This invention relates to dishwashing machines and has for one of its objects a simple, improved dishwashing machine adapted to quickly, cheaply and efficiently cleanse dirty dishes.

Another object of the invention is a dishwashing machine provided with means for washing, rinsing and sterilizing dishes, and in which machine the dishes are substantially wholly immersed in water during the washing, rinsing and sterilizing of said dishes and which water, in all of said operations of the machine is rapidly moved over the dishes from a single source of power.

Another object of the invention is an improved construction in dishwashing machines for positioning and supporting the dishes relative to a rapidly moving current of water, whereby the dishes are subjected to a more efficient washing action than heretofore.

A further object of the invention is the provision of improved means in a dishwashing machine for altering the directional flow of water over dishes immersed in a body of said water whereby the greatest washing efficiency is obtained according to the shape or sizes of the dishes being washed.

A still further object of the invention is improved means in a dishwashing machine for simultaneously moving a body of water in a tank over dishes in said tank from opposite sides of the tank while withdrawing the water from said opposite sides and while the dishes and the inlet and outlets for the moving water adjacent the opposite sides of the tank are below the level of the body of water in said tank and which means includes structure adapted to varyingly control the directional flow of the moving water.

Other objects and advantages will appear in the specification and drawings annexed hereto.

In the drawings,

Fig. 1 is a part section part elevational view of my improved machine as viewed from the front.

Fig. 2 is a part sectional part elevational view of my machine as seen from line 2—2 of Fig. 1.

Fig. 3 is a sectional view of one compartment of my machine as seen from line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary elevational view of one of the control elements of my machine, the tank walls being in section.

Fig. 5 is a perspective view of one of the propeller housings in my dishwashing machine, with the screen shown in place.

In detail, my machine as shown in the drawings comprises an elongated tank I provided with opposite end walls 2, 3 and a front wall 4 and rear wall 5. Commencing at the left (Fig. 1) said tank is divided into three compartments of equal size by spaced partitions 6, 7, the left hand compartment being a wash section A, the middle compartment being a rinse section B and the right hand compartment being a rinse section C. The front, rear, end, and partition walls all connect at their lower edges with a bottom 8.

The three compartments or sections A, B and C are identical insofar as the elements contained thereon are concerned and insofar as the washing action or movement of the water within the tanks is concerned.

Extending longitudinally of the tank and centrally thereof adjacent, but spaced above bottom 8, is a horizontal shaft 9 which shaft is rotatably mounted in packed bearings 10 in the opposite end walls and in packed bearings 11 carried by the partitions through which said shaft extends.

Inasmuch as the central compartment B, in Fig. 1 is broken away to show internal construction, and since the internal construction of each compartment is the same, the following description will be particularly directed to the central compartment, and in referring to partitions 6, 7, it is to be understood that the end 2 and partition 6 or partition 7 and end 3 which are the corresponding ends of compartments A and C, may be substituted for partitions 6, 7.

Propellers 12, 13 are secured on shaft 9 adjacent, but spaced a short distance from partitions 6, 7 respectively and are each positioned within a horizontally directed, open-ended, cylindrical passageway 14 of a housing to which the passageway is secured at one end as best indicated in Fig. 5. A vertical wall 15 of said housing extends perpendicularly from one end of the walls of passageway 14, which wall is formed with a flat, generally U-shaped plate 16 disposed in a vertical plane with its flat sides extending horizontally, which plate is integral with wall 15 and extends from the side of said wall opposite the cylinder 14. The plate 16 is formed with flanges 18 provided with openings 19 for bolts adapted to extend through the partition 6, or 7 or end walls 2, 3, as the case may be, for securing the housing to such partitions or walls.

The housings of the above structure are each adapted to be disposed in the compartments A, B, C against each of the partitions and end walls, with the lower bottom of the cylinders 14 resting on or closely adjacent the bottom 8.

The housings on opposite sides of partitions 6, 7...
are, of course, secured thereto by the same bolts, since the housings are identical, but merely extend oppositely on opposite sides of the partitions, as is clear from the drawings.

While I have designated plate 16 as being U-shaped, the heads of the U is extended divergently from the bottom as best seen in Fig. 6, instead of being parallel, but the curved lower end of the U is merely an extension of the lower side wall of the cylinder and on the same plane thereof.

Shaft 2 extends centrally through the cylinder 15 of the several housings and the pitch of the propellers 12, 13 in each compartment is opposite so that upon rotation of the shaft in one direction, water within the sections will be drawn downwardly therein, through cylinders 15 and will be ejected into the upwardly directed passageway whose opposite vertical sides are plate 15 and the wall of the tank against which the flanges 16 are secured.

Since the rotation of the propellers tends to throw the water to one side relative to the propeller axis, I provide vertical fins or blades 20 in each of the cylindrical passageways on the sides of the propellers adjacent the tank walls that support the respective housings, thus overcoming this tendency. The water after passing said fixed blades, will spread outwardly in the shape of a fan, to opposite sides of a vertical plane longitudinally bisecting the cylinders 14, the apex of the fan being the lower curved side of U-shaped plate 16.

To prevent solids of all kinds, such as spoons, bones, paper, etc., from being drawn into cylinders 14 from the tank, I provide a perforated screen or plate 21 over the open end of each cylinder that opens into the tank which plate is formed with a flat top 22, depending sides 23 and an end between said sides and below the top, the opposite end of the screen or plate being open and fitted at its edges adjacent the cylinder, against corner flanges or ears 24 formed on cylinder 14, the means for removable securing the screen in place being clips 25 that engage said ears and the vertical end wall of the screen housing is vertically slotted at 26 for shaft 9, whereby the screen can readily be lifted from position on the housing that encloses the propeller.

The top 22 of the screen is inclined downwardly from the top of cylinder 14 for a purpose later to be described.

Disposed over the upwardly opening, U-shape channel formed by the propeller housing, as above described, is a horizontally disposed shaft 27 below which is rigidly secured a horizontally extending elongated, deflector plate 28. The underside of plate 28, and facing the U-shape channel is formed with horizontally spaced, downwardly projecting, vertically disposed ribs 29 extending transversally of plate 28.

The shaft 27 is mounted at its ends outwardly the ends of plate 28 in bearings 20 that are secured to the partitions or end walls of the tank.

One end of the shaft 27 terminates within the tank (Fig. 4) and a coil spring 31 between said end and the bearing 30 adjacent thereto reacting between a nut and washer 32 at the extreme ends of the shaft tends longitudinally toward said extreme end. The opposite end of the shaft extends through a packed bearing 33 and the front wall 4 of the tank, and on the end of the shaft projecting outwardly of said front wall is a handle 34 of the same plane and side thereof as plate 28, 75 which handle carries a pin 35 adapted to fit in any one of recesses 36 formed in a quadrant plate 37 (Figs. 1 and 4) secured on the outer side of the front wall of the tank. The recesses 36 are in a semi-circular arrangement about the axis of the shaft as a center. The bottom end of the recess may be beveled, or the ends of the pins 35 may be beveled, in order to permit forceable turning of shaft 27 by the handle to positions in which the pin will engage in any one of the recesses by compression of spring 31 and longitudinal sliding of shaft 27, but pins 31 will hold the shaft (and deflector plate) in the desired position, against accidental dislodgment, when the pin is in any one of the recesses. By turning shaft 27 by means of handle 35, it will be seen that the inclination of plate 28 in its transverse dimension is such that water ejected upwardly from the U-shaped passageway will strike the plate and will be deflected thereby toward the opposite wall of the compartment relative to the one that supports the plate. The ribs 29 being on the deflecting surface of the plate will straighten out the current of water striking the plate to follow generally parallel lines extending across the compartment instead of the current being fan-shaped, as would normally be the result of its being discharged from a fan-shaped passageway.

This regulation and control of the water is very important since it enables the cleaning of dishes of various sizes and also enables the operator to set the deflecting plates at opposite sides of each compartment to different angles as is highly desirable in certain instances.

The basket for the dishes, generally designated 30, is of wire construction and of generally rectangular form but open at the top for insertion and removal of dishes and has the usual handles 32.

About midway between the top and bottom of the basket and across the top of said basket, are a row of spaced rods 49 extending between two opposite sides of the basket. These rods are parallel and are set at an angle relative to the other two sides of the basket, as best seen in Figs. 1, 2 and 3, and the space between the adjacent pairs of rods of the upper and lower layer is adapted to accommodate, and to space, a single vertically disposed dish 41, as seen in Figs. 1 and 3. Thus when the basket 31 is disposed between the propeller housings with the rods 49 extending in a direction generally across the compartment between said housings, and with the sides of the basket parallel with the adjacent walls of the compartment, it will be seen that the dishes themselves are at an angle to the directional flow of water deflected by the deflector plates 28. Thus the faces of the dishes will tend to be scoured by water coming from one deflector plate while the backs will be scoured by water coming from the opposite plate, and the water itself will be broken up by the water striking the dishes at an angle. Also water returning from within the tank to the propellers will scour opposite sides of the dishes.

The basket in each compartment is supported on brackets 42 that extend slantingly downwardly from the front wall 4 of the tank and then horizontally at their lower ends part way across the tank. The horizontal lower ends of the brackets are in a horizontal plane just above shaft 9 so that the basket and dishes are supported at a level partially below the horizontally extending from the passageway in cylindrical 14. This is very important to the efficiency of the machine, since the water flow as indicated
In Fig. 1 will then be such that the water deflected by deflector plates 23 over the upper half of the dishes will be drawn with substantially equal force in the opposite direction over the lower half of the dishes while the space between the shaft and the bottom of the tank will receive the downwardly flowing water from the center of the tank for passage to the propellers.

The inclined portions of the tops 22 of the screens and the inclined portions of the basket supporting brackets 42 serve to position the baskets 38 centrally within the compartments and will prevent rotation or dislodgment of the baskets when the water strikes the angularly disposed baskets in said baskets.

Each of the compartments A-B-C is provided with a vertical overflow pipe 43 in one corner, which pipe extends at its upper end above the top of the dishes in the baskets, and the lower ends of the pipes respectively are removably supported in sockets in the inlet ends of the drain pipes 44 that extend from the bottom 8 of the tank.

Compartments A and C each have a drain shelf 45 adjacent their upper ends extending over the overflow pipe in the compartment, and between the front and rear walls of the tank, which shelf has a small drain pipe 46 depending therefrom and draining into the overflow pipe in the conventional manner.

Hot water valves 47, 48, 49 respectively, feed hot water through discharge nozzles 50, 51, 52 into tanks A, B, C and a cold water valve 53 also controls the flow of cold water through nozzle 50 in compartment A.

Also, each compartment A, B, C is provided with a thermometer 54.

Below each compartment is a gas burner 55 connected with a conventional gas line, said burners each being provided with the usual manual gas valve control 56 exposed at the front side of the tank, but the below, and inspection doors 57 are in front of the burner control panel for observing the flames from the burners.

The thermometers and valve handles are all exposed to an operator at the front of the tank, the valve handles being preferably on the forward side of a vertical panel extending upwardly from the rear wall of the tank, which panel covers the water valves and piping.

The shaft 9 is rotated by a belt 59 extending over a pulley 60 secured on the end of the shaft at one end of the tank outwardly of a bracket 61 that is mounted on the tank and which bracket carries a car bearing 62 rotatably mounting the outwardly projecting end of said shaft. Belt 59 passes over pulley 63 on the shaft 64 of the electric motor 65. The motor 65 is below the tank 1 and below compartment A and is carried on a support 66. Legs 67 support the tank elevated above the floor.

A housing 82 to which support 66 is secured encloses the bracket 61, pulley, belt and motor. Insulated wall 69 separates the motor housing from the burners, and insulated wall 70 at the opposite end of the tank provides similar insulation for the motor in the event it is desirable to mount the motor at the opposite end of the tank, for it is obvious that with my construction the shaft 9 may be projected from either opposite end of the tank as desired for drive by the motor from either end of the shaft.

In operation, the several tanks are first filled with water. The water in tank A may be of any desired temperature and may contain soap or other washing ingredient. Tank B contains hot rinse water and tank C may contain hot water at sterilizing temperature.

Upon actuation of motor 65 the water in all three tanks is caused to rapidly circulate from opposite sides, respectively, by the propellers which are adjacent the bottom of the tank at opposite sides of each compartment. The water drawn by the propellers is immediately ejected back into the tank in a wide stream with great velocity and in a large volume, and the directional flow from the propellers and through the discharge openings is straight across each compartment toward the opposite side. The capacity of the propellers to move the water and the capacity of the horizontal passageways in which the propellers are disposed as well as the upwardly flaring discharge passageways connecting with the propeller passageways, is such as to provide a minimum frictional resistance to the movement of the water in the compartments, respectively. Hence my invention does not contemplate a pressure spray action, but instead, a rapid circulation of the entire volume of water in the tank over the dishes. By dropping the position of the dishes to overlap the horizontally projected areas of the opposed cylindrical passageways through which the water is drawn away from the dishes, and by directing such water back against the upper portions of the dishes, the efficiency of the apparatus appreciably exceeds the efficiency of a machine lacking this feature. Also by reason of the structure that enables a control of the direction of the water discharged against the dishes, my machine is capable of handling various sized dishes with equal efficiency, which would otherwise be impossible.

It is obvious, of course, that some installations only require a washing tank, but the complete washing and sterilizing of dishes from a single source of power with all propellers mounted directly on a single shaft, is a feature that is believed to be new, and which feature is important since the dishes at all stages are in a flow of moving water, and the power required to properly circulate the water in the washing, rinsing and sterilizing compartments is reduced to the minimum since there are no transmission gears, sprockets, or chains between the propeller units that are in the separate pairs of compartments.

I claim:

1. In dishwashing apparatus including a substantially rectangular tank for water, a pair of relatively short open-ended conduits at opposite sides of the tank and adjacent the bottom, one end of each conduit opening laterally into the tank toward the center thereof at a point closely adjacent said bottom and the opposite end of each conduit opening upwardly into the tank at a point spaced above said bottom for discharging water in the conduit vertically therethrough, a plate spaced above and extending across the upper open end of each conduit adapted to deflect water discharged from said conduit generally upwardly to the center of the tank, means for moving the tank water through the open end of each conduit and out of said conduit open end for deflection by the plate over said conduit open end, means mounting each plate for tilting to various positions on a vertical plane relative to the directional flow of water from each opposite open end of each conduit, said means comprising a plate for directing the water at various angles relative to the central vertical axis of the tank and means for securing
said plate in any of the tilted positions, means on said plate forming a plurality of guide channels positioned to receive the water discharged against said plate and for guiding the water received in said channels.

2. A dishwashing machine comprising a substantially rectangular tank for water, a similar shaped chamber at each of two opposite sides of the tank adjacent the bottom thereof having opposed adjacent sides formed with axially aligned circular openings directed toward each other across the tank communicating with the interior of the tank and each chamber being formed with an upwardly directed opening in its upper side communicating with the interior of the tank, a rotatably mounted horizontal shaft extending across the tank and into each of said circular openings in coaxial alignment therewith, a pair of propellers secured on said shaft one within each of said circular openings, said propellers being arranged and adapted to draw water within the tank thereto for movement to within said chambers and out of each of said chambers at locations upon rotation of the shaft in one direction, means for rotating said shaft in said one direction, water deflecting means for deflecting the water moved out of said upwardly directed opening laterally into said tank and generally toward a vertical plane midway between said two opposite sides, and means for positioning dishes over said shaft and within the tank for washing by water deflected by said deflecting means and by the water caused to move toward said propellers, said chamber having two upwardly extending opposite sides extending divergently upwardly from points at opposite sides of said circular opening, said upwardly directed opening extending substantially across the chamber between the upper ends of said last mentioned opposite sides, and said upwardly directed openings being disposed adjacent the uppermost sides of said circular openings, respectively.

3. In dishwashing apparatus, including a substantially rectangular tank for water, means for circulating water in said tank comprising an upwardly extending passageway at one lateral side of said tank opening upwardly at its upper end, the walls of said passageway comprising two vertically disposed, opposed, substantially flat side walls and a generally U-shaped plate connecting said side walls, the upper end of said plate being disposed adjacent the opposite sides of said tank that connect with the opposite vertical edges of said lateral side and said plate extending convergently from said upper end to the curved lower portion of the plate, a horizontally directed water inlet formed in the flat side wall of said plate disposed nearest the center of said tank, said inlet being disposed just above the curved lower end of said plate, a vertically disposed screw propeller and a generally shaped chamber with a horizontally directed water inlet and mounted for rotation about a horizontal axis substantially concentric with the axis of said opening arranged and adapted to draw water from said tank into said conduit through said inlet for discharge of such water upwardly from the upper open end of said passageway when said propeller is rotated in one direction, said upper open end of said passageway extending horizontally substantially the distance between said opposite sides of said tank, and water deflecting means over said upper open end arranged and adapted to deflect the water discharged from said open end back into said tank, said water deflecting means being movable to various angular positions from horizontal for varying the angle of deflection of the water deflected thereby, as desired, and means for rigidly securing said deflecting means in a fixed position.

4. In dishwashing apparatus, including a substantially rectangular tank for water, means for circulating water in said tank comprising an upwardly extending passageway at one lateral side of said tank open at its upper end, the walls of said passageway comprising two vertically disposed opposed substantially flat side walls and a generally U-shaped plate connecting and spacing said side walls, said plate extending convergently from its upper ends to the curved lower portion of said plate, one of said flat side walls being said lateral side of said tank, a horizontally disposed, open-ended cylindrical conduit opening at one of its ends into said passageway through on opening formed in the lower portion of the flat side said upwardly directed opening at the center of the tank and extending into said tank toward said center, a vertically disposed, screw propeller within said conduit and spaced from the opposite open ends thereof, means mounting said propeller for rotation on the central horizontal axis of said conduit and said propeller being arranged and adapted to draw water from said tank into said conduit and for forcing such water upwardly in said passageway for discharge from the open upper end of the latter, a screen extending across the entire of said conduit that opens into said tank, the upper open end of said passageway extending substantially the distance between the lateral sides of the tank adjacent said lateral side thereof and a water deflecting plate extending horizontally over said upper open end and spaced therefrom for deflecting the water in the passageway into said tank.

5. In dishwashing apparatus, including a substantially rectangular tank for water, a vertical partition within said tank forming a pair of separate compartments therein, a horizontally extending shaft extending through said partition and across one of said compartments and through the lateral wall of the tank opposite said partition, a pair of vertically disposed screw propellers secured on said shaft, the propellers being disposed adjacent said partition at opposite sides thereof, an upwardly extending conduit at each opposite side of said partition, said partition forming one of the walls of each conduit and another wall of each conduit being formed with an inlet opening at its lower end adjacent and in substantially axial alignment with the central horizontal axis of each propeller, the blades of said propellers, respectively, being arranged and adapted to move the water in said tank into the inlet of each conduit upon rotation of said shaft in one direction, whereby upon such rotation the water in each compartment will be forced into said conduit for discharge from the upper ends of the latter, the upper end of each conduit being formed with a discharge opening for said discharge of water, means for deflecting the water from said discharge opening away from said partition generally toward the center of each compartment, and single power means for rotating said shaft.

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