

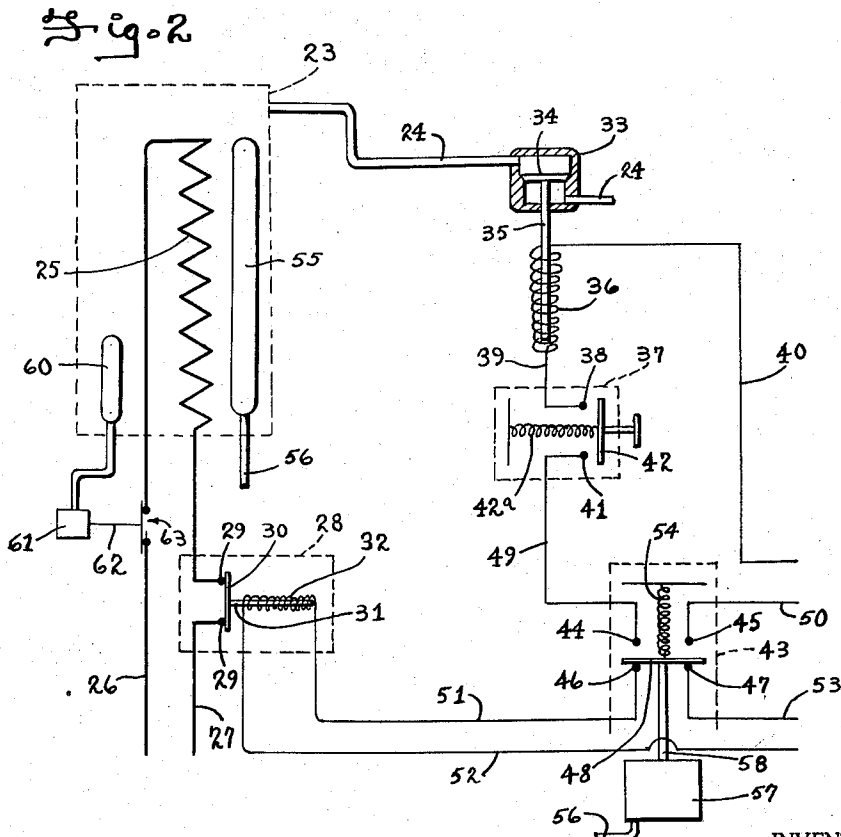
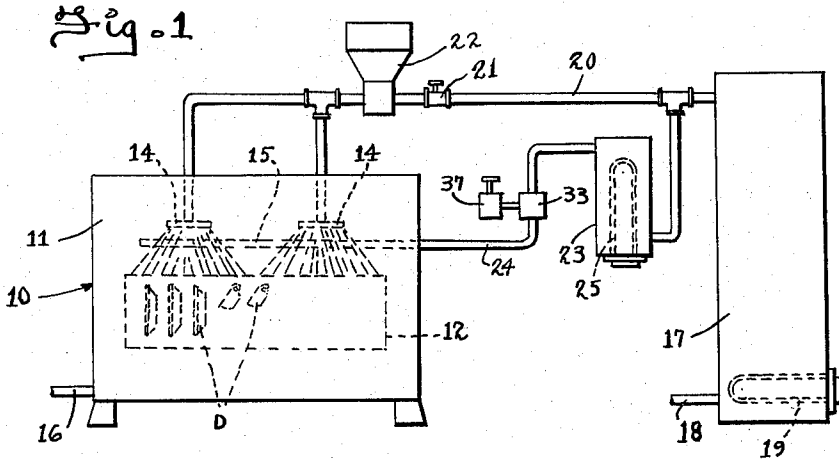
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CONTROL SYSTEM

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CONTROL SYSTEM

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My invention relates to systems for controlling flow of water dependent upon the temperature of the water and the principal object of my invention is to provide new and improved control systems of this character.

The control system of my invention is particularly applicable to use with dishwashers, especially of the commercial type. In commercial dishwashers, a booster water heater is used in order to raise the temperature of rinse water from heated supply water temperature (140° F. for example) to an elevated temperature required for adequate flash drying after rinsing and for sterilization. The elevated temperature is usually 180° F. to about 195° F.

Heretofore, a control valve was manually actuated by an operator, following the washing cycle, to provide for flow of rinse water. A careless operator either used too much rinse water or used such water before it had reached, or after it had dropped below, the required temperature. To guard against careless operators, the booster water heaters were sometimes made over-sized but this resulted in considerable installation and maintenance cost.

I have found that by proper proportioning of a temperature and flow control regulator with the physical constants of the water system, excessive use of rinse water will be eliminated. Accordingly, my invention makes it possible to limit the rinsing cycle to a proper time interval and assures that rinse water is always delivered at the proper temperature. These, and other advantages will be apparent from a study of this specification and the drawing appended thereto.

In the drawing accompanying this specification and forming a part of this application, there is shown, for purposes of illustration, an embodiment which my invention may assume, and in this drawing:

Figure 1 is a side elevational view of a commercial system for washing dishes, and

Figure 2 is a diagrammatic representation of the control embodied in the system shown in Figure 1.

A commercial dishwasher 10 is schematically disclosed in Figure 1 and may take the form of any well known make now commercially available. The usual dishwasher comprises a large container or casing 11 in which is disposed a wire basket 12, or other suitable rack, for supporting the dishes D to be washed. Washing jets 14 are arranged to spray wash water on the dishes and rinsing jets 15 (only one shown) are arranged to spray rinse water on the dishes following the washing operation. The wash and rinse water is collected in the bottom of the casing 11 and may be withdrawn therefrom through a suitable drain 16.

In the usual commercial system, a relatively large storage tank 17 is provided for containing water at a predetermined temperature for dish washing. It has been found that the usual temperature is approximately 140° F. Water from a source may be admitted to the tank 17 through a suitable inlet pipe 18 and the water in the tank may be heated in any suitable manner, such as

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by one or more electric heaters 19 of the immersion type. Any well known control may be used to regulate the operation of the heaters and to limit the temperature of the water in the tank 17.

Heated water passes from the tank 17 through a conduit 20 to the wash jets 14. A valve 21 is interposed in the conduit to control water flow and a detergent container 22 may also be interposed in the conduit to add detergent to the water flowing to the wash jets.

A booster heater tank 23 receives heated water from the tank 17, as shown in Figure 1, and heated water from the booster tank flows through a conduit 24 to the rinse jets 15. To reduce cost and maintenance, the booster tank is preferably relatively small and holds as an example, about three gallons of water. It has been determined that a ten second rinsing cycle, during which about 1.73 gallons of 180° F. water is delivered to a dishwasher, will give adequate rinsing, drying and sterilizing.

Heretofore, a manually operated water valve was interposed in the conduit 24 and the operator opened the valve to permit rinse water to flow to the rinsing jets. However, a careless operator may open the valve prematurely or may hold the valve open too long and thus water at a lower temperature than required would flow to the rinse jets.

In accordance with my invention, any error caused by a careless operator is removed and only rinse water at required temperature may be delivered to the rinse jets.

The booster tank 23 is heated in any suitable manner, such as by an electric immersion heater 25 of standard design. The heater receives electric current from a suitable source through wires 26, 27, and interposed in wire 27 is a contactor switch 28, comprising switch contacts 29, 29 and a bridging bar 30. The plunger 31 of a solenoid is secured to the bar 30 for actuating the same and this plunger works in a solenoid coil 32.

A water valve 33 is interposed in the conduit extending between the booster tank 23 and the rinse jets 15, the valve member 34 being secured to the plunger 35 of a solenoid, the plunger working in a solenoid coil 36 in the usual manner.

A manually operated electric switch 37 controls operation of the water valve 33 and one contact 38 of the switch is electrically connected, by wire 39, to one end of the solenoid coil 36, the opposite end of the coil being connected, by wire 40, to a source of electrical energy which may be at lower potential than the source for electric heater 25. The switch 37 also includes a second contact 41 and the contacts are adapted to be bridged by a manually operable bridging bar 42 which is normally pressed to open position by means of a spring 42a.

A thermostatically controlled switch 43 completes the control system and this switch has two sets of contacts 44, 45 and 46, 47, selectively bridged by a bridging bar 48. Contact 44 is connected by wire 49 to contact 41 and contact 45 is connected by wire 50 to the source of current in conjunction with wire 40.

Contact 46 is connected by wire 51 to one end of the solenoid coil 32, and the opposite end of this coil is connected to a source of current by wire 52, while contact 47 is connected to this same source by wire 53.

The bridging bar 48 is normally pressed by a spring 54 to bridging engagement with the contacts 46, 47. A temperature sensing means is provided for moving the switching bar 48 to bridging engagement with the contacts 44, 45 and, in the present embodiment, this sensing means comprises a temperature bulb 55 within the booster tank 23 and containing an expansible fluid. The bulb 55 is connected by a conduit 56 with a motor 57 which is operated by expansion of the fluid and

acts through a rod 58 to push the bar to bridging relation with the contacts 44, 45.

In the position of parts shown in Figure 2, it is assumed that the temperature of the water within the booster tank 23 is below a predetermined amount (below 180° F. for example). Control current thus flows through wire 53, between bridged contacts 46, 47, through wire 51, solenoid coil 32 and back to source through wire 52. Energization of solenoid coil 32 holds bar 30 in bridging relation with contacts 29, 29 of contactor 28 and therefore the electric heater 25 is energized through wires 26, 27. In this position of parts, the operator cannot cause flow of water to the rinsing jets even if he closes contacts 38, 41 by manually moving the bar 42 into bridging relation therewith since the control circuit is open at contacts 44, 45.

When the temperature of the water in the booster tank 23 reaches 180° F. (or any other predetermined temperature to which the sensing bulb 55 is set) the expansion of the fluid within the bulb 55 and conduit 56 will cause operation of the motor 57 to move the bar 48 into bridging relation with the contacts 44, 45 and out of bridging relation with the contacts 46, 47. The motor 57 preferably operates with a snap action in well known manner so that the bar 48 bridges either the contacts 46, 47 or the contacts 44, 45 and does not float between its positions.

With the water in the booster tank 23 at predetermined temperature, current to the solenoid coil 32 is interrupted by reason of the open contacts 46, 47 and the bar 30 is spring-pressed away from engagement with the contacts 29, 29 to open the circuit to the electric heater 25.

When the operator now presses the bar 42 into engagement with the contacts 38, 41, current will flow from the source through wire 50, bridged contacts 44, 45, through wire 49, bridged contacts 38, 41, through wire 39, solenoid coil 36 and return to source through wire 40. Solenoid coil 36 is thus energized to push upwardly on plunger 35 and unseat valve member 34. Under these conditions, rinse water will flow from booster tank 23 to the rinsing jets as long as bar 42 is manually held in bridging relation with contacts 38, 41.

However, when the temperature of the water in booster tank falls below 180° F., the fluid in the bulb 55 and conduit 56 will have contracted to a point where it no longer acts on motor 57 to hold the bar 48 in bridging relation with contacts 44, 45 and, as a result the bar 48 will move from contacts 44, 45 to bridging relation with contacts 46, 47 to simultaneously energize solenoid coil 32 and consequently energize the electric heater 25. The parts will therefore be in the position shown in Figure 2 and the water valve member 34 will be held closed (by a spring or the like) despite the fact that the operator still holds the bar 42 in bridging relation with the contacts 38, 41.

Since the operator will soon learn that rinse water will not flow unless it has reached proper temperature, such operator will be able to govern his operations to more nearly coincide with operation of the control system.

In order to safeguard against excessive temperatures in the booster tank 23, a separate temperature sensing device 60 may be contained within the tank, this device operating a motor 61 which actuates a link 62 connected to the arm of a switch 63 interposed in the heater circuit.

In view of the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described,

hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. In a system for supplying water at a predetermined temperature, a container for receiving water, an electric heating element for heating water, within said container, means for controlling flow of heated water from said container including a solenoid-actuated water valve and a manually operable electric switch controlling energization of the solenoid of said water valve, and thermostatically controlled switch means for simultaneously energizing said heating element and interrupting current flow to said manually operable electric switch when the temperature of the water is below said predetermined temperature.

2. In a system for supplying water at a predetermined temperature, a container for receiving water, an electric heating element for heating water within said container, a temperature sensing element affected by the temperature of water within said container and containing an expansible fluid, means for controlling flow of heated water from said container including a solenoid-actuated water valve and a manually operable electric switch controlling energization of the solenoid of said water valve, and switch means operated by the expansible fluid of said temperature sensing element for simultaneously energizing said heating element and interrupting current flow to said manually operable electric switch when the temperature of the water is below said predetermined temperature.

3. A dish washer and rinser, comprising a container for receiving the dishes to be washed, a main water storage tank containing heated water, a conduit from said main storage tank to washing jet means within said container for delivering wash water to washing jet means, an auxiliary tank receiving water from said main storage tank and a conduit between said auxiliary tank and rinsing jet means within said container, an electric heating element for heating water within said auxiliary tank to a degree higher than the temperature of the water in said main storage tank, means for controlling flow of heated water from said auxiliary tank to said rinsing jet means including a solenoid-actuated water valve and a manually operable electric switch controlling energization of the solenoid of said water valve, and thermostatically controlled switch means for simultaneously energizing said heating element and interrupting current flow to said manually operable electric switch when the temperature of the water in said auxiliary tank is below a predetermined amount.

4. In a system for supplying water at a predetermined temperature, the combination comprising a container for receiving water to be heated, an electric heating element through which electrical energy may be passed to heat water within said container, a valve which opens to provide for flow of water from said container and which closes to prevent flow of water from said container, and means responsive to the temperature of the water within said container to simultaneously provide for closure of said valve and passage of electrical energy through said heating element when the water in said container is below said predetermined temperature.

References Cited in the file of this patent

UNITED STATES PATENTS

2,277,291	Blair	Mar. 24, 1942
2,285,305	Reid	June 2, 1942
2,619,097	Von Bromssen	Nov. 25, 1952
2,621,666	Hiort Af Ornas	Dec. 16, 1952
2,742,927	Frumet	Apr. 24, 1956
2,781,765	Steidley	Feb. 19, 1957
2,842,144	Lyman	July 8, 1958