

May 26, 1942.

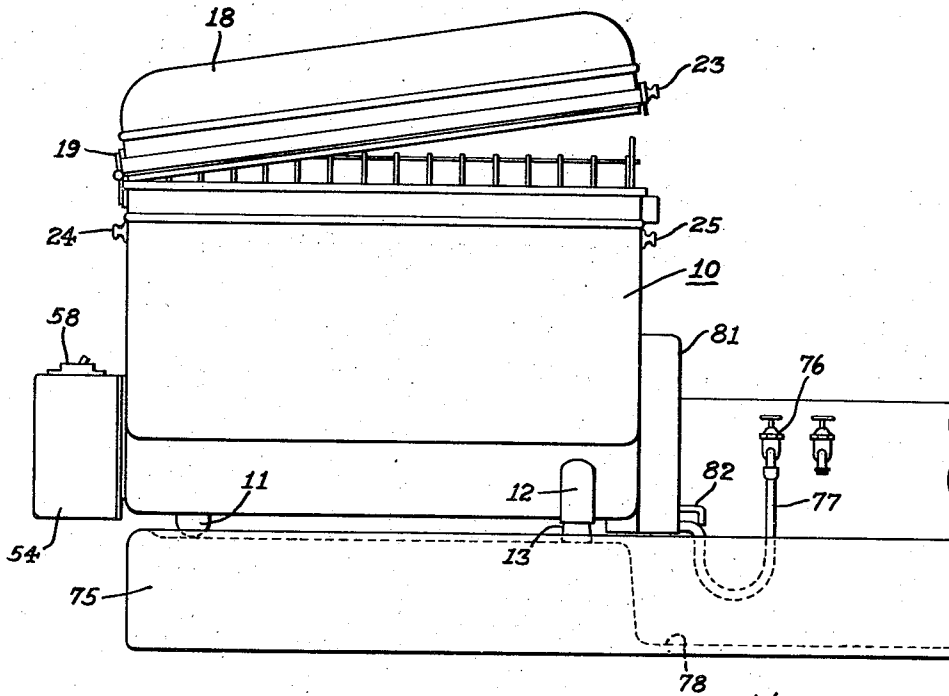
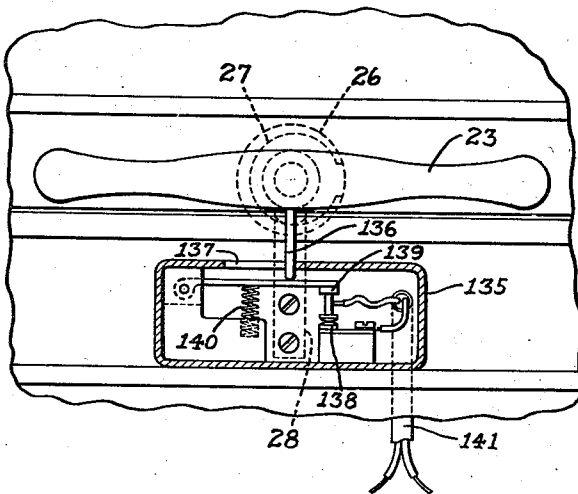
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2,284,026

DISHWASHER

Filed Aug. 25, 1938

4 Sheets-Sheet 1



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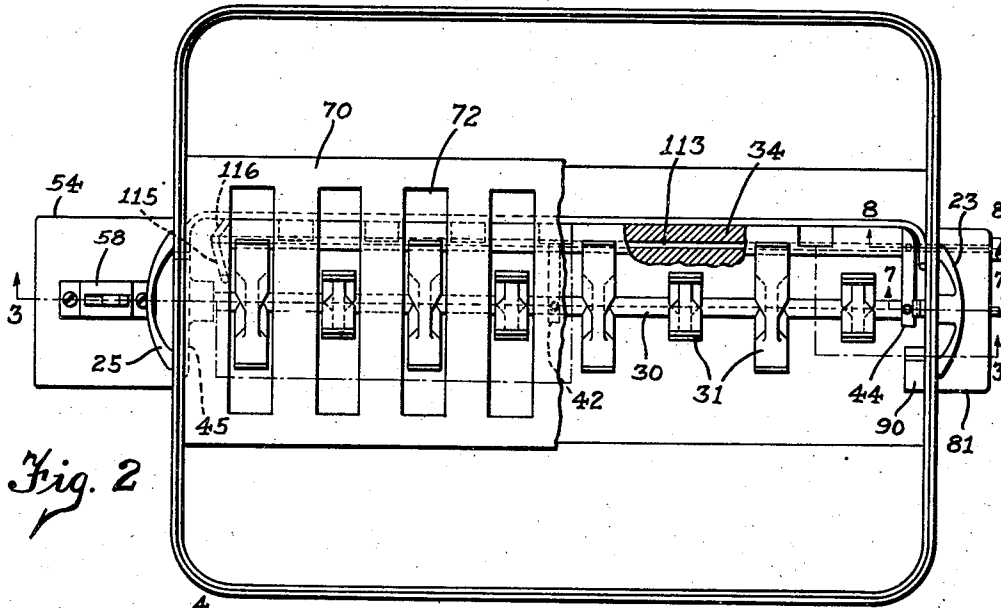


Fig. 2

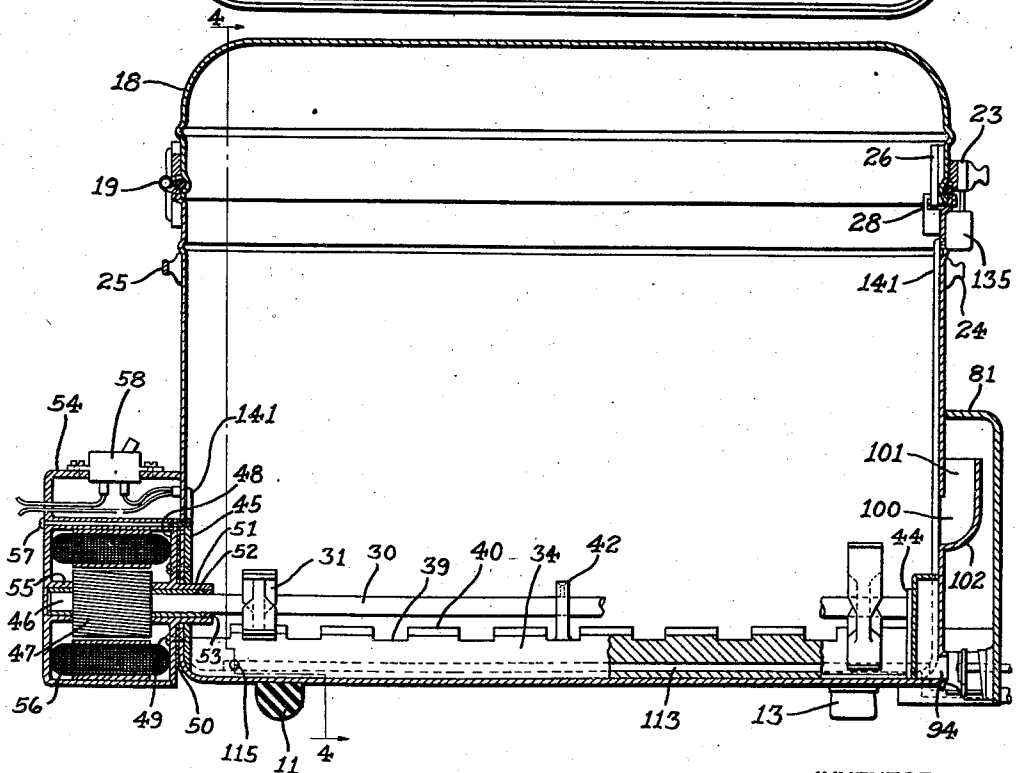


Fig. 3

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4 Sheets-Sheet 3

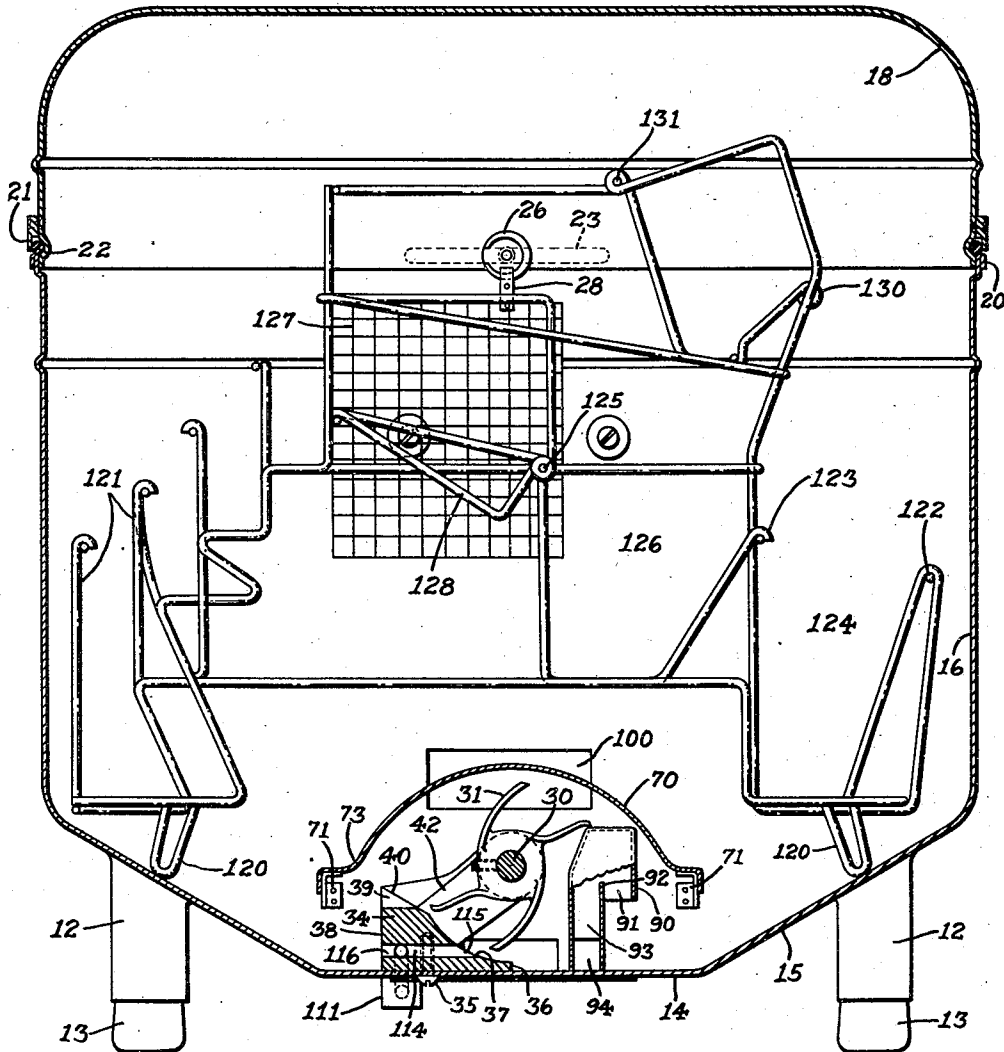
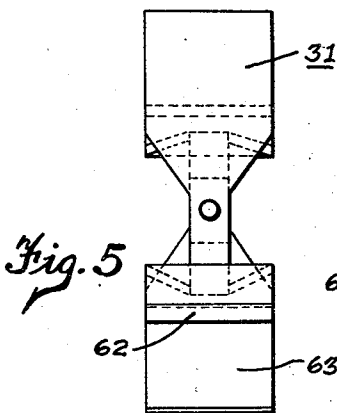
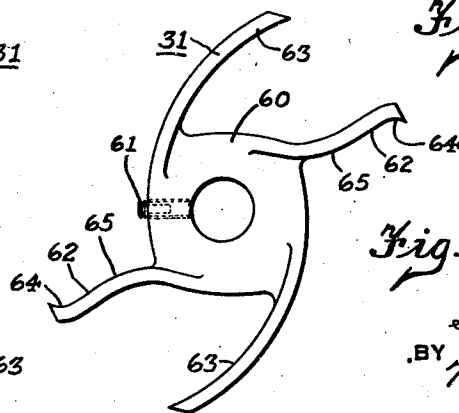


Fig. 4

Fig. 5

Fig. 6

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DISHWASHER

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4 Sheets-Sheet 4

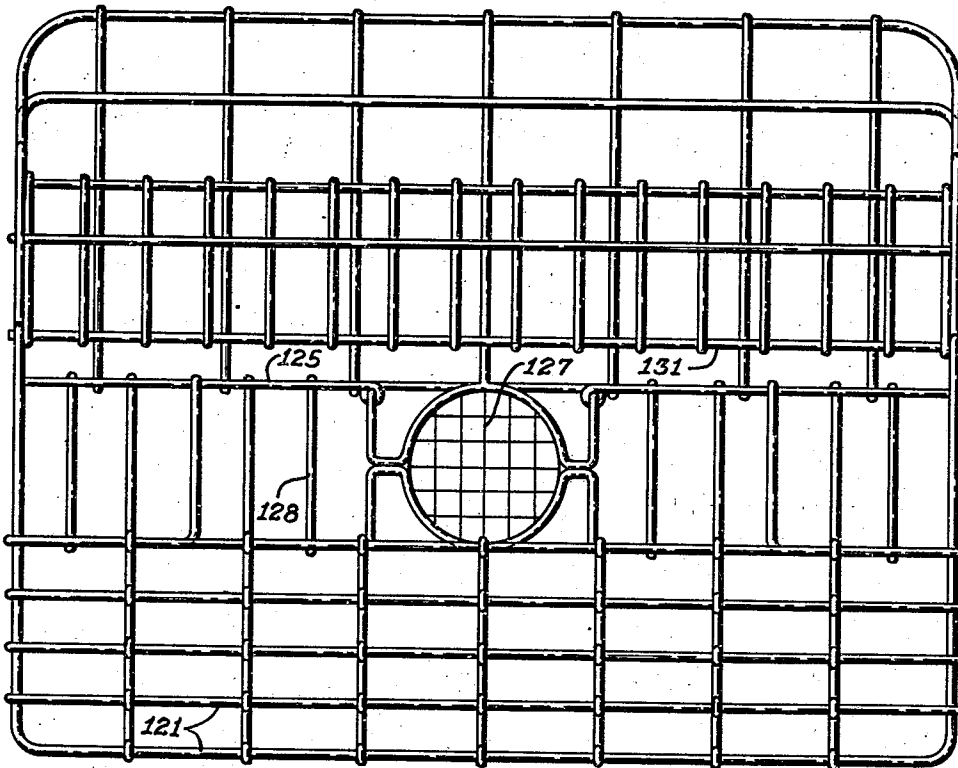


Fig. 9

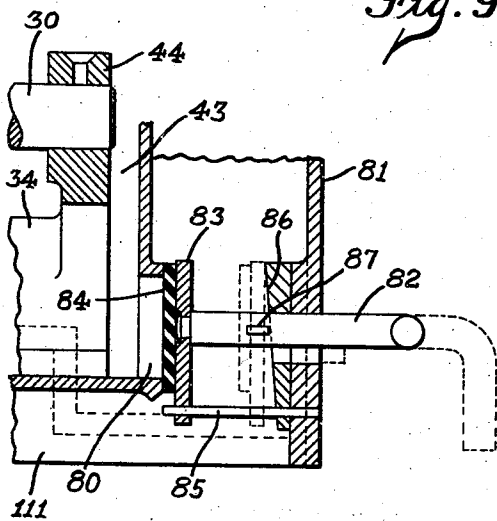


Fig. 7

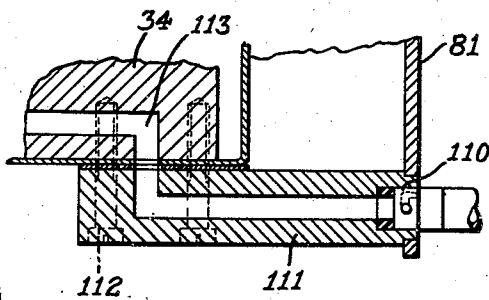


Fig. 8

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UNITED STATES PATENT OFFICE

2,284,026

DISHWASHER

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Application August 25, 1938, Serial No. 226,611

19 Claims. (Cl. 141—9)

This invention relates to washing machines and more particularly to machines for washing dishes and the like.

It is a principal object of the invention to provide a dishwasher which is relatively small, compact, and light in weight, adapted to be removably placed on a kitchen sink and which functions in a highly effective manner to thoroughly and rapidly wash and rinse the dishes normally required by a family.

It is a further object to provide a washer in which the articles may be thoroughly rinsed and completely cleaned with a minimum usage of washing fluid which is recirculated, while food particles removed from the dishes are continuously collected and removed from the path of circulation.

It is a further object to provide a washer of this character in which the washing is effected through the use of finely divided sprays of high velocity and low mass which thoroughly permeate the entire washing zone and provide for cleansing the dishes while avoiding any damage thereto.

It is a still further object to provide a rack structure for use in such a washer adapted to hold the dishes or other articles to be washed in coordinated positioning with the washing sprays, to secure efficient use of the space and effective cleansing of all of the dishes.

It is a further object to provide a washing device having a container and a removable cover and having a high speed washing element adapted to project washing sprays at high velocity into the interior of the closed washing container in which interlock means are provided for preventing operation of the washer except when the cover is closed and locked in operative position.

Other objects and advantages will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 shows a view in side elevation of a washing device constructed in accordance with the present invention mounted in convenient location upon a kitchen sink, the cover being shown partly raised;

Fig. 2 is a plan view looking into the washer with the rack and the cover removed, certain of the parts being broken away to more clearly show the construction;

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a cross sectional view through the

washer on the line 4—4 of Fig. 3, with the rack in place in the container, certain parts being broken away;

Fig. 5 is a detail end elevational view of one of the impeller means;

Fig. 6 is a detail side elevational view of the impeller;

Fig. 7 is a detail sectional view through the discharge outlet on the line 7—7 of Fig. 2;

Fig. 8 is a detail sectional view showing the fresh water inlet, taken on the line 8—8 of Fig. 2;

Fig. 9 is a plan view of a rack constructed in accordance with the present invention; and

Fig. 10 is a view showing the construction of the interlock means for the control of the motor in accordance with the position of the cover.

Referring to the drawings which illustrate a preferred embodiment of the invention, there is shown a generally rectangular container 10 which may be suitably formed of sheet metal drawn and pressed into the desired shape as illustrated. The container is provided with a fixed support 11 extending across one end, and is formed adjacent the other end with a pair of legs 12 within which are adjustably mounted the friction feet 13 which are adjustable as to height in order to secure the proper position of that end of the container with respect to the other, to secure proper drainage therefrom in use. As shown in Fig. 4, the container wall is preferably formed with a lowermost centrally located longitudinally extending portion 14 and with sloping portions 15 which connect such lowermost portion with the side wall portions 16.

The cover 18 is pivotally attached to the upper portion of the side walls of the main body of the container by a pair of hinges 19 positioned at one end of the container. The upper edge of the side wall portions 16 is outwardly flanged as shown at 20 around its entire periphery, and the lower edge of the cover is provided with a downwardly turned flange 21 forming with the body of the cover a recess for receiving a flexible sealing member 22, such as a rubber strip or the like, adapted to provide a substantially water-tight connection with flange 20. Further the flange 21 at the hinged side of the cover is of such extent that when the cover is raised, it will overlies the adjacent flange 20, and hence any liquid which drains therefrom will fall inside the container and not on the outside thereof. A suitable handle 23 is positioned upon the open side of the cover to provide for raising and lowering the same, and additional handles 24

and 25 are fastened to the main container body to provide for lifting and carrying the same. The metal of which the container and cover are formed being relatively light to avoid excess weight, the walls thereof may be suitably ribbed as shown to increase the strength and rigidity thereof.

In order to provide for securely locking the cover upon the container body, handle 23 is rotatably mounted in the cover and upon its inner end carries a locking disk 26 having an eccentric slot 27 therein which in one position of the handle will interfit with a projecting tongue 28 fastened to the inner side of the main body of the container. Upon lowering the cover into closed position, and rotating handle 23, the slotted portion of the disk 26 engages tongue 28, and provides for camming the cover down into a locking position where it is securely retained upon the body and held in substantially sealed relation with respect thereto.

To provide for distributing the washing fluid into and upon the articles within the container, a rotary impeller shaft 30 is positioned in the lower part of the container and extends generally longitudinally thereof, and substantially throughout the entire length of the container. This shaft carries a plurality of spaced impellers, indicated generally by the reference character 31, which are adapted to pick up washing fluid from the bottom of the container and to discharge the same upwardly throughout the interior of the container. For ease of manufacture and improved character of operation, the entire drive unit is preferably supported so that it can be constructed as a unit, and installed in the container without the necessity for precise positioning with respect to the container body itself. Thus minor manufacturing variations which occur in the formation of the sheet metal containers are not objectionable from the standpoint of securing proper operation of the drive mechanism.

The shaft 30 is supported from a baffle member 34 which also extends substantially throughout the lower portion of the container. This baffle member is bolted to the portion 14 of the container by means of a series of bolts 35, and is preferably provided at one side with a thin edge 36, which edge projects substantially into the plane of the vertical axis of shaft 30. The main portion of the baffle member lies to one side of the shaft axis, and the face 37 thereof is curved as shown about a center substantially coinciding with the axis of shaft 30. The opposite side 38 of the baffle member is substantially higher than edge 36, and is provided along its top portion with a series of notched portions 39 leaving spaced projections 40 extending above the main body of the baffle member. The projections 40 may be generally triangular in cross section, as shown in Fig. 4, and are positioned substantially in radial alignment with the several impeller blades 31, the notched portions 39 between the projections corresponding with the spaces between the impeller blades. The baffle member terminates somewhat below the horizontal axis of the impeller, and curved face 37 thereof is so positioned with respect to the outer periphery of the impeller blades as to approach closely with respect thereto, thereby providing for securing control of the discharge of the sprays in the operation of the device as will be pointed out hereinafter.

The impeller shaft 30 is supported from this baffle member, and for this purpose the baffle member is formed adjacent the outlet end of the container with an upwardly projecting integral arm 44 in which the end of the impeller shaft is suitably journaled. If desired the arm 44 may be formed with an enlarged boss adapted to bear against the inner side wall of the container for support, but it is preferred to form the arm 44 of such strength and cross sectional area that it will adequately support the shaft without contact with the end wall of the container, preferably leaving a space 43 therebetween for discharge of washing fluid around the end of the baffle member. An integral upwardly extending arm 42 supports the shaft intermediate the ends thereof.

At the opposite end of the container, the baffle member 34 is formed with an integral upwardly extending arm or plate 45 which is adapted to lie against the inner wall of the end of the container at that end, forming a bracket for supporting the shaft bearing. The container wall is suitably apertured and the shaft 30 extends through such aperture with an overhanging portion 46 projecting to the exterior of the container. A drive motor is mounted directly upon this portion 46 of the shaft, the rotor 47 being fastened directly to the overhanging shaft 46. A bearing plate 48 is suitably bolted by means of bolts 49 to the container wall, such bolts also threading into bracket 45, to securely retain both the bearing plate and the bracket securely in assembled position. Preferably a gasket 50 of rubber or suitable composition material, is included between plate 48 and the wall of the container. Bracket 48 is formed with an axially extending sleeve portion 51 which is centered in desired location by fitting into a finished opening in plate 45, such opening having been previously formed in alignment with the bearing support 42 by a machining operation performed upon the baffle member prior to its assembly into the container. The sleeve 51 receives the bearing member 52 for journalling the shaft, a packing seal 53 being provided for preventing leakage of the washing fluid along the shaft and into the bearing. A motor casing 54 encloses the motor, and is formed with a projecting part 55 for journalling the shaft end 46. The stator 56 of the motor is mounted directly in the casing 54, and bolts 57 extend through plate 48 and bracket 45 to retain the casing upon the container and to secure the bearing brackets in assembled position. A suitable motor control switch 58 is provided for controlling the operation of the motor.

As will be apparent from the foregoing, upon removal of bolts 57 the motor casing may be removed, including the stator part of the motor. Thereafter removal of bolts 49 will permit the bracket 45 to be separated from the plate 48, and upon withdrawal of bolts 35, the baffle member may be loosened from the lower portion of the container. It is then a simple matter to withdraw the shaft 30 axially from its inner bearing, the impellers being slipped along the shaft, the entire drive assembly thus being readily removable from its operative position. Also it will be understood that the baffle member 34 with its respective arms 42, 44 and 45 provides definitely for locating the bearings for the shaft and since this baffle member can be conveniently formed with the openings in its respective arms in proper

alignment assurance is provided that the bearing for the shaft will also be and remain in alignment, irrespective of minor manufacturing variations in the walls of the container.

It is desired to operate the impeller shaft at a relatively high speed in order to secure proper distribution of the washing fluid, and for this purpose the motor is directly connected to the drive shaft so that the shaft will operate at the same speed as the motor. A suitable motor for use in the present invention is one having a starting winding which is dephased by the use of a condenser, such motor having been found to produce the necessary torque at proper operating speeds, to satisfactorily operate the impeller shaft.

The impeller is suitably formed as shown in Figs. 5 and 6 with a plurality of blades to provide the desired discharge of the washing fluid throughout the interior of the container and comprises a hub portion 60 with means such as set screws 61 for fastening the blades in predetermined angular and axial position upon shaft 30. Each impeller is formed with a series of impeller surfaces, preferably comprising a pair of surfaces 62, and another pair of surfaces 63.

Surfaces 62 are relatively open, having an outwardly positioned concave part 64, of relatively short radius, and an inner convex part 65 of relatively longer radius of curvature. These blades tend to discharge the washing fluid picked up on the surface thereof relatively readily, that is, relatively sooner in the course of rotation so that these blades have more tendency to discharge the washing fluid in that portion of the container which is in line with the blades in their upwardly moving course. The direction of rotation of the blades is clockwise as shown in Figs. 4 and 6, and these blades 62 tend to discharge a greater portion of liquid thereon into the container area which lies to the left of the axis through the shaft.

Blades 63 are relatively more closed, and have a concave surface of relatively long radius of curvature, these blades tending to retain washing fluid for a longer period of time than the blades 62. Hence in operation these blades tend to discharge a greater portion of the fluid picked up thereby into that portion of the container which is in line with the blades on their downwardly moving course and which lies to the right of the center axis as shown in Fig. 4. The spray produced by each blade also has a tendency to fan out so that adjacent sprays overlap and cover the entire longitudinal extent of the container. The conjoint effect of this composite blade structure therefore is to provide a substantially uniform distribution of washing fluid into and throughout the entire interior of the container.

It will also be noted that the extreme radius of each of the sets of impeller blades 62 and 63 is substantially the same, and that these blades are made to approach relatively closely to the arcuate surface 37 of the baffle member 34. Baffle member 34 thus acts to control and limit the introduction of the washing fluid onto the surfaces of the impeller blades. While the washing fluid is free to flow into the path of the impeller blades at the downwardly moving side thereof, its passage into the blades is definitely restricted on the upwardly moving side of the blades by the baffle member. Rotating at high speed, the blades tend to cavitate the washing fluid on the downwardly moving side, picking up on their surfaces only a

relatively small quantity of washing fluid which distributes itself as a thin film over the surface. Moving upwardly this film is retained on the surface of the blades, and does not tend to move off radially by reason of the close positioning of baffle member 34. Fluid may also be supplied to the blades in a generally axial direction by means of notches 39 which are formed intermediate the blades 31. The notches being below the normal liquid level in the container, liquid may flow through the notches between the spaced projections 40, and thence in a generally axial manner toward the surfaces of the blades. The projections 40, lying in radial alignment with the blades, tend to prevent the direct flow of fluid onto the blades, it having been found that where such direct flow took place the discharging action of the blades was interfered with and the most satisfactory discharge and distribution of the washing fluid was not secured. Also the blades are preferably not all mounted in the same angular position upon shaft 30, being mounted in staggered relation with for example adjacent blades rotated 90° with respect to each other so as to secure more uniformity in load upon the motor and in the discharge characteristics of the impeller.

In accordance with the present invention the blades are operated at high speed, and only a limited quantity of washing fluid is supplied to the surface of the blades so that each blade provides for discharging this thin film of fluid in a spray travelling at relatively high velocity but having only low mass. This results in discharging the washing fluid in a spray having extremely high penetrating power, which substantially completely fills the entire interior of the container, so that articles positioned at any point therein are subjected to this spray travelling at high velocity and having high washing power. However the spray is in very finely divided condition, and does not have such mass to cause damage to even fragile glassware positioned in its direct range of operation. For example a thin tumbler may be located in inverted position directly over the spray, and is not lifted from its supported position under the action of these rapidly moving sprays.

Very satisfactory results have been secured using impellers as shown having a radius of two inches to the outer tip of the blade, and travelling at approximately 3200 to 3600 R. P. M., the impeller under such condition delivering the desired finely divided sprays of high velocity and of low mass.

To protect the operating parts against possible damage, there is preferably provided a guard plate 70 adapted to overlie the impeller shaft 30 and the impellers 31 thereon. This guard plate is curved in a semi-circular manner, and is adapted to be supported by fixed brackets 71 fastened to the inner end walls of the container in position where the arcuate surface thereof lies just above the periphery of the impellers. The guard plate is formed with cut-out portions 72 in alignment with the several impellers 31 so as not to interfere with the discharge of the washing fluid by such impellers. Thus the openings 72 extend down at each side of the guard to a point such as shown at 73 which is below the range of operation of sprays which are effective upon the articles within the container, so that no interference with the operation of the device is occasioned by the use of the guard plate. It does however extend above

the impellers and functions effectively to prevent accidental contact with a dish, or an article of cutlery should such for example fall into the range of operation of the impeller shaft.

The device of this invention is arranged for convenient location and operation upon a sink, such as usually found in the ordinary kitchen, and for this purpose it is arranged to receive and discharge all of the washing and rinsing fluid from one end of the container. As shown in Fig. 1, the container is adapted to rest upon the sink 75, to receive fresh water from a tap 76 by means of a flexible hose 77, and to discharge its washing fluid into the drain portion 78 of the sink. For this purpose the container is provided with a discharge outlet 80 at the discharge end of the machine, the outlet communicating with the lowermost portion 14 of the container, and the adjustable feet 13 being so regulated as to provide a downward slope toward the outlet. A casing member 81 is positioned over the outlet and is provided with a valve actuating handle 82. The valve member 83 is positioned for rotation upon the inner end of handle 82, and preferably carries a gasket 84 of suitable material for establishing a fluid-tight seal. A pin 85 fastened in casing 81 serves to permit axial movement of valve plate 83 while preventing rotation thereof. A cam surface 86 is fastened to the inner face of the casing 81, and is adapted to cooperate with a projection 87 formed on shaft 82, the casing 81 being suitably apertured to receive such projection. In order to close the valve the handle is moved to the dotted line position and then pushed axially toward its seat and also rotated. Upon rotation the projection 87 moves over the cam surface 86 causing the pressing of the valve plate 83 firmly into closed position. The valve opens freely as shown in the dotted line position in Fig. 7 to provide for complete and rapid discharge of the fluid contents of the container when desired.

In order to properly control the depth of washing fluid at all times within the container, and to provide a predetermined depth for operating purposes, an overflow outlet 90 is provided also at the discharge end of the container. This overflow comprises an inlet opening 91 and a plate 92 which serves to control the actual height to which fluid may rise within the container. Opening 91 communicates with a downward discharge opening 93 which continues through the permanently opened discharge 94 to provide for discharge of the fluid when it rises above the level of the plate 92. It will be noted that the maximum height to which the fluid can rise is somewhat above the notched portion 39 of the baffle member, but not substantially above the top portion of projection 39.

Because of the rapid discharge of the washing sprays under the action of the impeller in accordance with this invention it has been found that an excessive pressure is generated in the air within the container, particularly upon initial operation of the washer when hot water sprays are first projected upwardly into the container containing air at substantially room temperature. The extremely rapid distribution of the washing sprays under the high velocity discharging action of the impellers, tends to rapidly heat such air and to cause the production of an excessive air pressure within the container. Accordingly in order to relieve such air pressure there is provided a breather comprising a per-

manently open and protected outlet from the container, above the normal liquid level.

As shown, the breather opening 100 is positioned at the discharge end of the machine substantially above the normal liquid level, and comprises a generally rectangularly shaped opening of substantial cross sectional area, extending upwardly through passage 101. The wall 102 of the breather is preferably curved so as to avoid the formation of pockets which would cause the deposit and collection of food particles thereon. The passage 101 opens into the casing 81 at its upper end, providing a path for the discharge of the air downwardly through the casing, the lower portion of which is permanently open. Normally there will be no discharge of washing fluid through this breather opening, the plate 102 providing for returning into the container such washing fluid as tends to enter the breather opening; however in certain cases where for example an excessive quantity of soap is utilized, some of the soapy washing fluid may be discharged through the breather opening, and in this case it will be at the discharge end of the machine and in direct position to pass into the drain part of the sink.

As described above, the fresh water supply for the washer is delivered through a flexible connection 77 which is preferably formed with a bayonet attachment to be received upon a cooperating socket 110, which opens through the lower portion of the wall of casing 81. The socket 110 leads through a tube 111 suitably bolted by means of bolts 112 to the lower portion of the container, to a position directly beneath the baffle member 34. The baffle member is suitably apertured as shown at 113, and an aligning opening is formed in the lower wall of the container to provide for the flow of water from the flexible hose connection 77 into the passage 113. This passage 113 extends through baffle member 34 from the discharge end thereof to the remote end where a cross passage 114 is provided with an opening 115 upon the impeller side of the baffle member, and an opening 116 upon the opposite side thereof. These openings preferably are arranged at an angle pointing in the general direction of the discharge outlet to cause improved flushing of the food particles from the floor of the container toward such outlet.

In operation, the flexible connection is attached to the tap, and hot water supplied through the connection and through passage 113 for discharge into the body of the container through the several openings as described. In the normal operation, it is desired to place the articles to be washed within the container and to then run the washing fluid therewith the motor not operating until the water runs out of the overflow opening showing that the proper depth of water has been established. A limited quantity of a soap material, such as soap flakes is added to the hot water, a relatively small quantity having been found adequate to produce the desired washing suds, and a larger quantity to cause the production of a heavy and persistent foam, under the action of the rapidly moving impellers. Thereafter the motor is started and the washing operation takes place, actually requiring only a relatively short time, of the order of a few minutes. During such washing operation the baffle member 34 forms a relatively quiescent pool of washing liquid between itself and the adjacent portions 14 and 15 of the container wall, on the side 38 remote from the impeller blades. This

pool is kept at a predetermined level by reason of the notches 39, which provide for flow into the impellers when the level in the pool exceeds a predetermined amount, but which assures the maintenance of this definite pool of washing fluid. Being relatively quiescent as compared with the remainder of the body of washing fluid, food particles and the like tend to collect in this pool and to precipitate downwardly to the bottom of the container, in back of this baffle member. In actual operation, it is found that where the articles being washed contain food particles they will be deposited very largely in this area between the baffle and the wall of the container, so that they are not continually recirculated, but are in effect progressively withdrawn from circulation with the result that in operation the device tends to become self-cleaning.

At the end of the washing operation, the discharge gate or valve is opened, and the washing fluid together with the greater portion of the entrained particles, is drained outwardly. At this time, fresh washing fluid may be introduced into the container, and in that case the passages 115 and 116 provide for direct introduction of washing fluid on both sides of the baffle member to the innermost portion of the container, so as to effectively flush all such food particles toward and out of the drain.

After such action has taken place the discharge valve may be again closed and the container filled up to the desired level with fresh rinsing water. The impeller is again placed in operation to cause similar discharge of finely divided rinsing sprays into and upon the articles resulting in the washing and rinsing thereof free of remaining particles of food material, and entirely free of any adhering or residual film or deposit. Upon the final draining of the rinse water both the dishes themselves as well as the interior of the container are in a washed and highly cleansed condition requiring no further cleaning treatment.

The rack means which provides for supporting the articles in predetermined position within the container is formed in predetermined relation with respect to the washing operation to secure the most effective utilization thereof. For this purpose the rack, formed of wire of such cross section as to offer a minimum of resistance to the washing sprays, is preferably made removable, being formed with foot portions 120 adapted to rest upon the sloping wall portions 15 of the container, and being formed with a series of upwardly extending rack members 121 spaced apart to provide a series of stepped slots for receiving plates, saucers, and the like at one side of the rack. Thus each successive step on the plate provides for picking up and discharging over the surface of the plate held therein separate portions of the spray so that each one of the entire series of plates is effectively sprayed and cleansed.

On the opposite side of the rack a longitudinally extending rod 122 is spaced from rod 123 to provide a space 124 for the reception of large dishes and the like, which are adapted to stand in position with their open faces toward the impeller shaft. Similarly rods 125 are spaced from rods 123 to form space 126 for the additional reception of dishes of relatively large size. Centrally of the rack there is provided a circular grid-work 127 which is adapted to receive cutlery, which may be stood on end in the pocket formed thereby. At each side of the grid 127, 75

and preferably mounted at an angle are provided rods 128 forming a support for receiving tumblers and the like, which may be placed with their open ends facing downwardly and at an angle suitable to cause the proper application of the washing sprays thereto. Generally above space 126 is a pivoted rod member 130 which may be moved from its operative position as shown in Fig. 4 to an open position on the opposite side of its pivot support 131, to provide access to space 126. After being loaded, the rod 130 is moved into its operative position where it provides a support for receiving cups and the like which are also mounted generally downwardly and at a suitable angle. The rack thus provides for receiving the normal supply of dishes for a household, and for supporting the same in compact relation and in position to be acted upon effectively by the washing sprays.

In order to avoid possible accidental operation of the washing sprays when the cover is in raised position, with consequent discharge of the washing sprays into the kitchen, means are provided to interlock the drive motor with the position of the cover so as to permit operation of the drive motor only when the cover is in its closed and locked position. This means comprises switch box 135 mounted upon the container adjacent the upper edge thereof, and generally in alignment with rotatable handle 23 mounted on the cover. Handle 23 carries an operating pin 136, and the switch box 135 is formed with a cut-out opening 137 through which the pin 136 is adapted to project when the cover is in lowered position and the handle 23 turned to cause the locking thereof in such position. Within the switch box there is positioned a fixed contact 138 and a movable pivotally mounted contact 139, resilient means 140 tending to normally retain said contacts in open circuit position. Upon contact with pin 136, movable contact 139 is depressed and caused to close the circuit with contact 138, and in this position the motor is subject to the control of the operator by operation of switch 58 but the provision of the interlocking device prevents actuation of the impeller with the cover raised. The connection to this interlock switch is preferably made through the interior of the container, a tube 141 being fastened to the interior of the container and passing through an opening therein in suitably soldered or welded relation to avoid escape of washing fluid there-through.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A washing device of the character described which comprises a container adapted to receive a quantity of washing fluid, a shaft extending along the lower portion of said container, a plurality of spaced impellers mounted on said shaft, spaced baffle means adjacent and in corresponding alignment with the periphery of said impellers on the upwardly moving side thereof and limiting the supplying of washing fluid to the impellers in a radial direction from the discharge side thereof while providing for supply of fluid from between adjacent blades, and means for rotating said shaft and said impellers at high speed to distribute the water into and throughout the

interior of the container in a finely divided spray travelling at high velocity and having low mass.

2. A washing device of the character described which comprises a container for holding a quantity of washing fluid, a shaft extending along the lower portion of said container, a plurality of spaced impellers mounted on said shaft, spaced baffle means adjacent the periphery of the impellers on the upwardly moving side thereof and substantially in radial alignment therewith, the spaces between said baffle means providing for controlled feeding of washing fluid toward the surface of the impellers in a generally axial direction to form a thin film of fluid thereon, and means for rotating said shaft and said impellers at high speed to discharge said thin films of water thereon upwardly into the space within said container in a finely divided spray travelling at high velocity, said baffle means preventing flow of said washing fluid radially into said blades on said upwardly moving side.

3. A dish washing machine of the character described comprising a container for holding a quantity of washing fluid, a shaft extending substantially throughout the length of said container, a plurality of spaced blades mounted on said shaft adapted to dip into the body of washing fluid, baffle means along the lower portion of said container cooperating with the individual blades on the upwardly moving side thereof to feed the fluid into the blades from between adjacent pairs thereof, said baffle means forming between itself and the wall of the container a relatively quiescent pool of washing fluid adapted to cause the collection and precipitation of suspended particles, and means for rapidly rotating said shaft and said blades to cause the discharge of said washing fluid into the interior of said container in a finely divided spray of low mass and high velocity.

4. A dish washing machine of the character described which comprises a container for holding a quantity of washing fluid, a shaft located in the lower portion of said container and extending longitudinally thereof, a plurality of blades mounted on said shaft adapted to dip into the washing fluid, baffle means on the bottom of said container in corresponding location to the blades on the discharge side thereof to avoid direct back-flow of liquid into the blades while providing for flow therebetween and forming a pool at one side of said shaft, said baffle means being formed to provide a bearing support for said shaft, and means for rapidly rotating said shaft and blades thereon to cause the discharge of said washing fluid into the interior of said container in a finely divided spray.

5. A dish washing machine of the character described which comprises a container for holding a quantity of washing fluid, a shaft located in the lower portion of said container and extending longitudinally thereof, a plurality of blades mounted on said shaft adapted to dip into the washing fluid, spaced baffle means on the discharge side of said blades for individually preventing direct back-flow into the blades on the discharge side thereof, the spacing of said baffle means corresponding to that of said blades, and said means providing for feeding washing fluid substantially axially toward said blades from between adjacent pairs of blades, and means for rapidly rotating said shaft and said paddles to cause discharge of the washing fluid upwardly into the container in a finely divided spray.

6. A dish washing machine of the character

described which comprises a container for holding a quantity of washing fluid, a shaft located in the lower portion of said container and extending longitudinally and outwardly through one end thereof, a plurality of blades mounted on said shaft adapted to dip into the washing fluid, baffle means continuous along and resting in fluid blocking relation upon the lower wall of said container forming a pool at one side of said shaft between itself and the wall of said container adapted to cause the collection and precipitation of suspended particles in the washing fluid, said baffle means at one end providing a support for journalling said shaft, and also being provided with a curved surface beneath said shaft arranged in close peripheral relation with respect to said blades to control and limit the fluid carried by each blade, and means for rapidly rotating said shaft and said blades to cause the discharge of said washing fluid upwardly into said container in a finely divided spray.

7. A dishwasher of the character described which comprises a closed container for receiving a quantity of heated washing fluid, rotary impeller means within said container for discharging said fluid in a finely divided spray of high velocity into and throughout the interior of said container, said spray being adapted to quickly heat and expand the enclosed body of air within the container, a discharge outlet formed in the lower portion of a vertical wall of said container, a housing over the outlet to provide for downward discharge of fluid therefrom, a permanently open breather outlet of substantial area located in a protected position in said vertical wall, said breather opening into said housing to provide for discharge of fluid therethrough in said downward direction, and means for substantially preventing escape of washing fluid through said breather outlet.

8. A dish washer of the character described which comprises a closed container for receiving a quantity of heated washing fluid, rotary impeller means within said container for discharging said fluid in a finely divided spray of high velocity into and throughout the interior of said container, and adapted to rapidly heat and expand the air in said container, a breather opening formed in the end wall of said container adjacent the lower part thereof, said breather providing for relieving pressure created within said container caused by the heating of the air upon operation of the impeller, a wall extending upwardly and outwardly from the lower side of said opening to prevent the discharge of washing fluid through said breather opening while providing for free flow of air therethrough, and an outer housing closed at its upper end adjacent said container wall and spaced from and overlying said upwardly extending wall, said housing being open at its lower end to provide for the discharge of the air therethrough.

9. A dish washer of the character described which comprises a container, a shaft extending longitudinally of said container and located in a position adjacent the bottom of said container, means within said container for journalling said shaft, said shaft having an end extending through said container, drive means mounted directly on the end of said shaft, a drain outlet adjacent the opposite end of said container, a valve for controlling said drain outlet, an overflow outlet adjacent said drain outlet for predetermining the maximum depth to which the container may be filled, a breather outlet also

located at the end of said container adjacent said drain and overflow outlets, and a common discharge member through which all of said outlets discharge.

10. A dish washer of the character described comprising a container, a shaft extending longitudinally of said container, a plurality of impeller blades on said shaft, baffle means for controlling the supplying of washing fluid into said impeller blades, outlet means adjacent one end of said container, and means for introducing fresh washing and rinsing fluid into said container on both sides of said baffle means at the end thereof remote from the outlet means to facilitate the flushing of food particles toward and out said outlet.

11. A dish washer of the character described comprising a container, a longitudinally extending shaft, a plurality of impeller blades on said shaft, baffle means for controlling the supplying of washing fluid into the impeller blades, said baffle means forming a pool with the wall of said container to provide for collection of food particles therein, a discharge outlet adjacent one end of said container, and means for introducing fresh washing and rinsing fluid into said pool adjacent the end remote from said outlet to facilitate the flushing of food particles toward and out said outlet.

12. A dish washer of the character described comprising a container, a longitudinally extending shaft, a plurality of impeller blades on said shaft, baffle means for controlling the supplying of washing fluid into the impeller blades, said baffle means forming a pool with the wall of said container to provide for collection of food particles therein, a discharge outlet adjacent one end of said container, and means for introducing fresh washing and rinsing water on both sides of said baffle means adjacent the end of the container remote from said outlet to facilitate the flushing of the said food particles toward and out said outlet.

13. A dish washer of the character described comprising a container, a shaft extending longitudinally of said container, a plurality of impeller blades on said shaft, baffle means for controlling the supplying of washing fluid into said impeller blades, outlet means adjacent one end of said container, means including a passage formed through said baffle means for introducing fresh washing and rinsing fluid into said container adjacent the opposite end to facilitate the flushing of food particles toward and out said outlet, and a connection at the end of the container having the discharge outlet for supplying fresh water to said passage.

14. A dish washer of the character described comprising a container adapted to receive a quantity of washing fluid, a shaft extending longitudinally of said container, a plurality of impeller blades mounted on said shaft, baffle means mounted on the lower portion of said container and adapted to control the supplying of washing fluid to said blades, said shaft extending continuously from adjacent one end of the container through the opposite wall thereof, a bearing for the inner end of said shaft supported from said baffle means, a bearing for journalling the portion of said shaft extending through said opposite wall, and means on said baffle means and within said container for locating said last mentioned bearing in predetermined alignment with said first mentioned bearing.

15. A dish washer of the character described comprising a container adapted to receive a quantity of washing fluid, a shaft extending longitudinally continuously from adjacent one end of the container through the opposite wall thereof, a plurality of impeller blades mounted on said shaft, means for mounting said shaft independently of the wall portions of the container and for separate assembly and removal from the container comprising a member supported from the lower portion of said container and having spaced upwardly projecting arms, a bearing positioned within one of said arms providing for journalling said one end of said shaft, a second bearing for journalling the portion of said shaft which projects through said opposite wall, means including the other of said arms for supporting said second bearing upon the wall of said container in predetermined alignment with the first mentioned bearing, and motor drive means for rotating said shaft directly mounted upon the portion of said shaft projecting outwardly of said container from said second bearing member.

16. A dish washer of the character described comprising a container adapted to receive a quantity of washing fluid, a shaft extending longitudinally thereof, a plurality of impellers mounted on said shaft, said impellers dipping within the washing fluid and providing for receiving a film thereof upon the surface, each of said impellers having a hub portion and having a convexly curved surface extending substantially radially from which the washing fluid is readily discharged, to provide for discharge of said film of washing fluid taking place upwardly primarily into the space within said container which lies on the upwardly moving side of the axis of said shaft, and each of said impellers having another surface with a concave curvature projecting forwardly substantially beyond a radial position and forming with said hub a pocket from which the washing fluid is less readily discharged to provide for delivery of the film of washing fluid thereon primarily into that portion of the container above said shaft on the downwardly moving side thereof, and means for rapidly rotating said shaft to cause discharge of a finely divided spray throughout the interior of said container.

17. A dishwasher of the character described comprising a container adapted to receive a quantity of washing fluid, a shaft extending longitudinally thereof, a plurality of impellers mounted on said shaft, said impellers dipping within the washing fluid and providing for receiving a film thereof upon the surface, each of said impellers having a hub portion for mounting on said shaft and having a plurality of alternating faces thereon, one of said faces extending outwardly from the outer portion of said hub with a forward curvature in the direction of rotation such that the outer portion of said face projects in advance of a radial plane midway between the points of attachment to the hub of that face and the next preceding face, to provide delayed discharge of the washing fluid therefrom and delivery thereof primarily into that portion of the container above said shaft on the downwardly moving side thereof, and the other faces on said hub extending substantially radially therefrom to provide for more immediate discharge of fluid therefrom and primarily into the portion of the container which lies above the upwardly moving side of the shaft, and means for rapidly rotating

said shaft to cause discharge of a finely divided spray of said washing fluid throughout the interior of said container.

18. A dishwasher of the character described comprising a container adapted to receive a quantity of washing fluid, a shaft extending longitudinally thereof, a plurality of impellers mounted on said shaft, said impellers dipping within the washing fluid and providing for receiving a film thereof upon the surface, each of said impellers having a hub portion for mounting on said shaft and having a face thereon extending outwardly from the outer portion of said hub substantially tangential thereto with a curvature in the direction of rotation, the outer end of said face projecting forwardly beyond the axis of the shaft and located substantially in the plane normal to the radius through the point of tangency to provide delayed discharge of the washing fluid therefrom and delivery thereof primarily into that portion of the container above said shaft on the downwardly moving side thereof, and another face on said hub extending substantially radially therefrom to provide for more immediate discharge of fluid therefrom and primarily into the portion of the container which lies above the upwardly moving side of the shaft, and means for rapidly rotating said shaft to cause discharge of a finely divided spray of said washing fluid throughout the interior of said container.

19. A dishwasher of the character described comprising a container adapted to receive a quantity of washing fluid, a shaft extending longitudinally thereof, a plurality of impellers on said shaft, said impellers dipping within the washing fluid and providing for receiving a film thereof upon the surface, each of said impellers having a hub portion for mounting on said shaft and having a face thereon extending outwardly from the outer portion of said hub substantially tangential thereto with a curvature in the direction of rotation the outer end of said face projecting forwardly beyond the axis of the shaft to provide delayed discharge of the washing fluid therefrom and delivery thereof primarily into that portion of the container above said shaft on the downwardly moving side thereof, and another face on said hub extending substantially radially therefrom and having a forwardly and reversely curved face thereon providing for more immediate discharge of fluid therefrom and primarily into the portion of the container which lies above the upwardly moving side of the shaft, and means for rapidly rotating said shaft to cause discharge of a finely divided spray of said washing fluid throughout the interior of said container.

GORDON ELLIS STOCKHAM.