

Feb. 16, 1937.

H. L. JOHNSTON

2,071,036

WASHING MACHINE

Filed Aug. 30, 1930

6 Sheets-Sheet 1

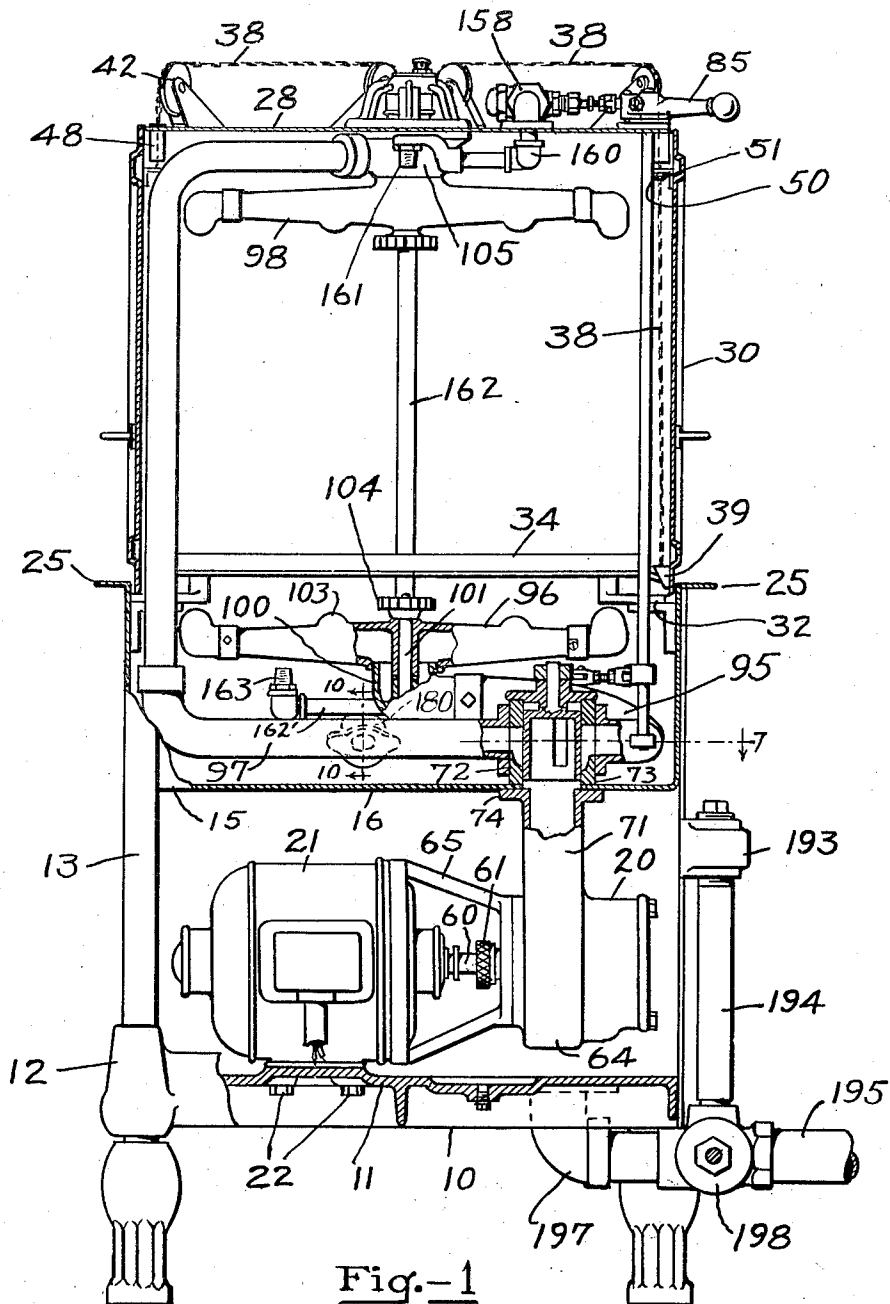


Fig.-1

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WASHING MACHINE

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6 Sheets-Sheet 2

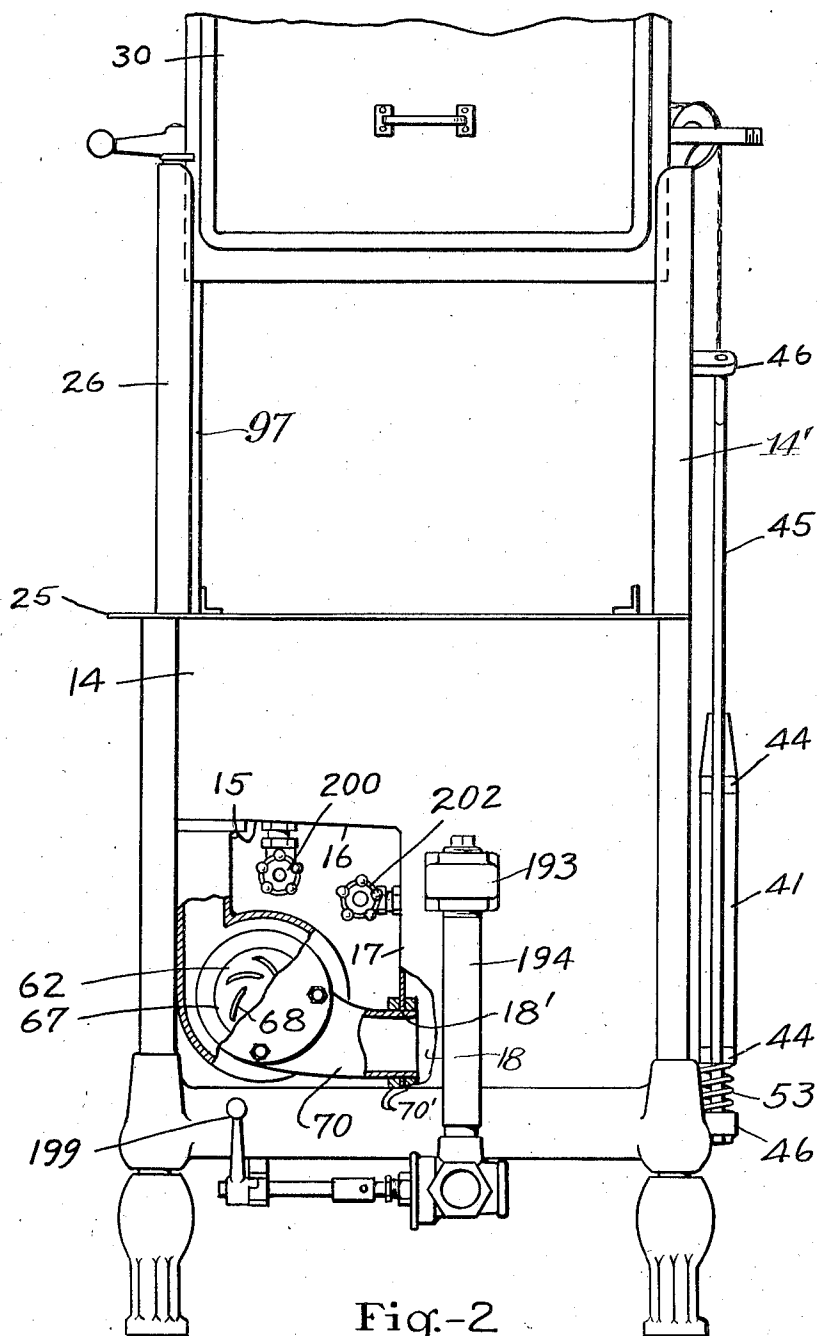


Fig.-2

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WASHING MACHINE

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6 Sheets-Sheet 3

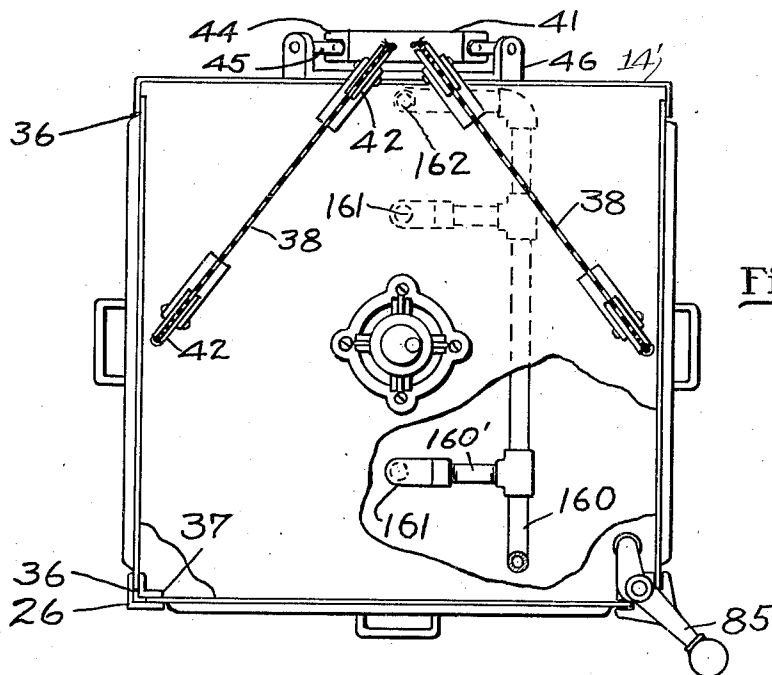


Fig.-3

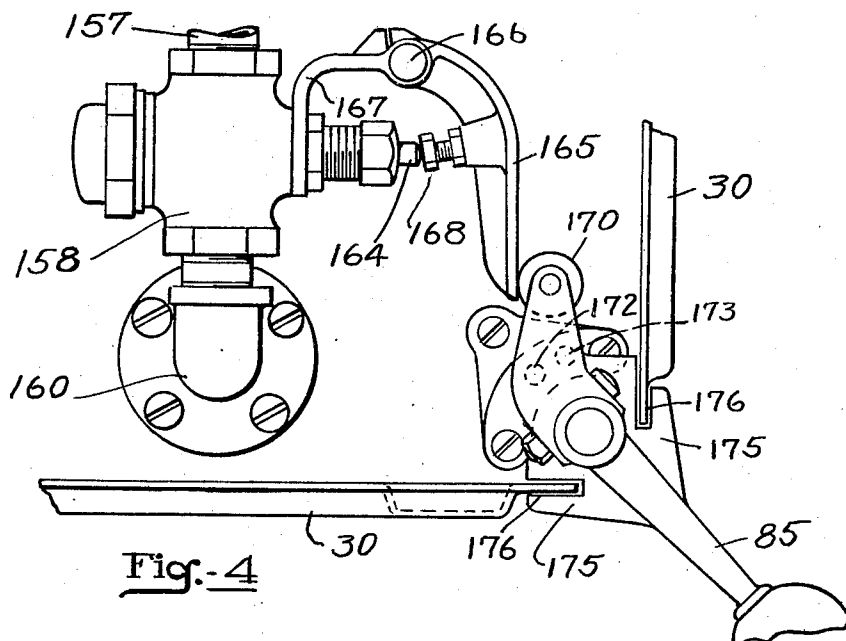


Fig.-4

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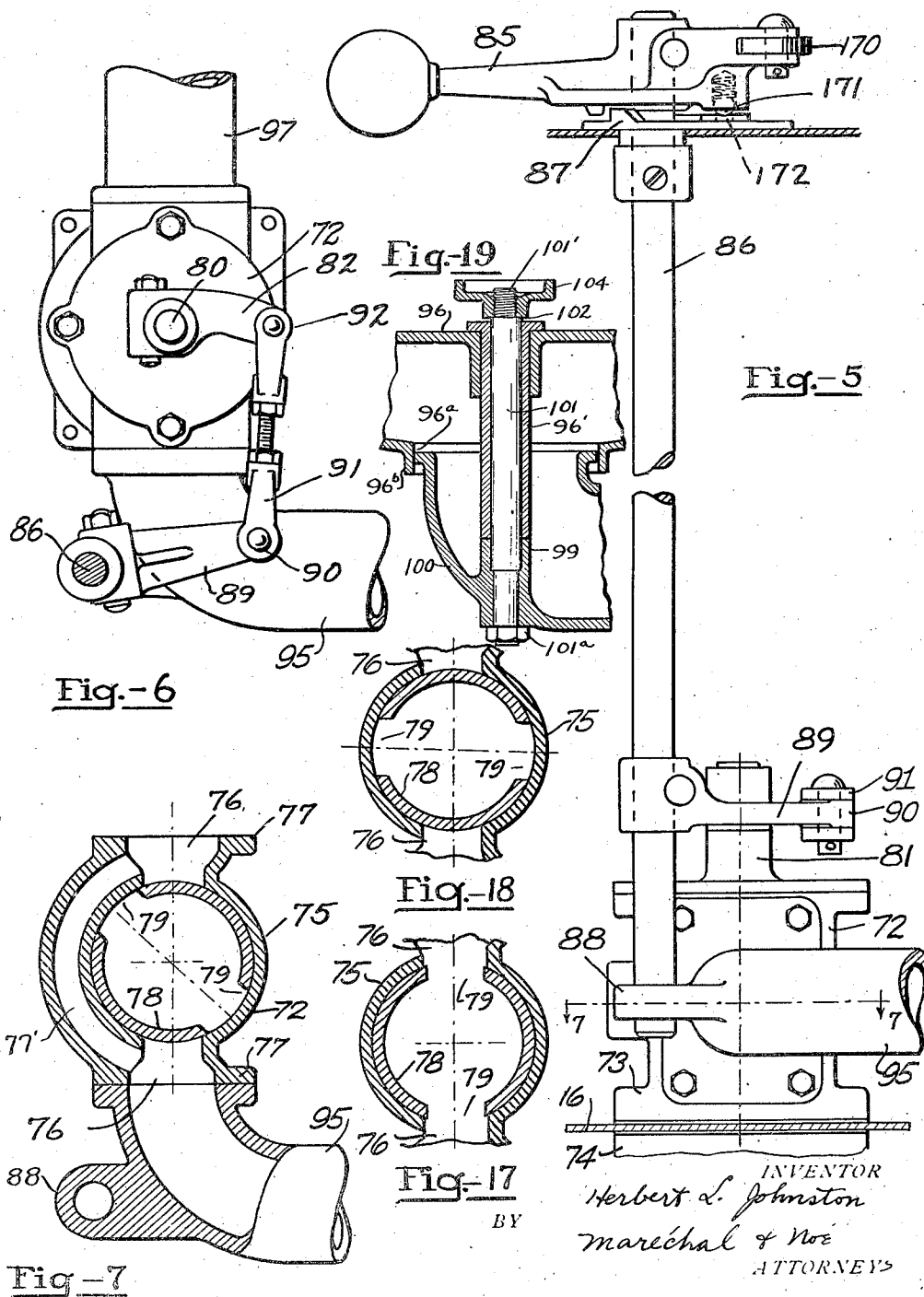
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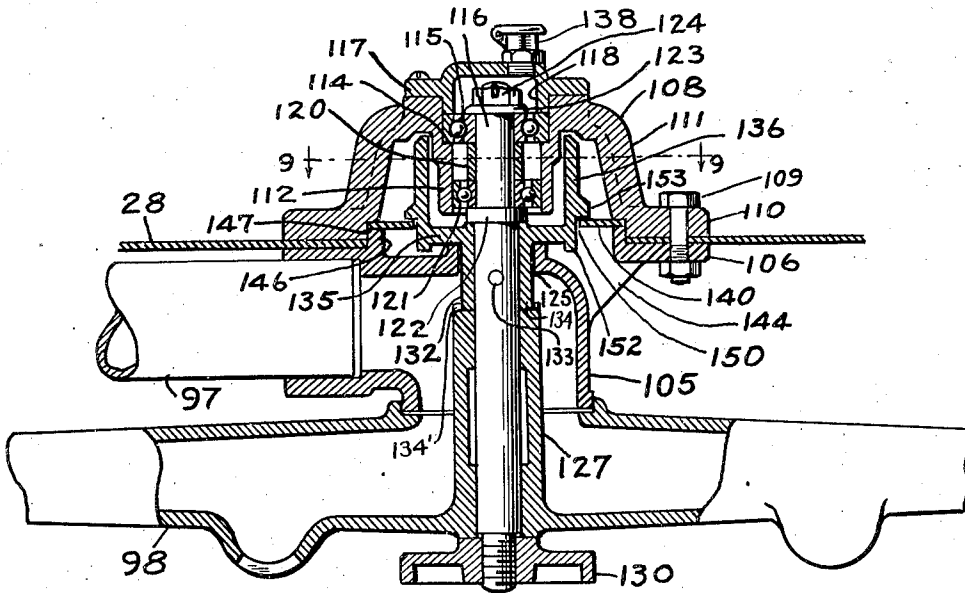


Fig. 8

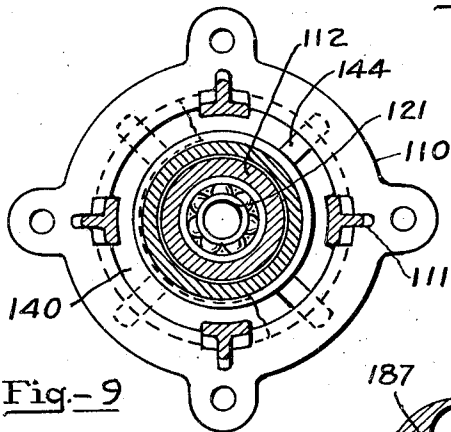


Fig. 9

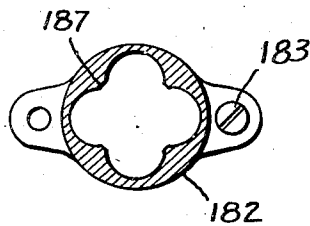


Fig. 11

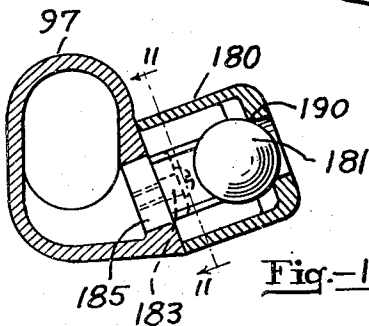


Fig. 10

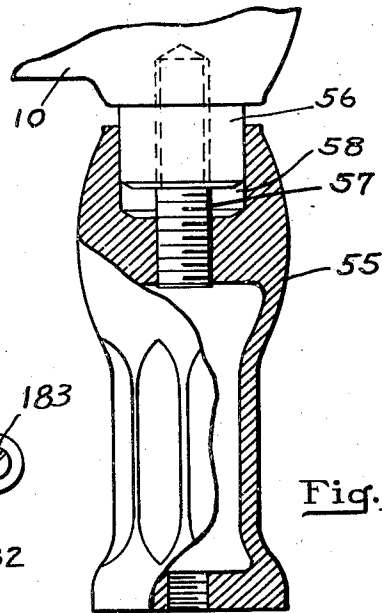


Fig. 12

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WASHING MACHINE

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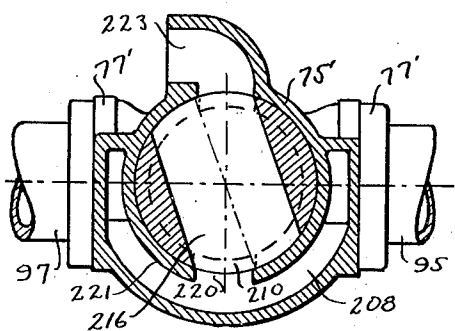


Fig. 16

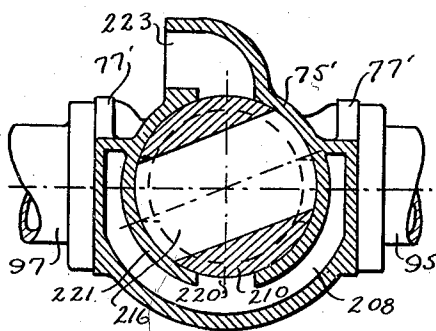


Fig. 15

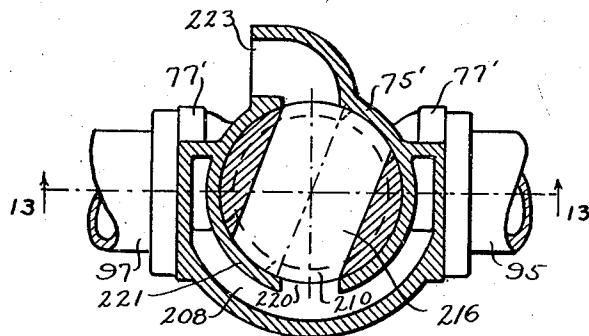


Fig. 14

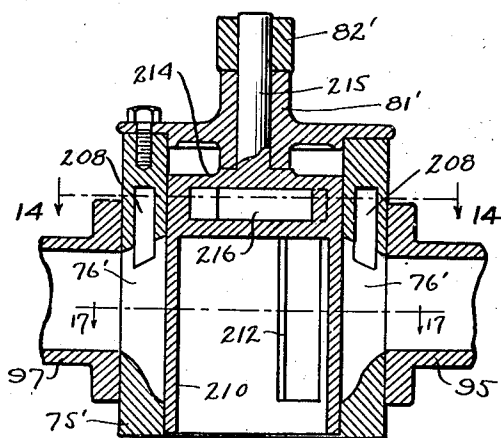


Fig. 13

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UNITED STATES PATENT OFFICE

2,071,036

WASHING MACHINE

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Application August 30, 1930, Serial No. 478,978

14 Claims. (Cl. 141—9)

This invention relates to washing machines.

One of the principal objects of the invention is the provision of a washing machine of simple construction which is adaptable to various installation conditions, may be readily set up for service, and is capable of sustained use without deterioration of the washer parts.

Another object of the invention is the provision in a washing machine of this character of a rotatable wash arm mounted within the washing compartment, and supported upon a bearing positioned on the exterior of the washing compartment and effectively protected from the atmosphere of the washing compartment.

A further object of the invention is the provision of a washing machine which is so constructed that the various operations may be carried out in rapid sequence, the arrangement of parts being such that the operator is required to follow a proper procedure in the cycle of operation.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings, in which like characters of reference designate like parts throughout the several views thereof—

Fig. 1 is a side elevational view of a washing machine constructed in accordance with this invention; some of the parts being shown in section for clearness of illustration;

Fig. 2 is an end elevation of the washing machine;

Fig. 3 is a plan view of the washing machine in which some of the parts are broken away;

Fig. 4 is an enlarged detail of a portion of the valve control;

Fig. 5 is a fragmentary showing of the valve control;

Fig. 6 is a plan view of the wash water distributing valve;

Fig. 7 is a sectional view taken on the plane of the line 7—7 of Fig. 5; the valve member being shown in vertical position;

Fig. 8 is a vertical sectional view of the upper wash arm and its supporting structure;

Fig. 9 is a sectional view taken on the plane of the line 9—9 of Fig. 8;

Fig. 10 is a sectional view taken on the plane of the line 10—10 of Fig. 1;

Fig. 11 is a sectional view taken on the plane of the line 11—11 of Fig. 10;

Fig. 12 is an enlarged detail of the supporting leg;

Fig. 13 is a vertical sectional view of a modified form of wash water distributing valve;

Fig. 14 is a sectional view taken on the plane of the line 14—14 of Fig. 13 showing the valve in neutral position;

Fig. 15 is a view taken similarly to Fig. 14 showing the valve in wash position;

Fig. 16 is a view taken similarly to Fig. 14 showing the valve in rinse position;

Fig. 17 is a sectional view taken on the line 7—7 of Fig. 5 and the line 17—17 of Fig. 13 showing the wash water valve member in wash position;

Fig. 18 is a view taken similarly to Fig. 17 showing the wash water valve member in rinse position; and

Fig. 19 is a vertical sectional view of a portion of the lower wash arm and supporting structure therefor.

Cross reference is here made to Patents Nos. 2,013,387 and 2,058,083 granted upon divisional applications of the present application.

The washing machine comprises generally a frame within which is mounted a wash water circulating pump and driving motor therefor, a washing compartment, and an enclosing housing for the washing compartment; the housing being provided with suitable doors for the reception and withdrawal of racks of dishes and like articles.

As shown, the machine is provided with a cast metal base 10 having a bottom portion 11 and extending flanges 12; the base being substantially rectangular in shape. Suitable supporting members 13, which are preferably of angular cross section, extend upwardly from the corners of the base portion 10 for the support of the washing machine structure. The washing compartment comprises an open top tank which is composed of side walls 14 and a bottom wall 15 suitably joined as by welding to form a liquid tight compartment which may be attached as a unit to the upright members 13 to which it is secured as by means of bolts. The bottom wall 15 comprises an upper substantially horizontally extending portion 16 which extends part way across the bottom of the tank, then extends downwardly as indicated at 17 to substantially the level of the base 10, then continues on a substantially horizontal plane to join the rear wall of the tank. This arrangement of parts provides a washing compartment, comprising the four vertically extending walls 14 and the bottom wall 15, which in its lower extended portion incorporates a water supply chamber or sump 18 formed by the downwardly extending wall portion

17 and the side walls 14. The area beneath the bottom wall portion 16 and adjacent the wall portion 17 provides a space which is freely open and exposed at the sides and front of the machine. This space provides a readily accessible location for a wash water circulating pump 20 and its driving motor 21; the driving motor being suitably supported upon the base portion 11 as by means of attaching bolts 22.

The rear wall of the tank has attached to it a wall portion 14' which extends upwardly to the top of the machine and forms part of an enclosing casing for the washing compartment. The side and front walls 14 terminate in outwardly extending flanges 25 which are shown positioned at substantially the level of a work table or shelf to permit racks of dishes to be readily moved into and withdrawn from the machine. Angle bars 26, which are positioned at the forward corners of the washing compartment and are suitably joined to the members 13 by connecting bolts, extend upwardly from the level of the flanges 25 and, with the rear wall 14', provide a support for the top 28 of the machine. The angle bars 26, in cooperation with the rear wall 14', form guides for suitable movable doors 30 which in their closed position extend from the flanges 25 to the top of the machine and, with the rear wall 14', provide a water tight enclosing housing for the washing compartment.

The supporting frame comprising the angle members 13 and 26 is provided with brackets 32 for the support of suitable rack guides or tracks 34 which are adapted to carry the racks or trays holding the dishes or articles to be washed within the casing. The rack guides 34 may be shaped to permit the dish carrying racks to be entered at one side of the machine and be withdrawn from the opposite side, or to be entered from one side and withdrawn from either of the adjacent sides; this arrangement of parts providing a machine which is readily adaptable to meet various conditions of installation. The doors are adapted to slide vertically and operate in grooves 36 formed between the angle members 26 and guide members 37 which are attached to the inside surface of the angle members.

A mechanism is provided whereby the two doors through which the racks are entered or withdrawn may be operated simultaneously; the arrangement being such that movement of one door automatically effects corresponding movement in the other door. This door operating mechanism includes a counterbalance weight so that the door movement may be accomplished with but little effort. Each of the doors regularly used, which as illustrated in Fig. 3 comprises the oppositely positioned doors, is provided with a connecting chain 38 which is attached at one end to the lower edge of the door by means of an attaching bracket 39 and is connected at the opposite end to the counterbalancing weight 41; suitable supporting pulleys 42 being provided for the guidance of the chains 38. The counterbalance 41, which is preferably a cast member, is provided with oppositely extending forks 44 which are adapted to engage spaced rods 45 to properly guide the travel of the weight 41. The guide members 45 are supported from the machine by suitable brackets 46 and are shaped to stand substantially parallel throughout the normal range of travel of the counterweight, and to flare outwardly beyond the normal range of travel so that by lifting the weight to a position beyond its normal range of travel it may be read-

ily withdrawn from the guides. This arrangement of guide members facilitates the assembly of the machine and permits the counterweight to be inserted in operating position without disturbing the assembled guide members. The weight of the member 41 is adjusted to substantially balance the combined weights of the two doors to which it is connected so that upon manual actuation of one door the balance of weight will be such as to automatically actuate the other connected door. The chains 38 pass through the top cover member 28 within suitable guides 48 and, as mentioned, are attached to the lower edges of the doors so that these doors may be raised to substantially the full opening of the housing to completely expose the interior of the housing. The upward movement of the doors is limited by contact of the attaching members 39 with rubber bumpers 50 which are carried upon brackets 51 suitably mounted on the supporting angles 26. Downward movement of the counterweight 41 is limited by springs 53 which are positioned upon the guides 45 and rest upon the lower supporting brackets 46. The arrangement of counterweight and connecting chains is such that any two doors may be readily attached to the counterweight; the attached doors being those in the path of travel of the dish racks.

As shown, the machine is supported at each of its four corners by means of supporting legs 55; these legs incorporating an adjustment whereby the machine may be readily leveled to stand in proper operating position. As shown, the base casting 10 is provided at each of the four corners with a downwardly extending cylindrical extension 56. A concentrically positioned threaded stud 57 extends downwardly from the cylindrical member and threadedly engages the leg 55. The upper end of the leg is provided with a cylindrical socket of such size that it may be received upon the member 56 so that when the leg 55 is threaded onto the stem 57 the threaded connection between the leg and stem 57 will be concealed by telescoping of the portion 56 over the socket 58. The cylindrical member 56 and socket 58 are provided of sufficient length that the interengagement of these parts will exist throughout a considerable range of adjustment for the leg so that the threaded connecting pin 57 will remain hidden under all conditions.

The electric motor 21 which drives the pump 20 is provided with an extending armature shaft 60 which extends through a suitable stuffing box 61 into the interior of the pump for actuation of the pump impeller 62. The housing 64 of the pump is provided with an attaching structure 65 whereby the pump is supported at one side directly from the frame of the motor 21. The pump housing, which is preferably of substantially cylindrical cross section, encloses the impeller 62 which comprises a plate portion 67 upon which are formed a plurality of vanes 68. Upon actuation of the pump by its driving motor wash water is drawn from the sump through an intake 70 connecting the sump to a suction opening in the pump housing 64. The rotating impeller forces the water drawn from the sump through a discharge pipe 71, preferably formed as an integral part of the housing 64, to a valve 72. The motor and pump, including the circulating pipes 70 and 71 comprise a unitary structure which may be readily assembled in position upon the washing machine by merely attaching the motor to the base 10 by means of screws 22, by completing the connection of the pipe 71 to the

valve 72, and by providing a water tight joint at the point of entrance of the suction pipe 70 within the sump 18. As shown, the end of the pipe 70 which enters the sump 18 through an opening 18' is threaded for the reception of suitable lock nuts, 70'; one being provided on the pipe on the exterior of the sump while the other is adapted to be positioned on the pipe on the interior of the sump after assembly. Suitable gaskets are provided between the nuts and the sump wall so that upon drawing the nuts tight a water tight joint will be provided. The valve 72 is shown positioned on the interior of the washing compartment adjacent the horizontally extending wall 16 and is provided with a contacting flange 73 which is adapted to coact with a similarly shaped flange 74 on the discharge pipe 71 to provide a water tight passage for washing fluid from the pump through the casing member 16 to the interior of the valve 72.

The valve 72 comprises a casing 75 which is substantially cylindrical in cross section and which is provided with suitable passages 76 and flanged connections 77 for the attachment of connecting pipes leading to suitable wash water discharge nozzles such as the rotary wash arms shown. A hollow cylindrical valve member 78 is rotatably mounted within the valve casing 75 and is provided with opposed slots 79 which in open position of the valve member are adapted to coincide with discharge openings 76 in the valve casing connecting to the wash arm conduits. The provision of separate slots 79 in the valve member for each wash arm conduit results in an independent connection between the wash water supply pipe 71 and each conduit so that the flow of water to each wash arm is balanced. A by-pass is connected around the valve 72 so that the connecting pipes to the wash arms are always in communication with each other. As shown, a by-pass 77' is formed within the valve casing 75, and connects the passages 76. The valve member 78, which is rotatably mounted within the casing 73, is provided with an axially extending stem 80 which is suitably supported within a sleeve 81 formed in the valve housing. The stem 80 extends beyond the exterior of the housing 75, and has fixed to it an operating arm 82 to which suitable linkage is attached connecting the arm 82 to an operating handle. As shown, the operating handle comprises a lever 85 which is positioned on the exterior of the machine adjacent a corner of the top 28. The lever 85 is fixed to a rotatably movable connecting rod 86 which is suitably supported at one end by means of a bracket 87 provided on the top member 28 and is guided at its lower end in a bracket 88 which is shown formed on a portion of the wash water distributing structure. The rod 86 has attached to it a crank arm 89 which has pivotally connected to it at 90, an adjustable linkage 91 whose opposite end is pivotally connected at 92 to the arm 82. Movement of the control arm or operating handle 85 results in corresponding movement of the valve member 78.

Wash water from the valve 72 is carried to the several wash arms by means of the conduits or connecting pipes which are attached by suitable means to the flanges 77 of the valve casing 75; the pipe 95 providing a communicating passage from the valve to a lower wash arm 96, while the pipe 97 provides a fluid passage to an upper wash arm 98. As shown, the pipe 95 extends from the valve 72 to substantially the vertical center line of the machine and there is pro-

vided with an elbow 100 which terminates in an open upstanding end. A vertical shaft 101 is suitably supported within the elbow 100 and forms a journal upon which the wash arm 96 is mounted. This wash arm 96 comprises a hollow member which is freely rotatable upon the supporting shaft 101 and is provided with a plurality of spray openings 103 which direct the wash water upwardly. Certain of the spray openings are inclined so that the reaction forces of the water on the nozzles impart a rotating movement to the wash arm. The wash arm is maintained in position upon the shaft by means of a hand nut 104 which is threadedly received upon the upper threaded end 101' of shaft 101 until the nut engages a shoulder 102 on the shaft immediately below the threaded portion. The wash arm may be provided with a bearing sleeve 96' which rotatably engages the shaft 101. The lower end of sleeve 96' is adapted to rest, during the time the wash arm is not operating, against the upper portion of a lug 99 formed integrally with elbow 100, the lug having a suitable bore through which the shaft 101 passes and to which it is fastened by a nut 101^a received upon an exterior threaded portion of the pin 101 and engaging the exterior of the lug 99. The proportioning of the parts is such that the distance between the upper surface of the lug 99 and the shoulder 102 is somewhat greater than the length of the bearing sleeve 96' which extends between these parts so that a free running clearance is provided for the wash arm 96. The under side of the wash arm 96 is provided with an opening 96^a which rotatably receives the upper open end of the elbow 100 in a free running fit to minimize leakage. An annular flange 96^b is provided about the opening 96^a so that the wash arm 96 can move vertically on the pin 101 between a lower position in which it engages the top surface of the lug 99 and an upper position in which it engages the nut 104 without moving the flange 96^b out of cooperative relationship with the upper end of elbow 100 so that wash water is not wasted.

The distributing pipe 97, which is positioned within the confines of the washing compartment and housing, extends from the valve casing 75 to a corner of the washing machine housing, then extends upwardly toward the top of the housing, then inwardly for attachment to an elbow or conduit member 105 which is positioned within and substantially upon the vertical center line of the machine. The member 105, which provides a fluid conduit for wash water from the pipe 97 to the upper discharge member 98, has a spaced flange 106 which is bolted to the interior side of the cover member 28 beneath and in alignment with an opening provided in the cover member. A bearing supporting member 108 is positioned on the exterior of the housing member 28 in substantial alignment with the member 105; the entire assembly being held together by means of bolts 109.

The member 108, as shown, comprises an attaching flange 110, upwardly extending ribs 111, and a cylindrical bearing retainer or sleeve 112 within which are mounted suitable bearings for the support and free rotational movement of the upper wash arm 98. The interior of the downwardly extending cylindrical sleeve 112 is provided with a step 114 for the support of a ball bearing 115. The bearing 115 is carried upon a shaft 116 which is removably attached to and supports the wash arm 98. The bearing is posi-

tioned to sustain the thrust loads on the shaft 116. A cap member 117 secured to the portion 112 has a downwardly extending cylindrical flange 118 which is adapted to bear against and position this bearing. The bearing 115, a spacing sleeve 120 and a second bearing 121 are secured to the shaft 116 by being clamped between a collar 122 shown formed as an integral part of the shaft, and a washer 123 which is held in clamped engagement against the bearing assembly by means of a nut 124 threadedly engaging the end of the shaft 116. The lower bearing 121 contacts with the interior cylindrical surface of the sleeve 112 and, with the bearing 115, serves to maintain the shaft 116 in correct alignment. The shaft 116 extends downwardly through an opening 125 provided in the member 105 and at its lower end is engaged by a sleeve 127 which is provided on the wash arm 98 and extends upwardly upon the axis thereof to within the area of the member 105. The lower end of the shaft 116 is threaded to receive a nut 130 which holds the member 98 in position upon the shaft. Upon assembling the wash arm 98 upon the shaft 116 and drawing the nut 130 tight the wash arm 98 is held securely in location by contact of the sleeve 127 against a collar 132 which is held to the shaft as by means of a pin 133. The collar 132 is provided with downwardly extending tongues 134 which fit within corresponding grooves 134' in the upper end of the sleeve 127 to form a positive driving connection between the wash arm 98 and the shaft 116.

The collar 132 is provided with a disk like extension 135 having attached to its peripheral edge an upstanding cylindrical collar 136 which encircles the portion 112 of the member 108. The disk 135 and collar 136 form a substantially cup shaped retainer for the retention of oil supplied to the bearings 115 and 121; a suitable oil feeding means such as the oil cup 138 being provided upon the cover member 117. The cup shaped retainer cooperates with a disk like member 140 which is positioned between the members 105 and 108 to prevent the passage of washing fluid from the interior of the casing through the opening provided in the casing cover 28 adjacent the point of attachment of the members 105 and 108. As shown, the body of the member 105 and the flange portion 106 are connected together by a plurality of webs 144 between which are openings which provide communicating passages to the interior of the casing. The flange 106 is provided with an upstanding collar 146 which is adapted to be received within the cylindrical groove 147 provided in the flange portion 110 of the member 108. The disk like retaining member 140 is positioned within the groove 147 and is held in place by the sleeve 146 when the members 105 and 108 are clamped in position. The member 140 is provided with an opening of such size that a small clearance space, indicated at 150, is provided between the disk like member 140 and the sleeve 136. Suitable peripheral ridges 152 and 153 are provided on the sleeve 136 adjacent the member 140 to prevent the passage of washing fluid between these members and to direct back into the washing compartment any fluid which may enter this area. Any washing fluid which may escape from the conduit 105 through the opening 125 adjacent the shaft 116 will, upon rotation of the member 132, be carried outwardly on the disk like face 135 and will be discharged therefrom by being thrown centrifugally from the flange 152 whereupon it enters the housing through the

passages in the member 105. Any washing water that may pass through the passages between the body portion and flange 106 of the member 105 is prevented from reaching the exterior of the housing by the close fitting relationship between the disk 140 and the flanges 152 and 153. This construction which positions the wash arm bearings on the exterior of the housing not only provides an effective means of retaining the bearing lubricant but also protects, by the close fitting relationship between the stationary disk 140 and the flange 153 of the rotatable lubricant retainer, effectively prevents the passage of washing fluid to the exterior of the housing and tends to prevent the escape of the damp atmosphere from the interior of the washing compartment housing through this small clearance space. However, if any steam or water vapor should escape between the disk 140 and flange 153 this is promptly dissipated into the outer atmosphere by the normal circulation of air accessible to this area by the ribbed construction of the bearing supporting member; the damp atmosphere of the washing compartment does not, therefore, have an opportunity to come into contact with the wash arm bearings. The bearing lubricant retainer sleeve 136 terminates in close fitting relationship to the portion 112 of the bearing support and thus functions as a protecting enclosure to further minimize the likelihood of the ingress of dampness or steam from the washing compartment into the bearing enclosure.

Means are provided for supplying rinse water to the interior of the housing including a supply pipe 157, which may be attached to some suitable source of rinsing water, and a control valve 158 which is adapted to be actuated from the control lever 85. A pipe connection 160 extends from the valve 158 to the interior of the housing where branch pipes 160' connect to suitable rinse nozzles 161 which are shown positioned adjacent the top of the washing compartment to direct sprays of rinse water downwardly towards the articles being washed. A pipe 162, which is shown positioned adjacent the rear wall of the housing and out of the path of travel of the dish racks, extends downwardly from the pipe 160 and has connected to it branch pipes 162' to which additional rinse nozzles 163 are attached; the nozzles 163 being directed upwardly. The valve 158 is provided with a spring pressed control stem 164 which is adapted to constantly urge the valve to closed position. An arm 165 is pivotally supported at 166 upon a bracket 167 carried by the valve 158; the arm 165 being provided with an adjustable stud 168 which is adapted upon actuation of the arm to contact with the stem 164 to open the valve. The arm 165 is positioned so that upon movement of the lever 85 in one direction a roller member 170 carried by the lever 85 will contact with and actuate the arm 165 to open the rinse valve.

The rinse valve actuating arm 165 and the wash water valve member 78 are positioned with respect to one another so that actuation of the control lever 85 in one direction will permit opening of one valve and movement in the reverse direction will permit opening of the other valve. As shown, the lever 85 will, upon being moved in a counterclockwise direction from the neutral position shown in Fig. 4, contact with the arm 165 to actuate the rinse valve. Upon movement of the valve in a clockwise direction from neutral position, the valve member 78 will be moved to bring the slots 79 into reg-

istration with the passages 76 to permit the flow of wash water from the pump to the wash arms 96 and 98. For the convenience of the operator the wash lever 85 carries a spring pressed detent 171 which cooperates with spaced holes formed in the supporting bracket 87 to permit the control lever 85 to be maintained in either neutral or washing position without requiring the operator to hold the valve in either of these positions. As shown, a detent retaining hole 172 is provided at the neutral position, and a second hole 173 is provided to maintain the valve handle in washing position. No detent hole is provided for the rinse position as it is desirable to require the operator to intentionally maintain the valve in this position against the tension of the rinse valve spring to prevent the waste of rinse water. Upon completion of the washing operation, the operator moves the control lever 85 in a counterclockwise direction from washing position to rinsing position where the valve must be held to be maintained open against the spring tension exerted on the stem 164. At this time hot rinsing water is supplied to the rinsing nozzles and inasmuch as this operation usually lasts about four to six seconds the spring tensioned control is provided so that the control will not be accidentally left in rinsing position with consequent waste of rinse water.

To insure that the proper procedure in the cycle of operation will be followed by the operator the control lever 85 is provided with means which permits actuation of the control valve only when the doors are closed and prevents actuation of this valve when the doors are open. As shown, the lever 85 is provided with outwardly extending flanges 175 which have provided therein slots 176 so positioned that with the lever 85 in neutral position (shown in Fig. 4) the doors 30 adjacent the control lever 85 may be opened by sliding upwardly through the slots 176. In any other position of the control lever the flanges overlie the upper edges of these doors so that the operator is prevented from raising these doors during a washing or rinsing operation. This arrangement of interlock between the control lever and the doors, and the provision of the interconnected counterweight makes it impossible to move the control lever from neutral position when any of the doors are opened; the doors positioned adjacent the interlock flange being adapted to cooperate with the flange directly to prevent valve movement, while the door positioned away from the flange is adapted to cooperate through the interconnecting counterweight chains to actuate an adjacent door. With the valve in operating position the adjacent doors are locked closed by the interlock flange. The remotely positioned door, although not positively maintained closed, is relieved of the balancing effect of the counterweight upon latching the adjacent doors. Consequently upon opening the remotely positioned door under these circumstances it is necessary to lift the entire weight of the door. This serves as a reminder that the door is not to be opened.

It is particularly desirable in order to reduce the time for washing that the operator should be able to move the control instantly from washing to rinsing position and to secure an effective rinse operation without delay incidental to the dirty washing water draining from the wash nozzles. A drain valve is provided to permit the two operations of washing and rinsing to

be carried out in rapid sequence without having to wait for the wash line to drain through the wash nozzles before introducing the clean rinse water to the machine. The drain valve 180 is provided in a low point in the distributing pipe 97 and comprises an automatically operated check valve including a ball 181 which is movably positioned within a cage 182 attached as by means of screws 183 to the pipe 97 adjacent an opening 185 provided therein. During operation of the machine the check valve is automatically maintained closed by pressure of the wash water and upon closing the valve 72 at the completion of a washing operation the valve is automatically opened to permit the column of wash water then standing in the wash water distributing system to quickly drain through the valve 180 rather than pass slowly through the nozzles 103 of the lower wash arm; the flow under such circumstances being at a slow rate but of sufficient intensity to reach the dishes and thereby reduce the effectiveness of the rinsing operation. The drain valve 180 is, as mentioned, positioned at a low point in the pipe 97 to the upper wash arm. The lower wash arm and connecting pipe 95 are also connected to the drain valve through the by-pass 77' so that upon opening of the valve 180 the entire distributing system may quickly drain into the washing compartment for return of the drained liquid to the sump 18. The weight of the ball is proportioned and positioned to overcome the hydrostatic head on the distributing system so that upon shutting off the pressure flow of wash water the valve will immediately open to drain position. The ball runway is inclined so that the force of gravity will tend to move the ball towards the open position in which the ball rests against the pipe 97; the size and weight of the ball being so proportioned that upon the introduction of wash water under pressure to the pipe 97 the ball will be moved outwardly to close the opening 190. As shown, the opening 185 in the pipe 97 is of such shape as to prevent passage of the ball 181 to the interior of the pipe but permits passage of water around the ball when the ball rests against the exterior of the pipe. The cage 182, which is positioned concentrically with respect to the opening 185, is provided with a passageway comprising ridges 187 for the proper guidance of the ball as it moves from drain position adjacent the opening 185 to closed position adjacent the opening forming a valve seat 190 in the end of the cage. The ball provides an automatic valve which is simple in operation, is adapted to automatically close whenever washing water flows under pressure through the fluid distributing system, and automatically opens to quickly drain the distributing system whenever the supply of water is cut off. The provision of this automatic valve effectively prevents any possibility of the dirty wash water spraying upwardly upon the dishes and permits the rinsing operation to follow the washing operation without having to wait for the wash water distributing system to drain through the nozzle outlets. The valve 180 serves also as an outlet through which any leakage water from the valve member 78 may drain directly into the washing compartment for return to the sump 18.

The side of the wash water chamber or sump 18 is provided with an overflow connection 193 which is connected by a pipe 194 to a drain line 195. A drain pipe 197 connects the bottom of

the chamber or sump 18 to a drain valve 198 having a suitable control handle 199 arranged within convenient reach of the operator so that the sump may be quickly drained into the drain pipe 195. The overflow connection 193 is constantly maintained open to the drain pipe 195 so that a maximum predetermined fluid level in the sump will not be exceeded, and also to permit surface layer of grease and waste material to be drained from the washing fluid. The drain connection 197 is under control of the handle 199 and is opened only upon actuation of the handle.

For convenience in placing the machine in operation and to permit a rapid filling of the chamber or sump 18 with wash water at the beginning of washing operations a pipe connection is provided to the washing compartment from a supply of wash water and is under control of the hand valve 200. The pipe connecting to the hand valve 200 may be joined to the pipe 157 supplying water to the rinse valve. To raise the temperature of the wash water within the sump a steam line may be provided for connection into the sump; a hand valve 202 being provided in this steam connection to regulate the flow to the interior of the sump where any suitable form of injector or bubbler arrangement may be provided to effect transfer of heat from the steam to the wash water.

In Figs. 13 to 16 a somewhat modified form of wash water distributing valve is shown with which is incorporated a drain valve which is adapted to provide a positive drain for the wash water distributing system, and which operates automatically as the wash water control valve is moved. As shown the valve comprises a casing 75' which is substantially cylindrical in cross section, is provided with means for attachment to the discharge outlet 71 of the pump, and is provided with suitable passages 76' having flanged connections 77' for the attachment of the connecting pipes 95 and 97 which lead to the rotary wash arms similarly to the valve 72. A by-pass 208 connects the passages 76' and is shown formed integrally in the valve housing. A hollow cylindrical valve member 210 is rotatably mounted within the valve casing 75' and is provided with opposed slots 212 which in the open or wash position of the valve member are adapted to coincide with the discharge openings 76'. The valve member is open at its bottom end to permit a flow of wash water from the pump through the ports 212 for distribution to the wash arms. The head portion 214 of the valve member is provided with an axially extending stem 215 which is suitably supported within a sleeve 81' formed in the cap portion of the valve housing. The stem 215 extends beyond the exterior of the housing and has fixed to it an operating arm 82' by which it may be actuated from the control mechanism of the machine.

The head portion 214 of the valve member is provided with a cored passage 216 extending perpendicularly to the valve axis and positioned with relation to the ports 212 to provide a drain outlet for the wash water distributing lines when the valve is in either neutral or rinse positions. A port 220 is formed in the inner wall 221 of the valve housing to provide communication between the by-pass 208 and the passage 216; the port 220 being positioned to register with the passage 216 when the valve member 210 is in neutral or rinse position. A discharge port 223

provided in the valve housing is shown positioned oppositely to the passage 220 to serve as a drain for any water in the distributing system during times that the passage 216 provides an outlet from the by-pass.

The positioning and width of the passage 216, and the lateral extent of the ports 220 and 223 are proportioned so that when the valve member 210 is in washing position, as shown in Fig. 15, the passage 216 will be turned so that the port 220 will be closed and no water may then flow from the drain outlet. When the valve member is in either neutral or rinse position communication is provided through the passage 216 to the drain outlet so that any water contained in the distributing system may be readily drained therefrom. The provision of the drain valve as an integrally formed part of the positively operated wash water valve member not only permits rapid draining of the wash water distributing system so that the control mechanism may be moved quickly from washing to rinsing position without having to wait for the wash water to drain slowly from the distributing system through the wash arms, but also provides means whereby any leakage water passing around the valve member 210 may be discharged directly into the washing compartment at a position remote from the articles being washed. By providing a positive control for the drain valve proper operation is insured even though grease or other foreign matter has collected as a result of extended use.

It will now be apparent that there is provided a washing machine of compact form and simple construction which is adapted to meet various conditions of installation requirements and which is adapted for rapid operation. The few moving parts of the machine are so constructed and protected against deterioration and wear that the machine may be operated for long periods of time without the need for replacement of parts. The control mechanism for the machine is so arranged that the operator is required to follow a proper procedure in the cycle of operation and is thereby protected against injury to himself by scalding or injury to the mechanism of the machine.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a washing machine, a fluid supply pipe, a valve casing attached thereto, fluid distributing pipes attached to said casing, a valve member in said casing movable to a position providing communication between said supply pipe and each of said distributing pipes, and a by-pass around said valve providing communication between said distributing pipes.

2. In a washing machine, a fluid supply pipe, a valve casing attached to said fluid supply pipe, an upper wash arm, a lower wash arm, independent fluid conduits separately connecting said wash arms to said valve casing at diametrically opposed and aligned openings extending through the casing, a manually rotatable valve member in said casing for simultaneously controlling the discharge of fluid to the fluid conduits, said valve member having diametrically opposed and aligned openings adapted for simultaneous registration with the casing openings and having an

axial inlet passage communicating with its opposed openings and extending from said fluid supply pipe, the openings of the casing and of the valve member being positioned with respect to the valve member axis to balance pressure fluid forces normal to the axis.

3. In a washing machine having means for reception of articles therein, a fluid distribution system comprising discharge means positioned for application of washing fluid to articles in the machine, fluid flow controlling means, and drain means in the system effective upon termination of fluid flow in the system for diverting fluid remaining in the system from the fluid discharge means and draining the same so as to promptly terminate objectionable flow from the discharge means toward the articles upon termination of flow in the system.

4. In a washing machine, a washing compartment, a fluid distributing system positioned within said washing compartment, said fluid distributing system comprising a distributing valve, an upper wash arm, a lower wash arm, fluid conduits providing independent connections between said wash arms and said distributing valve, a bypass providing intercommunication between said conduits around said distributing valve, a check valve positioned in a lower portion of said distributing system, means for supplying fluid under pressure to said distributing valve for circulation through said distributing system, said check valve being automatically maintained closed during passage of fluid under pressure through the distributing system, and being automatically opened upon cutting off of the supply of fluid under pressure to drain the fluid contents of the distributing system.

5. In a washing machine having means for reception of articles therein, a fluid distribution system comprising discharge means positioned for application of washing fluid to articles in the machine, fluid flow controlling means, comprising a valve, valve actuating means, and drain means in the system operated by the valve actuating means to open upon termination of fluid flow in the system for diverting fluid remaining in the system from the fluid discharge means and draining the same so as to promptly terminate objectionable flow from the discharge means toward the articles upon termination of flow in the system.

6. In a washing machine, a fluid supply pipe, a valve casing attached thereto, spaced outlets in said valve casing, fluid distributing means connected to said outlets, a valve member in said valve casing, said valve member being movable to a position providing communication between said supply pipe and said outlets, a drain outlet in said valve casing, and means operable with said valve member providing a passage from said fluid distributing means to said drain outlet when said valve member is closed with respect to said spaced outlets.

7. In a washing machine having means for reception of articles therein, a fluid distributing system comprising discharge means positioned for application of washing fluid to articles in the machine, means for supplying fluid under pressure to said distributing system, means for turning on and cutting off the supply of fluid under pressure to said distributing system, a drain passage for diverting fluid remaining in the system from the fluid discharge means upon cutting off the supply, and a pressure operated drain valve responsive to fluid pressure in the fluid distributing system for

automatically closing said drain passage when fluid under pressure is turned on to said distributing system, and for automatically opening said drain passage to drain the distributing system when the supply of fluid under pressure is cut off from said distributing system so as to promptly terminate objectionable flow from the discharge means toward the articles upon termination of flow in the system.

8. In a washing machine having means for reception of articles therein, a fluid distributing system comprising discharge means positioned for application of washing fluid to articles in the machine, means for supplying fluid under pressure to said distributing system, means for turning on and cutting off the supply of fluid under pressure to said distributing system, a drain passage for diverting fluid remaining in the system from the fluid discharge means upon cutting off the supply, said drain passage being upwardly inclined and having a valve seat in an elevated portion thereof, and a valve in said drain passage responsive to the pressure of fluid when turned on to said distributing system and held thereby against said valve seat for closing said drain passage, said valve moving under the influence of gravity away from said valve seat to open said drain passage to thereby drain said distributing system when the supply of fluid under pressure is cut off from said distributing system so as to promptly terminate objectionable flow from the discharge means toward the articles upon termination of flow in the system.

9. In a washing machine having a washing chamber, an upper spray header and a lower spray header for said washing chamber, separate fluid conduits for said upper and lower spray headers, means for supplying fluid under pressure to said conduits, valve means intermediate the supply means and conduits and movable to different control positions for simultaneously opening or closing the conduits to the fluid supply means, a drain passage in said valve means, said valve means having spaced ports providing communication between said fluid supplying means and said separate fluid conduits while closing communication of said separate conduits with said drain passage in one position thereof, and having an additional port providing communication of said separate fluid conduits with said drain passage while closing communication of said fluid supplying means with said conduits in another position thereof.

10. In a washing machine having a washing chamber, a wash liquid spraying system, a rinse liquid spraying system, means for controlling the supply of wash liquid to said wash liquid spraying system, means for controlling the supply of rinse liquid to said rinse liquid spraying system, a single actuating member for both the rinse liquid and wash liquid controlling means, a drain passage for said wash liquid spraying system, and means interconnected with said single actuating member for automatically connecting said wash liquid spraying system with said drain passage as said single actuating member is actuated to terminate the supply of wash liquid to said wash liquid spraying system and to initiate the supply of rinse liquid to said rinse liquid spraying system.

11. In a washing machine having a washing chamber, a wash liquid spraying system, a rinse liquid spraying system, means for controlling the supply of wash liquid to said wash liquid spraying system, means for controlling the supply of rinse liquid to said rinse liquid spraying system, a sin-

- gle actuating member for both the rinse liquid and wash liquid controlling means having a neutral position in which both the wash liquid and rinse liquid controlling means are in the off position, a wash position in which the wash liquid controlling means is turned on while the rinse liquid controlling means is turned off, and a rinse position in which the rinse liquid controlling means is turned on while the wash liquid controlling means is turned off, a drain passage for said wash liquid spraying system, and means interconnected with said single actuating member for automatically closing communication of said wash liquid spraying system with said drain passage in the wash position of said actuating member, and for automatically opening communication of said wash liquid spraying system with said drain passage in both the neutral and rinse positions of said actuating member.
12. In a washing machine having a washing compartment, an upper spray header, a lower spray header, a fluid supply pipe, a valve casing attached to said fluid supply pipe, separate conduits connecting said valve casing with said upper and lower spray headers respectively, a valve member in said casing movable to a position providing communication between said supply pipe and each of said conduits, a by-pass around said valve providing communication between said conduits, and a drain passage for said conduits and headers positioned at an elevation at least as low as the lower header and communicating with at least one of said conduits and headers through said by-pass.
13. In a washing machine, a fluid supply pipe, a valve casing attached to said fluid supply pipe, an upper wash arm, a lower wash arm, independent fluid conduits separately connecting said

wash arms to said valve casing at openings extending through the casing, a rotatable valve member in said casing for simultaneously controlling the discharge of fluid to the fluid conduits, said valve member having openings corresponding in positioning to the casing openings and adapted for registration therewith, said casing and member openings being positioned with respect to the valve member axis to balance the pressure fluid forces normal to the axis, said casing having a by-pass formed as an integral passage therein affording intercommunication between the fluid distributing pipes.

14. In a washing machine, a fluid supply pipe, a valve casing attached to said fluid supply pipe, an upper wash arm, a lower wash arm, independent fluid conduits separately connecting said wash arms to said valve casing at openings extending through the casing, a rotatable valve member in said casing for simultaneously controlling the discharge of fluid to the fluid conduits, said valve member having opposed openings corresponding in spacing to the casing openings and adapted for simultaneous registration therewith, said casing and member openings being positioned in diametrically spaced relationship with respect to the valve member axis to balance pressure fluid forces normal to the axis, a drain outlet in said casing, said casing having a bypass formed therein affording communication between said independent fluid conduits, said valve member having a passage for connecting said bypass to said drain outlet when the valve member is positioned to close said casing openings whereby the independent fluid conduits may be connected either to the fluid supply pipe or to said drain outlet.

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