My invention relates to cleaning dishes. Although a large number of household type dishwashers have been proposed, public acceptance of dishwashing machines has been withheld except in large restaurants and dining places. One reason for this is that in the usual home the quantity of tableware is not sufficiently large for a dishwashing machine to materially reduce handling of the dishes. Housewives point out that if dishes have to be scraped and then placed just so in a washing machine, the time and labor is no less than that involved by hand washing. Another objection is that household type washing machines do not effect thorough washing of the variously shaped dishes and utensils ordinarily encountered in the home. Another objection is that household type dishwashers do so small a part of the total job automatically that the cost is not worth while. Thus, even though permitting use of hotter water and reducing so-called dishpan hands, household dishwashers have encountered such sales resistance as to have kept them from coming into general use.

I have invented a household kitchen sink having the usual utility of a sink but which has the further utility of being more easily cleaned, and which has the still further utility of automatically cleaning dishes and tableware without a separate preliminary treatment such as scraping or rinsing. Dishes and tableware are brought directly to this sink which, after automatic operation, is itself clean and presents the articles thoroughly clean and dry. I have thus provided a new kitchen device which is functionally and economically acceptable in the home.

My invention resides in a new set of operations carried out by an apparatus having a new relationship of parts. When using the sink for automatic cleaning, soiled dishes and tableware are brought directly to the sink. Solids and the bulk of the waste material are disintegrated and disposed of to waste. Then the articles are engulfed in a swift stream of hot water containing soap or other suitable detergent. Next, the articles are subjected to a hot water rinse and then a current of air which prevents accumulation of water vapor and thus effects immediate drying.

The invention is described in more detail in connection with the accompanying drawings of which:

Fig. 1 is a front view with parts in vertical section and showing some of the water supply connections;

Fig. 2 is a view similar to Fig. 1 with water pipe connections omitted and the waste line shown in section;

Fig. 3 is a partial vertical section taken on line 3—3 in Fig. 4;

Fig. 4 is a plan view of the automatic sink shown in the preceding figures;

Fig. 5 is a detail section of one of the several spray nozzles;

Fig. 6 is a detail section of a part of the sink lid taken on line 5—5 of Fig. 3;

Fig. 7 is a horizontal section of the disintegrator on line 7—7 in Fig. 2;

Fig. 8 is a detail section on line 8—8 in Fig. 7;

Fig. 9 is a detail section of a float operated switch which does not appear in previous views;

Fig. 10 is a wiring diagram of the control circuit for the automatic sink;

Fig. 11 is a plan view of a rack for use in the automatic sink;

Fig. 12 is an elevation of the rack shown in Fig. 11;

Fig. 13 is a left-end view of the rack;

Fig. 14 is a right-end view of the rack;

Fig. 15 is a detail perspective of the center rail of the rack; and

Fig. 16 is a detail view of a center holder for use in the rack.

I have embodied my invention in a general utility kitchen sink. Referring to Figs. 1, 2, 3, and 4, a cabinet 10 is provided with a base 11 of a type providing enclosure to the floor level but affording toe space at the front of the cabinet. A tank in the form of an open top sink 12 is located in the upper part of the cabinet 18, the rim of the sink forming the top of the cabinet. In the bottom center of the sink 12 there is a large diameter drain opening 13. A closure member or stopper 14 for the drain opening 13 is mounted on a lever 15. A rod 16 connects the lever 15 to the operating arm 17 of a three-position motor 18. In one position of the motor 18, the drain valve 14 is fully open. In a second position of the motor 18, the drain valve is partly closed. In the third position of the motor 18, the drain valve 14 is fully closed. I prefer to connect the drain valve 14 to the lever 15 by a member 19 which has resiliency so that should the drain valve attempt to close upon a solid object, the valve and its operating parts will not be strained nor damaged.

The drain valve 14 is located in the upper portion of a housing 20 in the lower narrowed part of which there is provided a disintegrator or macerator (see Fig. 2). The disintegrator comprises a spindle 21 provided with projecting teeth 22 arranged in circular rows. The teeth 22 on the spindle are interdigitated with circular rows of teeth 23 on the interior of the narrowed part.
of the housing 20. The spindle 21 is mounted on the upper end of a shaft 24 and projecting through the bottom of the disintegrator housing 20. A pulley 25 is mounted on the end of the shaft 24 outside of the housing 20 and the pulley 25 is connected by a belt 26 to an electric motor 27. A pipe 28 is connected to the disintegrator housing 20 below the spindle 21. The leading edges of the macerator teeth 22 are beveled downward and rearward so that when the spindle 21 is rotated by the motor 27, matter is continually urged downward.

A small blower 29 is connected to discharge air through an opening 30 in the upper part of the disintegrator housing 20. The blower 29 is connected by a belt 31 to the electric motor 27.

The disintegrator and the blower are operated when the electric motor 27 is energized. As it will hereinafter appear, the motor 27 is only operated when the drain valve 14 is open. In its full open position the valve 14 obstructs the opening 32 through which it is connected to its operator 18, and the air discharged by the blower 29 into the casing 20 causes an upward breeze through the large drain opening 15 into the sink 12.

At the top of the cabinet 10 and at the rear of the sink 12 there is a panel or upright ledge 33. A recess or niche 34 is provided in the panel 33 and in this niche there are located a horizontally pivoted spout 35 and hot and cold water valve handles 36 and 37. The spout 35 can be swung out of the recess 34 and over the sink 12 when the latter is used for general utility purposes as shown in dotted outline in Fig. 3. Valves (not shown) operated by handles 35 and 37 control flow of hot and cold water from the spout 35 in known manner.

In the top of the cabinet 10 in front of the panel 33 there is a slot 38 through which a sink cover 39 may be drawn upward and lowered to close the top of the sink, or lowered downward into the cabinet when not needed.

Near each end of the sink cover 39 there is a slot 40 formed, for instance, by cutting and pressing inward a louver 41 and stretching the metal to fully cover the slot 40. The cover slots 40 (see Fig. 6) permit exit flow of air blown upward into the sink by the blower 29.

In the bottom of the sink 12 there are two groups each of four spray nozzles 42. Each nozzle 42 is like that illustrated in vertical section in Fig. 5. Referring to Fig. 5, a distributing head 43 is normally located in an upwardly conical opening 44 and flush with the wall of the sink 12. Below each opening 44 the sink wall 12 has formed thereon a boss 45 which is drilled and threaded to receive a fitting 46. The latter has a shoulder 47 which acts as a seat for the spray head 43. A spider 48 and a leaf spring 49 are mounted on a stem 50 of the spray head 43. The leaf spring 49 engages behind the shoulder 47 and normally holds the spray head 43 seated in the opening 44. A water pipe 51 is connected to the fitting 46. When water is admitted to pipe 51, as hereinafter described, the pressure of the water raises the spray head 43 from its seat against the action of the spring 49. Thereupon the water issues through the opening 44 and is projected into the sink in the form of a spray around the hole 43. When water is cut off from pipe 51, the spring 49 returns the spray head 43 to its closed position.

The spray nozzles 42 in the bottom of the sink are connected by suitable piping to a supply pipe 52 which is connected to a hot water line 53. A magnetically operated valve 54 controls flow of water from the line 53 to the supply pipe 52 and thus to the bottom spray nozzles 42.

In the sides of the sink 12, that is, the front and back walls, there are four groups each of four spray nozzles 55 which are like the previously described sprays 42 are suitably manifolded and connected by suitable piping (not shown) to a supply pipe 56 which is connected to the hot water line 53. A magnetically operated valve 57 controls the flow of water from the line 53 to the supply pipe 56, as hereinafter described.

In each end wall of the sink 12 there are four sprays 58 which are like the previously described sprays 42. The sprays 58 are manifolded and connected by suitable piping (not shown) to a supply pipe 59 which is connected to the hot water line 53. A magnetically operated valve 60 controls flow of water from the line 53 to the supply pipe 59 as hereinafter described.

The magnetically operated valves 54, 56, and 58 are normally closed and adapted to open when energized.

Supply 52 and 56 are provided at the ends of the sink 12 adjacent the bottom. These slots are connected by conduits 63 and 64 to a housing 65. The conduits 63 and 64 are formed with upward U-bends 66 and 67. A supply pipe 66 is connected from the housing 65 to the hot water line 53. A magnetically operated valve 68 controls the flow of water from the line 53 to the supply pipe 66 as hereinafter described. The valve 68 is normally closed and adapted to open when energized.

A slot 70 is provided in the upper part of the rear wall of the sink 12. As seen in Fig. 3, the slot 70 is connected by fitting 71 and a pipe 72 to the inlet of a water pump 73. The latter is driven, together with the blower 29, by the electric motor 27 through the belt 31. The discharge side of the pump 73 is connected by a pipe 74 to the casing 20.

In Fig. 9 there is illustrated a device connected to the pump inlet pipe 72. This connection is indicated in Fig. 3 but not shown in the other drawings for the sake of clarity. Referring to Fig. 9, a vertical pipe 75 is connected by means of an elbow and a T to the pump inlet pipe 72. The upper end of the vertical pipe 75 is located at a level above the slot 70 in the rear wall of the sink 12. A bushing 76 is threaded in the upper end of the pipe 75 and acts as a guide for a rod 77 which projects downward through the bushing 76 into the pipe 75. A float 78 is attached to the lower end of the rod 77. The upper end of rod 77 is provided with a head 79 by which the rod 77 and float 78 are normally suspended in the pipe 75. A fitting 80 secured at the upper end of the pipe 75 provides a pivot for a tester number 81. One end of the tester 81 overlies the float rod head 79 and is normally held downward by a weight 82. A mercury type switch 83 is mounted on the other end of the tester 81. The switch 83 is normally closed. Whenever water rises in pipe 75 to a height sufficient to raise the float 78, the tester 81 is so tipped that the mercury switch 83 opens for a purpose hereinafter described.

Referring to Fig. 2, the rear panel 33 has on the right-hand side a control knob 84 turnable to any one of six positions. The knob 84 operates an electric switch 85 illustrated diagrammatically in Fig. 10. On the left-hand side of the panel 33 there are two push button switches 86 and 87 which are also shown diagrammatically in the wiring diagram of Fig. 10. Although not shown in the other views, a switch 88, shown diagram-
matically in Fig. 10, should be so arranged as to be closed only when the lid 39 is closed.

In Fig. 11 there is shown a plan view of a wire basket or receptacle 88 adapted to be removably located in the sink 12. The foraminous receptacle 88 is shaped so as to conform generally to the interior outline of the sink 12. At each end of the receptacle 88 there is a handle 39. When the receptacle 88 is placed in the sink 12, each handle 90 rests in a ledge 91 formed at the top of each end of the sink 12. The receptacle 88 is formed by a plurality of wire rods. Adjacent to the center of the receptacle 88 there is a circular opening 92 in the bottom. A circular ledge 93 is located at some distance above but directly over the opening 92. When the receptacle 88 is located in the sink 12, the opening 92 is generally in the vicinity of the sink drain opening 13. The ledge 93 is covered with rubber or some other soft and resilient material so that crockery may be jarred against this ledge without breaking.

The receptacle 88 has four principal sections. One section is in the left-hand end where a plurality of transverse bars 94 is foamed to provide three tiers of generally trough-like racks for glassware. The second section is in the right-hand end where a number of straight cross bars 95 provide a series of vertical slots for plates. A third section is formed in the right front half of the receptacle where a plurality of vertical rods 96, as best seen in Fig. 14, slope from the top of the receptacle downward to the bottom front corner thereof, forming an area 97 of decreasing width from top to bottom. This area accomodates smaller shapes such as comparison, and other tableware of miscellaneous nature.

As shown in Fig. 16, a foraminous cylindrical container 98 fits within the striking ledge 93 over the opening 92, and is provided with a ring 99 which rests upon the ledge 93 to support the receptacle 88. This receptacle is forsilverware and the like.

Referring back to the wiring diagram in Fig. 10, the four water control valves 54, 57, 60, and 69 are indicated. The valve 54 controls the bottom sprays 42. The valve 57 controls the side sprays 55. The valve 60 controls the end sprays 38. The valve 69 controls the flush openings 61 and 62. The previously described motor 27 is shown diagrammatically. When the motor 27 is operating, the disintegrator, water pump, and blower are operated. The three-position motor 18 with its operating arm 17 is shown. When the arm 17 is in the full line position, the sink drain valve 14 is closed. When the arm 17 is in the dotted line position 6, the sink drain valve 14 is in its normal position. When the arm 17 is in the dotted line position 7, the sink drain valve 14 is in its fully open or flushing position.

The float operated mercury switch 83 is shown in the wiring diagram of Fig. 10, and also in the manual switch 88, the push button switch 96 and 97, and the lid operated switch 88. Additionally there is a timer 106 comprising a small operating motor 101 and a series of ten switches operated from a camshaft driven by the motor 101, as known in the art. Energy for operating the timer 106, the three-position motor 18, and the main motor 27, and the magnetically operated valves is obtained from a source of electric current 102. In Fig. 10, the timer motor 101 is shown at standstill. It cannot operate because the lid switch 88 is open, meaning that the sink lid is not closed, and also because switch 103 is open. Switch 103 is opened when the timer camshaft has turned through one cycle and thus terminates each cycle.

Assume that a meal has been completed and there is a batch of soiled dishes and tableware to be cleaned. The wire basket is placed in position in the sink 12 without the cylindrical container 98. The soiled dishes and tableware are brought to the sink and placed in the wire basket.

Any large solids such as bones may be dumped from the dishes as they are placed in the basket through the basket ring 93 and the lower opening 92. The soft covering of the ledge 93 permits dishes to be jarred on this ledge for dislodging such large pieces. Silverware and the like is placed in the cylinder 98 and the latter is placed in the rack as illustrated in Fig. 16. The lid 39 is drawn upward and lowered over the top of the sink 12. The push-button 87 is operated and the next operation by the user is to raise the lid and remove the clean and dry dishes, for instance, by raising the rack 99 and conveying to a place of dish storage. This of course can be done at any convenient subsequent time.

When the lid is closed, the limit switch 88 is closed. When the push-button 87 is depressed, the timer motor 101 is energized and starts the timer, whereupon switch 103 closes and keeps the timer motor energized. When the timer starts, a switch 104 opens and prevents any interruption of the automatic operation by means of the manual control 88.

When the timer starts, the holding switch 103 closes and the disconnect switch 106 opens, as just described, and switch 105 closes followed by a switch 105. The closing of switch 105 energizes the three-position motor 18 to close the sink drain valve 14 if it is not already closed. The closing of the switch 105 energizes the magnetically operated valve 54 to start the bottom sprays 42.

After a short interval of time, a switch 107 closes to energize the water valve 57 causing operation of the side sprays 55.

After another short interval of time, the switch 108 opens and a switch 108 closes. This shuts off the bottom sprays 42 and starts the end sprays 50.

After another short interval of time, the switches 107 and 108 open to stop the side and end sprays. A switch 109 closes and energizes the servo-motor 18 to open the sink drain valve 14 to its fullest extent. Simultaneously switches 110 and 111 close. This energizes the motor 27 which drives the disintegrator, water pump, and blower, and also energizes valve 69 to discharge water from the ports 61 and 62.

During the first three periods of operation just described, the several sprays flush the disintegrator and tableware in rack 88. In the fourth period, dislodged matter is drained from the sink and disposed of through the disintegrator and the pipe 28. During this period the bottom of the sink 12 is flushed by water from the slot type ports 61 and 62.

After the fourth time interval the switch 109 opens and the switch 105 closes. This causes the motor 18 to close the sink drain 14. Water issuing from the ports 61 and 62 fills the sink.
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Thereupon the water overflows into the fitting and pipe 72 and enters the water pump 73. The pump discharges water through pipe 74, the casing 65, and the pipes which lead back to normal position 69, also the starting circulation of the water in a circuit which includes the sink. Water continues to enter this circuit through the valve 69 until the level of water in the stand pipe 73 (see Fig. 9) rises sufficiently to buoy the float 70 and thus lift the mercury switch 83. Tilting of the switch 83 de-energizes the valve 69 and shuts off supply of water from the hot water line. The water pump 73 has a sufficiently high capacity to cause circulation of the water at a relatively high rate of speed so that the two currents are formed in the sink from the ports 61 and 62 to the upper port 70. These two streams of water necessarily transverse the dish rack 69 and its contents which create considerable turbulence. This results in a thorough cleaning of the dishes and tableware. I prefer to pick up the dish rack a suitable detergent held in a container which shields the detergent from the action of the sprays while permitting dissolution of the detergent into the turbulent streams during the final washing operation.

After a suitable washing period, switch 105 opens, switch 110 opens, and switch 109 closes. This opens the circuit to valve 69 so that supply of water remains cut off even when the float switch 83 returns to its normally closed position, and causes the motor 18 to open the sink drain valve 74. The pump 73 clears the pipes leading thereto and the water from the sink is rapidly disposed of through the disintegrator and the pipe 28. This draining period is made sufficiently long to effect complete draining of the sink even with some variation in rate of flow through the waste pipe. In the claims below, the disintegrator housing 25 and the pipe 28 are together referred to generically and synonymously as a drain conduit, a drain line, a discharge conduit, or a waste pipe.

At the end of the sixth and final draining period the switch 105 again closes to energize valve 54 and start the bottom sprays 42 for rinsing the sink, the dish rack and its contents.

After a short operation of the bottom sprays, the switch 105 opens and the switch 107 closes. This stops the bottom sprays and starts the side sprays 53.

After a further short period, the switch 107 opens and the switch 108 closes. This stops the side sprays and starts the end sprays 56.

The sequential operation of the bottom, side, and end sprays effects a thorough rinsing of the sink, the dish rack, and its contents. Thereupon the switch 108 opens and the switch 110 closes. This shuts off the end sprays and sends a flow of water across the bottom of the sink from the ports 61 and 62, thus finishing a thorough cleaning of the sink.

Following a short sink flushing period, the switch 110 opens and stops flow of water from the ports 61 and 62. The sink drain valve 74 is wide open and the motor 27 is operating the blower 29. Air from the blower 29 is blown upward through the sink drain opening 13 and issues through the louvre openings 40 near the ends of the sink cover 39. This flow of air upward through the sink prevents accumulation of water vapor formed during drying of the interior of the sink, the dish rack, and its contents. Thus the drying is greatly speeded.

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Following a sufficient period for drying of the dishes and tableware, the switch 111 opens and a switch 112 closes. This stops the main motor 27 and energizes the motor 18 to move the sink drain valve 74 to its partly open position.

Thereupon the switch 112 opens, the switch 114 closes, and the switch 103 opens. The opening of switch 103 terminates an operating cycle by opening the circuit of the timer motor 101 to stop the timer. The closing of switch 104 returns control to the manually operating switch 85. Whenever it should be found convenient, the lid 39 may be returned into its slot 38 and the rack 69 with its clean dry dishes and tableware removed to storage.

The switch 85 (Fig. 10) operated by the knob 84 on the back panel (Fig. 2) has five positions. It has a switch arm 113 which is shown in its normal "off" position. The switch arm 113 may be turned to a position 114 to energize the motor 18 to close the sink drain valve 74. The switch arm 114 may be turned to a position 115 to return the sink drain valve to its normal partly open position. The switch arm 13 may be turned to a position 116 to operate the main motor 27 and thus the disintegrator in the waste line. The switch arm 13 may be turned to a position 117 to open the sink drain valve 14 wide and operate the disintegrator in the waste line.

The bottom of the sink may be flushed at will by depressing the push button 86 (Figs. 2 and 10). Operation of the push button 86 energizes valve 68 so that water discharges from the ports 61 and 62 as long as the push button switch 68 is depressed.

Various changes may be made within the scope of the invention as set forth in the following claims.

I claim:

1. In a sink for automatic dish cleaning having a sink bowl and drain line therefor, a drain valve, a servo-motor for operating said valve, a disintegrator in said drain line, a motor for operating said disintegrator, manually operable control means for controlling operation of said motors, and a manually instigated automatic sequence control for said motors which when in operation renders said manual control inoperative.

2. A sink comprising a sink bowl having a bottom drain opening, a drain conduit connected to said opening, a disintegrator in said conduit, a dish holding rack having an opening in the bottom and removably supported in said bowl with said opening adjacent said drain opening, a water pump connected in a closed circuit with said sink bowl, a plurality of sprayers in the wall of said sink bowl, a blower for delivering air to said drain conduit, a valve for stopping and un-stopping said drain opening, a water inlet to said circuit, and control mechanism operative to cause operation of said elements in certain sequence to spray dishes in said rack, engulf the dishes in said rack in a swift stream of water, again spray the dishes, and then subject them to a moving current of air.

3. A cleaning device for dishes comprising a tank, a support for articles to be cleaned in said tank, means for directing a water jet against the articles in the tank, a drain conduit adapted for communication with said tank, a macerator in said drain conduit, means for opening and closing communication between said tank and said drain conduit, means for filling said tank with
water when said communication is closed and producing a swift current in the water, a control operative to render operative first said jet directing means and said macerator and then said tank filling and current producing means, a 5 blower for producing a breeze through said tank, and said control being further operative to open said communication to drain the tank and then again render operative said jet directing means and then said blower.

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