

Dec. 12, 1933.

R. PAULY

1,939,630

DISHWASHING MACHINE

Filed Jan. 14, 1931

2 Sheets-Sheet 1

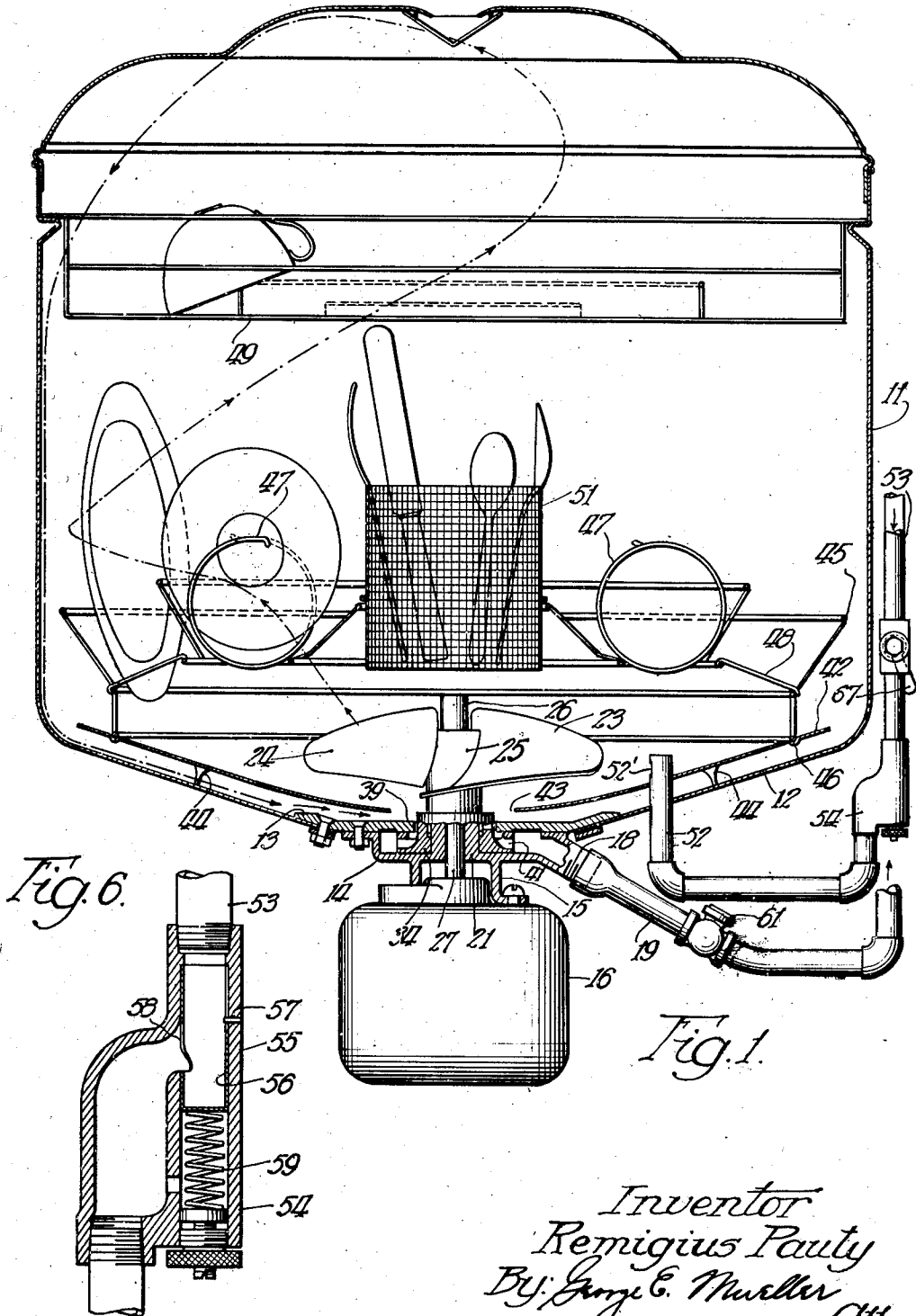


Fig. 6.

Fig. 1.

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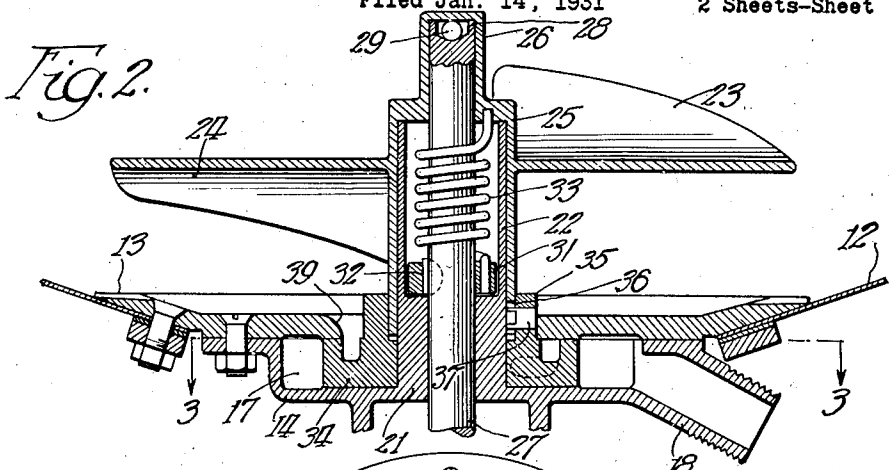


Fig. 3.

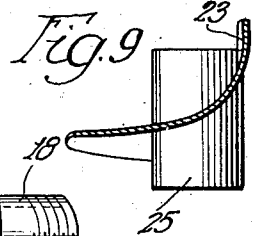
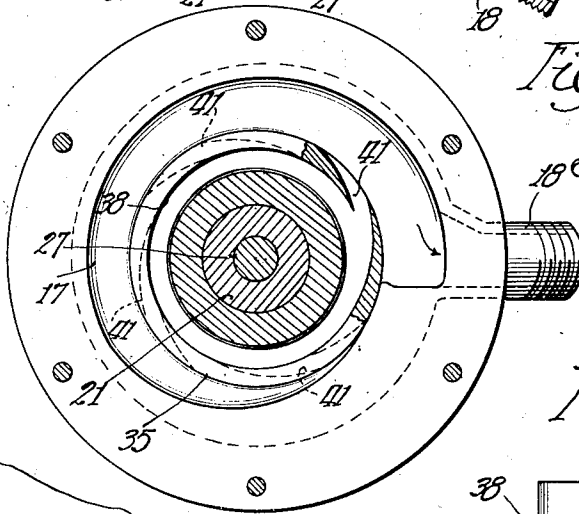


Fig. 4.

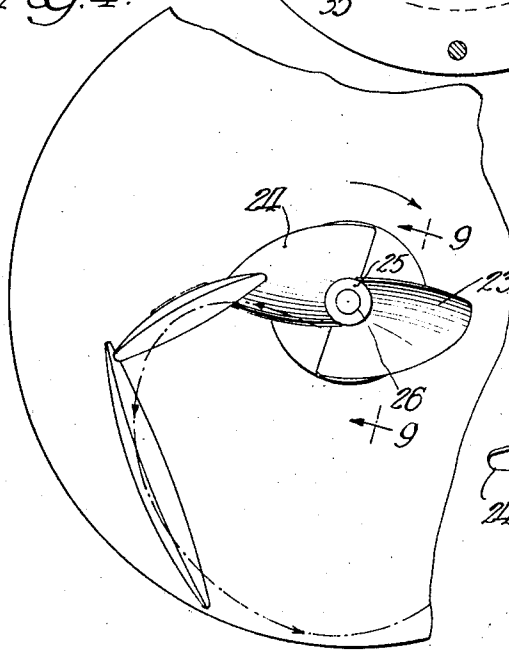


Fig. 5.

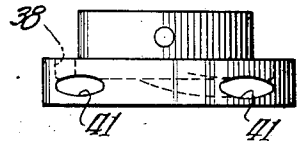


Fig. 8.

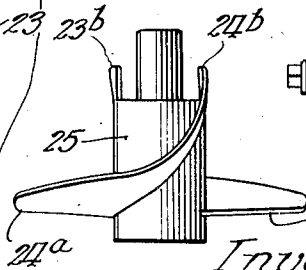
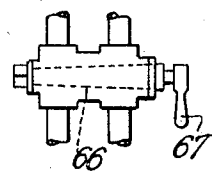


Fig. 7.



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UNITED STATES PATENT OFFICE

1,939,630

DISHWASHING MACHINE

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Application January 14, 1931. Serial No. 508,612

5 Claims. (Cl. 141-9)

Our invention relates to dishwashing machines, and more particularly to a dishwashing machine having means for changing the water in the machine to rinse the soapy water from the dishes after they are washed.

In order to thoroughly cleanse the dishes in a machine within a reasonable time, it is advantageous to place soap, soap flakes, or other detergent substance in the tub to aid in cleansing the dishes. However, after the dishes are clean the soapy water must be rinsed therefrom.

One of the difficulties encountered in automatically withdrawing the soapy water and replenishing it with clean water, is that the rate of supplying fresh water must be equal to the rate of withdrawing the used water, otherwise the tub will overflow or be emptied depending upon whether the supply is greater or less than the withdrawal of water. Experiments have shown that the machine operates most effectively with a definite amount of water therein.

An object of the invention is to provide a new and improved dish washing machine.

A further object is to provide means for changing water in the machine.

A further object is to provide means for supplying and withdrawing water at equal rates.

A further object is to provide improved means for supplying and withdrawing water from the machine.

Other objects and advantages will appear as the description proceeds.

Referring to the drawings, Fig. 1 is a side elevation partly in section of a dish washing machine embodying my invention.

Fig. 2 is an enlarged cross sectional view of the impeller and rotary pump,

Fig. 3 is a sectional view taken on line 3-3 of Fig. 2,

Fig. 4 is a schematic plan view of the machine with the cover removed,

Fig. 5 is a detail view of the rotary member of the pump,

Fig. 6 is a cross sectional view of the pressure regulating valve,

Fig. 7 is a detail of the valve for controlling the supply of water to and from the dishwasher,

Fig. 8 shows the impeller in side elevation, and

Fig. 9 is a sectional view through one of the blades of the impeller, taken along the line 9-9 of Fig. 4.

The washing machine consists of a tub 11, having a centrally sloping bottom 12, extending to a central opening in which a plate 13 is secured. Attached to plate 13 is a pump housing 14 pro-

vided with a downward extension 15, which supports a motor 16 for driving the operating portions of the machine. The pump housing has a spiral channel 17 provided with an outlet 18 from which water is expelled through a pipe 19 to any suitable drain, as for instance, to the kitchen sink. The pump housing has a central vertical journal 21 having a hollow cylindrical extension 22. An impeller having blades 23 and 24, is rotatably mounted upon this extension and the journal. The blades of the impeller are attached to a cylindrical hub 25, which is reduced at its upper end as shown at 26 to fit loosely over the drive shaft 27 of the motor, which extends from the motor through journal 21 and extension 22 into the reduced end of the hub 26. The end of the shaft may be provided with a cavity 28 having a ball-bearing 29 therein to allow the hub to rotate freely upon the shaft.

Shaft 27 has a collar 31 secured thereto by means of a key 32. Surrounding the shaft is a helical spring 33, one end of which is anchored in collar 31, while the other end extends through an opening in hub 25; thus the rotation of the shaft will produce a rotation of the impeller hub through the yielding connection of the spring.

Within the pump housing is a rotatable member 34, having an upwardly extending hub 35, having such an internal diameter as to receive the lower end of hub 25 of the impeller. The impeller hub has a longitudinal slot 36 fitting over a pin 37 carried by the pump hub so as to rotatably connect the impeller and pump hubs. The impeller may be removed from the machine by simply lifting it upwardly. This will at the same time disconnect the pump from the motor shaft, because the rotatable member of the pump is driven through the impeller. The rotatable member of the pump has an annular groove 38 in its upper face, which lies under an opening 39 in plate 13. Thus water draining from the tub through opening 39 will pass into the annular groove 38 of the rotatable member. Extending from the annular groove 38 to the periphery of the rotatable member are a plurality of spiral tunnels 41. The rotatable member is designed to rotate in a clockwise direction as indicated by the arrow in Fig. 3. By making the tunnels spiral it is found that a uniform flow of water is produced by the pump.

The tub is provided with a false bottom 42, which extends substantially parallel with the base of the tub and terminates short of the periphery of the tub to provide a peripheral opening to the space under the false bottom. The false

bottom has a central opening 43 through which the excess of water passing under the false bottom which is not withdrawn by the pump may be recirculated by the impeller. The false bottom is spaced from the bottom 12 by means of a plurality of spacers 44.

Upon the false bottom is a dish rack 45, the base of which rests in an annular groove 46. Rack 45 has a plurality of split rings 47 mounted concentrically around the center of the rack and disposed so as to support the dishes at an angle to the radius but less than a 90° angle to the radius. The outer portion of the rack has supporting rods 48 for supporting a second set of dishes concentrically about the first set of dishes, but at a greater angle to the radius. This arrangement results in a reversal of the direction of flow of the water from that imparted thereto by the impeller. Referring to Fig. 4 for instance, it will be seen that the propeller rotating in a clockwise direction tends to throw the water upwardly and outwardly and at the same time produce a rotational effect. The water from the impeller striking the first set of dishes at an angle, changes its direction of flow and strikes the second row of dishes which are disposed at a greater angle from where the water is deflected to the side of the tub and moving in the opposite direction from that at which it was thrown from the impeller. Since the water has an upward as well as outward and rotational movement, some of the water from the dishes will be splashed upwardly so as to reach the dishes in the upper rack 49. A large portion of the water after having passed the dishes, strikes the wall of the tub and passes downwardly under the false bottom 42. A rack 51 for silverware may be provided in the center of rack 45.

In order to thoroughly cleanse the dishes in the machine, soap in the form of flakes or the like, is first placed in the water and the action of the propeller quickly forms the necessary suds. After the dishes have been thoroughly washed, the water should be changed to rinse the soapsuds therefrom. In order to accomplish this automatically, it is necessary to provide means for supplying fresh water and withdrawing the used water at substantially the same rate, since the machine operates most effectively when a definite amount of water is in the tub. The pump described above serves to withdraw water from the tub at a very definite rate. In order to supply water to the tub at the same rate, an inlet 52 is provided, passing through bottom 12, and the false bottom 42, in close proximity to the periphery of the impeller. The inlet is supplied with water from a pipe or hose 53, which leads to any suitable source of water pressure such as a sink faucet. It is well known that the pressure of water systems varies at different times of the day and a valve 54 is therefore provided to provide a definite rate of flow of water into the machine irrespective of pressure variations in the supply. This valve consists of a cylinder 55 having a hollow cylindrical plunger 56 therein which is closed at one end. The side wall of the cylinder is provided with a longitudinal slot in which a stud 57 secured to the cylinder rides to prevent rotation of the plunger. The cylinder, as well as the plunger, is provided with exhaust ports 58 which are normally held in registry by a spring 59. It will be seen that water entering the cylinder 55 will tend to depress the plunger 56 against the tension of spring 59 and thus partially move the

ports 58 out of registry, thereby reducing the size of the outlet. The greater the water pressure the smaller will be the size of the outlet and therefore the rate of water passing through the outlet will be constant. In the operation of the machine the valve 61 will be closed until the proper level of water in the machine is reached. Thereafter the valve 61 is opened and the level of water will remain the same without requiring any further attention of the operator. After the dishes have been washed the source of supply is disconnected and the pump continues to operate until all of the water is withdrawn from the machine.

In operating the dishwasher it may be necessary or desirable to wash the dishes for a considerable length of time with soapy water before supplying the rinsing water. During the time that no fresh water is entering the tub, the soapy water must be retained therein. In order to facilitate the handling of the washer I provide a double valve having a single stem 66 operated by handle 67, the stem extending between the two pipes 19 and 53 so that the valves in the pipes are operated simultaneously by means of the single handle 67. Accordingly, when the dishes are placed in the tub supported by the racks and the preliminary charge of hot soapy water has been introduced through the pipe 53, the motor is started and at the same time the handle 67 is turned to shut off both valves, leaving the main supply valve to the pipe 53 open.

When the washing has been continued a sufficient length of time the handle 67 is merely turned to open both valves and the machine functions to rinse the dishes in the manner described.

In my prior application, Serial No. 726,770, filed July 18, 1924, now Patent No. 1,884,181, granted October 25, 1932, I show a dishwashing machine which includes a tub for holding water with a bottom means for supporting the dishes in a certain order above the bottom, and an impeller designed to throw the water upwardly and outwardly against the dishes. This movement of the water, coupled with the positioning of the dishes, particularly the plates and flat articles, produces an unusual movement of the water. In this movement the water in the first instance moves upwardly and outwardly and also has some rotary movement in the direction in which the impeller is turning. As the water strikes the dishes, however, it is gradually deflected until it reverses its direction and then moves in a substantially rotary and upward path, thereby washing the backs of the dishes. In the present application, I show an improvement in the construction of the impeller by means of which this action is further enhanced and in which the required movement of the water takes place with relatively little loss of power. In other words, by the new and improved construction of the impeller the desired action of the water is brought about to a more satisfactory extent, and the size of the motor required to produce the turning of the impeller can be decreased.

The shape of the impeller is shown generally in Figs. 1, 2 and 4. In Figs. 8 and 9 I show details of the impeller which still more clearly bring out the shape thereof. Referring to Fig. 8, the impeller blades have substantially horizontal portions 23—*a* and 24—*a*, and substantially vertical portions 23—*b* and 24—*b*, with a curve of gradually decreasing radius from the horizontal to the vertical portions. The length of

the blades at the horizontal portion is less than at the vertical portion, and in the embodiment with which I have had the best results in the combination herein shown, the vertical portion is substantially twice the length of the horizontal portion.

For the best operation of the dishwasher, particularly during the rinsing period, it is desirable to have the water discharged from the pipe 52 in such a manner as to be caught immediately in the blades of the impeller. To secure this result I may place a slot 52' in the pipe 52, where it projects through the false bottom 42. I may, however, so place the pipe 52 as to direct the end opening thereof directly toward the impeller.

What I claim is new and desire to protect by Letters Patent of the United States, is:

1. In a dishwashing machine, a tub, an impeller for agitating the water in the tub, a drive shaft therefor, a pump operatively connected to said shaft, said pump being located under the impeller and comprising a housing having a discharge outlet at the periphery thereof, a rotatable member therein having an annular groove in its upper face and spiral tunnels extending from said groove to its periphery, a plate forming the base of said tub, and overlying said rotatable member and housing and having an aperture for admitting water to said annular groove.

2. In a dishwashing machine, a tub, an impeller for projecting water in the tub upwardly and outwardly, a shaft for driving said impeller, a pump operatively connected to said shaft, and located under the impeller and in communication with the tub, a false bottom in the tub extending substantially parallel with the base of the tub and being open at the periphery whereby the projected water flowing down the side wall will enter under the false bottom at the open periph-

ery, said false bottom extending between the impeller and pump and having an opening surrounding the shaft to permit water to flow there-through to the impeller.

3. In a dishwashing machine, a tub having a base, a plate in the center of the base and having an outlet opening therein, a pump housing secured to said plate having a vertical journal, a hollow cylindrical extension on said journal, a shaft extending through said journal and extension, an impeller comprising a cap having blades thereon, said cap fitting over said extension, a spring having one end attached to said shaft and the opposite end attached to said cap, a pump in said housing, and means for inter-connecting said cap and pump to drive the pump.

4. In a dishwashing machine, a tub having a base, a plate in the center of said base and having a water outlet opening, a pump housing secured to said plate having a discharge outlet at the periphery thereof, a rotatable member in said housing having an annular groove in its upper face lying under said outlet opening, said rotatable member having a plurality of tunnels therethrough extending from said groove to the periphery of the member, means for operating said rotatable member to withdraw water from the tub at a predetermined rate, and means for admitting water to the tub at the same rate.

5. In a dishwashing machine, a tub, an impeller located near the bottom of the tub, a pump connected to the impeller and adapted to turn therewith to withdraw water from the tub, means for admitting fresh water to the tub, means for controlling the water admitting means to admit water at a rate equal to the rate at which water is withdrawn from the tub, and other means for controlling the inflow and outflow of water so that both actions may be started simultaneously.

· REMIGIUS PAULY. 115

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