

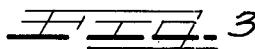
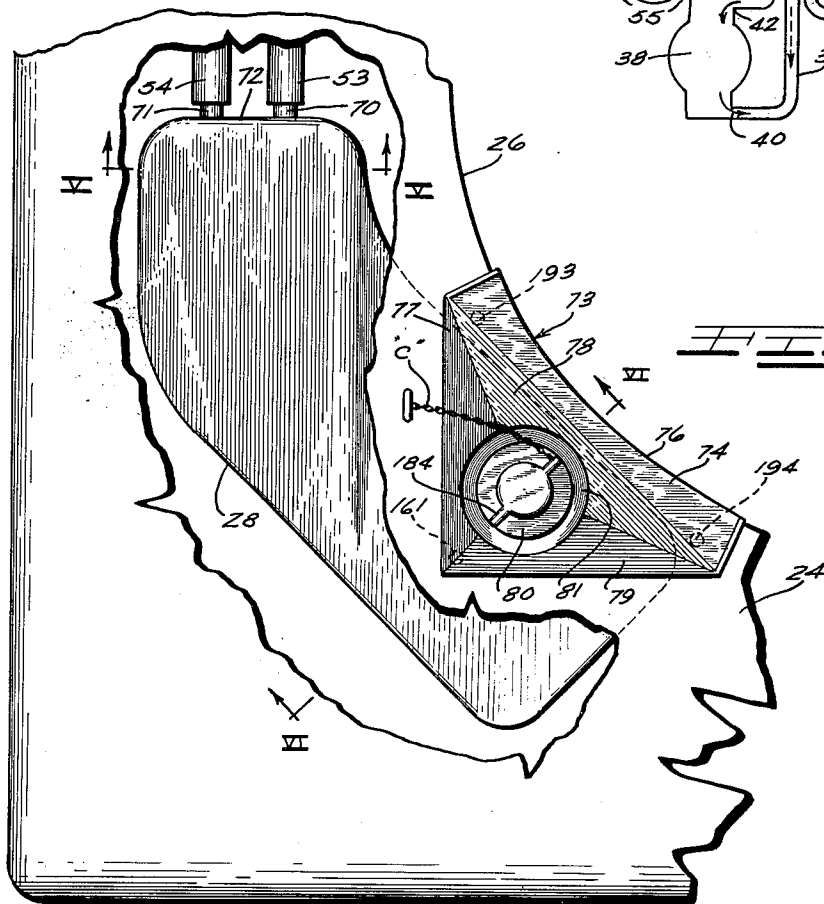
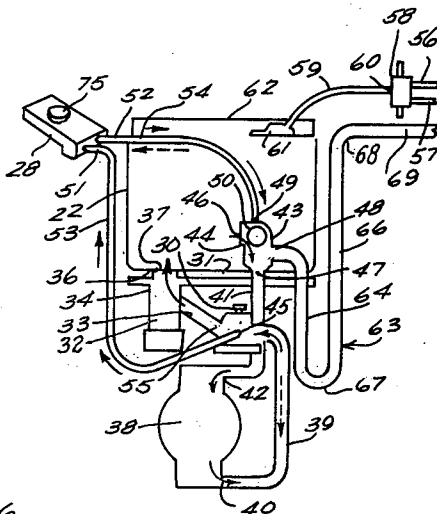
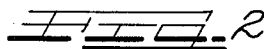
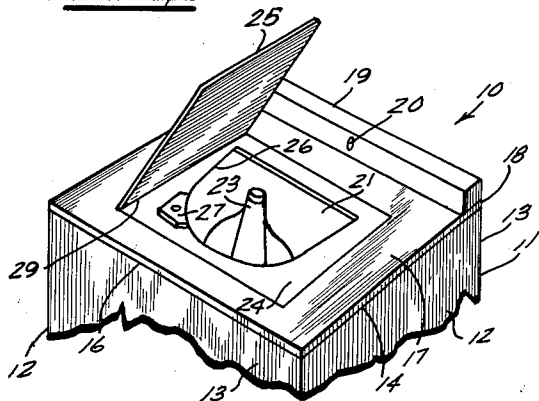
July 5, 1966

W. R. RICKEL
METHOD AND APPARATUS FOR DISPENSING AN ADDITIVE
TO A WASHING MACHINE

3,258,792

Filed Nov. 12, 1963

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG. 4

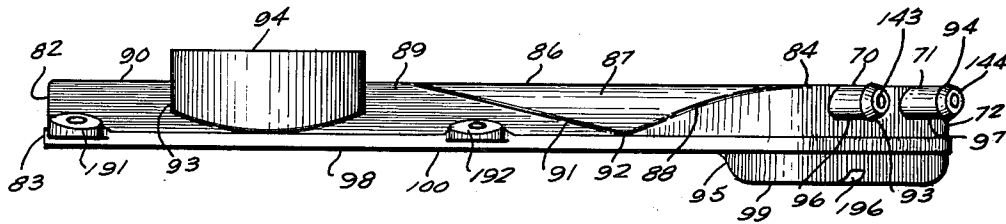


FIG. 5

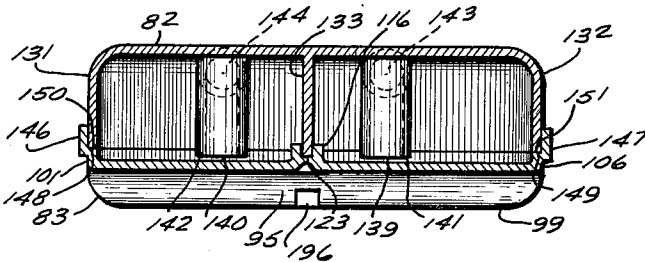
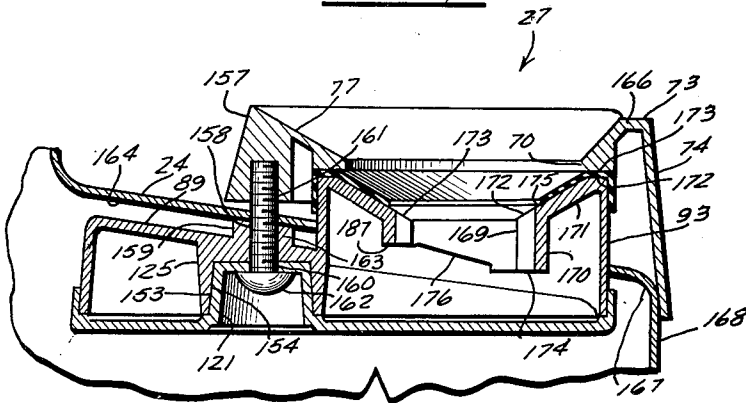


FIG. 6



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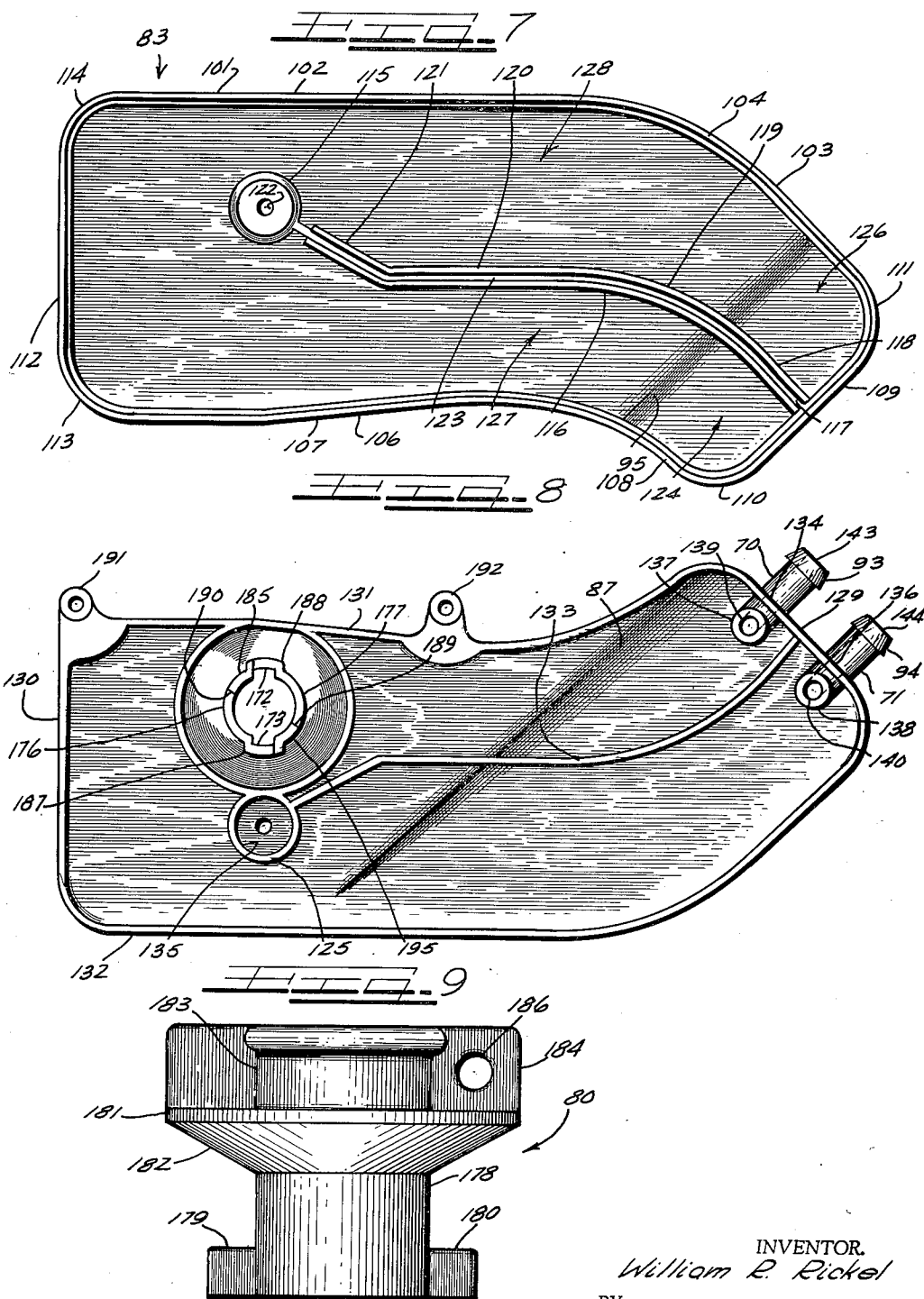
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METHOD AND APPARATUS FOR DISPENSING AN ADDITIVE TO A WASHING MACHINE

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18 Claims. (Cl. 8—158)

This invention relates generally to an automatic dispensing apparatus for a clothes washing machine and more particularly to a dispenser which operates under a positive pressure in a closed liquid circuit of an automatic washing machine, for example, in dispensing a bleach solution in an automatic washing machine, although its use may be extended to other solutions and additives containing detergents or fabric softening agents.

The embodiment of the invention shown in the accompanying drawings discloses an illustrative automatic clothes washing machine operable through a washing operation and a fluid extraction operation and incorporating a system of laundry liquid circuitry. This circuitry includes a fluid pump adapted to pump laundry liquid toward a generally imperforate tub during a washing operation and away from the tub during an extraction operation. A dispenser reservoir is connected in fluid communication to one side of the fluid pump and the bleach solution or other additive contained within the dispenser reservoir is gradually admixed with the laundry liquid circulated toward the tub during the washing operation. The circuitry from the pump through the dispenser reservoir to the imperforate tub is a closed circuit carrying a pressurized stream of laundry liquid, and the configuration of the dispenser reservoir is such as to effect gradual admixing of additive and the stream of laundry liquid during washing operations and to preclude draining of concentrated additive into the tub prior to the washing operation. By incorporating the dispenser reservoir in such a closed hydraulic circuit, a more favorable control of admixing and diluting of the additive into the wash fluid is attained, a more thorough mixing is accomplished, and, further, by reversing the direction of flow of laundry liquid through the dispenser reservoir during the extraction operation, the reservoir is back-washed and flushed in preparation for subsequent washing operations.

It is, therefore, an important object of the present invention to provide an additive dispenser for an automatic washing machine adapted to be incorporated in a closed circuit hydraulic system on the discharge side of a fluid pump to thereby subject the dispenser to a stream of liquid under positive hydraulic pressure.

Another object of the present invention is to provide a dispenser for bleach solutions, detergents, fabric softening agents and other desirable additives and cleansing aids which effects gradual and thorough admixing of the additive and laundry liquid before the admixture discharges into the tub during a washing operation.

Another object of the present invention is to provide a dispenser adapted to be loaded with a charge of additive or the like prior to commencement of a washing operation but which precludes discharge of the additive into the tub prior to commencement of the washing operation and without being thoroughly mixed and diluted with laundry liquid.

Another object of the present invention is to provide a washing machine having reverse-flow laundry liquid circuitry for circulating laundry liquid into the tub during a washing operation and from the tub during an extraction operation with an additive dispenser adapted to be incorporated into the reverse-flow circuitry for admixing additive or the like with the washing fluid during a washing

operation and for rinsing and flushing the dispenser with laundry liquid during an extraction operation.

And yet another object of the present invention is to provide a washing machine having a dispenser for bleach solution or the like which is easily accessible, can be simply and easily installed, requires no moving parts, and is compactly arranged to minimize space requirements.

Many other features, advantages and additional objects will become manifest to those versed in the art from the detailed description of the invention which follows and the accompanying sheets of drawings in which a preferred embodiment of a dispenser incorporating the principles of the present invention is shown by way of illustrative example.

On the drawings:

FIGURE 1 is a fragmentary perspective view of an automatic washing machine embodying the present invention;

FIGURE 2 is a substantially diagrammatic view of the hydraulic circuitry incorporated in the automatic washing machine of FIGURE 1 and including therein a dispenser of the present invention;

FIGURE 3 is a fragmentary plan view of the top panel of a washing machine embodying the present invention and having certain portions cut away;

FIGURE 4 is a side elevational view of the dispenser reservoir of the present invention;

FIGURE 5 is a cross-sectional view of the dispenser reservoir taken substantially along lines V—V of FIGURE 3;

FIGURE 6 is a fragmentary cross-sectional view taken substantially along lines VI—VI of FIGURE 3;

FIGURE 7 is a top plan view of the bottom half of the dispenser reservoir of the present invention;

FIGURE 8 is a bottom plan view of the upper portion of the reservoir of FIGURE 7; and

FIGURE 9 is an elevational view of the dispenser reservoir cap illustrated in plan view in FIGURE 3.

As shown on the drawings:

Although the principles of the present invention are of utility in any additive dispenser for cleaning apparatus, a particularly useful application is made to automatic washing machines. The illustrative embodiment herein shown consists of a vertical-axis agitator type automatic washing machine shown generally at 10 in FIGURE 1 wherein is illustrated a vertically upstanding cabinet enclosure as at 11 comprising rectangularly shaped matching end walls as at 12, 12 and front and rear walls as at 13, 13. Overlying top surfaces 14 and 16 of the end walls 12, 12 and front and rear walls 13, 13 respectively is a horizontally disposed rectangularly shaped top panel 17. Panel 17 is connected in firm assembly to the cabinet walls 12, 12 and 13—13 and at a rearward portion thereof an instrument or control panel 19 is mounted as at 18. A timer mechanism 20 of the type constituting a sequential control mechanism utilizing a stepping motor is incorporated in the control panel 19 for automatically controlling the operation of the washing machine through a series of washing, rinsing and extracting periods of a programmed cycle.

Housed within the cabinet enclosure 11 in a generally vertically oriented position is a perforate clothes basket as indicated at reference numeral 21. The clothes basket is rotatably mounted within the cabinet enclosure 11 and it will be understood that clothes or other material to be laundered are confined within the basket during a washing and an extraction operation. The clothes basket 21 is sometimes referred to as a receptacle or clothes container or spin basket.

An imperforate tub, indicated somewhat diagrammatically at 22 in FIGURE 2, is mounted within the

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cabinet enclosure 11 and surrounds the clothes basket 21. The washing or laundry fluid actually used in a washing operation is confined within the tub 22, and it will be understood that since the basket 21 is perforate, any clothes or other material to be laundered which are deposited in the basket 21 will be substantially immersed in a pool of washing or laundry fluid confined within the tub 22.

An independently operable washing member or agitator 23 of the vertical-axis type is shown as being provided in the basket 21.

In order to provide an opening in the cabinet enclosure 11 for depositing clothing within the basket 21, the top panel 17 comprises a recessed or depressed portion as at 24 overlying and substantially in registry with the basket 21. The recessed portion 24 forms an opening as at 26 to provide for convenient ingress and egress of clothing material to and from the basket 21.

As illustrated in FIGURE 1, the dispenser of the present invention is shown generally at 27 and is mounted above the recessed portion 24 adjacent the opening 26. The configuration of the dispenser 27 is arranged so that the portion thereof which extends vertically upwardly from the recessed portion 24 does not extend beyond the plane defined by the top panel 17.

A top cover panel or closure 25 is connected for pivotal movement, as for example by means of hinges or the like (not shown) along one end 29 of the recessed portion 24. The closure 25 is shaped complementarily to but smaller than the recessed portion 24 so that when it is swingably pivoted to a closed position, a top surface thereof will be disposed coplanar to and flush with the top panel 17. The dispenser 27 is arranged to permit full flush closing of the closure 25 without interference therewith. It will be understood that the usual safety device can be employed in connection with the closure 25 to interrupt operation of the washing machine if the closure 25 is not fully closed and fastened to thereby overlie the opening 26 and the dispenser 27.

FIGURE 2 is a plumbing diagram which illustrates diagrammatically the hydraulic circuitry of a washing machine embodying the principles of the present invention. A laundry liquid or fluid pump 30 is shown disposed below a bottom wall 31 of the tub 22 and is connected to a foreign objects trap 32 by means of a fluid conduit 33. The fluid pump 30 is of the reversible type, that is, it is adapted to discharge fluid first in one direction for a washing operation and then in a reverse direction for an extraction operation. The trap 32 comprises a substantially vertically extending body portion 34 which is connected in firm assembly to a lower surface 36 of the tub 22. A top opening 37 of the body portion 34 is in open communication with the interior of the tub 22. The purpose of the trap 32 is to collect foreign objects and particles contained in the laundry liquid and it is adapted for periodic inspection and cleaning.

In order to entrap fine pieces of material such as lint or the like which may circulate within the laundry liquid, a self-cleaning lint filter 38 is connected to the fluid pump 30 by means of the conduit 39. The filter 38 is self-cleaning and lint that has accumulated therein during a washing operation will be expelled therefrom when the direction of laundry flow is reversed during an extraction operation.

The conduit 39 is arranged to connect to the filter 38 at a bottom portion thereof as at 40. Another conduit 41 is connected at one end to a top portion 42 of the filter 38 and at its opposite end to a check valve assembly 43 which is in fluid communication with the interior of the tub 22. The valve assembly 43 also serves as a mixing chamber, and comprises a body portion 44 having a plurality of large openings as at 46, 47 and 48 and a smaller opening as at 49. Movably housed within the body portion 44 is a spherically shaped fluid flow actuated ball check 50 having a diameter which is larger than any of the openings 46-49. The ball check 50 is arranged to effect restric-

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tions of the flow of laundry liquid through one of the openings 46-48 in response to the direction of flow of the laundry liquid through the valve assembly 43.

In the embodiment of the invention illustrated in FIGURE 2, the dispenser 27 comprises a dispenser reservoir 28 which is mounted on the machine 10 at a level above the maximum operating level of the laundry liquid confined in the tub 22 during a washing operation. Since the dispenser 27 is adapted for use in a closed hydraulic circuit under pressure, it will be understood that the dispenser reservoir 28 could be mounted below the level of the washing liquid during a washing operation, but by positioning the reservoir 28 above the liquid level, a minimum amount of laundry liquid will remain in the reservoir after the liquid extraction operation. Of course, it will be understood that the dispenser reservoir 28 must be closed in water-tight assembly prior to operation of the fluid pump 30.

The reservoir 28 has a pair of openings as at 51 and 52 connected respectively to a pair of flexible hoses or conduits 53 and 54. Conduit 53 also connects to an opening 45 formed in the fluid pump 30 and the conduit 54 also connects to the smaller opening 49 of the mixing valve assembly 43.

In order to fill the tub 22 with clear washing liquid prior to commencement of a washing operation, liquid supply lines, as for example, a hot water line 56 and a cold water line 57 are connected at one end to the usual domestic sources of water and at an opposite end to a solenoid operated, thermostatically actuated temperature control valve 58 adapted to discharge therefrom a predetermined quantity of washing liquid at a suitable temperature as determined by the setting of the sequential controller or timer mechanism 20 (FIGURE 1). A fill hose 59 is connected at one end to an outlet 60 of the valve 58 and at an opposite end to a fill spout 61 mounted near a top surface 62 of the tub 22.

In order to drain the laundry liquid from the tub 22 during an extraction operation, a drain hose 63 is connected at one end to the large opening 48 of the valve assembly 43 and comprises a pair of substantially vertically upstanding leg portions 64 and 66 interconnected by means of a bottom portion or liquid trap 67 which is disposed at an elevational level below the bottom wall 31 of the tub 22. The leg 66 rises vertically to a level substantially adjacent the top surface 62 of the tub 22 where it connects by means of an elbow 68 to a substantially horizontally disposed portion 69 which leads to a sewer or drain.

As illustrated in FIGURE 2, the direction of flow of laundry liquid during a washing operation is indicated by full arrows and the direction of flow during an extraction operation is indicated by dashed arrows. A quantity of clothes to be washed is placed in the basket of the machine. A charge of bleach solution, detergent, softening agent or other additive may also be deposited in the dispenser reservoir 28 through an opening therein as at 75. Thereafter, the opening 75 is suitably sealed by a cap 80. FIGURE 3) and a predetermined washing and extracting cycle is selected and pre-set by means of the sequential controller or timer mechanism 20. No further attention of the operator is required.

Upon initiation of the cycle the timer mechanism 20 and a given quantity of laundry liquid at a selected temperature will be supplied into the tub 22 through the fill spout 61. After the tub 22 has been filled with laundry liquid to an operational level the fluid pump 30 is automatically energized so as to draw laundry liquid through the conduit 39 and discharge the laundry liquid in the form of a pressurized stream. At least a portion of the stream of pressurized laundry liquid will be communicated through the conduit 53 and the remainder passes through the conduit 33 into the trap 32 where it is discharged through the top opening 37 into the tub 22. The laundry liquid which flows through the conduit 53

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is circulated to the opening 51 of the dispenser reservoir 28. Additive which has been deposited within the dispenser reservoir 28 gradually mixes with the laundry liquid and the admixture of additive and laundry liquid is discharged from the reservoir 28 through the opening 52 into the conduit 54, through which it is conveyed to the valve assembly 43.

During the washing operation, the ball check 50 is positioned to check flow through the opening 48. Laundry liquid circulated from the reservoir 28 is drawn into the opening 49 of the valve assembly 43 and becomes admixed with laundry liquid entering the valve assembly 43 through the opening 46, and the entire mixture is drawn through the conduit 41, the lint filter 38 and the conduit 29 to the suction side of the fluid pump 30. The mixture is once again discharged from the pump 30 and the cycle of circulation through the hydraulic circuitry is repeated. Since the dispenser 27 is incorporated into the hydraulic circuitry on the discharge side of pump 30 during a washing operation it is subject to a positive hydraulic pressure.

After the washing operation has been completed, the timer mechanism 20 will automatically reverse the operation of the fluid pump 30 to discharge washing fluid through conduit 39, from which it will circulate through the filter 38 and the conduit 41 into the opening 47 of the check valve assembly 43. As the flow of washing fluid is thus reversed in the valve assembly 43, the ball check 50 will move to a position adjacent opening 46 to impede flow therethrough. A portion of the laundry liquid will be discharged through the valve opening 48 into the conduit 64 and then to a drain. The remaining portion of the laundry liquid will be conveyed through conduit 54 into the opening 52 to back-wash or flush the reservoir 28. The laundry liquid is then discharged from the reservoir 28 through the reservoir opening 51, from whence it proceeds through conduit 53 to enter the suction side of the pump 30 through the opening at 45. Simultaneously during the extraction operation, laundry liquid confined in the tub 22 will be drawn into the trap 32 through the opening 37 and will then be conveyed through conduit 33 into the suction side of the pump 30 through opening 55.

Accordingly, as the fluid pump 30 operates to pump laundry liquid in a first direction during a washing operation, additive deposited in the dispenser reservoir 28 is gradually admixed with laundry liquid to be discharged into the tub 22. When the flow through the pump 30 is reversed during an extraction operation, laundry liquid is back-washed through the dispenser reservoir 28 to effect a flushing operation. The laundry liquid is then discharged from the washing machine to the drain.

Referring to FIGURE 3, the dispenser reservoir 28 is shown mounted below the recessed portion 24 of the top panel 17 (FIGURE 1), and adjacent the opening 26. The reservoir 28 is particularly characterized as having a pair of cylindrically shaped hose connectors or fluid ducts 70 and 71 connected in firm assembly with and projecting outwardly from an end wall 72. Connected in tight sealing engagement with ducts 70 and 71 are the flexible conduits 53 and 54 which function alternately as intake and effluent communicating means for conveying laundry liquid and an admixture of laundry liquid and additive to and from the reservoir 28 during washing and extraction operations respectively. A dispenser pouring basin 73 is illustrated as being disposed adjacent the top surface of the recessed portion 24 and partially overlying the dispenser reservoir 28.

The pouring basin 73 comprises a downwardly sloping flange or bezel member 74 having a lower edge 76 arcuately shaped to conform to the opening 26 of the recessed portion 24. The pouring basin 73 also includes a plurality of downwardly sloping basin walls 77, 78 and 79 which slope downwardly toward a substantially centrally located reservoir cap 80. The cap 80, in conjunction with a reser-

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voir cap gasket 81 is operatively adjustable to satisfactorily seal the reservoir opening 75 during a washing and an extraction operation. In the embodiment of the invention herein illustrated, the gasket 81 comprises a rubber or a rubber compound material, but it will be understood that any suitable gasketing material may be used.

As best illustrated in FIGURE 4, the dispenser reservoir 28 comprises an upper portion 82 and a complementarily shaped lower portion 83. The top surface of the upper portion 82 comprises a top wall 84, which extends horizontally substantially from the end wall 72 across the top surface of the upper portion 82 to a ridge portion as at 86 where it converges with a downwardly disposed arcuately shaped portion as at 87. Extending laterally from the portion 87 is a downwardly sloping oblique wall member 89 having an upper edge 90 which is coplanar with the ridge 86 and the top wall 84. The oblique wall member 89 joins the portion 87 at an arcuately shaped curvilinear portion as at 91. In order to form a smooth transition between the top wall 84, the downwardly shaped portion 87 and the curvilinear portion 91, an arcuately shaped downwardly sloping transition surface 88 extends substantially angularly downwardly to a junction as at 92. Extending vertically upwardly from the oblique member 89 is a cylindrically shaped loading collar as at 93 having formed at one end thereof as at 94 an opening as at 75 (FIGURE 2). The additive which is to be dispensed into the laundry liquid is deposited into the dispenser reservoir 28 through the loading opening 75, and the opening is thereafter suitably closed and sealed by means of the reservoir cap 80 (FIGURE 2).

In order to provide a tight fit between the flexible hoses 53 and 54 and hose connectors or ducts 70 and 71, a distal portion of the ducts 70 and 71 form enlarged diameter expansion-fit connector heads as at 93 and 94 respectively. The diameter of the flexible hoses 53 and 54 is substantially equal to cylindrically shaped body portions 96 and 97 of the ducts 70 and 71 respectively, and the connection of the hoses to the ducts is made by urging the ends to the hoses over and beyond the connector heads 93 and 94. Due to the resiliency of the flexible hoses 53 and 54 they will be urged by a radially inward bias to conform in tight-pressing engagement to the configuration of the ducts 70 and 71. Of course, hose clamps or other suitable means may be used to effect a clamping action of the hoses to the ducts if desired.

As best illustrated in FIGURE 4, a bottom wall 98 of the lower portion 83 comprises a deep well as at 99 and a laterally extending portion as at 100 which slopes gradually downwardly toward the deep well 99. Accordingly, any additive or the like deposited in the reservoir 28 through the loading opening 70 will be urged by gravitational forces downwardly toward and into the deep well 99. A downwardly curving damping wall as at 95 interconnects the deep well 99 and the downwardly sloping portion 100 for confining additive in the deep well 99 and for providing a damping action on the admixture of laundry liquid and additive during a washing operation.

Referring to FIGURE 7, which is a top plan view of the lower portion 83 of the reservoir 28, a side wall 101 is particularly characterized as having a straight portion 102 and a portion extending at an angle to the portion 102 as at 103. An arcuately shaped intermediate portion 104 interconnects portions 102 and 103 and comprises a streamline surface for minimizing turbulence and pressure drop losses of fluid passing thereacross. An opposite side wall 106 comprises a straight portion 107 and a portion as at 108 which extends at an angle to portion 107. A substantially straight end wall portion 109 forms one end of the lower portion 83 and interconnects side walls 101 and 106 at rounded corner portions 110 and 111. Another end wall opposite end wall 109 is formed as at 112 and interconnects side walls 101 and 106 at rounded corner portions 113 and 114.

In order to gradually admix additive which may be confined in the deep well 99 with laundry liquid as it flows through the dispenser reservoir 28, an S-shaped ridge or serpentine wall 116 projects vertically upwardly from the bottom wall 98 of the lower portion 83. The serpentine wall 116 terminates at one end as at 117 at substantially the center portion of the end wall 109 from whence it extends substantially perpendicularly thereto as at 118 and then comprises a curved portion as at 119 conforming substantially and in intermediate spaced relation to curved portions 104 and 108 of side walls 101 and 106 respectively. A straight portion 120 extends substantially parallel to straight portions 102 and 107 of side walls 101 and 106 respectively, and connects to a portion 121 which extend upwardly at an angle thereto. The wall 116 terminated at a cylindrically shaped vertically upstanding support wall 115. The wall 115 is formed integrally with the bottom wall 98 and is apertured as at 122 to receive an assembly screw (FIGURE 6). A downwardly projecting axially extending groove or divider recess 123 is formed within the serpentine wall 116 throughout its entire length and, in conjunction with another member to be presently described, effectively divides the deep well 99 into similarly shaped sections 124 and 126 and separates substantially the remainder of the lower portion 83 into opposite sections 127 and 128.

Referring now to FIGURE 8, the upper portion 82 of the dispenser reservoir 28 is particularly characterized as having a pair of end walls 129 and 130 and a pair of side walls 131 and 132 which are shaped complementarily to and arranged to engage in abutting relation respectively with the end walls 109 and 112 and the side walls 106 and 101 of the lower portion 83. In order to compartmentalize or sectionalize the dispenser reservoir 28, the upper portion 82 has formed therein a reservoir divider wall 133 which is shaped complementarily to the divider recess 123 of the lower portion 83 to be received therein and, as can best be seen in FIGURE 5, effectively provides a vertically extending barrier in essentially the middle portion of the dispenser reservoir 28 throughout a portion of its length.

The divider wall 133 terminates at a cylindrically shaped upwardly extending mating wall 125 which is centrally apertured as at 135 to receive the support wall 115 of the lower portion 83.

Referring to FIGURES 5 and 8, the hose connectors or ducts 70 and 71 pass through the end wall 129 at apertures 134 and 136 respectively and have depending therefrom perpendicularly thereto vertical spouts 137 and 138 respectively. When the dispenser reservoir 28 is assembled as illustrated in FIGURE 5, openings 139 and 140 formed in bottom portions 141 and 142 respectively of the spouts 137 and 138 are situated above the deep well portion 99. Laundry liquid which enters the ducts 70 and 71 through external openings 143 and 144 formed respectively therein will be directed downwardly through a corresponding spout to discharge into the deep well 99 to become admixed with additive confined therein.

Referring to FIGURE 5, side walls 101 and 106 of the lower portion 83 comprise vertically upwardly extending offset portions 146 and 147 respectively and flat horizontally extending shoulder portions as at 148 and 149. Shoulder portions 148 and 149 are arranged to receive lower mating edges 150 and 151 of the side walls 131 and 132 respectively of the upper portion 82. The reservoir upper and lower portions 82 and 83 are joined together in firm assembly at the mating edges 150 and 151 by means of any suitable adhesive and sealing substance such as plastic cement or the like, and reservoir 28 is maintained in leakproof condition even when subjected to a positive hydraulic pressure.

FIGURE 6, which is a cross-sectional view taken substantially along lines VI—VI of FIGURE 3, illustrates the dispenser reservoir 28 as being disposed below the

recess portion 24 of the top panel 17. It will be noted that the section lines of FIGURE 6 pass through the center of the loading opening 75. As illustrated, the support wall 121 of the lower portion 83 comprises an outer surface 153 which is formed complementarily to and in abutting engagement with an inside surface 154 of the mating wall 125 which projects downwardly from the sloping surface 89 of the reservoir upper portion 82. The pouring basin 73 is illustrated as being mounted above the recessed portion 24 of the top wall 17. A substantially cylindrically shaped boss 157 extends downwardly from and is connected in firm assembly to a downwardly sloping basin wall as at 77 and is situated in vertical alignment with a centrally located bore 158 formed in the sloping surface 89 and an upwardly extending projection thereof as at 159. The support wall 121 and the boss 157 form respectively bores 160 and 161 which are disposed in concentric registry with bore 158 and adapted to receive in threaded engagement an assembly screw as at 162. The projection 159 has an oblique top surface as at 163 shaped complementarily to a bottom surface 164 of the recessed portion 24, and it will be understood that as the assembly screw 162 is inserted in threaded relation into bores 160, 158 and 161, the dispenser assembly 27 comprising the dispenser reservoir 28 and the pouring basin 73 is connected in firm assembly and securely mounted to the recessed portion 24 of the top panel 17.

As illustrated, the flange or bezel member 74 of the pouring basin 73 extends from and is securely connected to a top portion 166 of the pouring basin 73. The bezel member 74 extends downwardly over and is received in abutting engagement with a top portion 167 of an inner vertical flange 168 of the recessed portion 24.

Referring again to FIGURE 6, the additive which is to be deposited into the dispenser reservoir 28 is inserted therein through the loading opening 75 as defined by the sloping basin walls 77, 78 and 79. As illustrated, the opening 75 is in communication with the interior of the dispenser reservoir 28 through an opening 169 formed by a cylindrically shaped vertically extending inner wall 170 of the loading collar 93. The inner wall 170 comprises an angularly upwardly extending circumferentially continuous wall 171 which defines a horizontally disposed shoulder portion as at 172. The shoulder 172 is shaped complementarily to a corresponding shoulder portion 173 formed by the sloping basin walls 77, 78 and 79, and is separated therefrom by the sealing gasket 81.

The inner wall 170 is particularly adapted to receive the reservoir cap 80 (FIGURE 3), and to maintain the cap 80 in tight sealing engagement with the gasket 81 after the additive has been added to the reservoir 28 and the washing machine 10 is in a washing or extraction operation. For that purpose, the inner wall 170 comprises a pair of radially extending grooves as at 172 and 173, which extend vertically from the top surface 175 of the wall 171 to a bottom surface 174 of the wall 170. As can best be seen in FIGURE 8, grooves 172 and 173 are mutually diametrically opposed. The bottom surface 174 of the wall 170 forms a pair of complementarily shaped angularly upwardly extending wedging surfaces as at 176 and 177, and a pair of flat surfaces as at 185 and 195.

Referring to FIGURE 9, the reservoir cap 80 is illustrated as having a cylindrically shaped body portion 178 from which projects a pair of oppositely arranged radially outwardly extending clamping bosses or wedge members 179 and 180. The cap 80 is further characterized as having a radially outwardly extending flange portion as at 181 which comprises an angularly downwardly extending circumferentially continuous sealing surface 182. A cap turning knob 183 extends upwardly from the flange portion 181 and has projecting radially

outwardly therefrom a pair of finger turning flanges as at 184 for extending finger pressure thereon in rotating and tightening the cap 80. An aperture as at 186 is formed in one of the finger flanges 184 for inserting therethrough a safety chain C to fasten to the cap 80 and to the machine 10 to prevent misplacement thereof. In order to lock the cap 80 in tight sealing engagement over the loading opening 75 the clamping bosses 179 and 180 of the cap body portion 178 are inserted vertically downwardly into grooves 172 and 173 of the inner wall 170 (FIGURE 6). Since the diameter of the body portion 178 is only slightly less than the diameter of the opening 169, the cap 80 cannot be inserted unless the bosses 179 and 180 are so aligned with the grooves 172 and 173. After the bosses 179 and 180 have been inserted below a pair of flat surfaces 187 and 188 formed on the inner wall 170, the cap 80 is rotated in a clockwise direction, thereby moving the bosses 179 and 180 into a wedging action with wedging surfaces 176 and 177 to draw the cap body downwardly. As the cap 80 is rotated to its extreme tightened position, as determined by abutting engagement of bosses 179 and 180 with abutting surfaces as at 189 and 190, the sealing surface 182 of the cap 80 is urged into tight sealing engagement with the gasket member 81. Removal of the cap 80 is accomplished by counterclockwise rotation of the body portion 178 until the bosses 179 and 180 are in vertical alignment with the grooves 172 and 173, and then the cap 80 is withdrawn vertically from the opening 169.

As best illustrated in FIGURES 4 and 5, a pair of outwardly projecting centrally apertured mounting brackets 191 and 192 are connected in fixed assembly to the upper portion 82 of the reservoir 28. The apertures in these brackets as best illustrated in FIGURE 3, are arranged in registry with apertures 193 and 194 formed in the basin 73. Assembly bolts (not shown) are inserted into the aligned apertures and drawn up tightly to assist bolt 162 in maintaining the reservoir 28 and the basin 73 in fixed assembled relation with the cabinet closure 11. A longitudinally extending groove as at 196 (FIGURES 4 and 5) is formed in the deep well 99 for receiving a complementarily shaped brace member (not shown) mounted on the cabinet 11 for providing additional mounting support to the reservoir 28.

There has thus been provided a dispenser for admixing additive or the like into the laundry liquid which is exceptionally simple in construction, extremely compact, easy to use and provides for automatic self-cleaning. The arrangement of the deep well 99, in conjunction with the mounting of the dispenser above the operational level of laundry liquid in the tub, precludes inadvertent flow of concentrated additive into the tub prior to admixing with laundry liquid. The configuration of the cap and cap mounting means provides for simple, safe sealing of the dispenser when in use. By adapting the dispenser for connection into the hydraulic circuit on the discharge side of the pump during a washing operation, positive, controlled admixing of additives and laundry liquid is achieved without depending on less reliable, gravitationally motivated mixing forces.

Although various modifications might be suggested by those versed in the art, I wish to embody within the scope of the patent warranted thereon all such modifications as come within the scope of my contribution to the art.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. The method of admixing laundry additive with a laundry liquid in an automatic washing machine which comprises the steps of,

confining the laundry liquid in a hydraulic circuit, circulating the laundry liquid in one direction through said hydraulic circuit,

at one point in the circuit directing the laundry liquid in the form of a stream under positive hydraulic

pressure into an additive dispenser reservoir containing a supply of additive, admixing the additive and the pressurized stream of laundry liquid in the reservoir,

at a second point in the circuit situated downstream of said additive dispenser reservoir creating turbulence and reverse flow of the admixture of additive and laundry liquid to ensure thorough mixing thereof, and

at a third point in the circuit directing the admixture into a treatment zone for subjecting a batch of material to a laundry treatment.

2. In an automatic washing machine,

means forming a hydraulic circuit including a treatment zone and a pump for circulating laundry liquid from the treatment zone through the circuit and back to the treatment zone,

a dispenser adapted to receive a quantity of additive and to mix the additive with the laundry liquid and having a laundry liquid inlet and a laundry liquid outlet, first conduit means directly connecting said laundry liquid inlet of said dispenser to the discharge side of said pump for delivering a stream of laundry liquid to said dispenser,

a second conduit means separate from said treatment zone directly connecting said laundry liquid outlet of said dispenser to the suction side of said pump for delivering an admixture of laundry liquid and additive to said pump, and

third conduit means connecting the discharge side of said pump to said treatment zone for delivering the admixture of laundry liquid and additive to said treatment zone.

3. In an automatic washing machine,

means forming a hydraulic circuit including a tub and a pump for circulating laundry liquid from the tub through the circuit and back to the tub, and an additive dispensing means mounted in said circuit and comprising,

means for receiving and confining a supply of additive,

an inlet connected to the discharge side of said pump for receiving laundry liquid under pressure and directing the liquid into the additive receiving means for admixing the additive and liquid,

an outlet connected to the suction side of the pump for directing the mixture to the tub, and a divider wall in said receiving and confining means between said inlet and said outlet for diverting the flow of the admixture therebetween.

4. In an automatic washing machine, means forming a hydraulic circuit including a tub and a pump for circulating laundry liquid from the tub through the circuit and back to the tub,

a check valve means in said circuit having a pair of inlet connections and an outlet,

one of said inlet connections being in open fluid communication with said tub for receiving laundry liquid from said tub,

an additive dispensing means mounted in said circuit and including,

means for receiving and confining a supply of additive,

an inlet connected to the discharge side of said pump for receiving laundry liquid under pressure and directing the liquid into the additive receiving means to admix the additive and laundry liquid, and

an outlet connected to the other of said inlet connections on said check valve means for discharging the mixture into the check valve means, said outlet of said check valve means being in communication with said tub

whereby the mixture and the laundry liquid entering the

inlet connections of the check valve means are mixed before being recirculated into the tub.

5. In an automatic washing machine,
 - a tub adapted to confine laundry liquid,
 - a fluid pump,
 - conduit means connecting said tub and said pump,
 - a dispenser reservoir for receiving and dispensing additive solution into the laundry liquid,
 - said reservoir comprising
 - first and second conduit connectors,
 - an opening for depositing additives therein,
 - a deep well portion,
 - a downwardly sloping bottom wall for conveying additive deposited through said opening downwardly to said deep well portion, and a divider wall in said deep well portion separating and precluding flow directly between said first and said second conduit connectors,
 - a first conduit interconnecting said first conduit connector and said pump,
 - a second conduit interconnecting said second conduit connector and said tub, and
 - means to operate said pump to draw laundry liquid through said conduit means from the tub and discharge the laundry liquid through said first conduit into said reservoir for admixing with the additive and discharging said mixture through said second conduit into said tub.
6. In an automatic washing machine operable through washing operation and an extraction operation,
 - a tub adapted to confine laundry liquid,
 - a reversible fluid pump having alternate suction and discharge sides,
 - conduit means connecting said tub and said pump,
 - a drain hose in communication with said pump,
 - a dispenser reservoir for receiving and dispensing additive solution into the laundry liquid,
 - said reservoir comprising
 - first and second conduit connectors,
 - an opening for depositing additive therein,
 - a deep well portion, and
 - a downwardly slanted bottom wall for conveying additive deposited through said opening downwardly to said deep well portion,
 - a first conduit interconnecting said first conduit connector and said pump,
 - a second conduit interconnecting said second conduit connector and said tub, and
 - means to operate and reverse the flow of said pump to successively draw laundry liquid through said conduit means from the tub through the suction side of the pump and discharge the laundry liquid into said first conduit for admixing with additives in said reservoir during a washing operation and then to draw laundry liquid through said first conduit from the tub through the suction side of the pump to pass through and flush the reservoir and discharge through the drain hose during an extraction operation.
7. In a washing machine operable through a washing operation and an extraction operation,
 - a tub adapted to receive laundry liquid,
 - a top panel having a recessed portion defining an opening in communication with said tub for loading materials into said tub,
 - a hydraulic circuit for circulating laundry liquid from said tub through said circuit and back to said tub,
 - a dispenser reservoir having a pair of laundry liquid openings both situated at a given elevation and connected in said circuit, said dispenser reservoir having a loading opening also situated substantially at said given elevation and protruding through said

- recessed portion for depositing additives there-through into said reservoir,
- removable cap means for sealing said loading opening during operation of said machine,
- means for effecting a pressurized flow of laundry liquid through said circuit and said reservoir in one direction during a washing operation for admixing additive and laundry liquid, and
- means for effecting a pressurized flow of laundry liquid through said circuit and said reservoir in an opposite direction during an extraction operation for flushing and cleansing said reservoir.
8. In an automatic washing machine,
 - an enclosure cabinet,
 - a tub within said cabinet for receiving laundry liquid and material to be laundered,
 - conduit means including a circulating pump forming a hydraulic circuit for circulating laundry liquid under pressure from the tub through the circuit and back to the tub,
 - a dispenser reservoir in said circuit and mounted within said cabinet for receiving and dispensing laundry additive to the laundry liquid,
 - an opening in said cabinet for depositing additive into said reservoir,
 - receiving means defined by said reservoir and connected to the discharge side of said pump for receiving laundry liquid from said pump under positive hydraulic pressure and for injecting the liquid into the reservoir for admixing with the additive,
 - discharging means defined by said reservoir for discharging the admixture from the reservoir into the circuit for circulation to said tub, said pump being connected in said circuit between said discharging means defined by said reservoir and said tub whereby all of the admixture being discharged from said discharging means is circulated through said pump before being discharged by said pump into said tub.
9. In an automatic washing machine,
 - an enclosure cabinet having a top wall,
 - a tub within said cabinet for receiving laundry liquid and material to be laundered,
 - conduit means including a pump forming a hydraulic circuit for circulating laundry liquid under pressure from the tub through the circuit and back to the tub during a washing operation,
 - a dispenser reservoir in said circuit and mounted within said cabinet under said top wall for receiving and dispensing laundry additive to the laundry liquid,
 - an opening in said top wall for depositing additives into said reservoir,
 - first duct means defined by said reservoir and connected to the discharge side of said pump for receiving laundry liquid from said circuit under positive hydraulic pressure and for injecting the liquid into said reservoir,
 - means defined by said reservoir for confining additive therein and admixing the additive into the laundry liquid during a washing operation, and
 - second duct means defined by said reservoir for discharging the admixture from the reservoir directly to the suction side of said pump for circulation to the tub.
10. In an automatic washing machine operable through a washing operation and an extraction operation,
 - an enclosure cabinet having a top wall,
 - a tub mounted within said cabinet for receiving laundry liquid and material to be laundered,
 - a recessed portion formed in said top wall and defining an opening therein for loading material into said tub,
 - conduit means forming a reverse-flow hydraulic circuit for circulating laundry liquid from said tub through said circuit and back to said tub during a washing

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operation and from said tub through said circuit to a drain during an extraction operation,
 a dispenser reservoir mounted in said cabinet under said recessed portion for receiving and dispensing additives into the laundry liquid during a washing operation,
 said reservoir being connected in said circuit and comprising
 a loading collar extending through said recessed portion for depositing additive into said reservoir,
 a deep well portion for confining additive,
 a downwardly sloping bottom wall for conveying additive from said loading collar to said deep well portion,
 spout means for receiving a laundry liquid from said circuit during a washing operation and directing the laundry liquid in the form of a stream into the deep well portion for gradually admixing the additive and laundry liquid, and
 effluent duct means for discharging the admixture from the reservoir during a washing operation,
 said effluent duct means adapted to receive and direct laundry liquid into said reservoir during an extraction operation for flushing said reservoir, and
 said spout means adapted to discharge laundry liquid from said reservoir to said circuit during an extraction operation.

11. In an automatic washing machine operable through a washing operation and an extraction operation, a tub for receiving washing liquid, conduit means forming a reverse-flow hydraulic circuit for circulating laundry liquid from the tub through the circuit and back to the tub during a washing operation and from the tub through the circuit to a drain during an extraction operation, a fluid pump in said circuit for effecting circulation of said laundry liquid and having successively alternate suction and discharge sides, an enclosure cabinet having a top wall, a recessed portion in said top wall having an opening formed therein for loading material into said tub, an elongated generally horizontally disposed additive dispenser reservoir situated below said recessed portion.
 said reservoir being connected hydraulically into said circuit and comprising an apertured loading collar projecting upwardly through said recessed portion for depositing a charge of additive into said reservoir,
 a downwardly sloping bottom wall,
 a deep well formed in a portion of said bottom wall for confining the charge of additive,
 a divider wall for separating said reservoir into substantially longitudinal sections,
 first duct means in one of the sections for receiving laundry liquid from said circuit on the discharge side of said pump during a washing operation and for directing the liquid in the form of a pressurized stream into said deep well for admixing additive into the laundry liquid in a turbulent state and then re-directing the admixture into another of said section,
 said second duct means in another of said sections for discharging the admixture back into the circuit during a washing operation,
 a dispenser pouring basin above said recessed portion and surrounding said loading collar for directing additive deposited on said basin into said loading collar,
 means for mounting said reservoir and said basin on said recessed portion in fixed assembly with

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said recessed portion disposed intermediate the reservoir and the basin, and
 removable cap means for sealing said aperture in said loading collar during operation of said machine.

12. In an automatic washing machine as defined in claim 11, said reservoir being disposed at an elevational level which is higher than the highest operating level of laundry liquid in said tub.

13. In an automatic washing machine operable through a washing operation and an extraction operation, a tub having an upstanding wall adapted for receiving laundry liquid, conduit means forming a reverse-flow hydraulic circuit for circulating laundry liquid from the tub through the circuit and back to the tub during a washing operation and from the tub through a circuit to a drain during an extraction operation, a fluid pump in said circuit for effecting circulation of said laundry liquid and having successively alternate suction and discharge sides, an enclosure cabinet having a top wall, a recessed portion in said top wall having an opening formed therein for loading material into said tub, an elongated generally horizontally disposed additive dispenser having a reservoir disposed below said recessed portion in lateral spaced relation to said upstanding wall and comprising an apertured loading collar projecting upwardly through said recessed portion for depositing a charge of additive into said reservoir, a downwardly sloping bottom wall, a deep well formed in a portion of said bottom wall for confining the charge of additive, a divider wall for separating said reservoir into substantially longitudinally shaped sections, first duct means in one of the sections connected to said circuit for receiving laundry liquid from said circuit on the discharge side of said pump during a washing operation and for directing the liquid in the form of a pressurized stream into said deep well for admixing additive into the laundry liquid in a turbulent state and then forcing the admixture into another of said sections, and second duct means in another of said sections connected to said circuit for discharging the admixture back into the circuit during a washing operation, a dispenser pouring basin situated above said recessed portion and surrounding said loading collar for directing additive deposited on said basin into said loading collar, said basin having a downwardly sloping bezel member projecting outwardly over a portion of said opening in said recessed portion, means for mounting said reservoir and said basin respectively below and above said recess portion on said recessed portion in fixed assembly, and removable cap means for sealing off said aperture in said loading collar during operation of said machine.

14. A dispenser reservoir comprising, a housing having an end wall, a bottom wall with a relatively deep well portion for confining additive therein and an opening for charging said well with additive, removable cap means for sealing off said opening, an inlet duct and an outlet duct in said end wall, said inlet duct extending downwardly toward said well for receiving and directing laundry liquid into said well for admixing the liquid with the additive, whereby the admixture will be discharged from said reservoir through said outlet duct.

15. A dispenser reservoir comprising a housing having a pair of side walls and first and second end walls,

- a bottom wall having a deep well portion for confining additive therein and sloping downwardly toward said well,
- a first fluid duct formed in said first end wall for receiving laundry liquid into said housing under positive pressure and directing the liquid in a stream into said well for creating turbulence and admixing with said additive,
- means forming a divider wall within said housing substantially between said side walls and extending from said first end wall a predetermined distance toward said second end wall for directing the admixture first toward said second end wall and then toward said first end wall, and
- a second fluid duct formed in said first end wall for discharging the admixture from said housing.
- 16.** A dispenser reservoir for dispensing additives comprising
- a housing having an elongated generally horizontally extending first portion with a first end wall,
- a second portion extending at an angle to said first portion and having a second end wall,
- an opening in said housing for depositing additive therein,
- a bottom wall in communication with said opening having a deep well adjacent said second end wall for receiving the additive from said opening,
- said bottom wall sloping gradually downwardly toward said deep well,
- first and second ducts projecting through said second end wall above said deep well for receiving fluid into and discharging it from said reservoir,
- each of said ducts comprising a connector portion for connecting to a fluid hose and a spout portion positioned within said reservoir and extending substantially vertically relative to said deep well for alternately directing fluid in a stream into said deep well for admixing with said additive and then conveying fluid from said deep well, and
- a divider wall in said reservoir extending for a predetermined distance from said second end wall between said ducts for dividing said deep well and for directing fluid being admitted from one of said ducts around said divider wall to discharge from the other of said ducts,
- said divider wall terminating at its distal end adjacent said opening.
- 17.** A dispenser reservoir for dispensing additives comprising,
- a relatively shallow elongated housing having a longitudinal axis and comprising,
- a first portion extending substantially parallel to the longitudinal axis,
- a second portion extending at an angle to said first portion,
- a front side wall and a rear side wall,
- first and second end walls in said first and second portions respectively, a top wall having a generally horizontally disposed member extending over said second portion and a member sloping downwardly from said rear side wall to said front side wall over said first portion,
- said top wall having an arcuately shaped downwardly curving member interconnecting said horizontally disposed member and said downwardly sloping member,
- a bottom wall forming a deep well adjacent said second end wall and sloping gradually downwardly toward said deep well for receiving and confining the deposit of additive,
- a loading collar having a generally cylindrically shaped upstanding wall projecting vertically upwardly from

the sloping member of said top wall, a centrally apertured inner wall positioned within the confines of said upstanding wall in spaced relation thereto,

- said inner wall having a lower end portion comprising a flat surface and a downwardly extending wedging surface,
- a slanting lip surface interconnecting the upper extremities of said loading collar and said inner wall,
- a reservoir cap having a cylindrically shaped body portion adapted to be inserted into said aperture and comprising,
- a radially outwardly projecting boss on said body portion for engaging said wedging surface of said inner wall for tightening said cap, and
- a flange portion having a sealing surface for engaging said slanting lip surface in tight sealing engagement,
- a divider wall extending from said second end wall for a predetermined distance and terminating adjacent said loading collar,
- a pair of fluid hose connectors projecting through said second end wall and arranged in juxtaposition on either side of said divider wall, and
- a vertically downwardly extending spout connected to the inner end of each of said connectors for directing fluid downwardly into or receiving fluid upwardly away from said deep well.
- 18.** In an automatic washing machine,
- means forming a hydraulic circuit including a tub and a pump for circulating laundry liquid from the tub through the circuit and back to the tub,
- an additive dispensing means mounted in said circuit and including
- means for receiving a supply of additive,
- an inlet for receiving a stream of laundry liquid into said receiving means to mix with the additive, and
- an outlet for conveying the admixture of laundry liquid and additive from said receiving means,
- a first conduit in said circuit connecting the discharge side of said pump and the inlet of said receiving means,
- a second conduit in said circuit, exclusive of said tub, connecting said outlet of said receiving means and the suction side of said pump,
- a third conduit in said circuit connecting the discharge side of said pump to said tub, and
- means communicating laundry liquid from said tub to said second conduit at a point in said second conduit between said outlet of said receiving means and the suction side of said pump to add laundry liquid to the admixture of laundry liquid and additive being circulated from said outlet of said receiving means to the suction side of said pump.

References Cited by the Examiner

UNITED STATES PATENTS

2,431,040	11/1947	Harvey	68—17
2,540,431	2/1951	Davis et al.	68—17 X
3,019,629	2/1962	Ross	68—17
3,035,431	5/1962	Smith et al.	68—17 X
3,066,520	12/1962	Jennings	68—17

FOREIGN PATENTS

486,868	9/1952	Canada.
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