March 16, 1965 L. M. WYNNE ETAL 3,173,433

APPARATUS FOR WASHING RECEPTACLES AUTOMATICALLY

Filed Aug. 19, 1963 3 Sheets-Sheet 1

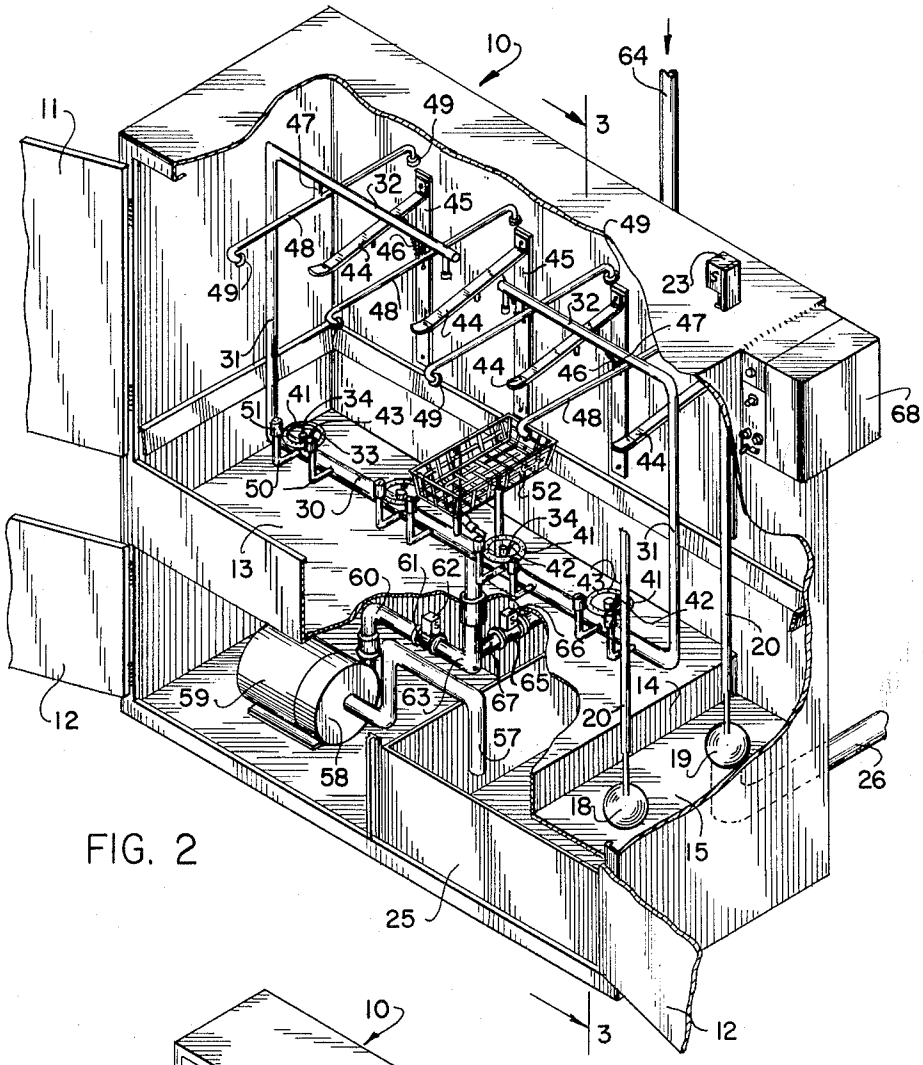



FIG. 2

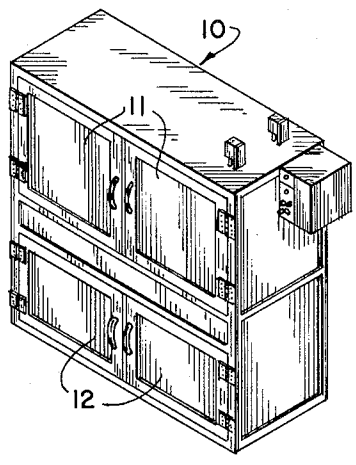



FIG. 1

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Filed Aug. 19, 1963 3 Sheets-Sheet 2

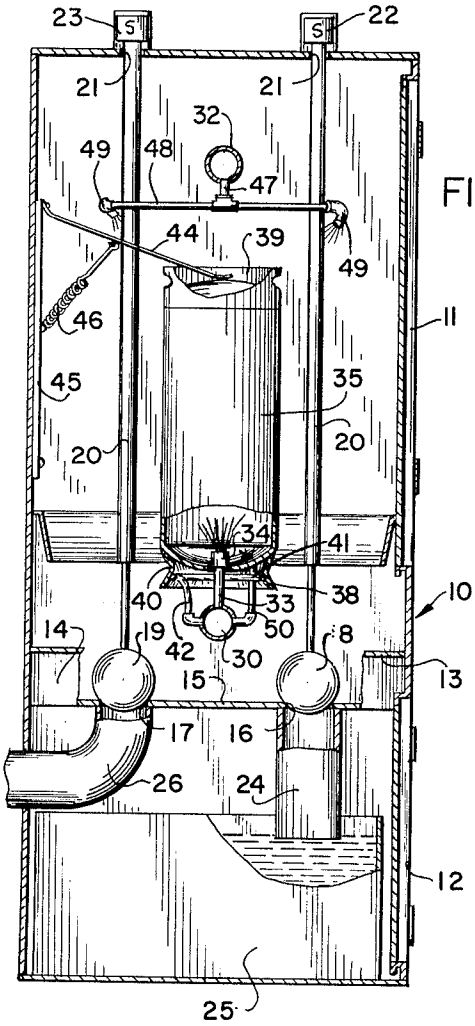



FIG. 3

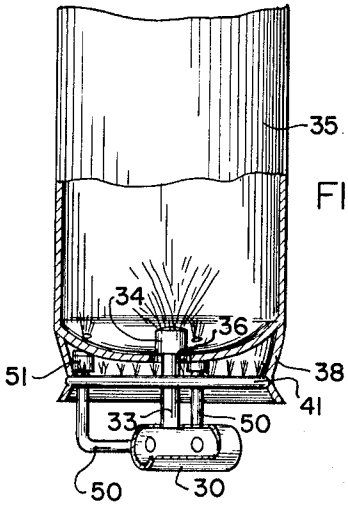



FIG. 4

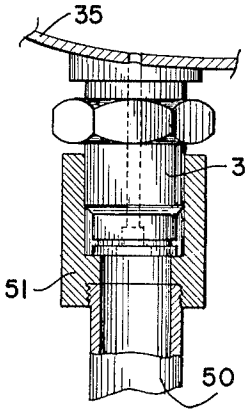



FIG. 5

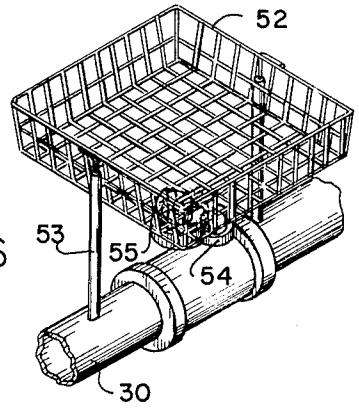



FIG. 6

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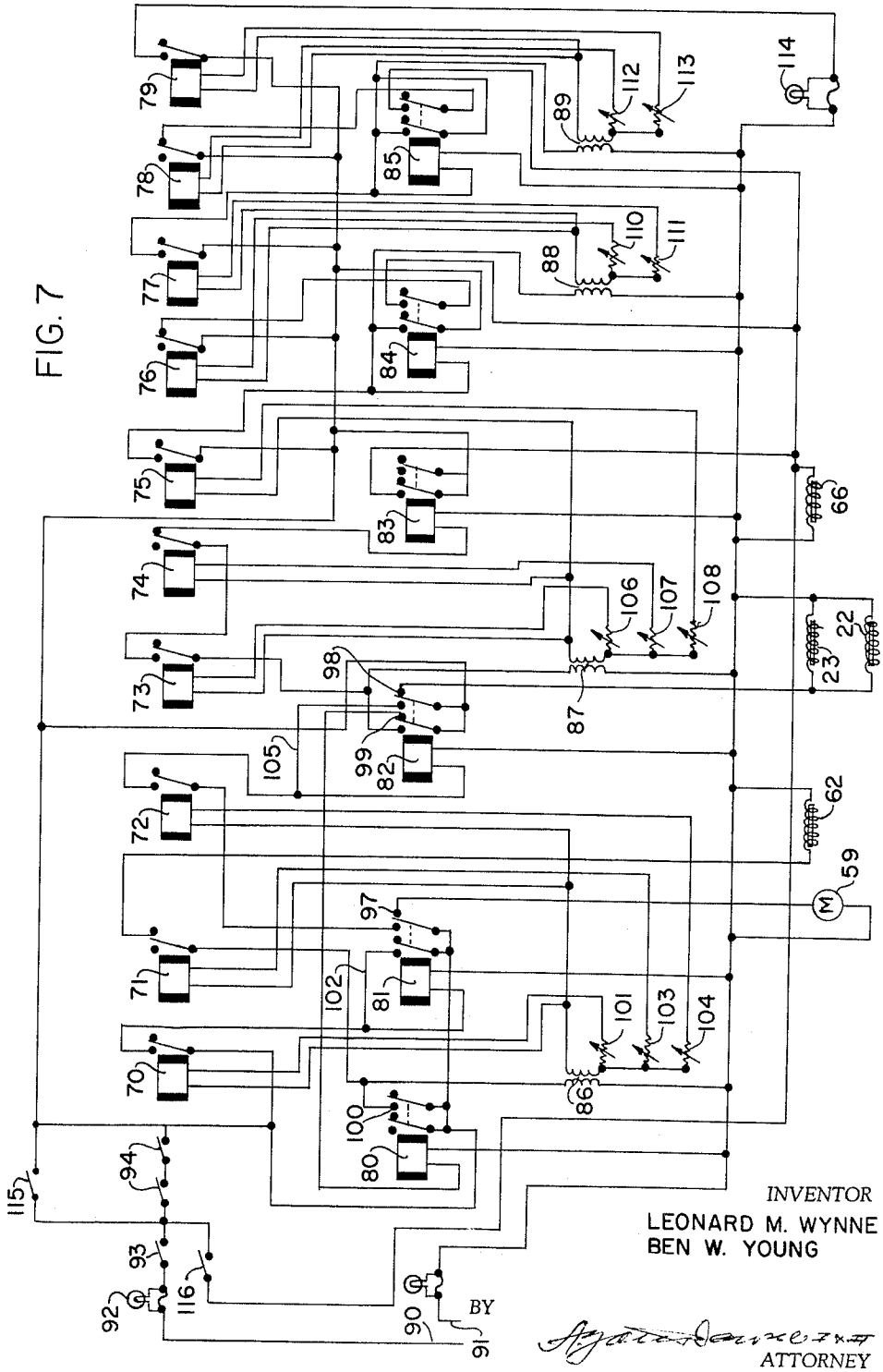
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March 16, 1965 L. M. WYNNE ETAL 3,173,433

APPARATUS FOR WASHING RECEPTACLES AUTOMATICALLY

Filed Aug. 19, 1963 3 Sheets-Sheet 3

FIG. 7




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3,173,433

# APPARATUS FOR WASHING RECEPTACLES AUTOMATICALLY

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2 Claims. (Cl. 134—58)

This invention relates to foods and apparatus and equipment utilized in the preparation and treatment of containers for storing material for human consumption in such a manner that the containers can be reused.

The invention relates particularly to the cleaning and sterilizing of containers and to apparatus in which the cleaning compound or caustic is retained and reusable while the rinsing medium is discarded as for example by being discharged into a sewer or the like.

Heretofore many devices for washing containers have been provided, some of which have automatic, electric, or electro-mechanical timing devices similar to the timing cycles on clothes washing machines, some of which have attempted to salvage and reuse the caustic washing solution, and some of which have relied upon steam, hot water, or the like for the rinsing operation. These devices have been complicated, difficult to service and maintain, time-consuming in operation, did not sufficiently clean the tanks to make them suitable for storing material for human consumption, and required skilled operators.

It is an object of the invention to overcome the difficulties enumerated and to provide novel apparatus for washing and sterilizing tanks in which the cleaning compound is reusable and the rinsing liquid is discharged from the machine as well as an apparatus in which the washing and rinsing cycles are automatically controlled as for example by thermal delay relays.

Another object of the invention is to provide a tank or other object in a washing machine in which the timing control elements may be easily and quickly applied, adjusted and replaced.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective illustrating the outside configuration of the machine of the present invention;

FIG. 2, an enlarged perspective thereof with portions broken away for clarity;

FIG. 3, an enlarged section taken along the line 3—3 of FIG. 2 with one of the tanks in position;

FIG. 4, an enlarged fragmentary section of the means for washing the inside of the tank;

FIG. 5, an enlarged section of the tank valve cleaning head;

FIG. 6, an enlarged fragmentary perspective of the wire basket utilized for cleaning small detachable parts; and

FIG. 7, a wiring diagram of the control system.

Briefly stated, the present invention is an apparatus which can be used by unskilled operators for washing and sterilizing tanks or other containers utilized in the storing and transporting of food and the like for human consumption. The apparatus includes a housing in which a plurality of tanks are received and which normally will not operate until the doors are closed whereupon the washing and rinsing cycles are begun and will continue automatically through the entire washing and rinsing cycle. A caustic is first sprayed on and into the tanks or containers by high pressure jets after which the caustic is drained from the spray area into a reservoir. The tanks are then rinsed several times with hot water and after each rinsing, the water is drained into a sewer or the like. The washing and rinsing cycles are controlled by a series of relays of the plug-in type controlled by variable resistance thermal delay elements which may be easily and quickly adjusted and replaced and are adapted to operate in sequence and at the end of the cycles to stop the apparatus.



With continued reference to the drawings a cabinet or housing 10 is provided having a pair of relatively large doors 11 in the upper portion of the front and a pair of smaller doors 12 in the lower portion of the front. A horizontal partition or shelf 13 is provided within the housing 10 and such partition slopes from one end of the housing toward the other so that liquid will drain down the partition to one end thereof. The lowermost end of the partition is provided with a depending wall 14 and a partition extension or bottom 15 which forms a sump or well to collect liquid which drains down the partition 13. The bottom 15 is provided with a pair of spaced openings 16 and 17 which are normally closed by ball-type plugs 18 and 19, respectively. Each of the ball-type plugs is provided with a rod 20 which extends upwardly through openings 21 in the top of the housing.

The rod 20 on ball 18 is connected to a solenoid 22 mounted on top of the housing 10 and the rod 20 on the ball 19 is connected to a solenoid 23 mounted on top of the housing in spaced relation with the solenoid 22. The solenoids 22 and 23 are adapted to be operated in a manner which will be described later to raise the ball-type plugs and permit the liquid within the sump to drain therefrom. A discharge pipe 24 is connected to the bottom 15 in communication with the opening 16 to discharge fluid from the sump into a caustic reservoir 25 after the caustic has been used to clean a series of tanks so that such caustic can be reused to clean subsequent tanks. A drain pipe 26 is connected to the bottom 15 in communication with the opening 17 for discharging water used in the rinse cycles into a sewer or the like (not shown).

A header 30 is provided within the housing 10 and such header is disposed above the partition 13 and located generally along the longitudinal center line of the housing. Such header has pipes 31 connected to each end thereof which extend upwardly to a position adjacent to the top of the housing. An auxiliary header 32 is connected to each of the upright pipes 31 and such auxiliary headers extend inwardly toward each other in substantially the same vertical plane as the header 30, such auxiliary headers terminating in spaced relation to each other. The header 30 is provided with a plurality of generally upright pipes 33, each of which has a spray head 34 mounted thereon and each of such spray heads is adapted to extend into a tank or container 35.

The tanks illustrated are of the type which can be pressurized and which normally have dome-shaped ends to withstand the internal pressures and with a filling opening 36 at one end which, if desired, may have a cap (not shown) for closing the opening when the tank has been filled. In order to subject the contents of the tank to pressure, such tank is provided with a pair of valves 37 by which air or other fluid under pressure is introduced into the tank after the material has been placed therein and the tank has been sealed. The valves 37 are protected from wear and tear by providing such tank with a skirt 38 extending upwardly above the valves 37. To maintain the tanks in an upright position each tank has a skirt 39 forming an extension of the cylindrical body and projecting downwardly to a position below the domed end thereof.

Each skirt 38 is provided with an annular inset portion 40 which engages one of a plurality of rings 41,

each of which is connected by a pair of pipes 42 to the header 30. Each ring has a plurality of orifices 43 around its upper periphery so that fluid from the header 30 will flow into the ring and will be discharged through the orifices against the tank. When a series of tanks are inserted in the housing, each tank is inverted so that the spray heads 34 extend upwardly through the opening 36 into the interior of the tank and the skirt 38 rests upon the ring 41. In order to maintain the tank in position a finger 44 of flexible material is mounted on a support plate 45 which in turn is mounted on the inside of the rear wall of the housing. In order to apply tension to the tank a spring 46 has one end connected to the support plate 45 and the opposite end pivotally connected to the finger 44 intermediate the ends thereof to exert a downward force on the free end of the finger.

The auxiliary headers 32 are each provided with a series of downwardly extending pipes 47 each of which terminates in a spray header 48 having nozzles 49 on each end so that fluid from the auxiliary headers will flow into the spray header and be discharged through the nozzles 49 in such manner that the spray from the nozzles will impinge upon the tanks.

As illustrated in FIGS. 3, 4 and 5 it is desirable that the valves 37 be open during the cleaning of the tanks and that the fluid used in the cleaning and rinsing of the tanks be simultaneously injected into the valves for the purpose of cleaning such valves. This is accomplished by providing a pair of pipes 50 connected to the header 30 and located adjacent to the ring 41, and each of such pipes is provided with a nozzle 51 in which one of the valves is received and each of such nozzles has means for opening the valve to permit the ingress of fluid.

If desired a basket 52 of open wire construction may be located within the housing and such basket is adapted to receive small detachable parts such as tank caps and the like for cleaning and sterilizing the same. The basket is supported by a pair of posts 53 attached to the header 30 and adapted to support the basket thereabove. The header 30 is provided with an outlet 54 having a spray nozzle 55 disposed beneath the basket 52 so that fluid will be discharged from the header 30 onto the small parts within the basket.

The reservoir 25 is located in the bottom portion of the housing and the fluid therein is adapted to be heated in any desired manner (not shown). The heated fluid is removed from the reservoir through a pipe 57 by means of a pump 58 driven by a source of power such as an electric motor 59. The caustic is discharged from the pump through a pipe 60 into the header 30 under the influence of a cut-off valve 61 operated by a solenoid 62. The cut-off valve 61 is connected to the header 30 by an inlet pipe 63. The water or other fluid used in the rinse cycles is introduced into the apparatus from a main 64 through a cut-off valve 65 operated by a solenoid 66 and such valve is connected to the inlet pipe by a nipple 67. The water used in the rinse cycles preferably has been heated to at least 180° F. to destroy any bacteria remaining in or on the tanks or containers.

An electrical element receptacle 68 is mounted on the end of the housing in a readily accessible position. A plurality of plug-in type relays 70 through 85 inclusive are mounted within the receptacle 68 along with transformers 86 through 89. Electrical energy is supplied to the machine through lines 90 and 91 and such energy passes through an indicator type fuse holder 92 and is subjected to an on-off switch 93 and a pair of door switches 94.

In the operation of the device the front doors 11 are opened and a plurality of tanks 35 are placed within the housing 10 and the switch 93 is closed. The door switches 94 will be closed when the doors 11 of the cabinet are shut and when the door switches are closed a cycle begins. Power is applied to the electric motor 59 through a contact 97 on relay 81 and such motor drives the pump 58 and causes the caustic to be removed from the reservoir 25 and forces such caustic through the line 60 and the cut-off valve 61 into the inlet pipe 63 and then into the header 30 and auxiliary header 32.



Simultaneously power is applied through a contact 98 on the relay 82 to energize solenoids 22 and 23 and open the normally closed caustic drain plug 18 and close the normally open water drain plug 19 to permit the caustic to return to the reservoir and prevent any wasting thereof through the water drain. At the same time contact 99 on the relay 82 will energize the coil of the relay 80 to apply power through a contact 100 to energize the transformer 86 and begin the timing cycle on relays 70, 71 and 72. The closing of the relay 80 also will transmit power through the relay 71 to energize solenoid 62 and open the normally closed cut-off valve 61 to permit the pump to force the caustic through the pipes 60 and 63 into the header 30 and auxiliary headers 32. A variable resistance thermal delay element 101 connected to the transformer 86 will delay approximately 15 seconds and then energize the relay 70 which in turn energizes relay 81 and breaks the contact 97 to stop the motor 59. The relay 81 is locked closed by a line 102. When the motor 59 has been cut off, the solenoid 62 will cause the valve 61 to remain open for approximately 60 seconds due to a variable resistance thermal delay element 103 on the transformer 86 to permit caustic within the headers 30 and 32 to drain back through the pipes into the reservoir 25. A third variable resistance thermal delay element 104 connected to the transformer 86 will delay approximately 60 seconds and then energize the relay 72 which in turn energizes relay 82. This de-energizes the relay 80 and takes relays 70, 71 and 72 out of circuit.

When the relay 82 is energized the solenoids 22 and 23 will be reversed so that the solenoid 22 will again close the caustic drain and the solenoid 23 will open the water drain. The solenoid 62 likewise will close cut-off valve 61 when the relay 71 is taken out of circuit.

When the relay 82 is energized it will be locked closed by a line 105 and will remain closed during the remainder of the cycle so that caustic control relays 70, 71, 72, 80 and 81 will remain inoperative. Power will be applied to the transformer 87 starting the timing cycle of relays 73, 74 and 75. A variable resistance thermal delay element 106 connected to the transformer 87 will delay approximately 5 seconds and then energize relay 73 which in turn energizes relay 83. When the relay 83 is energized, solenoid 66 will open the cut-off valve 65 and permit rinse water from the main 64 to flow through the nipple 67 into the inlet pipe 63 and into the headers 30 and 32. A variable resistance thermal delay element 107 connected to the transformer 87 will permit the rinse water to flow for approximately 15 seconds after which the relay 74 will be energized so that relay 83 will be taken out of the circuit and the solenoid 66 will close the cut-off valve 65 and stop the flow of water from the main 64. When the flow of water has been stopped the water in the sump will continue to drain for approximately 10 seconds after which variable resistance thermal delay element 108 connected to the transformer 87 will energize relay 75 at which time approximately 90 seconds have elapsed since the start of the washing cycle.

The energizing of relay 75 will apply power to the relay 84 and start the timing cycle of relays 76 and 77 and transformer 88. The closing of relay 84 will again energize the solenoid 66 and cause the cut-off valve 65 to open to permit water from the main 64 to again pass through the headers 30 and 32 to rinse the tanks for the second time. After approximately 15 seconds a variable resistance thermal delay element 110 connected to the transformer 88 will energize relay 76 which in turn will cause the solenoid 66 to close the cut-off valve 65 and

stop the second rinse. After approximately 15 seconds a variable resistance thermal delay element 111 connected to the transformer 88 will energize relay 77 which in turn will energize the relay 85 to begin the third rinse cycle. At the end of the second rinse cycle, approximately 120 seconds have passed.

When the relay 85 is energized power is applied to the transformer 89 and simultaneously the solenoid 66 controlling the cut-off valve 65 is again opened to permit water from the main 64 to again enter the headers 30 and 32. After approximately 15 seconds a variable resistance thermal delay element 112 connected to the transformer 89 will energize the coil of relay 78 which will stop the flow of current to the solenoid 66 and permit such solenoid to close valve 65 and stop the flow of water to the headers. After approximately 15 seconds more a variable resistance thermal delay element 113 on the transformer 89 will energize the relay 79 which in turn will energize a signalling device 114 such as an incandescent light or buzzer to indicate that the cycle is finished and that the doors 11 may be opened and the tanks removed. The total washing and rinsing cycle may be of any predetermined length although 150 seconds have been found satisfactory.

A test switch 115 is provided which may be closed to by-pass the door switches 94 in the event that the operator wishes to run the washer through a cycle with the doors open. If the operator wishes to test just the rinse cycle a switch 116 is provided.

It will be apparent that any of the relays for the variable resistance elements can be changed in a matter of seconds simply by changing the value by removing one tube and replacing it with another of different value.

It will be obvious to one skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. Apparatus for washing and sterilizing food receptacles comprising a housing, a generally horizontal partition within said housing, a sump in said partition, said sump having a pair of drains, means for selectively operating said drains, a caustic reservoir located below said partition for receiving fluid from one of said drains, a fluid header in said housing above said partition, a series of spray elements mounted on said header, means for supporting a plurality of receptacles within said housing and exposed to said spray elements, pump means for removing caustic from said reservoir and discharging it through said spray elements onto said receptacles, means for selectively introducing rinse water into said header and said spray elements, means for discharging water from said sump, automatic control means mounted on the exterior of said housing, said automatic control means including a plurality of replaceable relays, a series of transformers operated sequentially by certain of said relays, multiple variable resistance thermal delay elements carried by each transformer and controlling certain of said relays simultaneously and sequentially, whereby said automatic control means will operate said pump means to spray caustic onto said receptacles and thereafter operate said water introducing means to rinse said receptacles.



2. The structure of claim 1 in which said automatic control means includes a first series of replaceable tube type relays, a first transformer energized by certain of said first relays, multiple variable resistance thermal delay elements carried by said first transformer and adapted to operate said pump means and said caustic drain sequentially and simultaneously, a secondary series of relays energized sequentially by said first series of relays, a second transformer operated by certain of said second series of relays, multiple thermal delay elements on said second transformer controlling certain of said second series of relays to operate said water inlet valve means and said water drain sequentially and simultaneously, a third series of relays energized by and in sequence to said second series of relays, a third transformer controlled by certain of said third series of relays, multiple thermal delay elements on said third transformer controlling certain of said third series of relays to operate said water inlet valve means and said water drain sequentially and simultaneously, a fourth series of relays energized by and subsequent to said third series of relays, a fourth transformer controlled by certain of said fourth series of relays, multiple thermal delay elements carried by said fourth transformer for controlling certain of said fourth series of relays, whereby said caustic will be discharged through said header and returned to said reservoir and subsequently water will be discharged through said header a plurality of times.


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