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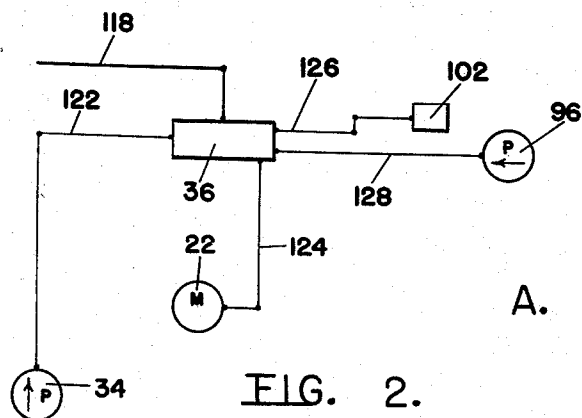
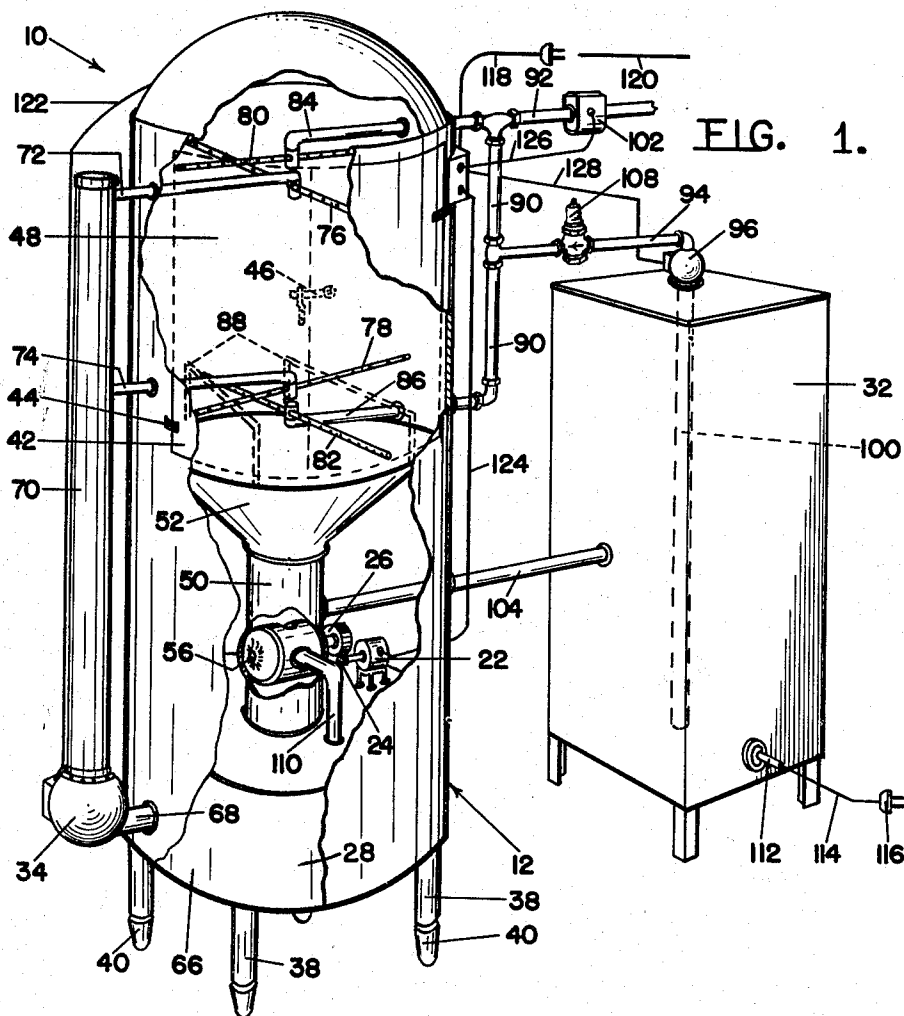
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2,963,029

FOUR-CYCLE DISHWASHING MACHINE

Filed Nov. 4, 1957

3 Sheets-Sheet 1



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FOUR-CYCLE DISHWASHING MACHINE

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3 Sheets-Sheet 2

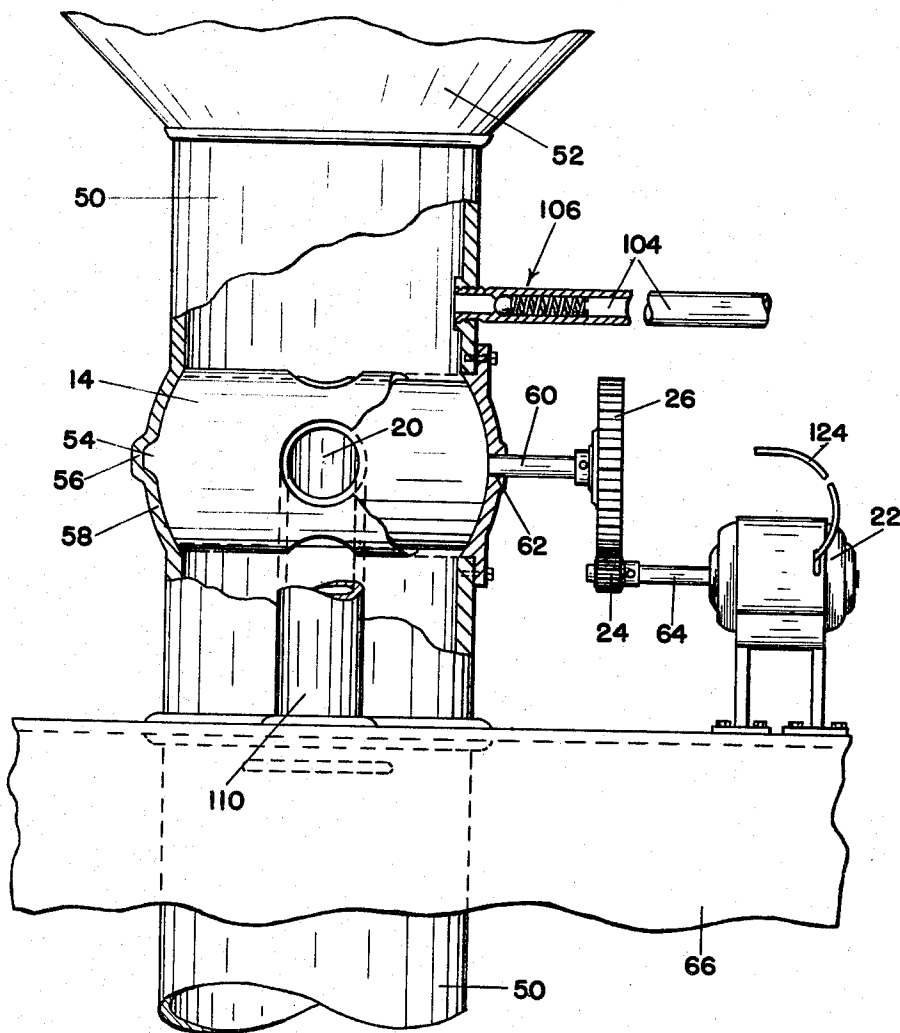


FIG. 3.

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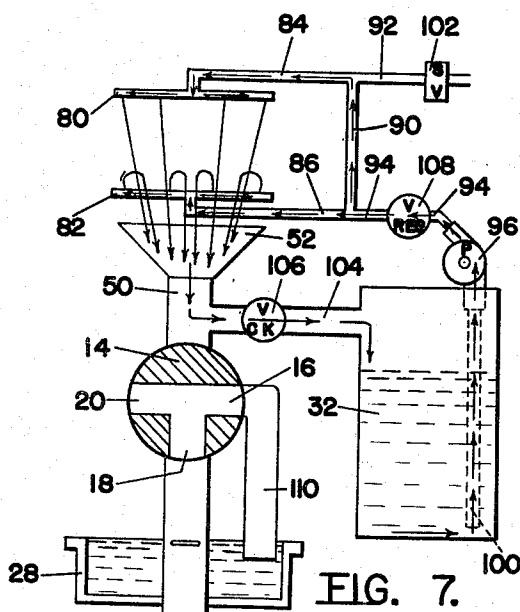
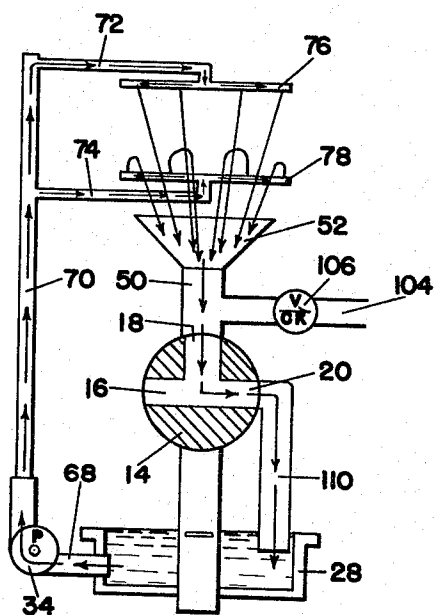
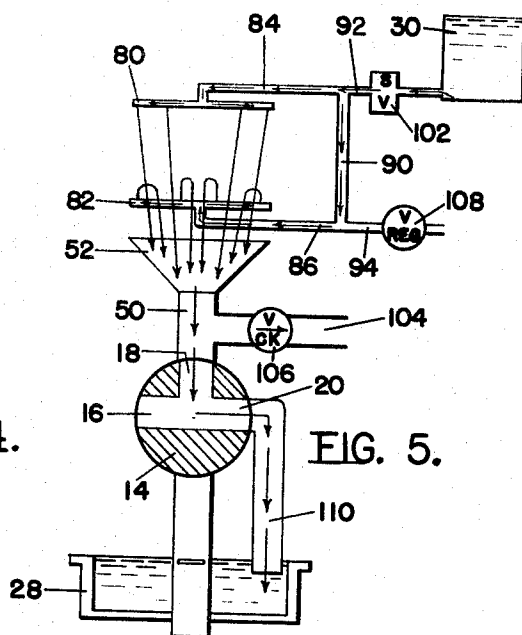
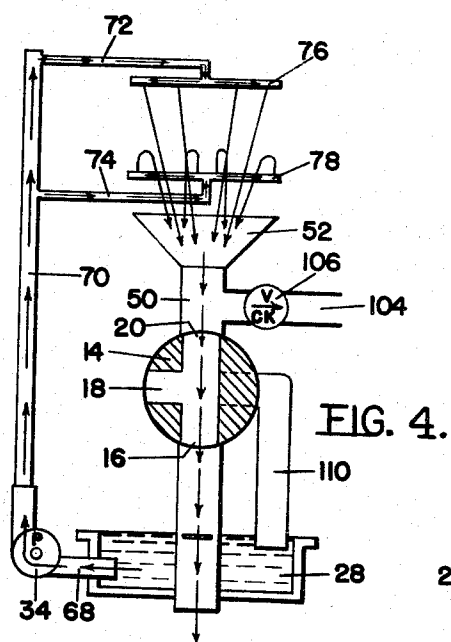
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FOUR-CYCLE DISHWASHING MACHINE

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3 Sheets-Sheet 3



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2,963,029

FOUR-CYCLE DISHWASHING MACHINE

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3 Claims. (Cl. 134—58)

This invention relates to dish washing machines for commercial or restaurant use wherein hot water is sprayed under pressure over dishes and other ware in a housing, and in particular a dish washing machine having a pre-wash phase in which particles of food are flushed from the ware by water from a supply or storage sump, a rinsing stage or phase in which the water used in the pre-wash phase is replenished, a washing phase, and a final rinse phase in which the ware is sprayed by a chemically treated fluid that is stored in a recirculating tank.

The purpose of this invention is to provide an improved dish washing machine that eliminates the necessity of rinsing the dishes before being placed in the machine and in which a final sanitized or otherwise chemically treated water rinse substantially sterilizes the dishes or other ware.

In conventional dish washing machines it is necessary to manually rinse food and the like from the dishes before they are placed in the machine, and, particularly in restaurants, where large quantities of ware is washed continuously this requires additional help and takes considerable time. Furthermore, conventional dish washing machines use large quantities of water and the water used in the machines is not reused.

With these thoughts in mind this invention contemplates a vertically disposed housing having a ware holding chamber with opposed spray headers in upper and lower ends thereof with a cylindrical three-way valve for directing fluid from the chamber directly into a drain, or into a sump providing a reservoir, or into a recirculating tank in a conduit extended downwardly from the chamber, and with a motor and controls for operating the elements in a predetermined sequence wherein food and the like is rinsed from the ware by recirculated water from a storage sump, the ware is rinsed with water from a supply container with the water replenishing the water of the storage sump, the ware is washed by water recirculated from the storage sump, and in which the dishes are finally rinsed by sanitized or other chemically treated water from a recirculating tank.

The object of this invention is, therefore, to provide an automatic dish washer which obviates the necessity of pre-rinsing ware washed therein, and which passes through a plurality of stages with the last stage substantially sterilizing the ware.

Another object of the invention is to provide a dish washing machine that operates in stages and in which water from the first stage only is flushed through the drain into the sewer.

Another important object of the invention is to provide a ware washing machine in which water is forced into spray devices under pressure by a pump.

It is yet another object of the invention to provide a ware washing machine in which food and other products on dishes and the like is flushed directly through a drain into a sewer before the cleansing stages are started.

A further object of the invention is to provide an improved ware washing machine in which all steps of the

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process, including rinsing food and the like from the ware, and also finally rinsing the ware with chemically treated water, are performed within the housing of the machine thereby eliminating the possibility of contamination of the ware.

A still further object is to provide a dish washing machine in which a substantial part of the wash water is re-used thereby obviating the necessity of using large quantities of water.

And a still further object is to provide an improved dish washing machine in which the pre-wash stage outside of the machine is eliminated, and in which the machine is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a cylindrical housing supported by legs and having doors providing access to a washing chamber in the upper part of the machine hinged to the wall of the housing and spaced from the upper end, opposed upper and lower spray headers for spraying fluid upon ware in racks in said chamber positioned in upper and lower ends of the chamber, a three-way valve positioned in a conduit depending from a funnel extending downwardly from said chamber, a motor operatively connected to the valve, a control switch for actuating the motor, a sump providing a reservoir, positioned to receive fluid from a rinse phase, and also from the wash phase, a supply container for providing water for one of the rinse phases, a wash pump for supplying water from the sump to the wash phase, and a recirculating tank for retaining chemically treated water or sanitized fluid for a final rinse of ware cleaned by the machine.

Other features and advantages in view the invention will appear from the following description taken in connection with the drawings, wherein:

Figure 1 is a perspective view of the improved dish washing machine with a wash pump and conduit extended therefrom shown on the outside of the housing for the purpose of illustration, and also with part of the housing broken away showing the washing chamber and water distributing three-way valve.

Figure 2 is a wiring diagram showing electrical connections between the parts.

Figure 3 is a view showing a conduit depending from a funnel-shaped section of the housing with part broken away illustrating the three-way valve assembly and with the parts shown on an enlarged scale.

Figures 4, 5, 6, and 7 are diagrammatic illustrations showing the passage of the fluids through the rinsing and washing chamber.

Figure 4 is a view showing the position of the three-way valve in the first phase of operations wherein food and the like is rinsed by water from the sump from the ware directly through the drain to a sewer or the like.

Figure 5 is a view showing the relative positions of the parts in the second phase or rinse of the machine wherein fresh water is supplied from a container and wherein the water is directed by a three-way valve into the sump.

Figure 6 shows the positions of the parts in the ware washing phase wherein water from the sump is sprayed upon the ware and returned to the sump.

Figure 7 shows the positions of the parts in the final rinse wherein chemically treated or sanitized water is supplied from a tank to the ware and returned to the tank.

While one embodiment of the invention is illustrated in the above-referred to drawings, it is to be understood that they are merely for the purpose of illustration and that various changes in construction may be resorted to in the course of manufacture in order that the invention may be utilized to the best advantage according to circumstances which may arise, without in any manner departing from the spirit and intention of the device, which is to be limited only in accordance with the appended claims. And

while there is stated the primary field of utility of the invention, it remains obvious that it may be employed in any other capacity wherein it may be found applicable.

In the accompanying drawings and in the following specification, the same reference characters are used to designate the same parts and elements throughout and in which the numeral 10 refers to the invention in its entirety, numeral 12 indicating a housing, numeral 14 a three-way valve having openings 16, 18 and 20 therein, and actuated by a motor 22 through a pinion 24 and a gear 26, numeral 28 a sump or reservoir positioned to receive water from the valve, numeral 30 a fresh water supply container for providing water for the second phase or rinse, numeral 32 a tank for sanitized water or other chemically treated fluid, numeral 34 a pump for supplying water from the sump to spray headers in the pre-washing and also in the washing phase, and numeral 36 a time switch for controlling the circuit to the motor to synchronize movements of the three-way valve with the different phases of operation of the machine.

The housing 12 is supported by legs 38 having sleeves of rubber or the like 40 on the lower ends, and the upper part of the housing is provided with an opening closed by doors 42 that are mounted with hinges 44. The doors are retained in the closed position by a latch, as indicated by the dotted lines 46, and the latch is readily released for opening the doors to place ware in an open chamber 48 in the upper part of the machine, and also to permit removing the ware, which is contained in baskets, not shown.

Below the chamber 48 is a funnel-shaped element or section of the housing and the three-way valve 14 is pivotally mounted in a conduit 50 that extends downwardly from the funnel portion 52. One end of the valve is provided with a stub shaft 54 that is positioned in a socket 56 in the wall 58 of the duct, and the opposite end is provided with a shaft 60 that is positioned in a bearing 62. The extended end of the shaft is provided with the gear 26 that meshes with the pinion 24 on the shaft 64 of the motor 22. The motor is mounted on a support 66, as shown in Figure 3.

The motor is actuated by the time control switch 36 so that, in the first phase, the ports 16 and 20 of the valve 14 register with the conduit 50 whereby food and the like from dirty ware is flushed directly through the conduit into a drain or sewer; in the second phase, fresh water rinsing the ware passes into the sump 28; in the third phase, the water also passes into the sump 28 and is recirculated for thoroughly washing the ware; and in the fourth phase the ports of the valve are closed, the water of the final rinse being recirculated through the tank 32.

The pump 34, which is referred to as the wash pump, is connected by a tube 68 to the sump 28 and by a conduit 70 to tubular arms 72 and 74 on right angularly disposed sections of extended ends of which spinning spray headers 76 and 78 are rotatably mounted, as shown in Figure 1. Similar spray headers 80 and 82 are rotatably mounted on right angularly disposed portions of tubular arms 84 and 86 extended into the housing and connected to the supply water and recirculating tanks 30 and 32 for supplying rinse water. The pump 34 and conduit 70 are positioned in the housing 12, and are only shown on the outside of the housing for the purpose of illustration. Spaced support rails 88 extend upwardly from the funnel-shaped section, as shown in dotted lines in Figure 1, for supporting racks of dishes or other ware in the path of liquid sprayed by the nozzles or spray headers.

The tubular arms 84 and 86 on the ends of which the spray headers 80 and 82 are carried are connected by a tube 90, the upper end of which is connected by a tube 92 to the supply container 30, and the lower end of which is connected by a tube 94 to a pump 96, the suction side of which is connected to a tube 98 which extends to a point 100 spaced from the lower end of the recirculating tank 32. The tube 94, which is connected to the dis-

charge of the pump 96, is provided with a pressure regulating valve which maintains approximately 30 p.s.i. on the tube.

The tube 92 connecting the spray headers of the rinse water to the container 30 is provided with a solenoid actuated intake valve 102 which is actuated by the timer switch 36 to admit clean water to the spray headers for the second rinse. The conduit 50 is provided with a branch connection 104 that connects the conduit to the recirculating tank 32, and the connection 104 is provided with a ball check valve 106 which, with the pressure regulating valve 108 in the tube 94 is actuated by the time switch 36. The conduit 50 is also provided with a connection 110 that extends to the sump 28.

The recirculating tank 32 is provided with an electric heating element 112 from which a conventional electric cord 114 extends, and the cord is provided with a plug 116.

The electric circuit of the washing machine is connected by a cord 118 to a line 120, and the cord 118 extends to the time switch 36, as shown in the wiring diagram, in Figure 2. The time switch is connected by a wire 122 to the wash pump 34, by a wire 124 to the motor 11, by a wire 126 to the solenoid actuated intake valve 102, and by a wire 128 to the pump 96.

Operation

Dishes or other ware, as removed from the table, or tables and counters, are placed in racks and the racks positioned on the rails 88 in the chamber 48 and, with the doors closed, water from the sump 28, pumped by the wash pump 34, is sprayed over the dishes flushing food and the like thereon through the conduit 50 and into the drain or sewer. In the next step or phase water from the supply container 30 is sprayed over the ware and with the valve 14 positioned as shown in Figure 5, the water is returned to the sump 28 replenishing the water therein. In the next step or washing phase water is circulated by the wash pump 34 from the sump, sprayed over the ware, and returned to the sump. In the final phase sanitized or other chemically treated water is recirculated by the pump 96 through the spray headers, over the ware, and returned through the connection 104, to the tank 32.

In these stages the time control switch actuates the motor whereby the motor turns the valve 14 to the respective positions illustrated in Figures 4, 5, 6, and 7. With the control devices actuated by the time switch as illustrated and described the water, or other fluid from the different storage or supply devices is sprayed over the ware at the desired intervals whereby the complete cleaning operation is accomplished automatically.

From the foregoing specification, it will become apparent that the invention disclosed will adequately accomplish the functions for which it has been designed and in an economical manner, and that its simplicity, accuracy, and ease of operation are such as to provide a relatively inexpensive device, considering what it will accomplish, and that it will find an important place in the art to which it appertains when once placed on the market.

It is thought that persons skilled in the art to which the invention relates will be able to obtain a clear understanding of the invention after considering the description in connection with the drawings. Therefore, a more lengthy description is regarded as unnecessary.

Changes in shape, size, and rearrangement of details and parts such as come within the purview of the invention claimed may be resorted to in actual practice, if desired.

Having now described the invention that which is claimed to be new and desired to be procured by Letters Patent is:

1. A dish washing machine comprising a housing having an opening closed by doors in the upper part,

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said housing having a ware holding chamber in the upper part and positioned to receive ware through said opening, opposed spinning spray headers in the housing and positioned above and below the ware holding chamber, a reservoir in the lower part of the housing, the housing having a funnel shaped element positioned below the ware holding chamber and extended for selective connection with a drain and with the reservoir, a valve rotatably mounted in the funnel-like element for directing the flow of fluids therethrough selectively to the drain and to the reservoir, a motor for actuating the valve, means for conveying water from the reservoir to ware in the ware holding chamber for flushing products from ware into the drain, means for supplying water from a supply container to the spray headers with the water replenishing water in the reservoir, said water conveying means comprising means for pumping water from the reservoir to the spray headers for washing the ware, the water of the washing phase being reused, and means for recirculating sanitized water to the spray headers for substantially sterilizing the ware.

2. In a dish washing machine, the combination which comprises a vertically disposed housing having an opening spaced downwardly from the upper end, doors hinged to the housing and mounted at the sides of the opening, the doors providing a closure for the opening, a sump in the lower part of the housing, a funnel-shaped element mounted in the housing and positioned below the lower end of the opening therein and having an extended lower end selectively connected to said sump and to a drain, ware rack retaining rails mounted in the housing and positioned above the funnel-shaped element, spinning spray headers rotatably mounted in the housing and positioned above and below the said opening, a pump for pumping fluid from the sump to some of the spray headers, a valve in the funnel-shaped element, the valve having passages therethrough for selectively connecting the lower end of the funnel to the sump and to the drain, a motor for actuating the valve to a position wherein water sprayed over ware on the rails is flushed directly through

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a drain, and to a position wherein the water is returned to the sump, means for supplying rinse water to some of the spray headers with the water returning to the sump, and means for recirculating chemically treated water through some of the spray headers.

3. In a ware washing machine, the combination which comprises a vertically disposed housing having a ware washing chamber in the upper part and having an opening in registering relation with the ware washing chamber, doors hinged to the housing and providing closures for the opening, a sump in the lower part of the housing, a funnel-shaped casing mounted in the housing and positioned below said chamber, rails mounted in the housing and also positioned below the chamber and having an extended lower end selectively connected to said sump and to a drain, a valve in the funnel-shaped casing, the valve having openings therethrough for selectively connecting the lower end of the funnel to the sump and to the drain whereby water sprayed over ware in the chamber passes through the funnel-shaped casing into a drain, or passes into the sump, spinning spray headers rotatably mounted in the housing and positioned above and below the chamber, a pump in the housing for pumping fluid from the sump to some of the spray headers, a fresh water supply container, means for supplying water from the fresh water supply container to some of the headers for rinsing ware in said chamber, a tank for chemically treated water, a pump for supplying the chemically treated water from the tank to some of the spray headers under pressure with the water returning to the tank, a time switch, a circuit connecting the time switch to the motor, pumps, and to the control devices of the elements, and to a source of current supply.

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