March 29, 1960 J. B. TUTHILL 2,930,721

DISHWASHING METHOD

Filed July 26, 1955 2 Sheets-Sheet 1

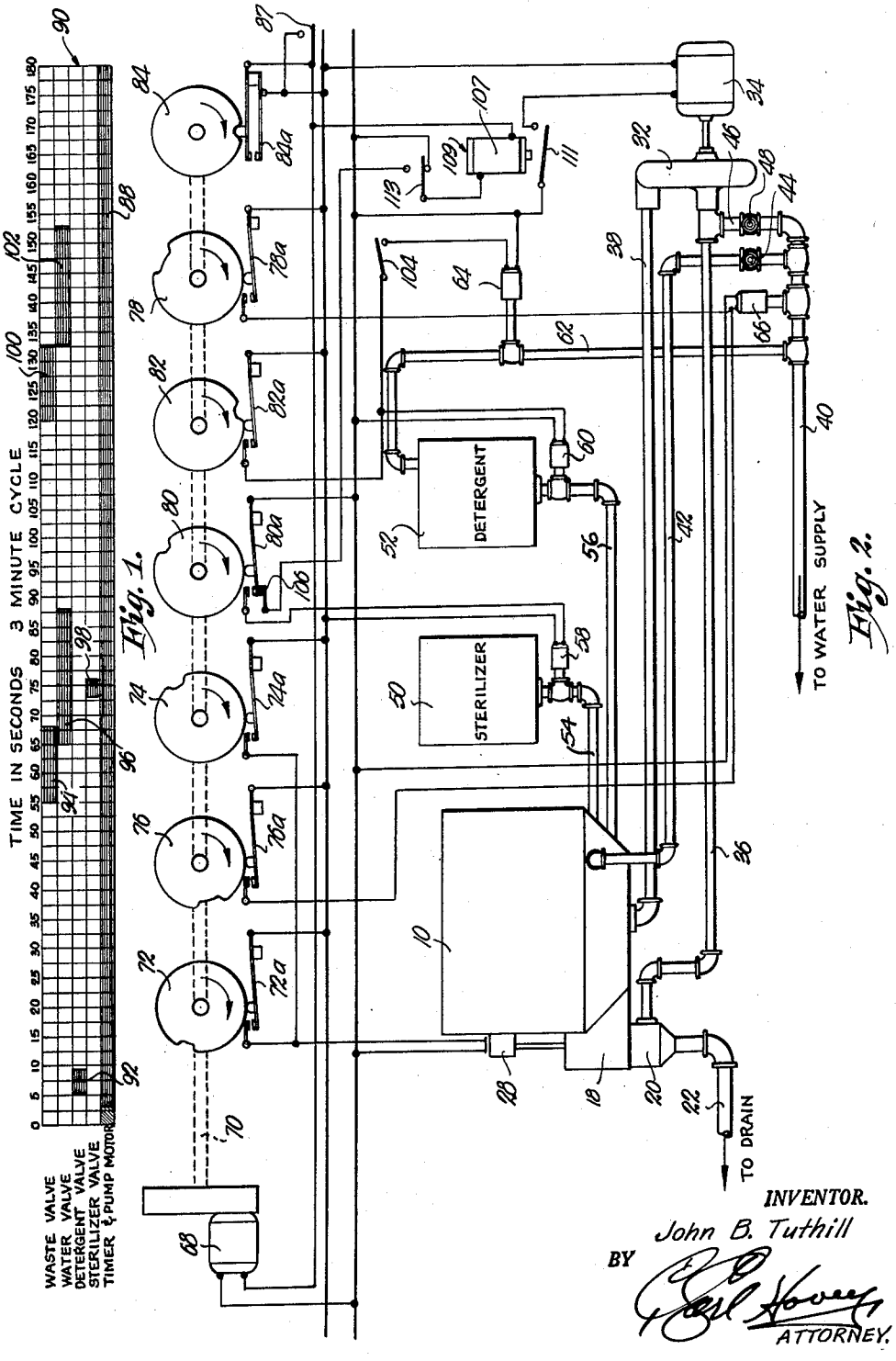


Fig. 1.

Fig. 2.

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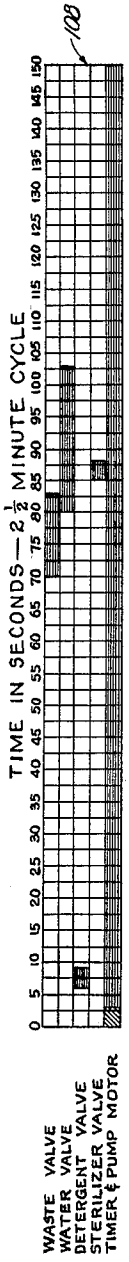


Fig. 3.



Fig. 4.

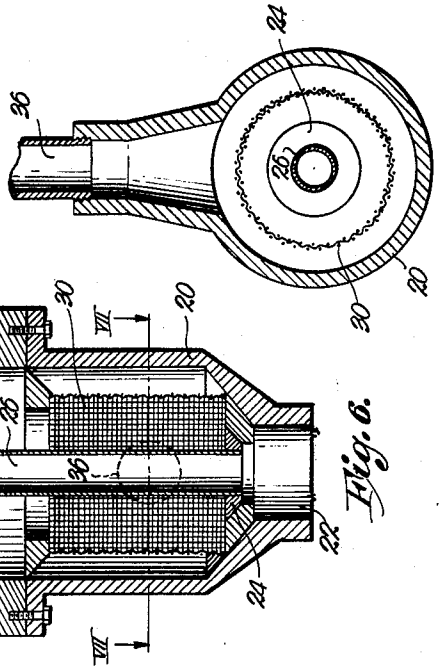


Fig. 7.

Fig. 6.

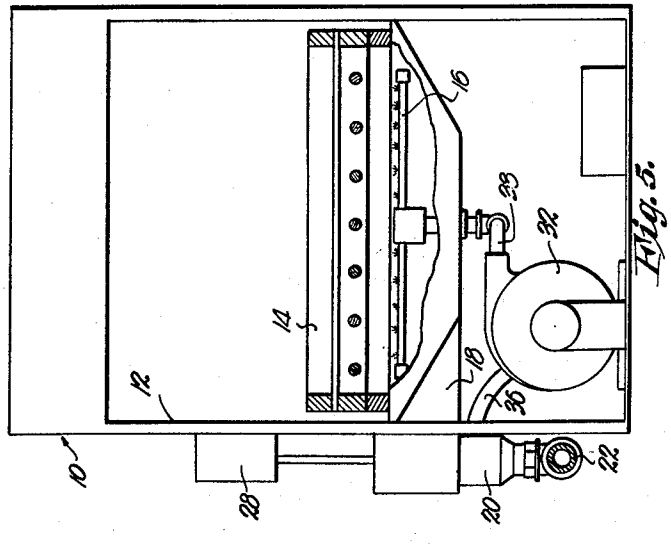


Fig. 5.

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DISHWASHING METHOD

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Application July 26, 1955, Serial No. 524,364

5 Claims. (Cl. 134—25)

This invention relates to automatic washing of dishes and is a continuation-in-part of my copending application Serial No. 132,444 filed December 12, 1949, now Patent No. 2,718,481, dated September 20, 1955, and entitled "Method of Washing Dishes," the primary object being to improve upon the inventions therein disclosed.

It is the most important object of the instant invention to provide an improved dishwashing method that incorporates water-saving features by utilizing the final rinse of each cycle of operation as the liquid medium for the washing step of the next succeeding cycle.

Another important obect of the present invention is the provision of a recirculation method for washing dishes including automatically cleaning, during each cycle, the safety screen employed to filter the circulating liquids and prevent clogging of the various parts of the machine.

A further important object of this invention is to provide in a dishwashing method, gravity flow introduction of a sterilizer and a detergent wherein the latter may either be in a powdered or liquid form.

A still further object of this invention is to provide for at least momentary discontinuance of the recirculating system during each cycle to prevent the possibility of air locking.

In the drawings:

Figure 1 is a chart showing schematically one time schedule that may be utilized in the method of washing dishes contemplated by the instant invention.

Fig. 2 is a schematic diagrammatical view showing a dishwashing machine made in accordance with my present invention.

Fig. 3 is a chart showing schematically another time schedule that may be utilized in the dishwashing system of the instant invention.

Fig. 4 is a chart showing schematically still another form of time schedule.

Fig. 5 is a side elevational view of the dishwashing machine with one wall of the shell thereof removed and parts being broken away and in section to reveal details of construction.

Fig. 6 is an enlarged, fragmentary, vertical, cross-sectional view through the outlet conduit of the dishwashing vat; and

Fig. 7 is a fragmentary, cross-sectional view taken on line VII—VII of Fig. 6.

As shown in Figs. 2 and 5 of the drawings, there is provided a vat broadly designated by the numeral 10 which is closed at the top and bottom thereof but provided with at least one access opening 12 through which a tray 14 may be moved into the vat 10 and within the path of a liquid spray emanating from a perforated manifold 16.

Vat 10 is provided with a drain 18 at the bottom thereof terminating in a valve body 20 that discharges to waste by means of a drain pipe 22. A normally closed

valve 24 within the body 20 has an overflow pipe 26 operably coupled with a solenoid 28, the pipe 26 being surrounded by a filtering medium such as a removable screen 30 within the valve body 20.

A water recirculation system is employed and includes a pump 32 driven by an electric motor 34 and having its inlet end connected with the body 20 above the valve 24 by a line 36, the outlet end of the pump 32 communicating with the manifold 16 through a line 38. Water from a supply line 40 may be introduced into the vat 10 above the overflow line of the latter through a pipe 42 provided with a shut-off valve 44. Alternately, the water supply may be coupled with the line 36 through the medium of a pipe 46 having a shut-off valve 48 interposed therein.

A sterilizer container 50 and a container 52 for a detergent, are connected directly with the vat 10 above the water level in the latter for flow of materials by gravity thereinto through pipes 54 and 56 respectively, having solenoid valves interposed therein, the solenoids whereof are designated by the numerals 58 and 60 respectively. In the event a powdered detergent is employed, water may be introduced into the container 52 from the line 40 by way of a pipe 62 having a solenoid valve whose solenoid is designated by the numeral 64. A solenoid valve in the line 40 between the line 42 and pipe 62, has a solenoid designated by the numeral 66.

A timer shown schematically in Fig. 2 includes a timer motor 68 operably coupled with a cam shaft 70 upon which is mounted a plurality of cam discs, discs 72 and 74 being associated with the solenoid 28, discs 76 and 78 being adapted to control the solenoid 66, disc 80 having an operable connection with solenoid 58, disc 82 corresponding to the solenoids 60 and 64, and disc 84 controlling the motors 34 and 68.

Normally open switches 72*a*, 76*a*, 74*a*, 80*a*, 82*a*, 78*a* and 84*a* are disposed adjacent the corresponding discs on shaft 70 for closing upon register with the various indentations provided at the peripheries of the said discs. The disposition and lengths of such indentations in the discs may best be understood by viewing the chart shown in Fig. 1 of the drawings.

Upon initial closing of a manual switch 87, motors 34 and 68 are energized and continue to operate as long as the cam 84 holds the switch 84*a* closed, the shaded area 88 of chart 90 (Fig. 1) indicating that shaft 70 and, therefore, the discs thereon, rotate one cycle each 180 seconds. Operation of motor 34 and, therefore, pump 32, recirculates the liquid in the system from vat 10, through drain 18, valve body 20, line 36, pump 32, line 38, and manifold 16, to wash away loose foreign material on the dishes within tray 14, for a period of approximately six seconds. Thereupon, cam disc 82 closes switch 82*a*, to in turn energize solenoid 60 for a period of approximately three seconds, as indicated by shaded area 92, to admit detergent from the container 52, through pipe 56 and into the vat 10.

The detergent admixes with the circulating liquid presenting a water-detergent admixture which is sprayed over the dishes in the tray 14. After the machine has operated for approximately 55 seconds, disc 74 closes switch 74*a* to energize solenoid 28 for approximately 13 seconds as indicated by shaded area 94 in Fig. 1, during which time the water-detergent admixture drains past valve 24 into pipe 22. Although the pump 32 is still operating, it is seen that, while the liquid is being drained from the vat 10, there will be no flow in the line 36, and, therefore, all filtered material collected on the inner surface of the filter 30 will be washed away.

While the valve 24 is still open, and after it has remained open approximately ten seconds, the water valve

in line 40 is opened by virtue of the operation of disc 78, closing switch 78*a* and energizing solenoid 66, thereby admitting fresh water into the vat 10 either by way of pipe 42 or pipe 46, depending upon which of the valves 44—48 is open.

After the machine is completely flushed clean of water-detergent admixture, valve 24 re-closes and solenoid 66 remains energized for an additional 20 seconds, as indicated by shaded area 96 in Fig. 1. However, while water is being admitted into the vat 10, disc 80 will have moved to a position closing switch 80*a*, thereby energizing solenoid 58 and causing a sterilizer to flow into vat 10 by gravity through pipe 54. As indicated by shaded area 98 in Fig. 1, solenoid 58 remains energized for approximately three seconds.

The water-sterilizer admixture is recirculated over the dishes in tray 14 until the machine is operated for a total of 120 seconds, whereupon disc 72 closes switch 72*a*, thereby energizing solenoid 28 and again opening the valve 24 for a period of thirteen seconds as indicated by shaded area 100 in Fig. 1. As soon as valve 24 recloses, the water valve in line 40 is again re-opened by energization of solenoid 66 because of the fact that disc 76 has opened switch 76*a*.

The water valve remains open for a period of twenty seconds, as shown by shaded area 102 in chart 90. The water thus admitted into the vat 10 is recirculated until the completion of the cycle when switch 84*a* re-opens and such water is utilized in the next cycle of operation for flushing foreign matter from the dishes and for admixture with detergent emanating from container 52 when the solenoid 60 is energized because of the closing of switch 82*a*.

In the event it is desired to direct water into the detergent container 52 upon closing of switch 82*a*, a manual switch 104 in series with the solenoid 64, is closed, it being noted that switches 72*a* and 104 are likewise coupled in series.

Oftentimes, by virtue of the aforedescribed cycle, the recirculation system becomes air-logged and, therefore, it becomes desirable to momentarily deenergize the motor 34. This is accomplished by utilizing a normally closed switch 106 which opens and remains open for three seconds during the energization of solenoid 58 through closing of switch 80*a*.

When switch 113 is in the position shown in Fig. 2, closing of manual switch 87 energizes timer motor 68. It also energizes coil 107 of relay 109 to close switch 111 of the latter. This energizes motor 34 through switch 111. As soon as disc 84 rotates to close switch 84*a*, motor 68 and coil 107 remain energized even after opening of switch 87 until switch 84*a* re-opens.

However, when switch 113 is placed in series with switch 106 (while switch 80*a* is open) coil 107 is energized to energize motor 34 through switch 111. When switch 87 is closed, motor 68 operates to cause closing of switch 84*a* to permit opening of switch 87. As soon as switch 80*a* closes, switch 106 opens, thereby deenergizing motor 34 for three seconds.

Many governmental codes do not permit the rinsing away of the sterilizing solution from the dishes as provided in the above cycle. Accordingly, in Fig. 3 of the drawings, there is shown a chart 108 contemplating a two and one-half minute cycle, wherein the opening of valve 24, as indicated by the shaded area 100, and the re-introduction of water as shown by shaded area 102, are eliminated. It is seen that under such circumstances the sterilizer-water admixture is retained at the end of each cycle and utilized with the detergent in the next succeeding cycle.

In comparing charts 90 and 108, it is seen that in the latter, the period of time for cleansing the dishes with the detergent water, is increased by approximately fifteen seconds, and that the dishes are actually sterilized for eighteen additional seconds notwithstanding the fact that the cycle of chart 108 is thirty seconds shorter than the cycle of chart 90.

Another embodiment is depicted by chart 110 in Fig. 4 that employs the same time cycle as shown in chart 90 so far as rinsing the dishes with detergent water is concerned and also in sterilizing the dishes. However, as contemplated by chart 108, the sterilizer water is here again utilized in the next cycle of operation for receiving the detergent.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A method of cleaning and sterilizing soiled dishes which comprises interposing said dishes to be cleaned and sterilized within the normally closed circuit of a water-recirculation system; gravitationally directing a detergent into said system for admixture and circulation with the water; opening said circuit after a predetermined period of time to drain the water-detergent admixture therefrom; introducing a predetermined amount of rinse water into said system after draining for a predetermined period of time while the system continues to operate and while the circuit is open whereby to remove the admixture from the dishes and flush the same from the system; reclosing the circuit after a predetermined period of time; gravitationally directing a predetermined quantity of sterilizer into said system while continuing to introduce rinse water; discontinuing introduction of rinse water; and discontinuing the recirculation of the water-sterilizer admixture after a predetermined period of time following completion of the rinse water introduction.

2. A method of cleaning and sterilizing soiled dishes which comprises interposing said dishes to be cleaned and sterilized within the normally closed circuit of a continuously operating, water-recirculation system; gravitationally directing a detergent into said system for admixture and circulation with the water; opening said circuit after a predetermined period of time to drain the water-detergent admixture therefrom; introducing a predetermined amount of rinse water into said system after draining for a predetermined period of time while the system continues to operate and while the circuit is open whereby to remove the admixture from the dishes and flush the same from the system; reclosing the circuit after a predetermined period of time; gravitationally directing a predetermined quantity of a sterilizer into said system while continuing to introduce rinse water; discontinuing introduction of rinse water; discontinuing the recirculation of the water-sterilizer admixture after a predetermined period of time following completion of rinse water introduction while the circuit is closed; and retaining said rinse water-sterilizer admixture within said closed system whereby the rinse water-sterilizer admixture retained in the system is used in the water-detergent admixture of the next succeeding cycle of operation.

3. A method of cleaning and sterilizing soiled dishes which comprises interposing said dishes to be cleaned and sterilized within the normally closed circuit of a water-recirculation system; gravitationally directing a detergent into said system for admixture and circulation with the water; opening said circuit after a predetermined period of time to drain the water-detergent admixture therefrom; introducing a predetermined amount of rinse water into said system after draining for a predetermined period of time while the system continues to operate and while the circuit is open whereby to remove the admixture from the dishes and flush the same from the system; reclosing the circuit after a predetermined period of time; gravitationally directing a predetermined quantity of a sterilizer into said system while continuing to introduce rinse water; discontinuing recirculation while introducing the sterilizer; resuming recirculation to rinse the dishes with water-sterilizer admixture; discontinuing introduction of rinse water; discontinuing the recirculation of the water-sterilizer admixture after a predeter-

mined period of time following completion of rinse water introduction while the circuit is closed; and retaining said rinse water-sterilizer admixture within said closed system whereby the rinse water-sterilizer admixture retained in the system is used in the water-detergent admixture of the next succeeding cycle of operation.

4. A method of cleaning and sterilizing soiled dishes which comprises interposing said dishes to be cleaned and sterilized within the normally closed circuit of a continuously operating, water-recirculation system; gravitationally directing a detergent into said system for admixture and circulation with the water; opening said circuit after a predetermined period of time to drain the water-detergent admixture therefrom; introducing a predetermined amount of rinse water into said system after draining for a predetermined period of time while the system continues to operate and while the circuit is open whereby to remove the admixture from the dishes and flush the same from the system; reclosing the circuit after a predetermined period of time; gravitationally directing a predetermined quantity of a sterilizer into said system while continuing to introduce rinse water; discontinuing introduction of rinse water; opening said circuit after a predetermined period of time following completion of rinse water introduction and until the water-sterilizer admixture is drained therefrom; reclosing the circuit; introducing a predetermined amount of water into the system for subjecting the dishes to a second rinse; discontinuing the recirculation of the second rinse water while the circuit is closed; and retaining said second rinse water within said closed system whereby said second rinse water retained in the system is used in the water-detergent admixture of the next succeeding cycle of operation.

5. A method of cleaning and sterilizing soiled dishes which comprises interposing said dishes to be cleaned and sterilized within the normally closed circuit of a water-recirculation system; gravitationally directing a detergent into said system for admixture and circulation with the water; opening said circuit after a predetermined period of time to drain the water-detergent admixture therefrom; introducing a predetermined amount of rinse water into said system after draining for a predetermined period of time while the system continues to operate and while the circuit is open whereby to remove the admixture from the dishes and flush the same from the system; reclosing the circuit after a predetermined period of time; gravitationally directing a predetermined quantity of a sterilizer into said system while continuing to introduce rinse water; discontinuing recirculation while introducing the sterilizer; resuming recirculation to rinse the dishes with water-sterilizer admixture; discontinuing introduction of rinse water; opening said circuit after a predetermined period of time following completion of rinse water introduction and until the water-sterilizer admixture is drained therefrom; reclosing the circuit; introducing a predetermined amount of water into the system for subjecting the dishes to a second rinse; discontinuing the recirculation of the second rinse water while the circuit is closed; and retaining said second rinse water within said closed system whereby said second rinse water retained in the system is used in the water-detergent admixture of the next succeeding cycle of operation.

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