Nov. 6, 1934. H. L. JOHNSTON 1,980,064

WASHING MACHINE

Filed March 31, 1928 6 Sheets-Sheet 1

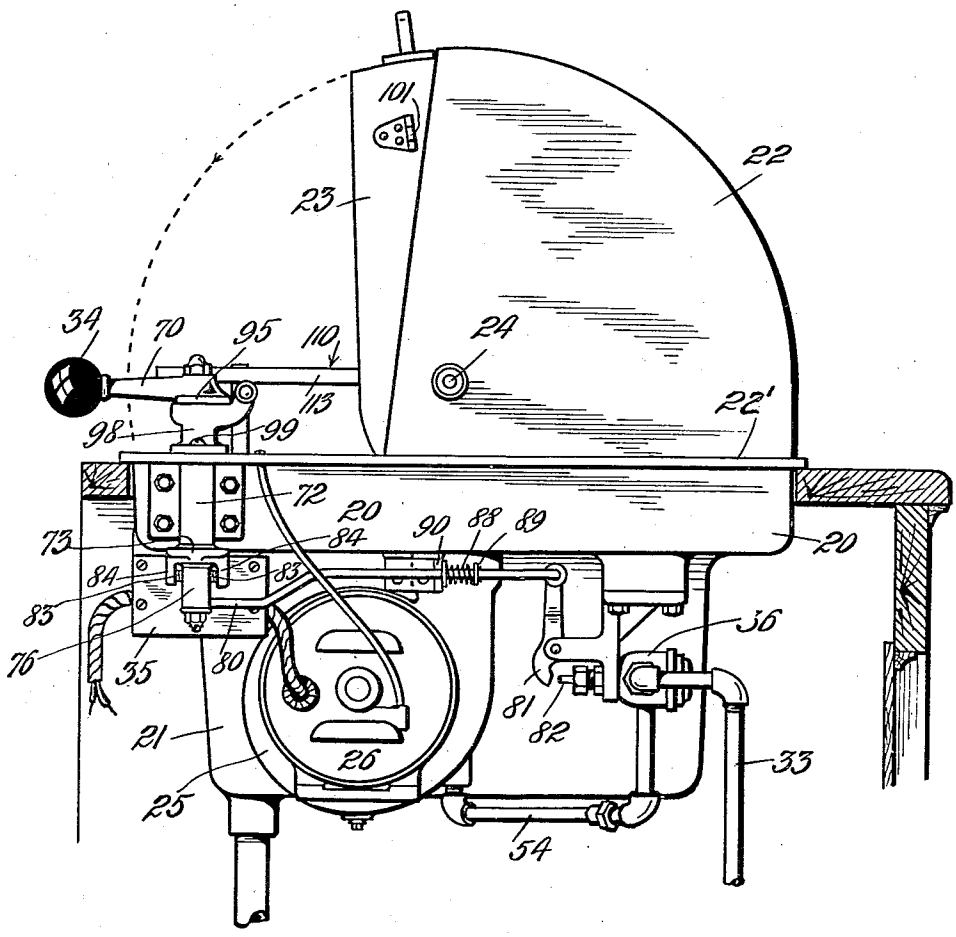



Fig.-1

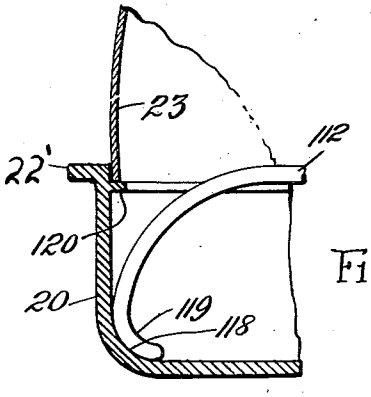



Fig. 21.

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WASHING MACHINE

Filed March 31, 1928 6 Sheets-Sheet 2

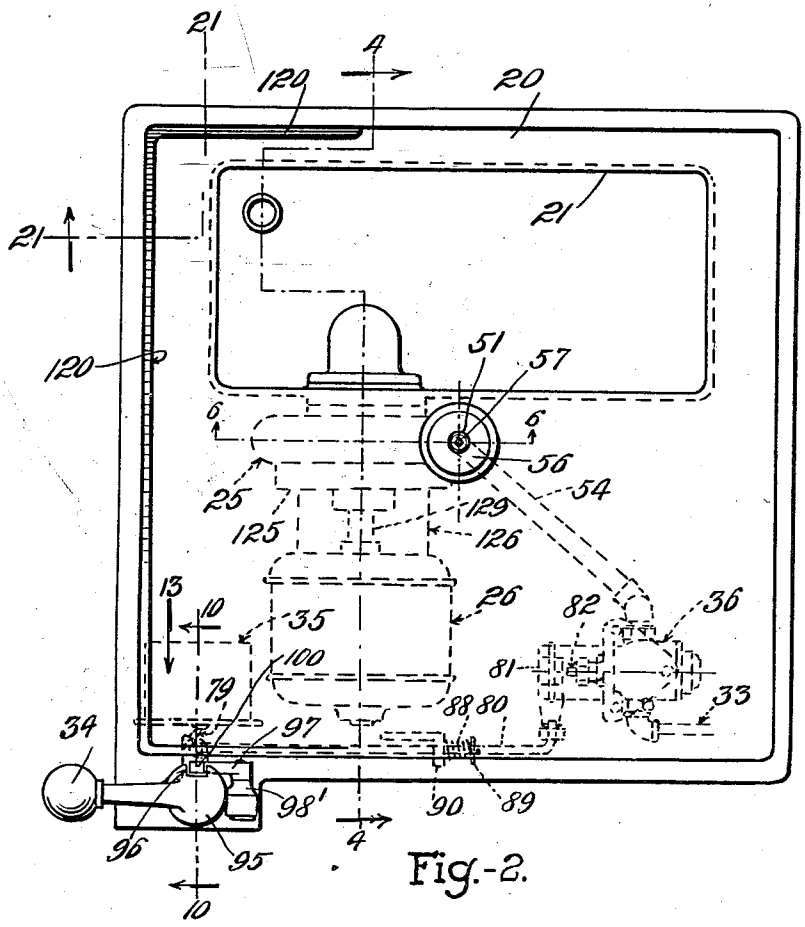



Fig.-2.

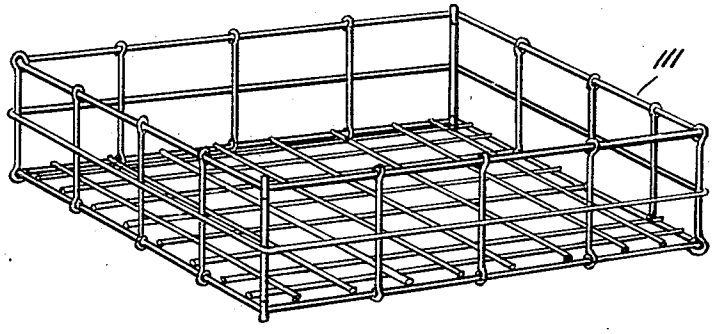



Fig.-3.

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WASHING MACHINE

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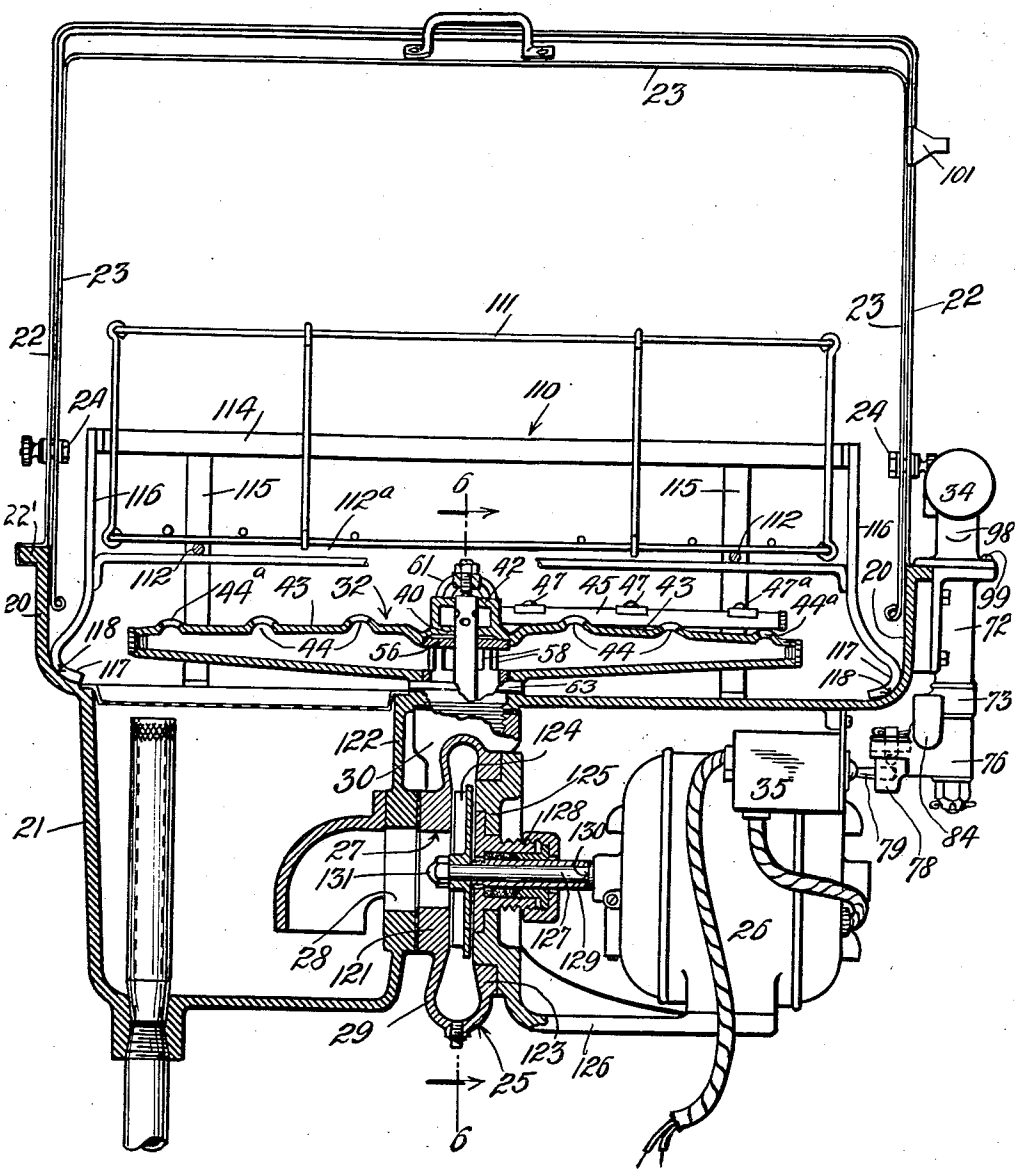



Fig.-4.

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WASHING MACHINE

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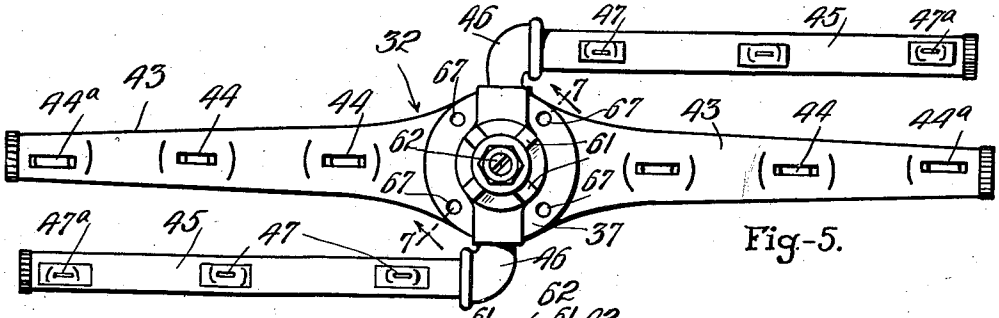



Fig.-5.

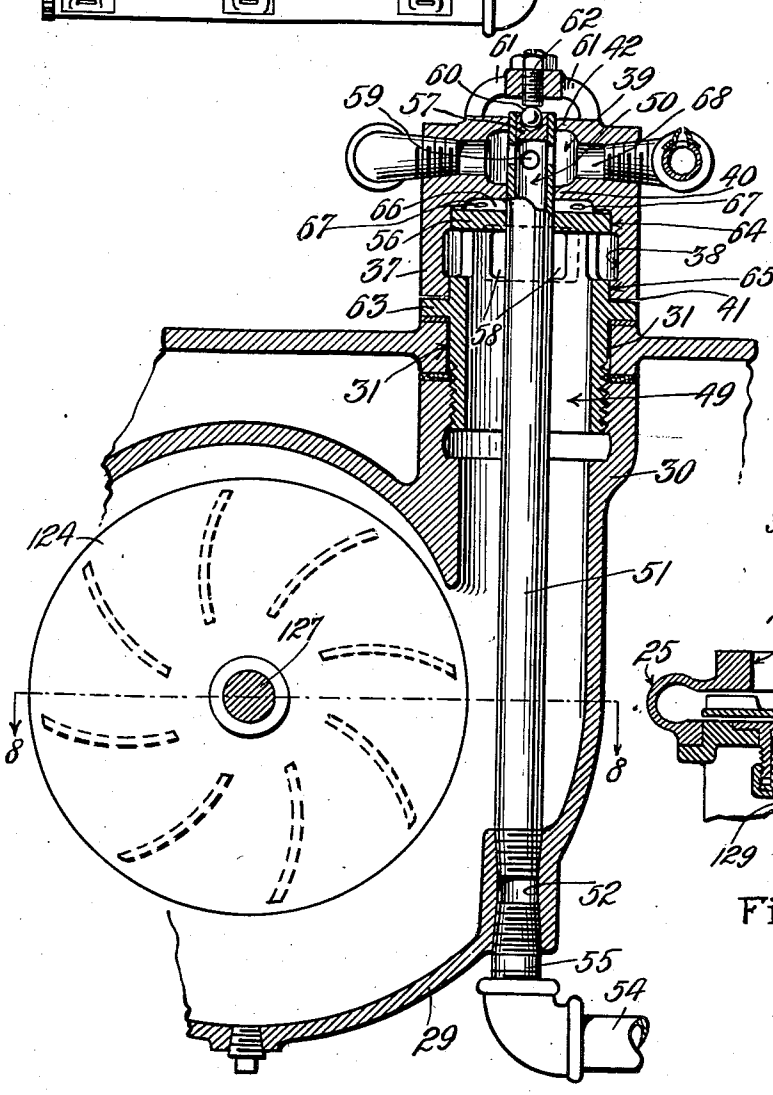
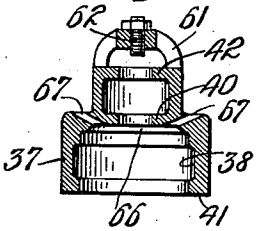



Fig.-6.

Fig.7.



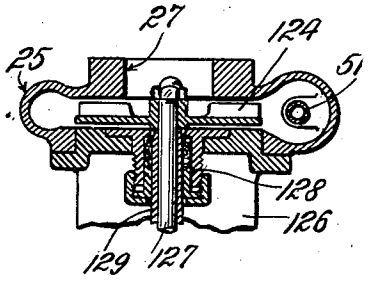




Fig.-8.

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WASHING MACHINE

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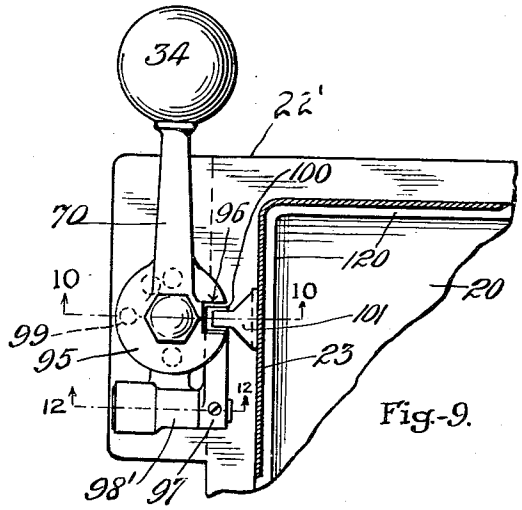



Fig.-9.

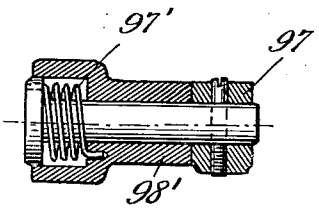



Fig.-12.

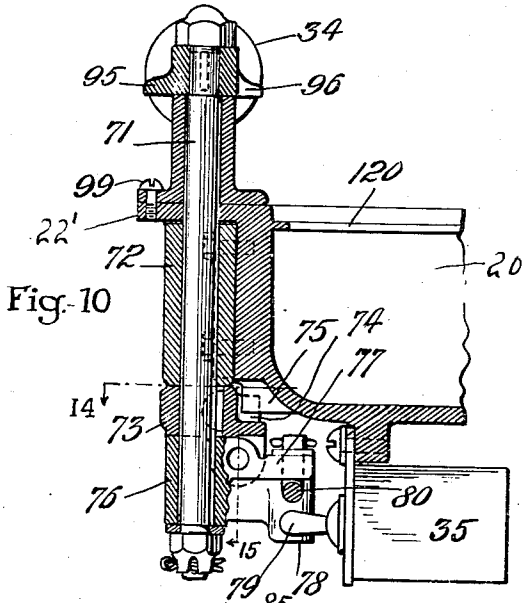



Fig.-10.

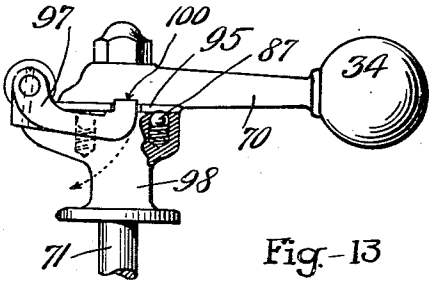



Fig.-13.

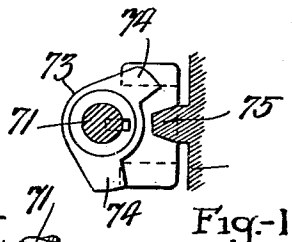



Fig.-14.

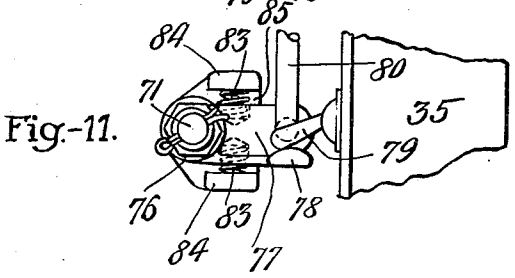



Fig.-11.

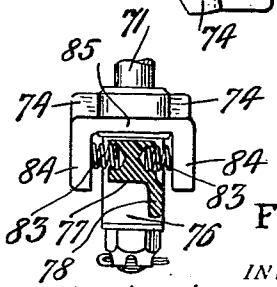



Fig.-15.

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WASHING MACHINE

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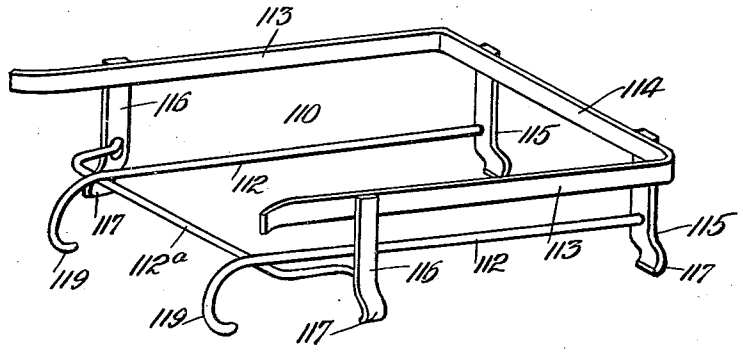



Fig.-20.

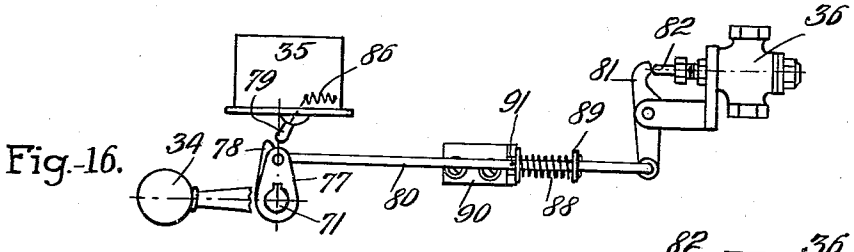



Fig.-16.

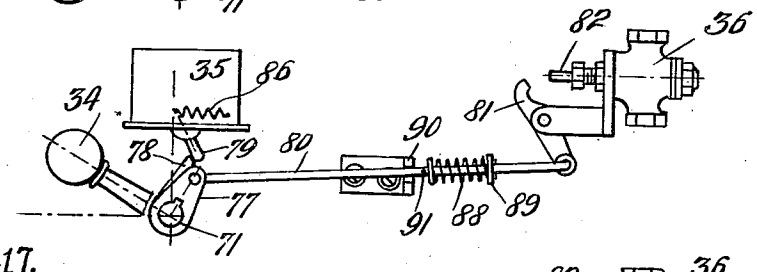



Fig.-17.

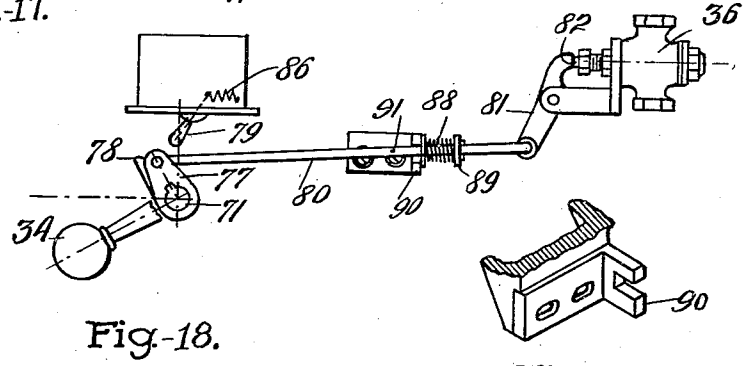



Fig.-18.




Fig.-19

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Patented Nov. 6, 1934 1,980,064

# UNITED STATES PATENT OFFICE

1,980,064

## WASHING MACHINE

Herbert L. Johnston, Troy, Ohio, assignor to The Hobart Manufacturing Company, Troy, Ohio, a corporation of Ohio

Application March 31, 1928, Serial No. 266,258

21 Claims. (Cl. 141—9)

This invention relates to washing machines and aims to provide a simple, inexpensive, compact and effective dish washing machine particularly adapted for use in lunch counters, soda fountains and small restaurants, and for household use.

A particular object of the invention is to provide for effective washing and rinsing of dishes with the use of a minimum quantity of hot water, which may be supplied under a comparatively low pressure.

In previous small dish washing machines, it has been customary to use the same distributing system for the wash water and the rinse water. This arrangement possesses the disadvantage of causing some contamination of the rinse water by dirt contained in the wash water, and the further disadvantage that the reservoir of the machine must be completely filled twice to wash and and rinse each batch of dishes. In larger dish washing machines, it has been customary to provide a separate distributing system for the rinse water, but, in such machines, it has been necessary to have a source of clean hot water under a comparatively high pressure and to use a considerable quantity of such water in order to secure effective rinsing. Both types of machines have, therefore, required the use of large quantities of clean hot water. To overcome this disadvantage, and to provide an effective machine requiring a very small quantity of clean hot water, I have invented means for utilizing energy developed in the distribution of pumped wash water to distribute rinse water supplied in small quantity and under low pressure and I have accomplished this without any contamination of the rinse water by the wash water.

An illustrative example of the means by which I have accomplished this important result will be given in connection with a detailed description of a small washing machine embodying this and other features of my invention and illustrated in the accompanying drawings in which:

Fig. 1 is a side elevation of the machine with its cover open;

Fig. 2 is a plan view of the machine with the casing and wash arm removed;

Fig. 3 is a perspective view of the dish basket used in the machine;

Fig. 4 is an enlarged vertical section of the machine taken on the line 4—4 of Fig. 2;

Fig. 5 is a plan view of the combined wash and rinse distributor of the machine on a still larger scale;

Fig. 6 is a further enlarged fragmentary vertical section taken on the line 6—6 of Fig. 4 and showing a part of the pump and the distributor;

Fig. 7 is a vertical section of the hub of the distributor on the line 7—7 of Fig. 5;

Fig. 8 is a horizontal section of the pump taken on the line 8—8 of Fig. 6 and on the same scale as Fig. 4;

Fig. 9 is a fragmentary plan view of one corner of the tank of the machine showing the control handle and lock, and showing in section the cover of the machine in closed position;

Fig. 10 is a fragmentary vertical section taken on the line 10—10 of Figs. 2 and 9, showing the control shaft and the mechanism mounted thereon;

Fig. 11 is a bottom view of the control shaft and mechanism mounted thereon;

Fig. 12 is a fragmentary vertical section on the line 12—12 of Fig. 9 showing the pivot and spring of the lock;

Fig. 13 is a side elevation of the control handle and lock, looking in the direction of the arrow 13, in Fig. 2;

Fig. 14 is a fragmentary horizontal section on the line 14 of Fig. 10 showing the stop limiting the movement of the control shaft;

Fig. 15 is a fragmentary vertical section on the line 15 of Fig. 10;

Figs. 16, 17 and 18 are diagrammatic plan views of the control mechanism, Fig. 16 representing this mechanism in "off" or neutral position, Fig. 17, in wash position, and Fig. 18, in rinse position;

Fig. 19 is a perspective view of a part of the control mechanism;

Fig. 20 is a perspective view of the slide for the dish basket, and

Fig. 21 (on sheet 1) is a fragmentary vertical section of the front wall of the tank, taken on the line 21—21 of Fig. 2.

The washing machine illustrated has a shallow tank 20 provided with a well 21, which serves as a reservoir. The tank 20 is covered by a casing consisting of a fixed cylindrically curved section 22, whose lower edge is turned around an external flange 22' at the upper edge of the tank 20, and a movable cylindrically curved section or cover 23 which is secured within the fixed section 22 by pivots 24 lying on the common axis of the sections. A centrifugal pump 25 is mounted under the tank 20 on the inner side of the well 21. The pump is driven by an electric motor 26 carried by the pump casing 29. The central intake opening 27 of the pump communicates with the well or reservoir 21 through an opening 28 in the side of the reservoir. The tangential discharge neck 30 of the involute casing 29 of the pump extends through a central opening 31 in the bottom of the tank 20. At the top of the discharge neck 30, is rotatably mounted a combined wash and rinse distributor 32, hereinafter described in detail. The dishes or other articles to be washed are supported in a basket (Fig. 3) above the distributor. As clearly shown in Fig. 1, the parts

described above are connected into a unitary washing machine assembly which is adapted to be inserted as a unit within a supporting table or counter, such for example, as the usual counter in a soda fountain, so that the additional floor space required by a machine which is mounted on its own legs or standards is obviated. As set forth above, the machine may be constructed quite small in size, being of only sufficient extent to receive a small sized rack therein, so that the entire washing machine assembly is readily received within an opening in the usual counter of this type, the washing machine tank serving as a support for the assembly on the counter, and the sump, motor and pump parts depending from the tank beneath the level of the counter as shown.

In the operation of a machine, wash water contained in the reservoir 21 is forced through the distributor 32 by the pump 25 and returns to the reservoir for re-use. Then clean hot rinse water, supplied through a pipe 33, is admitted to the distributor 32 to rinse the dishes. The machine is provided with a control handle 34 which controls the washing operation by movement of a switch 35 in the circuit of the motor 26 and controls the rinsing operation by opening and closing a valve 36 in the rinse supply pipe 33.

I will now describe in detail specific parts of the machine illustrated.

The combined distributor 32 (Figs. 4, 5, 6, 7) is in effect two distinct rotary distributors having their hubs integrally connected so that they are compelled to rotate as a unit. Thus the combined distributor has a hub 37 containing two distinct chambers 38, 39 separated by a horizontal wall 40. The hub has an open lower end 41 and a closed upper end 42. A pair of hollow wash arms 43 extend radially outward from the lower part of the hub 37. The inner ends of these arms open into the lower chamber 38 of the hub. The wash arms have relatively large discharge nozzles 44 along their upper surfaces. The nozzles 44*a* nearest the ends of the arms are inclined so that liquid issuing from them tends to rotate the hub and arms by reaction. Two hollow rinse arms 45 extend outwardly from the upper part of the hub 37 with their inner ends in communication with the upper chamber 39 of the hub. These arms may contain elbows 46 so that the rinse arms 45 are parallel to the wash arms 43 but are spaced laterally therefrom. This is, however, not essential, as the rinse arms 45 may extend from the hub in any direction so long as they do not lie directly over the wash arms so as to obstruct the jets of liquid issuing from the wash arm nozzles 44. The rinse arms 45 are provided on their upper surfaces with relatively small nozzles 47 so that forcible streams may be projected from them even when liquid is supplied to them at a slow rate and under low pressure. The outer rinse nozzles 47*a* are inclined in the same direction as the outer wash nozzles 44*a*.

Wash water from the pump 25 is supplied to the lower chamber 38 of the hub and thus to the wash arms 43, and rinse water from the pipe 33 is supplied to the upper chamber 39 of the hub and thus to the rinse arms 45. For this purpose the pump discharge neck 30 is provided with an annular wash water passage 49 and a central rinse water passage 50 which extends through the pump casing 29. The rinse passage is in a pipe 51, located centrally in the discharge neck 30 and tangential to a circle concentric with the impeller of the pump, so that it does not retard the flow of the wash water. In the form illustrated, the lower end of this pipe is screwed in the upper part of a vertical threaded hole 52 extending through the pump casing 29. Rinse water is supplied to the lower end of the pipe 51 from the rinse supply pipe 33 through piping 54 whose end 55 is screwed into the outer portion of the threaded hole 52. The pipe 51 extends through a closure 56 at the upper end of the discharge neck 30 and projects above it. The pipe 51 has a closure 57 at its upper end. Just below the closure 56, the neck 30 is provided with lateral discharge openings 58, which are surrounded by the lower portion of the hub in which the lower chamber 38 is formed. The projecting portion of the pipe 51 is provided with lateral discharge openings 59 which are surrounded by the upper portion of the hub 37 and communicate with the upper chamber 39 in the hub. The lower portion of the hub fits loosely around the upper end of the discharge neck 30 above and below the lateral openings 58 while the top 42 of the hub and the horizontal wall 40 contain central holes fitting loosely around the projecting portion of the pipe 51 above and below the lateral openings 59.

The entire distributor 32 is suspended from a one-point bearing provided by a hardened ball 60, seated in the closure 57 at the upper end of the rinse pipe 51. The upper end 42 of the hub is provided with a cage 61 having a flat vertically adjustable central bearing 62 resting on the ball 60. This bearing is so adjusted that clearances are provided between the hub and an external flange 63 on the neck 30 and the upper end 56 of the neck 30, so that the entire weight of the distributor is carried by the central bearing ball 60. The distributor bearing 62 is directly over, and well above, the center of gravity of the distributor, and the wash and rinse nozzles are each symmetrically located, so that there is substantially no friction between the hub and the sides of the neck 30 and rinse pipe 51. The suspension of the distributor from a central one-point bearing reduces friction to a minimum. It is so effective that, if the distributor once be placed in rotation, it will continue to rotate for several minutes after the force which started its rotation has ceased to act.

The mounting of the hub is such that the whole distributor may be freely lifted from the discharge neck 30 and rinse pipe 51, and may be replaced in operative position by merely dropping the hub over the ends of the neck and rinse pipe. This greatly facilitates cleaning of the machine. In order that the distributor may safely be mounted in this freely removable manner, means are provided for preventing the creation, in the chambers of the hub, of unbalanced fluid pressures which would tend to blow the distributor off the ends of the discharge neck and rinse pipe. For this purpose, both chambers in the hub are provided with upper openings as large as their lower openings. So far as the upper chamber 39 is concerned, this is accomplished by making the hole in the top 42 of the hub of the same diameter as that in the horizontal wall 40. To prevent an unbalanced upward pressure in the lower chamber 38, this chamber is provided at its top with an

opening 64 loosely surrounding the closed upper end of the neck 30 and of the same diameter as the opening 65 at the lower end of the hub. The opening 64 leads to an intermediate chamber 66 enclosed between the horizontal wall 40 of the hub and the closure 56 at the end of the discharge neck 30. Relief passages 67 extend from this chamber 66 through to the outer wall of the distributor to permit the escape of wash water as fast as it leaks into the chamber 66 through the opening 64 around closure 56, and thus to prevent building up liquid pressure against the lower side of the horizontal wall 40. The relief passages 67 are best shown in Fig. 7. These relief pasages 67, which prevent the building up of pressure in the intermediate chamber 66, serve, not only to prevent blowing off of the distributor, but also to prevent the wash water from forcing its way into the upper chamber 39 of the hub around the rinse pipe 51 and thus contaminating the rinse water.

From the description of the operation of the machine given above, it will be understood that wash water is first supplied to the lower chamber 38 and wash arms 43 of the distributor through the annular passage 49, and that, thereafter, rinse water is supplied to the upper chamber 39 and the rinse arms 45 of the distributor through the rinse pipe 51. As the wash water is pumped, it may easily be supplied at a rapid rate and under considerable pressure; and, issuing in large streams through the inclined nozzles 44*a*, it sets the distributor into rotation and maintains its rotation during the washing operation. The distributor continues to rotate under its own momentum after the supply of wash water to it is stopped, and, by its rotation, serves to distribute the rinse water subsequently supplied to the rinse arms 45. It is, therefore, not necessary to supply the rinse water at a sufficient rate and under sufficient pressure to initiate the rotation of the distributor; and, in fact, the entire rinsing operation may be completed while the distributor is still rotating under the momentum given to it by the wash water. The inclination of the nozzles 47*a* is, however, desirable to maintain the speed of rotation during the rinsing operation.

In order that the momentum of the distributor, obtained during the washing operation, may be effectively utilized to distribute the rinse water, the common control handle 34 is so connected that, by a single movement of it, the supply of wash water to the distributor may be stopped and the supply of rinse water started.

The control mechanism is shown in the Figs. 1 and 2 and in detail in Figs. 9 to 19. The control handle 34 is at the end of the arm 70 fixed on the upper end a vertical shaft 71 journalled in the bearing 72 secured to the side of the tank 20 near one corner of the tank (Figs. 1, 2, 10.) A sleeve 73 keyed on the shaft 71 has two short arms 74 which cooperate with the stop 75 projecting from the side wall of the tank to limit the turning of the shaft 71 and the handle 34 (Figs. 10, 14). A sleeve 76 on the shaft 71 carries an arm 77 whose movements are utilized to acutate the switch 35 and the rinse valve 36. For the former purpose, the arm has a depending part 78 positioned to engage the handle 79 of the switch 35. For the latter purpose, the arm 77 is connected by a rod 80 to a lever 81 positioned to open the rinse valve 36 by depressing its stem 82.

The sleeve 76 and the arm 77 share the turning of the shaft 71 and may be rigidly connected thereto; but, in order to prevent injury to the switch 35 in case of an inaccurate adjustment of the parts, I prefer to provide a resilient connection between the arm 77 and the shaft 71. This is accomplished in the form shown by mounting the sleeve 76 loosely about the shaft and resiliently connecting this sleeve with the keyed sleeve 73 by means of two compression springs 83 reacting between the sides of the arm 77 and two depending skirts 84 provided on a shelf 85 on the sleeve 73 (Figs. 11, 15).

The operation of the control mechanism which has just been described is best shown in the diagrammatic views, Figs. 16, 17, 18. Fig. 16 shows the neutral or inoperative position of the handle 34 and the operating mechanism, in which the switch 35 is held open by a spring 86 contained therein and the rinse valve 36 held closed by a spring contained therein. The handle is held in this position by a spring latch 87 (Fig. 13). Fig. 17 shows the handle 34 thrown to the left which turns the shaft 71 so as to cause the part 78 of the arm 77 to engage the switch handle 79 bringing the motor pump, and wash arms into operation. The handle may be left in this position as long as may be necessary to clean the dishes, as the switch spring 86 has not sufficient strength to turn the shaft 71. When the washing is completed the handle 34 is thrown from its extreme left hand position shown in Fig. 17, to its extreme right hand position, shown in Fig. 18. This movement of the handle 34 brings the part 78 of the arm 77 away from the switch handle 79, permitting the switch spring 86 to open the switch, and thus stopping the motor and pump; and causes the arm 77, acting through the connecting rod 80 to tip the lever 81 to depress the stem 82 of the rinse valve 36, and open the rinse valve to supply rinse water to the rinse arms while the distributor is still rotating under its momentum. The rinsing takes only a few moments, during which time the handle 34 is held in the position shown in Fig. 18. As soon as the handle is released, the rinse valve spring, and a spring 88 on the connecting rod 80 reacting between a disc 89 fixed on the rod and an abutment 90 on the tank return the handle 34 to its neutral position shown in Fig. 16. It should be noted that these springs cannot turn the handle beyond its neutral position, for, at the time the handle reaches this position, the valve stem 82 is all the way out, and the thrust of the spring 88 is taken by a pin 91 in the connecting rod 80, so that this spring no longer re-acts against the bracket 90.

In order to prevent the spilling of the wash or rinse waters, or the scalding of the operator, the operating mechanism and the covers 23 are so interlocked that neither the wash arms nor the rinse arms may be supplied with liquid except when the cover is closed, and the cover, after being closed, cannot be opened except when the operating handle 34 is in neutral position. The lock provided for this purpose includes a horizontal disc-shaped flange 95 fixed on the shaft 71 near its top. This flange may be made integral with the arm 70, as shown (see Figs. 2, 9, 13). The flange 95 contains a vertical slot 96, which is turned straight inward when the operating handle is in its neutral position. To cooperate with this slot 96, a lock bar 97 (Figs. 9, 13) is pivoted in a bearing 98' (Figs. 9, 12)

on a fixed sleeve 98 secured by a screw 99 to the flange 22' (Fig. 10). A torsion spring 97' (Fig. 12) normally urges this lock bar upward so that its free end 100 enters the slot 96 and prevents turning of the operating handle (Fig. 13). The cover 23 carries a projection 101 (Figs. 1, 4) which in the final closing movement of the cover strikes and depresses the free end 100 of the lock bar 97 (Fig. 9) and itself passes through the slot 96 in the flange 95 so that its upper surface lies below this flange. The operating handle is then free to be turned, but, as soon as it is turned out of its neutral position in either direction, the flange 95 overlies the projection 101 on the cover and prevents opening the cover. When the handle is returned to its neutral position, the projection 101 may pass up through the slot 96, allowing the cover to open, and the lock bar 97 to reenter the slot 96.

The ease with which the distributor may be lifted off to facilitate cleaning the machine has already been explained. To further facilitate such cleaning, the machine is provided with a removable support 110 for a dish basket 111 (see Figs. 1, 3, 4, 20, 21). This support provides two slides 112 for holding the bottom of the dish basket 111 above the top of the distributor and on a level with the top of the tank 20, so that the basket may easily be slid into and out of the machine; and also provides side guides 113 for the basket and a stop 114 for limiting the inward movement of the basket. The slides 112, side guides 113, and the stop 114 are supported on four resilient legs 115, 116, having curved lower ends 117 adapted to fit against the lower rounded corner 118 of the tank 20, at its sides and back. The side legs 116 are connected by a spring rod 112*a* which aids in supporting the slides 112. The slides are provided at their front ends with downwardly curved spring ends 119. When the support is in the tank, it is held securely in position by the engagement of the rear spring legs 115 and spring ends 119 with the back and front walls of the tank, and the engagement of the spring legs 116 with the side walls of the tank; but, when it is desired to clean the machine, the entire support 110 may easily be lifted out of the tank, as the spring ends 119 and the spring legs 116 yield sufficiently to pass an internal flange 120 (Figs. 2, 9, 21) provided on the front and side walls of the tank for the cover 23 to shut against. The distributor 32 is then lifted off, so that the entire inside of the tank is exposed for cleaning.

The pump 25 and motor 26 form a unit having a single rigid frame and a single rotary member, (Fig. 4). The pump casing is firmly fastened to the tank 20 by securing its discharge neck 30 in the central bottom hole of the tank 20, and by securing its side 121 which contains its intake opening 27 to the inner side wall 122 of the reservoir 21. The opposite side 123 of the pump casing contains an opening of sufficient size for the passage of the pump impeller 124. This opening is covered by a detachable face plate 125 rigidly secured to the casing. A shelf or bracket 126, extends laterally from the face plate 125, and on it the motor 26 is supported and secured. The shelf 126 is preferably made integral with the face plate 125 as shown.

The horizontal armature shaft 127 of the motor, which is provided with the usual bearings in the motor casing, projects from the motor sufficiently to enter the pump casing 29 through a stuffing box 128 provided in the face plate 125, and the impeller 124 is mounted on this shaft. Sufficient clearance is allowed between the metallic inner edges of the two parts of the stuffing box 128 and the shaft 127 to allow for slight inaccuracy in the positioning of the motor. After the pump and motor unit has been assembled, the stuffing box 128 is filled with a plastic material capable of hardening to some extent. Any well known form of plastic cement, particularly the lubricating type of plastics used for bearings, is satisfactory for this purpose. The shaft 127 is rotated before the plastic material hardens and a perfectly aligned additional bearing is thereby formed in the plastic material for the shaft.

Since shafts sometimes become cut or scored in stuffing boxes and since it is an expensive matter to replace the armature shaft of an electrical motor, I provide the projecting portion of the shaft 127 with an easily removable protecting sleeve 129. This sleeve rotates with the shaft and is held between a shoulder 130 on the shaft and the impeller 124 which is pressed against the sleeve by a nut 131.

The pump and motor unit which has been described, is strong and durable and is provided with perfectly aligned bearings. It can be manufactured at small cost.

Claims to certain important features of the machine which have been described have been divided out of this application under requirement of the Patent Office and form the subject matter of my divisional applications, Serial Nos. 348,629, filed March 20, 1929, and 349,375, filed March 23, 1929.

What I claim is:

1. In a washing machine, having coaxial wash and rinse distributors, a centrifugal pump having a rotary impeller and an involute casing provided with a tangential discharge neck communicating with said wash distributor, and a rinse conduit extending into, through and across the pump casing and projecting from its discharge neck and communicating with said rinse distributor, the portion of said conduit within the casing lying in a plane perpendicular to the impeller axis and in a line tangential to a circle concentric with the impeller so that it is in part parallel and in part oblique to the flow of liquid in said casing and does not substantially impede such flow.

2. In a washing machine, the combination of a movable cover, a control arm turnably mounted on an axis substantially parallel to the final closing movement of the cover, a disc coaxial with the arm and containing a radial slot, a projection on the cover movable through said slot when the arm is turned in one direction, and a movable lock bar yieldably urged into said slot when the arm is turned in said direction and removable therefrom by the projection on the cover.

3. In a control mechanism for a washing machine, a fixed member, a turnable vertical shaft, a disc on said shaft containing a radial slot, a bar pivoted on said fixed member, for movement towards and away from said disc, yieldable means urging the free end of said bar toward the disc so that the end of the bar enters the radial slot when the disc is turned in one direction, and means movable through said slot to displace the end of the bar therefrom.

4. In a washing machine, the combination of a movable cover, a slotted member, an element connected with the cover and positioned to pass

through said slot on the final closing movement of the cover when the slotted member is in one position, and a locking member yieldably urged into said slot when the slotted member is in said position and displaceable therefrom by said element connected with the cover.

5. In a washing machine, a wash distributor, a rinse distributor, a tank and movable cover to confine the liquid from the distributors, a control handle, means actuated by manual movement of said handle to control the supply of liquid to the wash distributor, means actuated by further manual movement of said handle to control the supply of rinse liquid to the rinse distributor, and means locking the cover shut except when said control handle is positioned to prevent the supply of liquids to the distributors and locking said control handle to prevent the supply of liquids to the distributors except when the cover is completely shut.

6. In a washing machine, the combination of a wash distributor, a rinse distributor, a tank and movable cover to confine the liquids from the distributors, a pump for supplying liquid to the wash distributor, a motor driving said pump, a switch controlling the supply of electricity to the motor, a valve controlling the supply of liquid to the rinse distributor, a common controlling member for the valve and the switch movable between a neutral position in which the valve is closed and the switch is open, a washing position in which it closes the switch and a rinsing position in which it opens the valve, and interlocking means preventing opening of the cover except when the control member is in its neutral position and preventing movement of the control member out of its neutral position except when the cover is closed.

7. In a washing machine, the combination of a distributor, a tank and movable cover to confine the liquid discharged therefrom, a movable controlling member for controlling the supply of liquid to said distributor, means preventing opening of the cover except when said controlling member is in one position and preventing movement of the controlling member out of said position except when the cover is closed, and a spring urging the controlling member into said position.

8. In a washing machine having a wash distributor, a pump for supplying liquid thereto, an electric motor for driving the pump, a switch controlling the supply of electricity to the motor, a rinse distributor, and a valve controlling the supply of liquid to the rinse distributor; controlling mechanism comprising a vertical shaft, a control arm fixed on said shaft, a stop limiting the turning movement of the arm and shaft in each direction, means carried by the shaft for closing the switch when the arm is turned to its extreme position in one direction, and means carried by the shaft for opening the valve when the arm is turned to its extreme position in the opposite direction, both said means being out of operative engagement with the switch and the valve respectively when the arm is in an intermediate position.

9. A washing machine having a tank, a horizontal internal ledge at the upper portion of said tank, a distributor in said tank having upwardly directed discharge openings, a cover for said tank cooperating in closed position with said ledge for confining the liquid discharged by said distributor, and a support for articles to be washed having an open carrying surface located above the distributor and legs resting on the bottom of the tank and engaging the inner side walls of the tank, the lower portions of said legs being normally separated by a distance greater than the internal width of the tank and being yieldable towards each other to permit them to pass said ledge.

10. A washing machine having a tank, a distributor therein, and a removable structure for supporting a dish basket over said distributor comprising tracks on a level with the upper edge of the tank, an open-ended frame above said tracks, and legs supporting the tracks and frame and resiliently engaging the side walls of the tank.

11. In a washing machine, the combination with a shallow tank having a depending sump and a side wall and a bottom wall draining into said depending sump, a rack supporting frame adapted to receive a rack containing articles thereon, said frame having depending legs resting on said bottom wall and braced against the side wall to support and hold the frame in proper position within said tank, slide rails fastened to the frame and positioned at substantially the level of the upper edge of said tank to slidably receive the bottom of a rack thereon, and guide rails fastened to the sides of the frame to confine and guide the sides of a rack in its sliding movement along said slide rails, said legs, slide rails and guide rails being connected together into a unitary frame which is freely removable as a unit from said shallow tank.

12. In combination with a table having a table top provided with an opening therein, a small size washing machine comprising an upwardly opening shallow tank having a depending sump, outwardly extending flange means carried by said tank adjacent the upper end thereof, said table receiving said flange means to suspend said tank from the table and within the opening thereof, with the upper end of said tank at substantially the level of said table top, a rack support within said tank at substantially the level of said table top, a stationary hood mounted over and partially closing the upper opening of said tank and providing a rack receiving opening, and a cover telescopically movable with respect to said hood from a position enclosing the balance of the upper opening of said tank to a position closely adjacent said hood while exposing said rack receiving opening therein.

13. In a washing machine, the combination of a wash distributor, a rinse distributor, a tank having a movable closure member to confine the liquids from the distributors, a pump for supplying liquid to the wash distributor, a motor driving said pump, a switch controlling the supply of electricity to the motor, a valve controlling the supply of liquid to the rinse distributor, operating means for the valve and switch movable from neutral to actuating positions, and interlocking means effective between the movable closure member and the operating means to retain the operating means in neutral position except when the closure member is closed, and to retain the closure member in closed position with the operating means in actuating positions.

14. In a washing machine, the combination of a wash distributor, a rinse distributor, a tank, a movable cover for said tank, interlock engaging means on said movable cover, a pump for supplying liquid to the wash distributor, a motor driving said pump, a switch controlling the supply of electricity to the motor, a valve control-

ling the supply of liquid to the rinse distributor, operating means for the valve and switch movable from neutral to actuating positions, and interlocking means effective between the cover interlock engaging means and the operating means to prevent movement of the operating means to switch or valve actuating position except when the cover is closed, and to retain the cover in closed position with the operating means in switch or valve actuating position.

15. In a washing machine, the combination of a wash distributor, a rinse distributor, a tank having a movable closure member to confine the liquids from the distributors, a pump for supplying liquid to the wash distributor, a motor driving said pump, a switch controlling the supply of electricity to the motor, a valve controlling the supply of liquid to the rinse distributor, a common controlling member for the valve and the switch, a handle on said switch, a switch operating member connected to said controlling member, a stop limiting the movement of said switch operating member, means operatively connecting the common controlling member to the valve, and a switch handle engaging member resiliently connected to said switch operating member.

16. In a washing machine, the combination of a wash distributor, a rinse distributor, a tank and movable cover to confine the liquids from the distributors, a pump for supplying liquid to the wash distributor, a motor driving said pump, a switch controlling the supply of electricity to the motor, a valve controlling the supply of liquid to the rinse distributor, a common controlling member for the valve and the switch, means operatively connecting the common controlling member to the valve, a handle on said switch, a pair of spaced abutments fixed to said common controlling member, a switch handle engaging arm freely mounted on the common controlling member and lying between said abutments, and compression springs reacting between said abutments and the opposite sides of said switch handle engaging arm.

17. In a washing machine, a wash distributor, a rinse distributor, a tank and movable cover to confine the liquids from the distributors, means for regulating the supply of liquid to the wash distributor, means for regulating the supply of liquid to the rinse distributor, a single controlling means for said regulating means including a member movable from a neutral position to a wash position to supply liquid to the wash distributor, and movable further to a rinse position to supply liquid to the rinse distributor, and interlock means to prevent movement of said controlling means to supply liquid to said distributors except when said cover is closed.

18. In a washing machine, a wash distributor, a rinse distributor, a tank and movable cover to confine the liquids from the distributors, means for regulating the supply of liquid to the wash distributor, means for regulating the supply of liquid to the rinse distributor, a single controlling means for said regulating means including a member movable in one direction from a neutral position to a wash position to supply liquid to the wash distributor, and movable in another direction from neutral position to a rinse position to supply liquid to the rinse distributor, and interlock means to prevent movement of said controlling means out of neutral position to either wash or rinse positions except when said cover is closed, and preventing movement of said cover away from closed position except when said controlling means is in neutral position.

19. In a washing machine, a washing tank, a wash distributor, a rinse distributor, a movable cover for said tank to confine the liquids from the distributors, means for regulating the supply of liquid to the wash distributor, means for regulating the supply of liquid to the rinse distributor, a single manual control member therefor comprising a handle rotatively mounted for movement on said washing tank, and movable from a neutral position in one direction of rotation to a wash position, and movable from the neutral position in the opposite direction of rotation to a rinse position, means for limiting the rotation of the handle in either direction so that the handle must pass through neutral position in moving from wash position to rinse position, means tending to return the handle from rinse position to neutral position so that the operator must positively hold the handle in rinse position for the rinsing operation, and interlock means preventing movement of the handle from neutral position to either wash or rinse positions except when said cover is closed.

20. In a washing machine, a wash distributor, a rinse distributor, a tank and movable cover to confine the liquids from the distributors, means for regulating the supply of liquid to the wash distributor, means for regulating the supply of liquid to the rinse distributor, a single manual control member therefor comprising a handle rotatively mounted for movement from a neutral position in one direction of rotation to a wash position, and from the neutral position in the opposite direction of rotation to a rinse position, means for limiting the rotation of the handle in either direction so that the handle must pass through neutral position in moving from wash position to rinse position, an interlock means for preventing rotative movement of the handle from neutral position to either wash or rinse positions except when the said cover is closed.

21. A dish washing machine adapted to be supported, as a self-contained unit, in a table opening, comprising a shallow open top tank having a depending sump at one side, said open top tank substantially defining the length and width of the machine and having an outwardly projecting flange adjacent its upper end for the support of the entire machine by said table within said opening with the upper end of said tank at substantially the level of said table top, a dish rack guide substantially at the level of said flange for supporting a dish rack substantially at said level, a fixed cover portion above the rear of said tank, a movable cover portion cooperating with said fixed cover portion to provide a washing chamber above said tank and guide and operable from a closing position above the front of said tank to expose the front side of said washing chamber opposite said guide, a pump for forcing liquid from said sump to said washing chamber, and a pump operating motor supported by said tank at a side of said sump.

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