United States Patent [19]

Marcussen et al.

[11] **3,890,987**

[45] **June 24, 1975**

[54] **WASHING APPARATUS WITH AUXILIARY DISTRIBUTOR**

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[73] Assignee: **Whirlpool Corporation,** Benton Harbor, Mich.

[22] Filed: **June 4, 1973**

[21] Appl. No.: **366,370**

[52] **U.S. Cl.**..... **134/57 D;** 134/106; 134/143; 134/177; 134/200

[51] **Int. Cl.**..... **B08b 3/02**

[58] **Field of Search**... 134/57 D, 58 D, 177, 105–108, 134/143, 200

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Primary Examiner—Robert L. Bleutge

[57] **ABSTRACT**

A washing apparatus such as a dishwasher having an auxiliary distributor for separately treating certain elements to be washed such as silverware. The auxiliary distributor may comprise a thermal pump which not only effects delivery of the washing liquid onto the silverware, but also effects a heating of the washing liquid for improved washing action. The auxiliary heater is coordinated with the main heater for improved overall dishwashing action in the apparatus.

17 Claims, 7 Drawing Figures

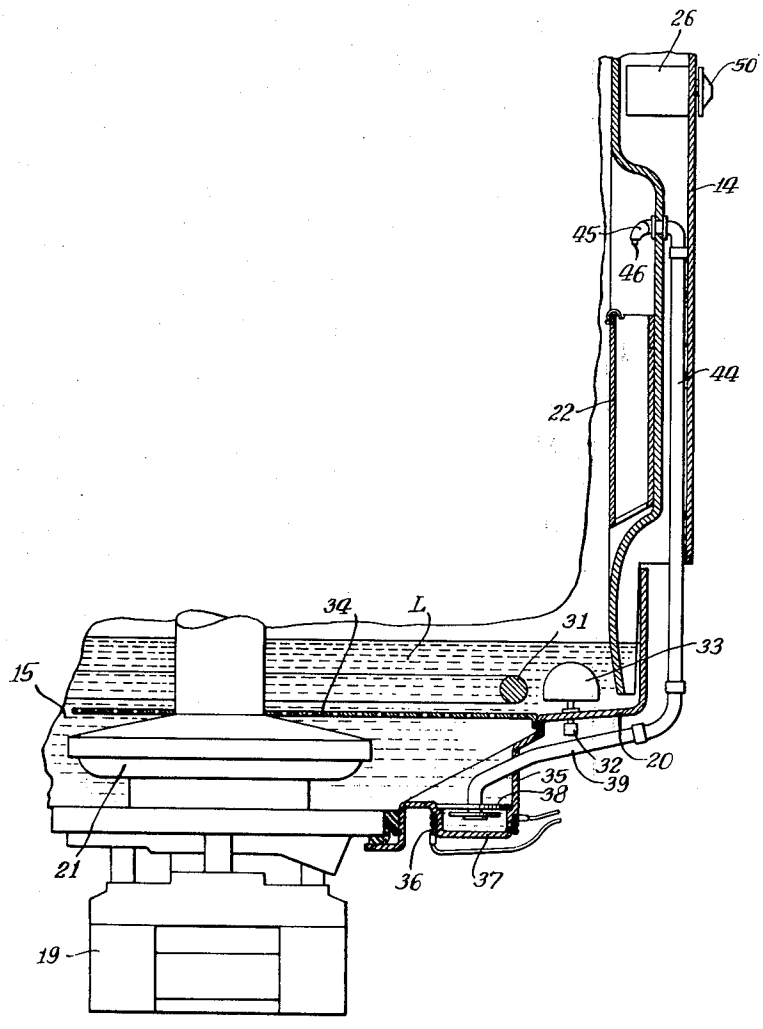


Fig. 1.

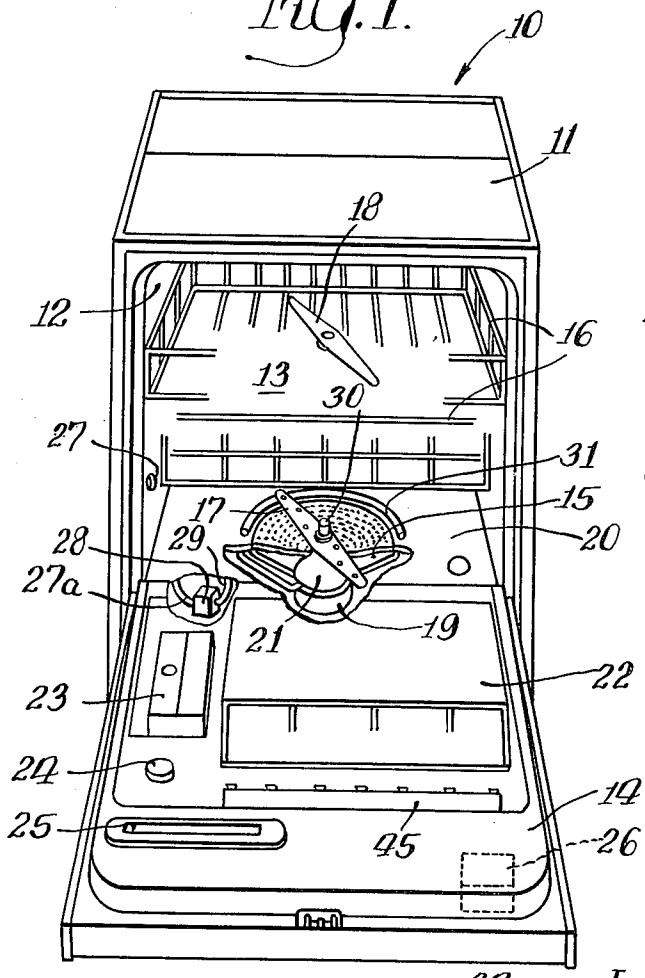
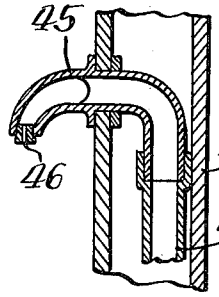


Fig. 3.



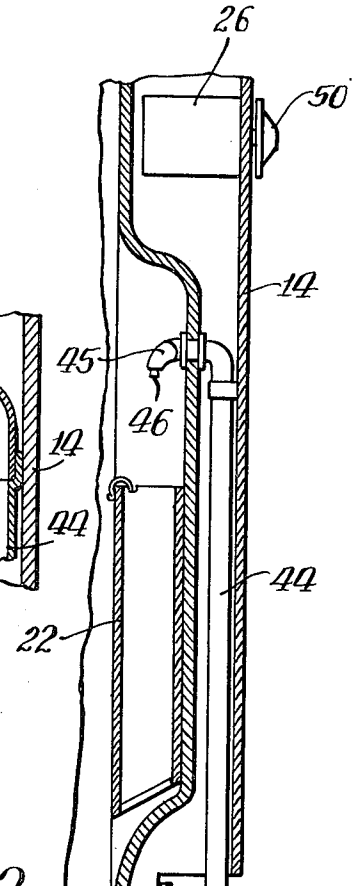


Fig. 2.

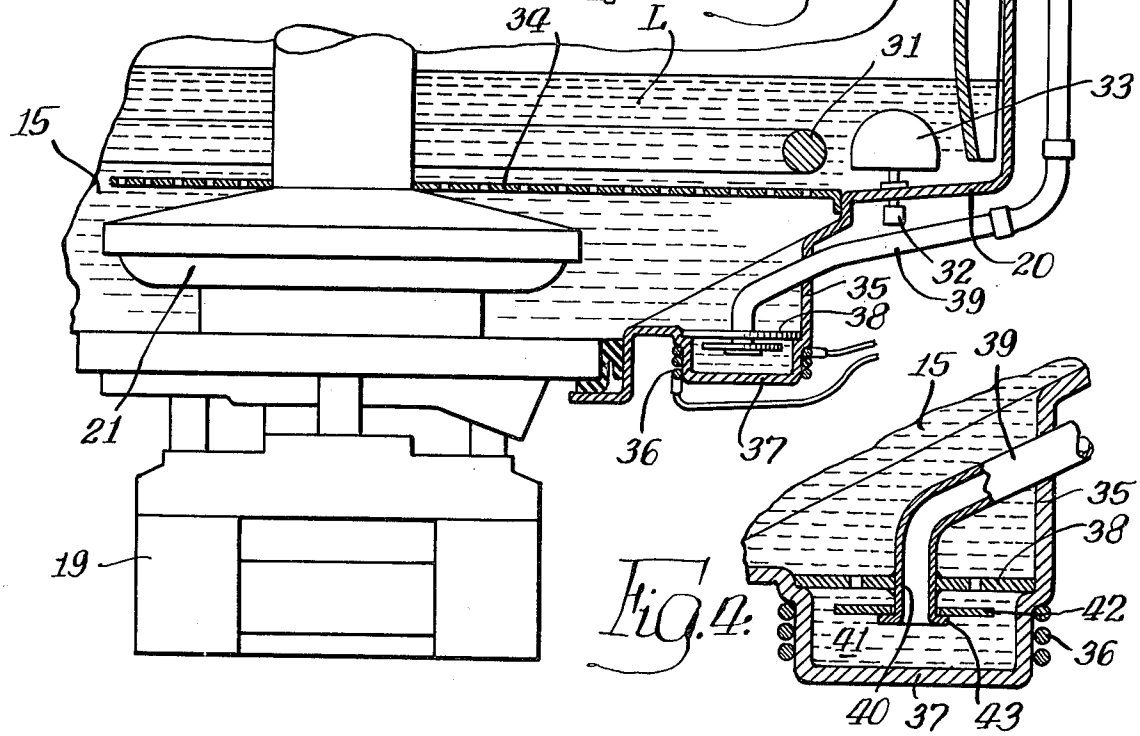


Fig. 4.

Fig. 5.

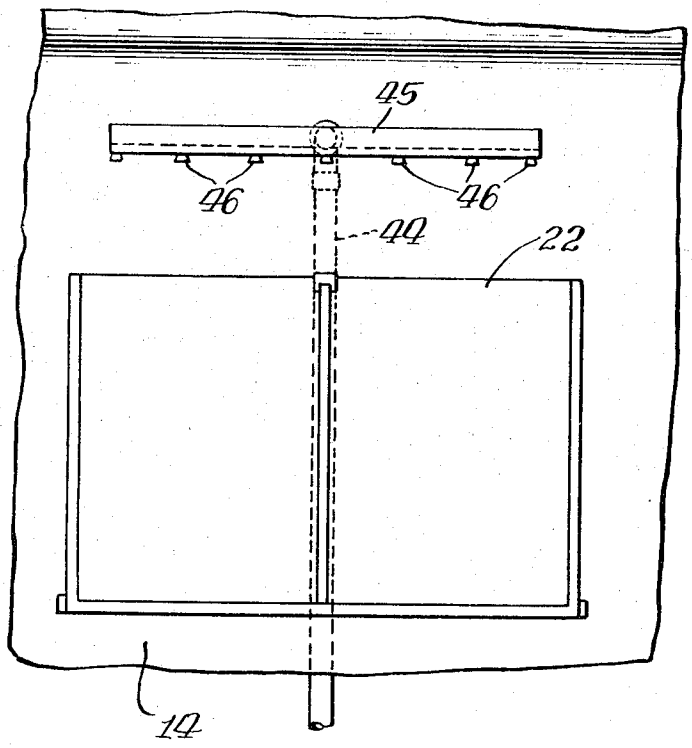


Fig. 6.

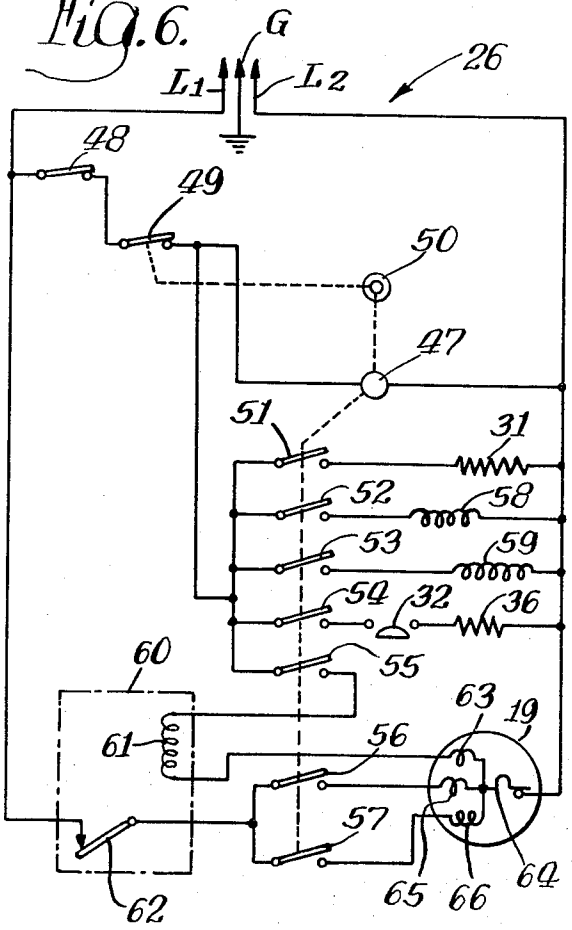
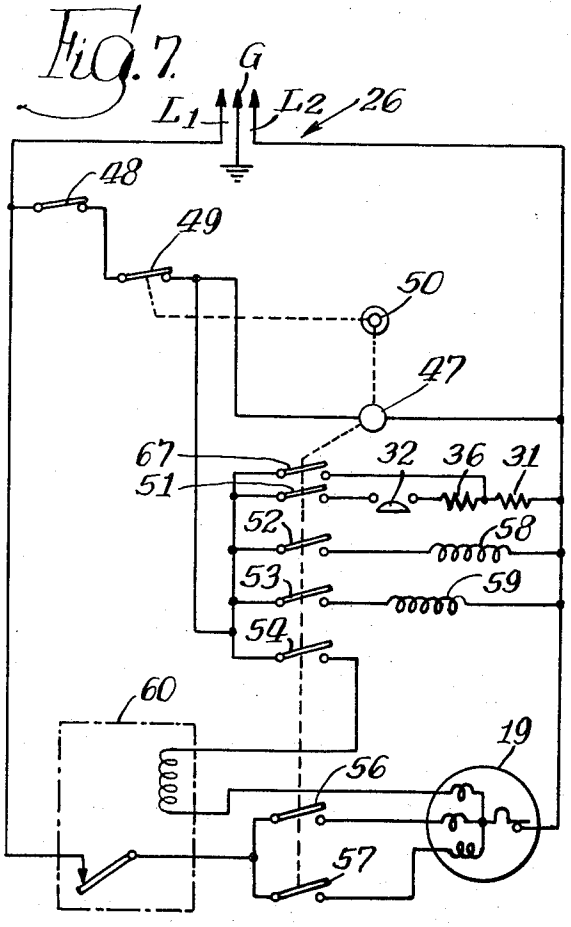


Fig. 7.



WASHING APPARATUS WITH AUXILIARY DISTRIBUTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to washing apparatus, and in particular, to dishwashing apparatus.

2. Description of the Prior Art

In the conventional dishwasher, dishes to be washed are placed in a dishwashing rack and are subjected to a spray of hot dishwashing liquid conventionally by means of a rotating spray arm. The dishwashing liquid may include hot rinse water, hot washing liquid having detergent or soap dissolved therein, and final rinse water having antispotting rinse additive therein. It is found conventional in the known dishwashers to provide a heating element for drying the dishes upon completion of the washing operation. The heating element is conventionally disposed in the sump of the dishwasher tub and further serves to heat the water for improved sanitary washing of the dishes.

Still further, conventionally, means are provided in such dishwashers for holding silverware and the like separate from other dishes. In one form of known dishwasher, as illustrated in U.S. Pat. No. 3,288,155 of Norman T. Swetnam, a separate spray arm is provided subjacent the silverware holder for providing an auxiliary spraying of the silverware.

As shown in the Swetnam patent, it is conventional to provide the necessary pressure head to effect the spraying of the washing liquid by means of an impellor driven by an electric motor. In another form of washing apparatus, as shown in the W. G. Givone U.S. Pat. No. 1,433,546, a clothes washing machine is illustrated as being provided with a percolator-type liquid pump wherein the water in the sump is heated by a subjacent burner and caused to be distributed over the clothes in the manner of a conventional coffee percolator pump system. Thus, in Givone, the entire body of washing liquid is heated to the pumping temperature which may be close to the boiling temperature as the pumping action functions on the basis of slugs of steam being formed in the lower pump chamber, lifting slugs of water upwardly through the pump stem as they rise to the top of the stem. The nearly-boiling water is then caused to flow down over a distributor strainer onto the subjacent clothes to be received in a sump disposed below a permeable support for the clothes, for subsequent repumping.

It is further conventional to carry the silverware in removable baskets mounted on the door of the dishwasher so as to be in the path of the washing liquid sprayed by the spray arm whereby the silverware is washed by a portion of the sprayed dishwashing liquid during the washing of the main body of dishes.

SUMMARY OF THE INVENTION

The present invention comprehends a washing apparatus having improved means for washing an auxiliary group of objects disposed within the washing chamber separately of the main group of objects. More specifically, the invention is adapted for use in a dishwasher for providing improved washing of silverware and the like normally carried separately from the main body of dishes arranged to be washed by the main spray means of the dishwasher.

The means for washing the auxiliary group of objects such as silverware herein comprises heating means for heating the washing liquid delivered thereto separately from the main body of washing liquid so as to effect an improved facilitated washing of the auxiliary objects. The heating means for heating this separate portion of the washing liquid may further comprise means for providing a thermal pumping action to effect the delivery thereof to the silverware. The washing liquid may then be returned to the sump of the dishwasher tub for mixing with the dishwashing liquid returned thereto from the main spraying action whereby the high temperature washing liquid returned from the silverware may be used in providing washing of the main body of dishes as a portion of the washing liquid recirculated onto the dishes by the spray means.

The auxiliary dishwashing liquid delivery means may be operated prior to the operation of the main spray means to provide a pre-wash of the silverware. Alternatively, the main heating element of the dishwasher may be de-energized while the auxiliary heating means and main spray means may be operated whereby the auxiliary heating means may effect the desired improved washing of the silverware and concurrently provide additional heat to the washing liquid for washing of the dishes.

Further alternatively, the auxiliary heating means and the main heating means may be operated concurrently. The two heating means may comprise electric heating means connected for concurrent operation, such as in an electrical series arrangement. Alternatively, the auxiliary heating means may comprise a portion of the main heating means disposed in an auxiliary heating chamber for thermal transfer only to the portion of the collected washing liquid to be delivered onto the silverware.

Thus, the invention broadly comprehends the provision of a washing apparatus including wall means defining a washing chamber, spray means for directing washing liquid from a main body of washing liquid in the chamber against a first and second group of objects to be washed disposed in the chamber, basket means for holding a second group of objects to be washed separate from the first group, collecting means for collecting a portion of the washing liquid, heating means for heating the portion of the washing liquid to a temperature higher than that of the main body in the chamber, and delivery means for delivering the portion of the washing liquid to the second group of objects for high temperature washing of the second group of objects.

More specifically, the invention comprehends the provision of a dishwasher including wall means defining a washing chamber, spray means for directing hot washing liquid in the chamber against dishes to be washed disposed in the chamber, basket means for holding silverware to be washed separate from the dishes, a sump for collecting the dishwashing liquid to be directed by the spray means against the dishes, and thermally operated pump means for delivering a portion of the dishwashing liquid from the sump to the silverware for washing the silverware, the dishwashing liquid portion being returned to the sump for recirculation by the spray means and the heat pump means.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a perspective front view of a dishwasher having an improved silverware washing means embodying the invention;

FIG. 2 is a fragmentary vertical section thereof;

FIG. 3 is a fragmentary enlarged vertical section thereof illustrating in greater detail the auxiliary delivery means;

FIG. 4 is a fragmentary enlarged vertical section thereof illustrating in greater detail the thermal pump means;

FIG. 5 is a fragmentary elevation of the silverware basket and washing liquid delivery means;

FIG. 6 is a schematic diagram showing the electrical wiring of the dishwasher; and

FIG. 7 is a schematic diagram showing the electrical wiring of a modified form of such dishwasher.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, a washing apparatus generally designated **10** comprising a dishwasher, is shown to include a cabinet **11** provided with a tub **12** defining a forwardly opening washing chamber **13** which is selectively closed by a hingedly mounted front door **14.** Tub **12** defines a lowermost sump **15.** Dishes are carried in washing space **13** on suitable racks **16** so as to have washing liquid L sprayed thereagainst by a main spray arm **17** and a secondary spray arm **18.** Spray arm **17** is rotated by the washing liquid forced upwardly through the spray arm by means of a pump **21** driven by a drive motor **19** disposed below the bottom wall **20** of tub **12.**

Door **14** carries a silverware basket **22,** a detergent dispenser **23,** and a rinse additive dispenser **24.** Chamber **13** is vented through the door by means of a vent **25** so as to facilitate drying of the dishes by discharging the humid air in the drying cycle. A suitable timer control **26** is mounted on door **14** for controlling the automatic operation of the dishwasher.

Water is delivered into tub **12** through opening **27** from a supply conduit **27***a*. A valve **28** is connected between supply conduit **27***a* and a delivery conduit **29** which is connected to a suitable source (not shown) for controlling delivery of the water into tub **12** under the control of timer control **26.**

Motor **19** may comprise a reversible motor whereby forward rotation of pump **21** causes spraying of the washing liquid upwardly through chamber **13.** As shown in FIG. **1,** spray arm **17** may be provided with a nozzle **30** for directing a jet of washing liquid upwardly to spray arm **18** for operation of spray arm **18** to provide a secondary spray onto the dishes from an upper portion of the washing chamber **13.** When motor **19** is operated in a reverse direction, the pump **21** is caused to drain the washing liquid from sump **15** for discharging as desired.

An electric heating element **31** is provided at sump **15** for heating the washing liquid L during the washing cycle. Upon completion of the washing operation, heater **31** may be energized to effect a heated drying of the dishes. A switch **32** is controlled by a float **33** responsive to the level of washing liquid L in sump **15** for controlling operation of the washing apparatus as will be brought out more fully hereinafter. As shown in FIG. **2,** a screen **34** may be provided on the bottom wall **20** to filter the washing liquid delivered to the pump **21.**

As discussed briefly above, the invention comprehends providing an auxiliary body of washing liquid to the silverware basket **22** in addition to the water spray provided by spray arms **17** and **18** for washing silverware and the like (not shown) disposed therein. As best seen in FIGS. **2** and **4,** this auxiliary washing liquid delivery means herein includes a well structure **35** opening to sump **15** for receiving a portion of the washing liquid. A coil heater **36** may be disposed about the lower end **37** of well **35** below a screen **38.** A conduit **39** is provided with a lower end **40** extending downwardly through screen **38** into the lower chamber **41** heated by coil heater **36.** A baffle plate **42** is mounted on an enlarged lower end **43** of the conduit **39** to restrict upward flow of steam generated in chamber **41** generally into conduit end **40** whereby a percolator action is effected causing slugs of steam and hot water to rise through conduit **39.** The conduit includes an upper portion **44** carried by door **14** and an outlet **45** having a series of discharge elements **46** adapted to spray the pumped washing liquid downwardly into basket **22,** as seen in FIGS. **2, 3,** and **5.** Energization of coil heater **36** is controlled by timer control **26** to effect the selective pumping of a portion of the dishwashing liquid onto the silverware to provide the desired improved silverware washing action.

Operation of dishwasher **10** may be best seen by reference to the wiring diagram of FIG. **6.** Timer control **26** may be connected to a suitable source of power through power supply leads L1 and L2 and may be grounded to the ground connection G. The timer motor **47** is connected from power supply lead L2 through normally closed door switch **48** and normally closed on-off switch **49** to power supply lead L1. A mechanical control knob **50** projecting forwardly from door **14** (see FIG. **2**) is mechanically connected to timer motor **47** and switch **49.** Control **26** further includes a series of normally closed switches **51, 52, 53, 54, 55, 56** and **57,** which are cam operated as a result of operation of timer motor **47** to effect controlled opening thereof in controlling the operation of the dishwasher.

More specifically, switch **51** is connected from switch **49** and in series with the electric heater **31** which illustratively may comprise a sheathed resistance heating element of conventional construction. Switch **52** is connected from switch **49** in series with the solenoid **58** of the water supply valve **28** for controlling delivery of water to the tub as discussed above.

Switch **53** is connected from switch **49** in series with a solenoid **59** for operating the detergent dispenser **23** at the proper time in the washing cycle to effect the desired sequence of rinse and washing operations. Switch **54** is connected from switch **49** through a series connection of float switch **32** and auxiliary coil heater **36** for energizing auxiliary heater **36** only when the level of liquid L in sump **15** is at or above a preselected minimum level so as to prevent operation of heater **36** during a dry condition or low level condition of the dishwasher and thereby prevent burnout of heater **36.** It should be understood that float switch **32** is a safety device that might be replaced by a thermostat or thermistor in well **37** to perform the same function. Further, cam operation of switch **54** permits effective energiza-

tion of heater **36** in conjunction with float switch **32** during preselected times in the operation of the dishwasher so as, for example, to provide a pre-wash operation in connection with the silverware as well as a washing operation during the normal washing operation of the dishwasher.

Switch **55** is connected from switch **49** through a starting relay **60** for controlling operation of motor **19**, having a solenoid coil **61** for controlling a normally closed power switch **62**. The starter solenoid coil **61** is connected through a run winding **63** of motor **19** and an overload device **64** to power supply lead L2 and the forward and reverse operation of the motor is controlled by the selective closing of either switch **56** or **57** in series with switch **62** and the forward winding **65** and reverse winding **66**, respectively, of motor **19** which are connected in parallel with winding **63**, as shown in FIG. **6**.

Thus, in normal operation, when the user initiates the dishwashing cycle by suitable manipulation of control knob **50**, a sequence of operation of cam operated switches **51–57** is effected to provide a sequential series of dishwashing cycles. Depending on the cam controlled timing of the opening of switches **51** and **54**, the energization of auxiliary heater **36** may be effected prior to or concurrently with the energization of main heater **31**.

As shown in FIG. **7**, a modified form of control may be provided wherein the heaters **31** and **36** are connected in series with the float controlled switch **32** so as to permit operation of the two heaters concurrently. In this arrangement, auxiliary heater **36** may comprise a portion of main heater **31** or a separate heater connected electrically in series therewith as desired. Further, a cam operated switch **67** is provided to shunt the float controlled switch **32** and heater **36** during the heated drying of the dishes.

Where it is desired to provide a pre-wash operation with the apparatus as shown in FIG. **6**, the heater **36** is preferably a relatively high wattage heater so as to effect rapid heating of the water in chamber **41** for effecting a pumping action in the absence of a heating of the water by heater **31**. If desired, the power capacity of heater **36** may be substantially similar to that of heater **31** so that control **26** may be arranged to utilize heater **36** concurrently with the operation of pump **21** but with the main heater **31** de-energized.

Thus, dishwasher **10** provides an improved washing of silverware and the like separately from the main body of dishes. By suitable arrangement of the control, pre-wash of the silverware may be effected. The means for delivering the washing liquid to the silverware provides flexibility in the operation of the dishwasher by effecting separate heating of the portion of water to be delivered to the silverware so that by suitable selection of the control parameters, this auxiliary heating operation may be utilized in a number of different ways as desired. The temperature of the washing liquid delivered to the silverware may be made to be different from that of the main body of washing liquid for improved washing of silverware which has been found to be difficult with conventional dishwashers. Further, as the temperature of the silverware washing liquid may be made to be close to the boiling temperature, improved sterilization thereof may be effectively provided. The silverware treating means of the present invention is extremely simple and economical of construction while yet providing the highly desirable advantages discussed above.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A washing apparatus comprising: wall means defining a washing chamber having a lower sump; spray means for circulating washing liquid from a main body of washing liquid in said chamber sump against a first and a second group of objects to be washed disposed in said chamber and back to said sump; basket means for holding said second group of objects to be washed separate from said first group; collecting means for collecting a portion of the washing liquid from said sump during the circulation of the washing liquid; heating means for heating the collected portion of the washing liquid to a temperature higher than that of said main body in the chamber sump; and delivery means for delivering said portion of the washing liquid to substantially only said second group of objects in said basket means for high temperature washing of said second group of objects concurrently with the washing thereof by the washing liquid delivered by the spray means.

2. The washing apparatus of claim **1** wherein said wall means includes a movable door, and said basket means is mounted on said door.

3. The washing apparatus of claim **1** wherein said wall means includes a movable door and a sump portion for collecting said main body of washing liquid for recirculation thereof against said first and second group of objects, said collecting means opening to said sump portion, and said basket means being mounted on said door.

4. The washing apparatus of claim **1** including means in said washing chamber for heating said main body of washing liquid.

5. The washing apparatus of claim **1** wherein said delivery means comprises means responsive to the heating of said washing liquid portion to effect the delivery of said portion of said second group of objects.

6. A dishwasher comprising: wall means defining a washing chamber; spray means for directing hot washing liquid in said chamber against dishes to be washed disposed in said chamber; basket means for holding silverware to be washed separate from said dishes; a sump for collecting the dishwashing liquid from said washing chamber to be directed by said spray means against said dishes; and thermally operated pump means for delivering a portion of the dishwashing liquid from said sump to substantially only said silverware in said basket means for washing said silverware, said dishwashing liquid portion being returned to said sump for recirculation by said spray means and said thermally operated pump means.

7. The dishwasher of claim **6** wherein the thermally operated pump means comprises a vapor pump defining a heating chamber communicating with said sump, and heating means for heating dishwashing liquid in said heating chamber and causing delivery of heated dishwashing liquid therefrom to said silverware as a result of said heating.

8. The dishwasher of claim **6** wherein the thermally operated pump means comprises a vapor pump defining a heating chamber communicating with said sump,

first heating means for heating dishwashing liquid in said heating chamber and causing delivery of heated dishwashing liquid therefrom to said silverware as a result of said heating, and said sump includes a second heating means for heating dishwashing liquid in said sump.

9. The dishwasher of claim **6** wherein the thermally operated pump means comprises a vapor pump defining a heating chamber communicating with said sump, first heating means for heating dishwashing liquid in said chamber and causing delivery of heated dishwashing liquid therefrom to said silverware as a result of said heating, said sump including a second heating means for heating dishwashing liquid in said sump, and circuit means are provided for energizing said first heating means for heating the liquid in said chamber prior to operation of said spray means to effect a pre-wash of the silverware.

10. The dishwasher of claim **6** further including means for preventing operation of the thermally operated pump means when the level of dishwashing liquid in the sump is below a preselected level.

11. The dishwasher of claim **6** wherein said sump includes first heater means for heating the washing liquid in the sump, and said thermally operated pump means includes second heater means for effecting the delivery of said washing liquid portion to the silverware.

12. The dishwasher of claim **6** wherein said sump includes first heater means for heating the washing liquid in the sump, said thermally operated pump means includes second heater means for effecting the delivery of said washing liquid portion to the silverware, and circuit means are provided for operating said second heater means prior to operation of said first heater means to effect a pre-wash of the silverware.

13. The dishwasher of claim **6** wherein said sump includes first heater means for heating the washing liquid in the sump, and said thermally operated pump means includes second heater means for effecting the delivery of said washing liquid portion to the silverware, and circuit means are provided for operating said second heater means prior to operation of said first heater means to effect a pre-wash of the silverware.

14. The dishwasher of claim **6** wherein said spray means includes a pump, said sump includes first heater means for heating the washing liquid in the sump, said thermally operated pump means includes second heater means for effecting the delivery of said washing liquid portion to the silverware, and circuit means are provided for operating said first and second heater means alternatively concurrently with operation of the pump.

15. The dishwasher of claim **6** wherein said sump includes first heater means for heating the washing liquid in the sump, and said thermally operated pump means includes second heater means for effecting the delivery of said washing liquid portion to the silverware, said first and second heater means comprising electrical heater elements connected for concurrent energization.

16. The dishwasher of claim **6** wherein said sump includes first heater means for heating the washing liquid in the sump, and said thermally operated pump means includes second heater means for effecting the delivery of said washing liquid portion to the silverware, said first and second heater means comprising electrical heater elements connected in series for concurrent energization.

17. The dishwasher of claim **6** wherein said sump includes first heater means for heating the washing liquid in the sump, and said thermally operated pump means includes second heater means for effecting the delivery of said washing liquid portion to the silverware, said first and second heater means comprising portions of a single heating element.

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