said valve body to the left and into its closed position. The valve body 80 is provided with a stem 83 which projects from the left hand end thereof and which reciprocably projects from the left hand end of the housing 79.

A tube or pipe 84 telescopes over the lower end of the pipe 71 and extends reciprocably through the flange or hollow shaft 29. The tube or pipe 84 is provided with a collar 85 at its open upper end which is fixed thereto and provided with an outwardly projecting ear to which one end of a lever 86 is pivotally connected, as indicated at 87. The lever 86 projects through an elongated slot 88 formed in one end of the offset portion 69 and in the upper portion of one of the legs 89 which connects said end of the offset portion 69 to one of the downwardly offset ends of the frame 68.

An anti-friction roller 90, as best seen in Figure 7, is journaled transversely of the lower end of the slot 88 to provide a fulcrum for the lever 86.

A bracket arm 91 is secured to or formed integral with said end of the frame portion 69, above the leg 89 and to one side of the slot 88 and is provided with upstanding laterally spaced legs 92, disposed adjacent said end of the offset portion 69 and having aligned openings to loosely receive a locking pin 93. The pin 93 is normally biased by a spring 94 from left to right of Figure 7, for engaging a recess 95 in the lever 86 when the latter is in its dotted line position of Figure 2. The bracket arm 91 extends outwardly and downwardly from the aforementioned end of the upwardly offset frame portion 69 and is provided at its opposite end with legs 96 for reciprocably receiving a locking pin 97 which is likewise spring pressed to the right, as seen in Figure 8, by an expansion spring 98 for engaging the recess 95 when the lever 86 is in its full line position of Figure 2.

The tube 84, as best seen in Figure 2, is provided with a conical-shaped apertured lower end 99 forming a nozzle or spray head and said tube 84 combines with the pipe 71 to form a telescoping conduit which is adjustable between its full and dotted line positions of Figure 2 by movement of the lever 86 from the full line to the dotted line position thereof. The lever 86 is provided adjacent its outer end with an enlargement 100 for engaging the outer end of the valve stem 83 for moving said stem in the valve body 80 from left to right of Figure 2 against the action of the spring 82 so that the passage 81 thereof will register with the conduit portions 74 and 75 when the conduit section 84 is extended downwardly to its dotted line position of Figure 2 and into the container or basket 46. It will be readily apparent that the locking pin 93 can then be engaged with the recess 95 to retain the lever 86 in its dotted line position to thus hold the valve 80 in an open position and the conduit portion 84 in an extended or lowered position. Likewise, when the lever 86 is swung on its fulcrum roller 90 to its full line position of Figure 2 to release the valve for movement by the spring 82 to a closed position and for retracting and elevating the conduit section 84, the locking pin 97 may be utilized by engagement with the recess 95 for locking said lever 86 in its full line position of Figure 2 to retain the tube or pipe 84 retracted relatively to the container or basket 46.

The lower portion of the compartment or chamber 18, below the level of the basket or container 46, forms a sump which is provided with an overflow outlet pipe 101 mounted in one side of the wall 13 and at a level between the lower open end of the shield or cage 25 and the bottom 50 of the container 46.

A pipe 102 likewise extends through one side of the wall 13 and has a downturned inner end which opens adjacent the bottom or base 11 and an outer end which connects with the intake side of a pump 103 which is secured to a flanged portion of the base 11 located outwardly of the wall 13. The pump 103 is provided with an outlet to which an upwardly extending pipe 104 is connected. The pipe 104 at its upper end joins with a coupling 105 which is connected to the outer end of the pipe 77 and to which a pipe 106 also connects. The pipe 106 is adapted to be connected to a source of water supply, not shown, and has a valve, not shown, interposed therein for shutting off the supply of water to the coupling 105.

A valve 107 is interposed in the pipe 104 and is provided with an outlet pipe 108, for a purpose hereinafter to be described.

The hood 14 is readily removable and is not required for the operation of the washing machine 10, the slot 78 thereof extending to the bottom edge of the flange of said hood or cover to accommodate the pipe 77. The upper edge of the wall 13 is preferably provided with vent openings 109 for the passage of air to and from the chamber 19 when the cover 14 is in applied position.

The container or basket 46 may be filled with clothes, not shown, or other articles to be washed while disposed externally of the washing machine housing and by moving the closure 43 to an open position and with the opening 33 in alignment with the opening 42, the container 46 can be inserted through said openings for engaging the rails 53 in the guide channels 35 and on the rollers 36 so that the container 46 can be rolled into the cage or shield 25 until the inner ends of the rails 53 abut against the closed end of the channels 35. For retaining the container 46 thus disposed in the shield 25, a bracket 110 is secured to a portion of the side wall 47 and adjacent the opening 33 to reciprocably support a plunger rod 111 which is spring urged downwardly by a spring 112 for engaging a recess 113 in the bar 34 for detachably locking the container 46 in its position of Figure 3.

The closure 43 is then returned to its closed position of Figure 1 and the lever 86 is moved from its full line to its dotted line position of Figure 2 and locked in said latter position for opening the valve 80 and for moving the conduit section 84 to its extended lowered position so that the nozzle 99 will be disposed in the container 46 substantially centrally thereof. A cleaning solution may be poured directly into the bottom part of the compartment 18 through the opening 42 or may be drawn directly into the pump 103 by another connection, not shown, to the intake side thereof, or soap or other detergent in any form may be placed in the bottom of the compartment 18 and water of a proper temperature admitted to the system through the pipe 106 and pipe 77. When the proper amount of cleaning liquid is in the system, the conduit 106 is closed by its valve and the valve 107 is positioned to close the outlet 108 and to provide communication between the ends of the pipe 104. The motor 55 and the pump 103 are then both placed in operation so that the motor 55 will rotate the hollow shaft 29 by the belt and pulley connection for revolving the shield or cage 25 and the container 46 which is keyed thereto by engagement of the rails 53 with the channels 35. The cleaning solution in the sump or lower portion of the compartment 18 will be drawn by the pump 103 through the pipe 102 and forced by the pump upwardly through pipe 104 and pipe 77 downwardly through the fittings 73 and the open valves passage 81 into and through the conduit sections 71 and 84 to be discharged through the nozzle or spray head 99 downwardly and into the central portion of the basket or container 46. The cleaning solution will mingle intimately with the clothing contained in the basket 46 and will be conveyed by the rotation thereof centrifugally through the clothing to be discharged from the apertures 47' in the cylindrical wall 47 thereof. The solution will thereafter be turned by gravity to the sump to be

again conveyed by the same route back to the spray head or nozzle 99. The overflow pipe 101 functions only in case the system is oversupplied with liquid.

The valve 107 can be moved to a position for closing the passage through the pipe 104 and opening the outlet 108 for draining the system after which the system can be replenished with a cleaning or deterging solution, as previously described, or clear water can be admitted through the pipe 106 and utilized for rinsing the clothes. After the clothes have been rinsed with clear water, the system is drained and the contents of the basket dried by centrifugal extraction of the moisture therefrom through rotation of said basket.

The lever 86 is then returned to and latched in its full line position of Figure 2, the closure 43 then being moved to an open position and the latch 111 released for removing the basket 46 from the washing machine 10. In order to save delays, another basket 46 loaded with clothing or other material to be washed may be immediately inserted and the operation repeated so that by providing two baskets 46 an almost uninterrupted operation of the washing machine 10 can be maintained. It will be readily apparent that the cover 14 is removed for operating the lever 86 and also for operating the brake actuating lever 66 which is forced downwardly or counterclockwise, as seen in Figure 2, for engaging the brake shoe 60 with the drum 58 for stopping the rotation of the cage or shield 25 and the container 46 after the motor 55 has been de-energized. The cage or shield 25 can be manually turned for aligning the opening 33 thereof with the housing opening 42 for applying or removing the container 46.

It will be readily obvious from the foregoing that the clothing while being washed or rinsed is not submerged in the washing or rinsing liquid thereby permitting the washing machine 10 to operate on much less power. Further, dirt and grime can be more readily extracted from the clothing due to the fact that clean water or clean detergent solution may be frequently admitted to the system and the dirty water or solution removed therefrom and, if desired, a filter may be interposed in the system for filtering the water or cleaning solution.

Various modifications and changes in the embodiment of the invention as illustrated are contemplated and may obviously be resorted to, without departing from the spirit and scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. In a washing machine of the character described, a housing having a side wall provided with a normally closed opening, a supporting member rotatably mounted in said housing having a side wall provided with an opening smaller than the opening of the housing side wall and registering therewith in one position of the supporting member, driving means for rotating the supporting member, a container for clothing or other items to be washed, guideways forming a part of said supporting member for slidably and removably engaging a portion of said container for keying the container to the supporting member for rotation therewith and for slidably guiding the container in its movement into and from the supporting member through said opening thereof, a conduit having a discharge nozzle disposed within the housing and reciprocally movable toward and away from the housing bottom and discharging downwardly into said container, said housing side wall having openings through which spaced portions of the conduit extend into the housing, said conduit having an intake end opening adjacent the bottom of said housing, the bottom of said housing forming a sump, a pump interposed in said conduit for drawing a liquid from the sump and for pumping it through said conduit for discharge from the nozzle, and said container having an apertured surrounding wall through which the liquid from the nozzle is ejected by centrifugal force after passing through the clothing within said container.

2. A washing machine as in claim 1, said conduit having a telescoping section provided with an end forming said nozzle and disposed centrally of said container, and a lever slidably fulcrumed in the housing for moving the nozzle into an extended position within the container or to a retracted position above the container.

3. A washing machine as in claim 1, said conduit having a telescoping section provided with an end forming said nozzle and disposed centrally of said container, and a lever slidably fulcrumed in the housing for moving the nozzle into an extended position within the container or to a retracted position above the container, a normally closed valve interposed in said conduit, and said valve having a stem disposed in the path of movement of said lever whereby the valve will be moved to and held in an open position when the lever is moved to a position for projecting the nozzle into the container.

4. A washing machine as in claim 1, said supporting member comprising a downwardly opening hood having a bar extending across said hood, below said opening and provided with laterally spaced channels forming said guideways.

5. A washing machine as in claim 1, said supporting member comprising a downwardly opening hood having a bar extending across said hood, below said opening and provided with laterally spaced channels forming said guideways, and a supporting standard secured to and rising from the base of the housing and having a shaft journaled therein and keyed to the cross bar of the supporting member for rotatably supporting the latter in the housing.

6. A washing machine as in claim 1, said housing having a partition dividing it into upper and lower compartments, said supporting member and container being disposed in the lower compartment thereof, a supporting standard in said lower compartment on which the supporting member is rotatably journaled, said driving means being mounted in the upper compartment, and said supporting member including an upwardly extending tubular portion extending rotatably through said partition and forming a hollow shaft having a driving connection with said driving means for rotating said supporting member.

7. A washing machine as in claim 1, said housing having a partition dividing it into upper and lower compartments, said supporting member and container being disposed in the lower compartment thereof, a supporting standard in said lower compartment on which the supporting member is rotatably journaled, said driving means being mounted in the upper compartment, and said supporting member including an upwardly extending tubular portion extending rotatably through said partition and forming a

hollow shaft having a driving connection with said driving means for rotating said supporting member, and forming a flanged opening in the upper end of the supporting member for loosely receiving a portion of said conduit.

8. In a washing machine, a housing having a side wall provided with a normally closed opening, a supporting member rotatably mounted in the housing having a side wall provided with an opening smaller than the opening of the housing side wall and registering therewith in one position of the supporting member, driving means for rotating said supporting member, a container for clothes or other items to be washed slidably keyed to said supporting member and removably mounted within said housing for rotation with the supporting member when applied thereto, said container being removably applied to the supporting member through the opening thereof, the lower portion of said housing forming a sump, and a conduit provided with a pump having an inlet end opening into the sump and a discharge nozzle disposed longitudinally in the housing and discharging downwardly into the central portion of the container for circulating a detergent or rinsing liquid from the sump through the conduit for discharge from the nozzle centrally into the container, said container having an apertured encompassing wall through which the liquid is ejected centrifugally after passing through the clothing for return by gravity to said sump.

9. A washing machine as in claim 8, the nozzle or discharge end of the conduit forming an extensible section thereof, lever means slidably fulcrumed in the housing for projecting the nozzle into the container or retracting it out of engagement therewith, and a shut-off valve interposed in the conduit and constructed and arranged to be moved to an open position by the movement of said lever means to a position for projecting the nozzle.

10. A washing machine as in claim 8, said supporting member including a cylindrical downwardly opening hood having a diametrically disposed supporting bar secured to its cylindrical side wall and below the opening and provided with guideways for slidably and removably receiving a depending portion of the container and for keying the container thereto.

11. A washing machine as in claim 8, said supporting member including a cylindrical downwardly opening hood having a diametrically disposed supporting bar secured to its cylindrical side wall and below the opening and provided with guideways for slidably and removably receiving a depending portion of the container and for keying the container thereto, and latch means for releasably retaining the container in a position within the hood and substantially concentric thereof.

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