

Sept. 20, 1955

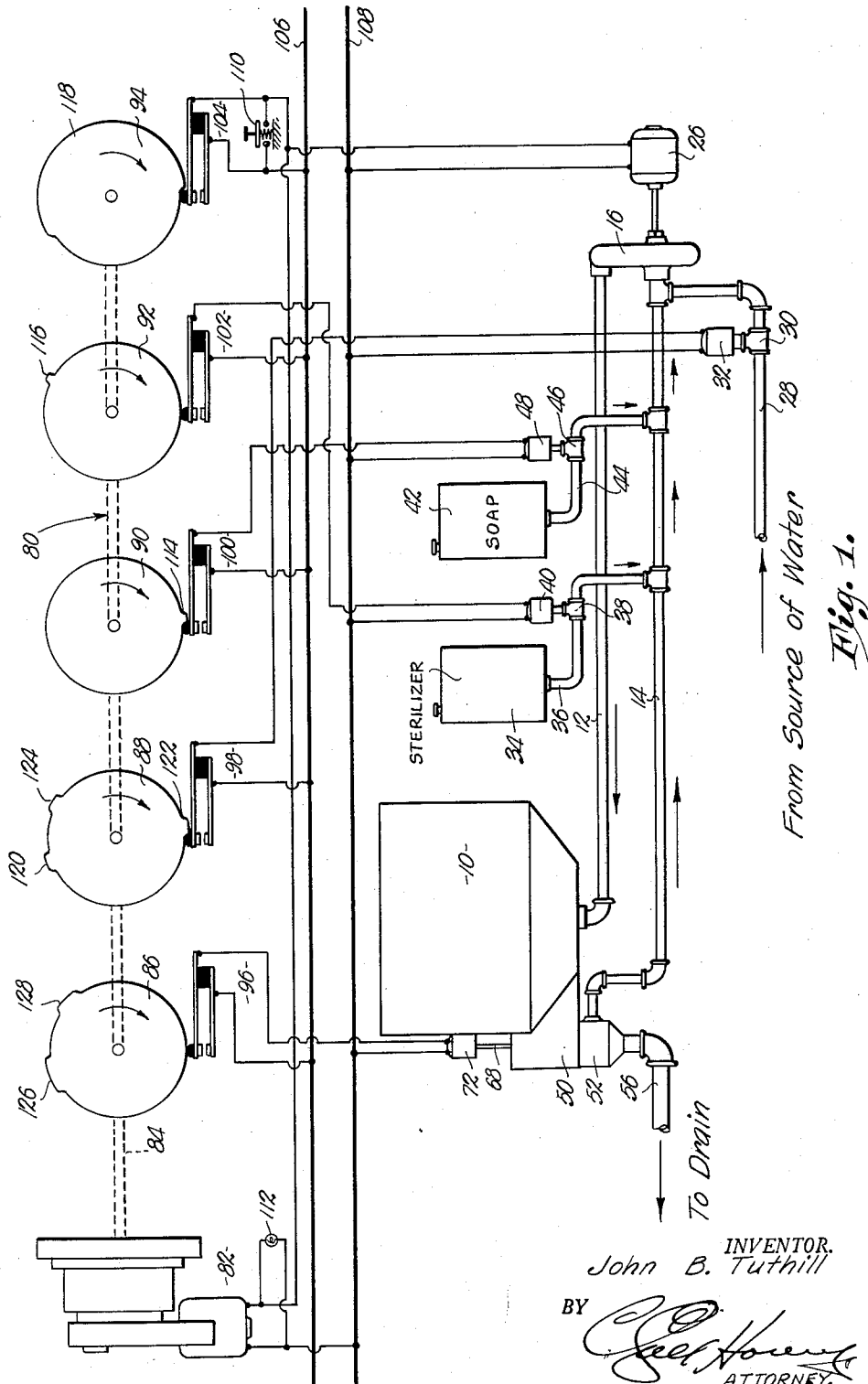
J. B. TUTHILL

2,718,481

METHOD OF WASHING DISHES

Filed Dec. 12, 1949

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

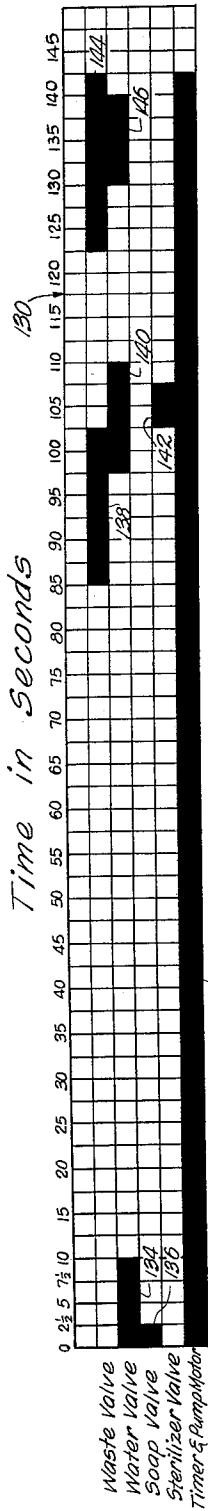


Fig. 3.

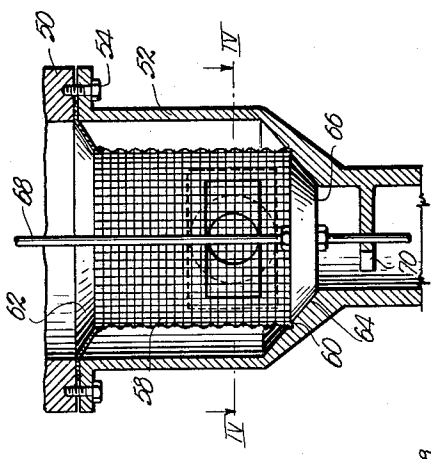


Fig. 3.

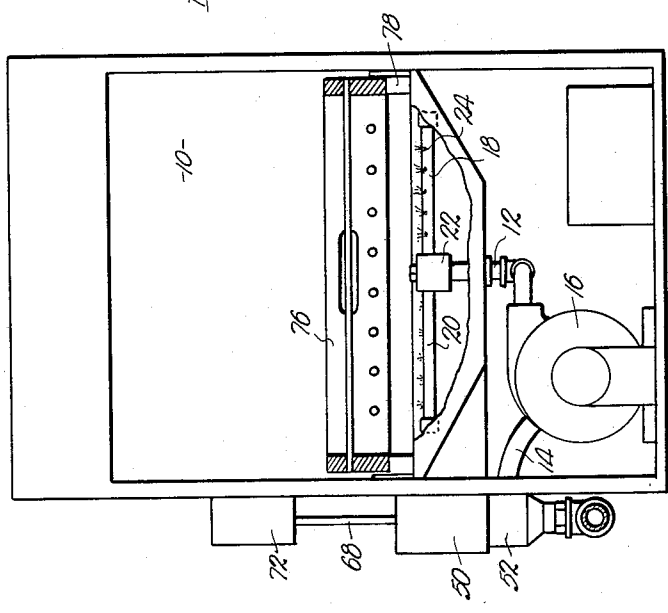


Fig. 2.

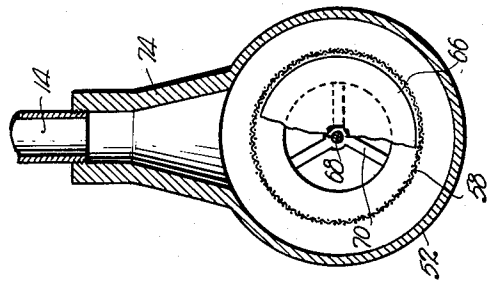


Fig. 4.

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2,718,481

METHOD OF WASHING DISHES

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20 Claims. (Cl. 134—25)

This invention relates to the field of cleansing dishes and eating utensils, the primary object being to provide a system of washing and sterilizing that is more satisfactory in many respects than conventional dishwashing systems from the standpoints of efficiency, expense and meeting the requirements of laws and ordinances designed to protect the health of the public. Generally speaking, public health authorities, by virtue of statutes provided to protect the health of the public, require industrial establishments handling dishes and other cooking and eating utensils, to wash and sanitize the same in water that is maintained at not less than 180° F., and kept in contact with the dishes at such temperature for a sufficient period of time to effect thorough sterilization; the requirements usually being at least 60 seconds. Public health officials do however, permit use of an approved sterilizer in lieu of hot water.

Conventional systems of dishwashing now being used are objectionable from the standpoint of expense in maintaining the water at the required temperature; the use of the same detergent for many dishwashing operations which becomes saturated with the food particles washed from the dishes, thereby losing its efficiency as a cleaning agent; the washing water is constantly diluted by the rinse water thereby becoming weak and ineffectual after long continued use; and by repeated use of the wash water and oftentimes rinse water, bacteria that may occur on one batch of dishes will be carried through the day and deposited upon subsequent batches that are washed in the same solution. This is especially true should the temperature of the wash and rinse water drop below that required to kill bacteria.

It is the most important object of the present invention therefore, to eliminate all of the aforesaid difficulties and disadvantages through the provision of a method of continually washing and rinsing a batch of dishes and thereupon sterilizing the same with a suitable agent with a final step constituting a rinse of clear water to remove the said agent.

Another important object of the present invention is to provide a system of washing dishes wherein the problem of maintaining the wash water and rinse water at a critical temperature, is overcome, and wherein the wash water is supplied with a predetermined amount of soap or detergent and such washing solution thereupon discharged to waste after circulating the same over the dishes for a predetermined length of time.

A further object of the present invention lies in the way in which the dishes are rinsed with clear water that is furnished with a suitable sterilizing agent of a predetermined amount, which sterilized rinsing water is also drained to waste and the dishes finally rinsed with clear, unadulterated water.

Additional objects will be made clear or become apparent as the following specification progresses, wherein:

Fig. 1 is a schematic, diagrammatical view showing a dishwashing machine suitable for use in practicing, and

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illustrative of, the system of washing dishes forming the subject matter hereof.

Fig. 2 is a side elevational view of the washing machine per se with one wall of the shell thereof removed and parts being broken away and in section to reveal details of construction.

Fig. 3 is an enlarged, fragmentary, vertical, cross-sectional view through the outlet conduit of the dishwashing vat.

Fig. 4 is a fragmentary, cross-sectional view taken on line IV—IV of Fig. 3, looking in the direction of the arrows; and

Fig. 5 is a chart showing schematically one time schedule that may be utilized in the system and by use of the dishwashing machine.

In Fig. 1 of the drawings there is illustrated a dishwashing machine having a vat broadly designated by the numeral 10 and provided with a re-circulating conduit having lengths 12 and 14 connected with the discharge end and inlet end respectively of a centrifugal liquid pump 16. That end of the conduit length 12 opposite to the pump 16, joins directly with vat 10 at the bottom thereof and passes upwardly as illustrated in Fig. 2 of the drawings to communicate with a tubular manifold having a pair of diametrically opposed tubular arms 18 and 20.

The innermost ends of spray arms 18 and 20 communicate directly with a hollow hub 22 that is freely rotatable on the innermost end of conduit length 12. A plurality of perforations 24 throughout the length of each of the arms 18 and 20, are disposed at a substantially 15° angle to the end that as liquid is forced into the spray arms 18 and 20 by operation of pump 16, arms 18 and 20 and hub 22, will revolve on a vertical axis.

The pump 16 is driven by an electric motor 26 and water is supplied to the intake side 14 of the re-circulating system by means of a pipe 28 coupled in line 14 next adjacent pump 16. Pipe 28 may be connected with any suitable source of water (not shown) such as the city water system and is provided with a "T" connection 30 having a valve therein that is controlled by an electric solenoid 32.

A container 34 for a suitable concentrated liquid sterilizer, has connection with the line 14 by means of a pipe 36 that is in turn provided with a valve within T connection 38 controlled by a solenoid 40. A suitable soap or detergent in concentrated liquid form is placed in a receptacle 42 having connection with line 14 by means of a short pipe 44. A coupling 46 interposed in the pipe 44 is provided with a shut-off valve that is in turn controlled by a solenoid 48. It is of course, understood that when the entire machine is built as a compact unit, the containers 34 and 42 will be mounted on or adjacent the vat 10 and motor 26, as well as pump 16, will be disposed in underlying relationship to vat 10 within a closed compartment capable of also housing the various pipes and conduits thus far described, all as shown in part in Fig. 2 of the drawings.

The vat 10 is additionally provided with a hollow housing 50 that communicates with vat 10 adjacent its bottom and also registers with a depending outlet pipe 52 removably connected with the housing 50 by means of bolts or the like 54. The lowermost end of the pipe 52 is in register with a suitable discharge drain by means of a pipe 56. The vertical pipe 52 is provided with a foraminous cylinder 58 that rests at its lowermost peripheral edge within an annular recess 60 formed in the pipe 52 intermediate the ends thereof. The uppermost end of the foraminous cylinder 58 is outwardly flared as at 62 and extended between the proximal edges of housing 50 and pipe 52 for releasably holding the cylinder 58 in place.

Pipe 52 additionally is provided with a seat 64 for re-

ceiving a vertically reciprocable, frusto-conical valve 66 that is in turn mounted upon an elongated, vertical rod 68. A cross-bar 70 in the pipe 52 receives the lowermost end of the rod 68 below seat 64 and serves as a guide for valve 66 as the same moves to and from the closed position illustrated in Fig. 3. Valve 66 is moved to an open position into the cylinder 58 by a solenoid 72 (Figs. 1 and 2) connected with the uppermost end of the rod 68 and mounted directly upon vat 10.

A laterally extending nozzle 74 (Fig. 4) communicates with the pipe 52 immediately above the valve 66 and receives the proximal end of the conduit length 14.

A suitable rack 76 is removably mounted within the vat 10 upon a bracket 78 directly above the spray arms 18—20 for receiving the dishes to be cleansed.

A timing assembly for controlling the operation of motor 26 and therefore, pump 16, as well as the various solenoid controlled valves above mentioned, is broadly designated by the numeral 80 and illustrated schematically in Fig. 1 of the drawings. A combination electrical motor and speed reducer unit 28 is provided with a driven shaft 84 having a plurality of disc-like cams operably connected therewith for rotation in the direction indicated by the arrows in Fig. 1. The five cams illustrated are designated by the numerals 86, 88, 90, 92 and 94 and correspond respectively with solenoid 72, solenoid 32, solenoid 48, solenoid 40 and motor 26. The aforesaid cams are additionally provided with electric switches 96, 98, 100, 102 and 104 respectively, and all of such switches, as well as motor 26, are coupled within primary lines 106 and 108 having connection with a suitable source of electrical energy not shown. It is also notable that each switch 96, 98, 100 and 102 is series connected with its corresponding solenoid in the usual manner and that switch 104 is coupled with motor 26 in the same manner.

A manually operable switch 110 makes and breaks the entire circuit as desired by the operator. The motor of unit 82 also receives energy from lines 106 and 108 through switch 110 and a pilot light 112 is coupled within the circuit for energization when switch 110 is closed to indicate operation of the timer assembly 80. The switches of timer 80 are all normally open and are moved to the closed position by the corresponding cams through the medium of peripheral knobs provided on such cams. The cams 90 and 92 are provided with relatively short knobs 114 and 116, while the cam 94 has a substantially semi-circular raised portion or knob 118.

The cam 88 is provided with a pair of substantially diametrically opposed knobs 120 and 122 of equal length and a third knob 124 adjacent the knob 120 that has a length slightly greater than the lengths of knobs 120 and 122.

Cam 86 has a pair of spaced knobs 126 and 128, the knob 126 being twice as long as either of the knobs 120 or 122. The knob 128 of cam 86 is slightly shorter than knob 126, but longer than the knob 124.

The timer unit 80 as just described, is properly synchronized and formed to cause operation of the dishwashing machine in accordance with the time schedule illustrated in Fig. 5 of the drawings. Assuming that dishes and other articles to be washed and sterilized have been placed within the rack 76 and the latter moved to an operative position upon the bracket 78, such overall operation of the machine is as follows:

As far as the operator is concerned, one step only is necessary, i. e. that of closing the switch 110. Unit 82 immediately is energized to cause rotation of the driven shaft 84 and of the cams mounted for operation thereon.

It is noted that at the beginning of the cycle of operation, knob 122 is in a position to immediately close switch 98, knob 114 is disposed to close its corresponding switch 100, and knob 118 is ready to close switch 104.

It is noted in Fig. 5 that chart 130 is graduated longitudinally by time in seconds, each square indicating 2½ seconds. The words "Waste Valve" in Fig. 5 relate to valve 66; "Water Valve" refers to the valve within cou-

pling 30; "Soap Valve" refers to the solenoid controlled valve in coupling 46; "Sterilizer Valve" refers to the valve within coupling 38; and "Timer and Pump Motor" relates to the motor of unit 82 and the electric motor 26 respectively. The switch 104 remains closed as governed by the knob 118 of cam 84 and the timer motor 82, as well as pump motor 26, thereby remain energized for a period of 145 seconds as indicated by shaded area 132 on chart 130.

As soon as switch 98 is closed, the solenoid 32 will be energized to open its valve within coupling 30 and thereby permit the flow of water to the line 14 and to the pump 16. Such water flow continues for a period of 10 seconds as indicated by shaded area 134 on chart 130 and as controlled by the knob 122 of cam 88. Solenoid 48, however, remains energized to open the valve within coupling 46 as determined by knob 114 closing switch 100 for a period of only 2½ seconds as indicated by shaded area 136 of chart 130. It is thus seen that immediately upon closing switch 110, water is admitted to the pump 16 and forced into the vat 10 by way of the spray arms 18—20.

The small quantity of soap or other detergent emanating from the container 42 will immediately admix with the re-circulating water and such washing medium will be sprayed upon the dishes on rack 76. The soapy water will flow from the vat 10 into the pipe 52 and thence into nozzle 74 and line 14 for re-circulation by pump 16. Such re-circulation continues after closing of both of the valves in coupling 30 and coupling 46 for a period of 75 seconds, whereupon the knob 128 of cam 86 moves to a position closing switch 96 and energizing solenoid 72. This causes valve 66 to open and to drain the washing medium by way of pipe 56 while motor 26 continues to operate. The knob 128 holds the solenoid 72 energized and the valve 66 open for a period of 17½ seconds as indicated by shaded area 138 on chart 130.

After valve 66 has been open for 12½ seconds, knob 124 closes switch 98 to again open the water valve in coupling 30, said valve remaining open after closing of the valve 66 and for a total period of 12½ seconds as indicated by shaded area 140 on chart 130.

Immediately upon closing of valve 66 and while the valve in coupling 30 is open, knob 116 closes switch 102 and holds the same closed for a period of 5 seconds, as indicated by shaded area 142 on chart 130. Such closing of the switch 102 energizes solenoid 40 to open the valve within housing 38 and to permit a predetermined amount of sterilizing agent to flow by way of pipe 36 into line 14.

At this stage of the operation therefore, the dishes on rack 76 are being sprayed with clear water emanating from pipe 28 and having admixed therein, the sterilizer agent introduced by way of pipe 36.

In this connection, any suitable solution may be used for such sterilization such as sodium hypochlorite, it being contemplated that 500 or more parts of the sodium hypochlorite be used for each million parts of the water being circulated by pump 16. After closing of the water valve in coupling 30, circulation of the sterilized liquid continues for a period of 12½ seconds, whereupon knob 126 of cam 86 again closes switch 96 to open drain valve 66. Solenoid 72 remains energized to cause draining of the sterilizing solution for a period of 20 seconds, and until the end of one cycle of operation as indicated by shaded areas 144 on chart 130. After valve 66 has been opened for a period of 7½ seconds, to drain the sterilizing water from vat 10, knob 120 of cam 88, closes switch 98 to again energize solenoid 32 and open the valve within coupling 30. Clear water is thereupon introduced into the re-circulating system for a period of 10 seconds, as shown by shaded area 146 of chart 130.

After closing of the water valve in coupling 30, drain valve 66 remains open for an additional 2½ seconds during which time the last rinse water is permitted to drain by way of pipe 56.

At the end of the cycle of operation, knob 118 has

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moved to a position where switch 104 opens to deenergize motor 26 as well as the motor forming a part of the unit 82.

It is seen from the foregoing that the re-circulating system of the dishwasher hereof continues to operate during the full 142½ seconds of operation and that the washing solution, the sterilizing solution and both rinses, are directed to the dishes on rack 76 in the form of a spray by means of the manifold arms 18—20.

Attention is called to the fact that a predetermined amount of soap or detergent is introduced into re-circulating line and by the same token, a measured amount of the sterilizing agent within the container 34 is introduced into the re-circulating clear water. It is notable further that clean, fresh water is used not only for the initial washing step but for the rinsing of the soapy water from the dishes, the sterilizing step, and the final rinsing of the sterilized solution from the dishes. It will also be understood that the expressions "soap," "soapy" and the like, when used alone herein, are to be interpreted as referring to and including, not only soaps in a restricted sense, but also materials such as detergents which are used as soap equivalents.

The use of a foraminous filtering cylinder 58 obviates the possibility of the small openings 24 of arms 18—20 becoming clogged with the food particles that are washed from the dishes. All of the liquid solutions that are pumped through line 14 and back into the vat 10 by way of line 12, must pass through the foraminous cylinder 58, but the particles of food that are washed from the dishes find their way to the drain when valve 66 is open. Accordingly, it is possible to maintain the valve 10 and all of the re-circulating system clean of food particles and bacteria because of the fact that the first rinsing step not only washes away all of the suds, but cleans the entire system prior to the introduction of the sterilizing agent into line 14.

While a particular time schedule has been set forth herein, it is appreciated that the same may be varied to suit various conditions and desires of the operator by merely changing the formation of the cams of timer 80.

It is appreciated that through use of the aforesaid system and apparatus, there is no needless waste of the water, heat, detergent or sterilizing agent and that a large number of utensils can be washed quickly and easily with little operator attention.

Details of construction of the machine per se and variances in the cleansing steps above enumerated, may manifestly be made within the spirit of this invention and it is, therefore, desired to be limited only by the scope of the appended claims.

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 continuously operating, liquid recirculation system; then, introducing soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be in-

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troduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, introducing a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; and then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution.

2. In the method as set forth in claim 1, wherein, during said recirculation of said cleaning solution, particles of foreign matter are restrained against recirculation and accumulated for discharge from said system along with said cleaning solution when the normally closed circuit of said system is opened.

3. In the method as set forth in claim 1, wherein said wash water and said rinse water are each introduced into said system at a sub-scalding temperature below 170 degrees Fahrenheit, and all of the steps of the method are carried out at sub-scalding temperatures below 170 degrees Fahrenheit.

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, liquid recirculation system; then, introducing soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, introducing a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; and then, after a predetermined further period of time, interrupting the flow of cleansing water into said system.

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 continuously operating, liquid recirculation system; then, commencing the introduction of soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time, and while said wash water continues to be introduced, interrupting the flow of soap into said system; then, after a predetermined further period of time, interrupting the flow of wash water into said system; then, after a predetermined further period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, introducing a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; and, then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution.

6. 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, liquid recirculation system; then, commencing the introduction of soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time, and while said wash water continues to be introduced, interrupting the flow of soap into said system; then, after a predetermined further period of time, interrupting the flow of wash water into said system; then, after a predetermined further period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, introducing a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution

to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; and, then after a predetermined further period of time, interrupting the flow of cleansing water into said system.

15 7. 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 con-
tinuously operating, liquid recirculation system; then, in-
20 troducing soap and wash water into said system for re-
circulation thereof within said system beginning as soon as
they are introduced, whereby said soap and wash water
are admixed to present a cleaning solution to whose action
said dishes are subjected during recirculation; then, after
25 a predetermined period of time during which recirculation
of said cleaning solution is continued, opening the normal-
ly closed circuit of said system to permit drainage for
clearing the system of said cleaning solution; then, after
a predetermined further period of time, and while said
30 system continues to operate in open-circuited condition,
commencing the introduction of rinse water into said sys-
tem for circulation through the system and over said
dishes, whereby any cleaning solution remaining on said
dishes and in the system will be flushed therefrom; then,
35 after a predetermined further period of time, and while
said rinse water continues to be introduced, reclosing the
circuit of said system for recirculation of said rinse water
through said system beginning as soon as it is introduced,
whereby to further rinse said dishes; then, as soon as said
40 system is reclosed, and while said rinse water continues to
be introduced, commencing the introduction of a steriliz-
ing agent into said system for recirculation thereof
through said system beginning as soon as it is introduced,
whereby said sterilizing agent and rinse water are admixed
45 to present a sterilizing solution to whose action said dishes
are subjected during recirculation; then, after a predeter-
mined further period of time, and while said rinse water
continues to be introduced, interrupting the flow of steril-
izing agent into said system; then, after a predetermined
50 further period of time, interrupting the flow of rinse water
into said system; and then, after a predetermined further
period of time during which recirculation of said steriliz-
ing solution is continued, opening the normally closed cir-
cuit of said system to permit drainage for clearing the
system of said sterilizing solution.

55 8. 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, liquid recirculation system; then, introducing soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, 70 commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while 75 said rinse water continues to be introduced, reclosing the

circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, commencing the introduction of a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time, and while said rinse water continues to be introduced, interrupting the flow of sterilizing agent into said system; then, after a predetermined further period of time, interrupting the flow of rinse water into said system; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; and, then, after a predetermined further period of time, interrupting the flow of cleansing water into said system.

9. 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, liquid recirculation system; then, commencing the introduction of soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time, and while said wash water continues to be introduced, interrupting the flow of soap into said system; then, after a predetermined further period of time, interrupting the flow of wash water into said system; then, after a predetermined further period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, commencing the introduction of a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time, and while said rinse water continues to be introduced, interrupting the flow of sterilizing agent into said system; then, after a predetermined further period of time, interrupting the flow of rinse water into said system; and, then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution.

10. In the method as set forth in claim 9, wherein,

during said recirculation of said cleaning solution, particles of foreign matter are restrained against recirculation and accumulated for discharge from said system along with said cleaning solution when the normally closed circuit of said system is first opened, and, during said recirculation of said rinse water prior to introduction of said sterilization agent and during recirculation of said sterilizing solution, further particles of foreign matter are restricted against recirculation and accumulated for discharge from said system along with said sterilizing solution when the normally closed circuit of said system is next opened.

11. In the method as set forth in claim 9, wherein said wash water and said rinse water are each introduced into said system at a sub-scalding temperature below 170 degrees Fahrenheit, all of the steps of the method are carried out at sub-scalding temperatures below 170 degrees Fahrenheit, and said rinse water and said sterilizing solution remain within the system for a total period of less than 60 seconds.

12. 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, liquid recirculation system; then, commencing the introduction of soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time, and while said wash water continues to be introduced, interrupting the flow of soap into said system; then, after a predetermined further period of time, interrupting the flow of wash water into said system; then, after a predetermined further period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, commencing the introduction of a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time, and while said rinse water continues to be introduced, interrupting the flow of sterilizing agent into said system; then, after a predetermined further period of time, interrupting the flow of rinse water into said system; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; and, then,

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after a predetermined further period of time, interrupting the flow of cleansing water into said system.

13. In the method as set forth in claim 12, wherein during recirculation of any of said liquids within said system, particles of foreign matter are circulated to a zone of accumulation and there restrained against recirculation and accumulated for discharge from said system along with the next liquid to be cleared from said system when the normally closed circuit of said system is next opened for drainage of said last-mentioned liquid.

14. In the method as set forth in claim 12, wherein each of said liquids is introduced into said system at a sub-scalding temperature below 170 degrees Fahrenheit, all of the steps of the method are carried out at sub-scalding temperatures below 170 degrees Fahrenheit, and said rinse water, said sterilizing solution and said cleansing water remain within the system for a total period of less than 60 seconds.

15. In the method as set forth in claim 14, wherein, after said dishes have been interposed within said system, the remainder of the steps of the method are performed and completed during a period of less than three minutes.

16. 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, liquid recirculation system; then, introducing soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, introducing a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, interrupting the flow of cleansing water into said system; and then, after a predetermined further period of time during which drainage of said cleansing water is completed, reclosing the circuit of said system for isolating the cleaned and sterilized dishes from contact with external, unsterile conditions until they are ready to be removed from said system.

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17. 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, liquid recirculation system; then, commencing the introduction of soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time, and while said wash water continues to be introduced, interrupting the flow of soap into said system; then, after a predetermined further period of time, interrupting the flow of wash water into said system; then, after a predetermined further period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, introducing a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, interrupting the flow of cleansing water into said system; and then, after a predetermined further period of time during which drainage of said cleansing water is completed, reclosing the circuit of said system for isolating the cleaned and sterilized dishes from contact with external, unsterile conditions until they are ready to be removed from said system.

18. 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, liquid recirculation system; then, introducing soap and wash water into said system for re-circulation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby

any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, commencing the introduction of a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are subjected during recirculation; then, after a predetermined further period of time, and while said rinse water continues to be introduced, interrupting the flow of sterilizing agent into said system; then, after a predetermined further period of time, interrupting the flow of rinse water into said system; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, interrupting the flow of cleansing water into said system; and then, after a predetermined further period of time during which drainage of said cleansing water is completed, reclosing the circuit of said system for isolating the cleaned and sterilized dishes from contact with external, unsterile conditions until they are ready to be removed from said system.

19. 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, liquid recirculation system; then, commencing the introduction of soap and wash water into said system for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after a predetermined period of time, and while said wash water continues to be introduced, interrupting the flow of soap into said system; then, after a predetermined further period of time, interrupting the flow of wash water into said system; then, after a predetermined further period of time during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes, whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, and while said rinse water continues to be introduced, reclosing the circuit of said system for recirculation of said rinse water through said system beginning as soon as it is introduced, whereby to further rinse said dishes; then, as soon as said system is reclosed, and while said rinse water continues to be introduced, commencing the introduction of a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose action said dishes are

subjected during recirculation; then, after a predetermined further period of time, and while said rinse water continues to be introduced, interrupting the flow of sterilizing agent into said system; then, after a predetermined further period of time, interrupting the flow of rinse water into said system; then, after a predetermined further period of time during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after a predetermined further period of time, and while said system continues to operate in open-circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in the system will be flushed therefrom; then, after a predetermined further period of time, interrupting the flow of cleansing water into said system; and then, after a predetermined further period of time during which drainage of said cleansing water is completed, reclosing the circuit of said system for isolating the cleaned and sterilized dishes from contact with external, unsterile conditions until they are ready to be removed from said system.

20. 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, liquid recirculation system; then, commencing the simultaneous introduction of soap and wash water into said system at respectively uniform rates for recirculation thereof within said system beginning as soon as they are introduced, whereby said soap and wash water are admixed to present a cleaning solution to whose action said dishes are subjected during recirculation; then, after about two and one-half seconds, and while said wash water continues to be introduced, interrupting the flow of soap into said system; then, after about seven and one-half seconds more, interrupting the flow of wash water into said system; then, after about seventy-five seconds more during which recirculation of said cleaning solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said cleaning solution; then, after about twelve and one-half seconds more, and while said system continues to operate in open-circuited condition, commencing the introduction of rinse water into said system for circulation through the system and over said dishes; whereby any cleaning solution remaining on said dishes and in the system will be flushed therefrom; then, after about five seconds more, and while said rinse water continues to be introduced, simultaneously reclosing the circuit of said system and commencing the introduction of a sterilization agent into said system for recirculation thereof through said system beginning as soon as it is introduced, whereby said sterilizing agent and rinse water are admixed to present a sterilizing solution to whose rinsing and sterilizing action said dishes are subjected during recirculation; then, after about five seconds more, and while said rinse water continues to be introduced, interrupting the flow of sterilizing agent into said system; then, after about two and one-half seconds more, interrupting the flow of rinse water into said system; then, after about twelve and one-half seconds more during which recirculation of said sterilizing solution is continued, opening the normally closed circuit of said system to permit drainage for clearing the system of said sterilizing solution; then, after about seven and one-half seconds more, and while said system continues to operate in open circuited condition, commencing the introduction of cleansing water into said system for circulation through the system and over said dishes, whereby any sterilizing solution remaining on said dishes and in said system will be flushed there-

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from; then, after about ten seconds more, interrupting the flow of cleansing water into said system; and then, after about two and one-half seconds more during which drainage of said cleansing water is completed, reclosing the circuit of said system for isolating the cleaned and sterilized dishes from contact with external, unsterile conditions until they are ready to be removed from said system.

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