

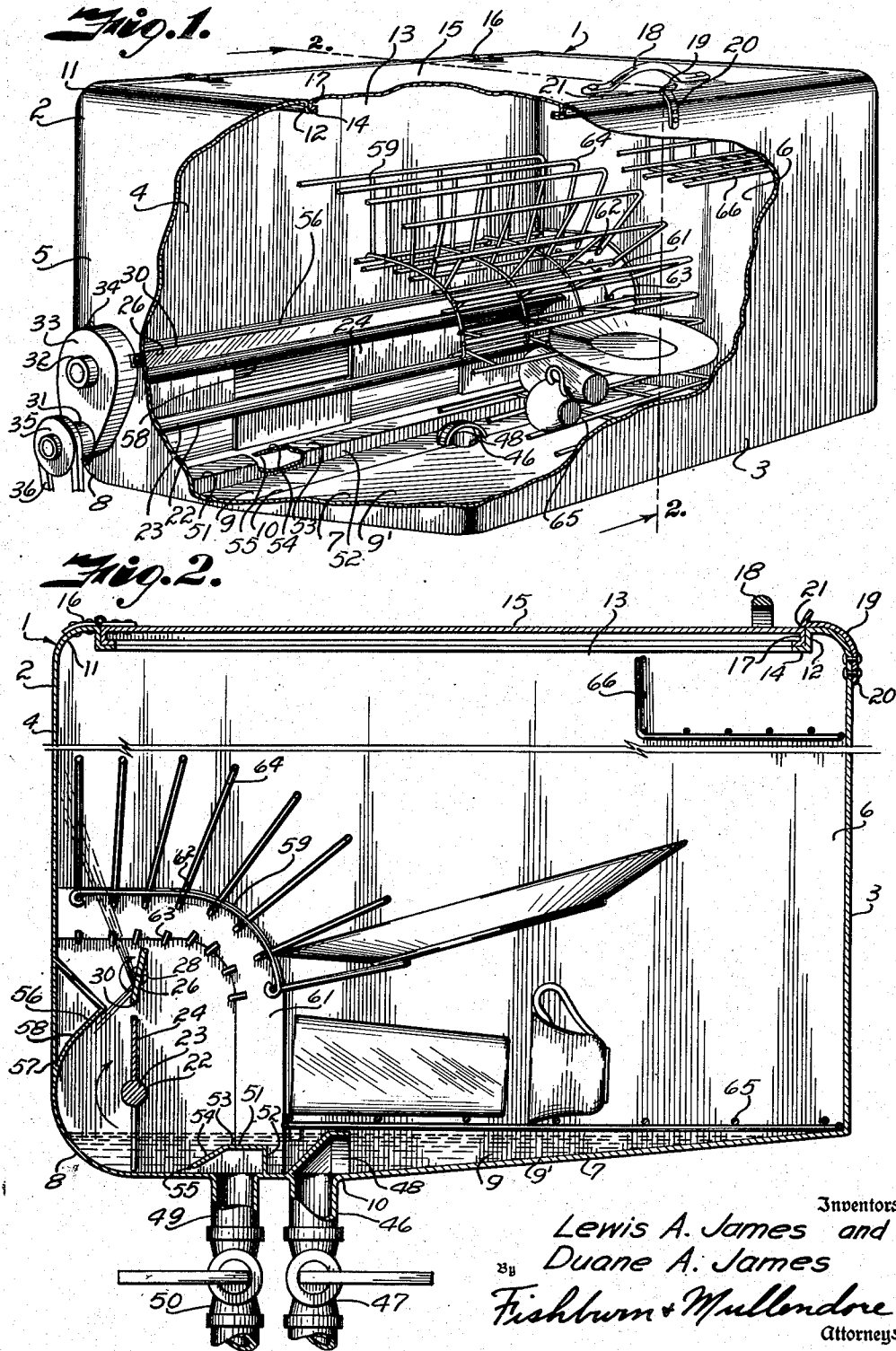
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L. A. JAMES ET AL
DISHWASHING MACHINE

2,660,185

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

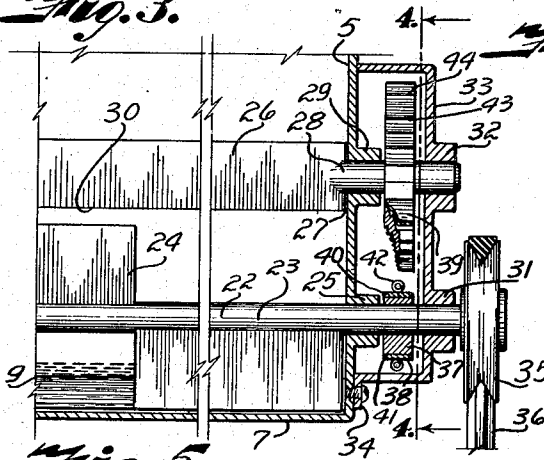


Fig. 4.

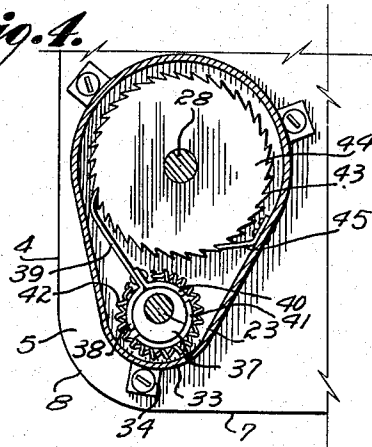


Fig. 5.

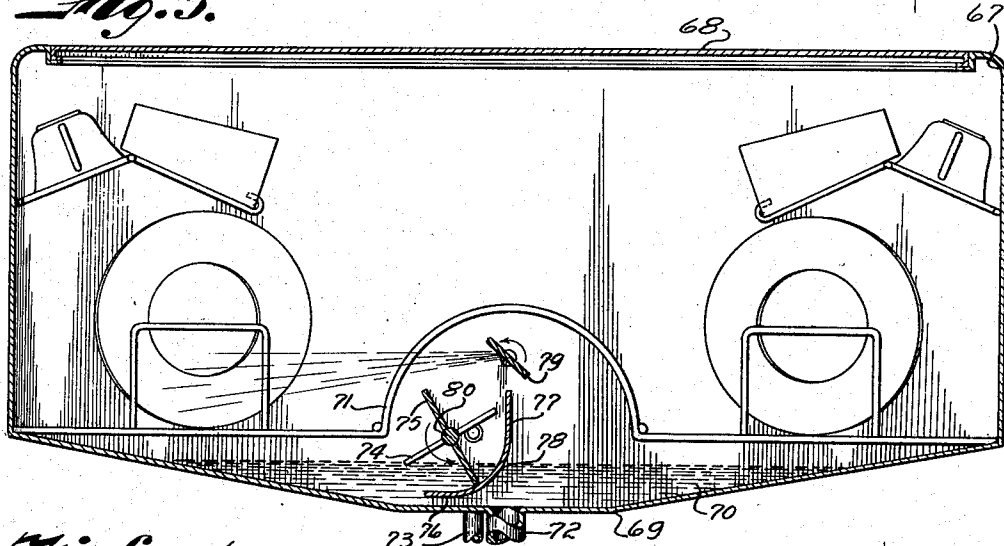
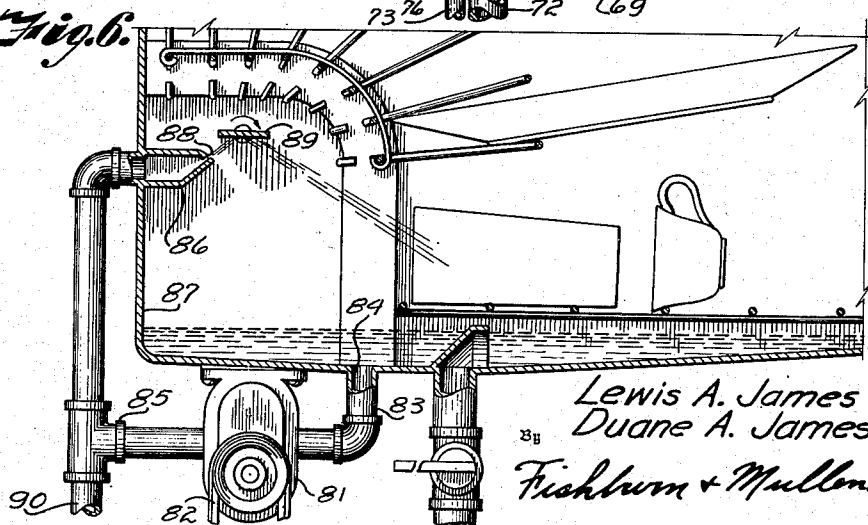


Fig. 6.



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UNITED STATES PATENT OFFICE

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DISHWASHING MACHINE

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2 Claims. (Cl. 134—183)

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This invention relates to dishwashing machines and particularly to a machine for washing and rinsing dishes, silverware and the like by a thin sheet or jet of liquid directed with considerable velocity against a rotating or oscillating baffle for distribution in a sweeping movement over the articles to be washed.

The objects of the present invention are to provide a closed compartment having a rack for supporting articles to be washed with a pump for moving wash liquid from the bottom of the compartment and delivering jets of said liquid against a moving baffle which deflects same to impinge on the articles to be washed; to provide a dishwashing machine with a single liquid impelling unit and a rotating baffle for concentrating the delivery of washing liquids in a sheet of considerable velocity which sweeps the interior of the washing compartment; to provide a dishwashing machine with a thin, flat baffle having an axis of rotation positioned in alignment with a sheet of liquid directed thereagainst for deflecting said sheet of liquid in a thin moving jet which sweeps the interior of the washing compartment; to provide a rack for supporting articles to be washed in position radially of the axis of rotation of the baffle; to provide a baffle to separate incoming fresh liquid from the used liquid for aiding in drainage of the dirty liquid from the washing compartment; and to provide a dishwashing machine which is economical to manufacture and efficient in operation.

In accomplishing these and other objects of the present invention, we have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of the dishwashing machine embodying the present invention, portions of the housing being broken away to illustrate the structure therein.

Fig. 2 is a transverse sectional view through the dishwashing machine on the line 2—2, Fig. 1.

Fig. 3 is a partial longitudinal sectional view through the drive for the impeller and the movable baffle.

Fig. 4 is a transverse sectional view on the line 4—4, Fig. 3, illustrating a ratchet form of drive of the baffle from the impeller shaft.

Fig. 5 is a modified form of dishwasher to provide increased capacity for articles to be washed.

Fig. 6 is a transverse sectional view through a dishwashing machine having a modified form of apparatus for moving the liquid from the compartment and delivering it against the moving baffle.

Referring more in detail to the drawings:

1 designates a dishwashing machine consisting of a receptacle 2 having side walls 3 and 4, end

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walls 5 and 6, and a bottom 7, said bottom being suitably connected to the side and end walls to form a watertight tank. The bottom 7 is preferably connected to the side walls 4 by an arcuate portion 8, whereby the adjacent portions of the bottom and side wall are tangential to said arcuate portion. The bottom 7 extends horizontally from the arcuate portion to form a sump 9 longitudinally of the receptacle, said bottom including an upwardly sloping portion 9' extending from the edge 10 of the sump to the side wall 3. The upper edges of the side and end walls are turned inwardly as at 11 and terminate in downwardly turned flanges 12 defining an opening 13 providing access to the receptacle, the lower edges of said flanges being provided with inturned lips 14.

A cover 15 of suitable size to close the opening 13 is secured by hinges 16 to one of the walls adjacent the flange 12 thereof, said cover preferably being provided with downwardly and inwardly turned flanges 17 substantially engaging the flanges 12 and lips 14 when the cover is in closed position. Secured to the cover adjacent the side opposite the hinges 16 is a handle member 18 for facilitating moving of said cover. Also the wall of the receptacle opposite the hinges is provided with a spring clip 19 secured as at 20 whereby the free end 21 extends slightly over the edge of the cover to latch same in closed position.

An impeller 22 extends longitudinally of the receptacle coaxially of the arcuate portion 8 thereof, said impeller having a shaft 23 on which are mounted a plurality of alternate, oppositely directed blades 24. The ends of the shaft 23 are rotatably mounted in bearings 25 in the end walls 5 and 6 and the blades are of suitable width that the outer edges thereof move close to but clear the inner surface of the arcuate portion 8. Spaced above the impeller 22 and preferably having its axis of rotation substantially in a vertical plane with the axis of the shaft 23, is a baffle 26 consisting of thin, flat metal, of such length as to extend longitudinally of the receptacle with the ends 27 of said baffle having clearance with the inner surfaces of the end walls 5 and 6. The baffle is provided with trunnions 28 rotatably mounted in bearings 29 suitably arranged in the end walls 5 and 6, the width of the baffle 26 being such that there is clearance between the side edges 30 of the baffle and the edges of the impeller blades 24. It is preferable that the baffle rotate at a much slower speed than the impeller. While various driving mechanisms may be used, in the illustrated form the shaft 23 and trunnion 28 extend through the wall 5 and into bearings 31 and 32 respectively carried by a housing 33 suitably secured as at 34 to the end wall 5 to provide an enclosure for the baffle driving mecha-

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nism. The outer end of the shaft 23 is provided with a sheave wheel 35 drivingly engaged by a belt 36 connected to a suitable prime mover (not shown) for rotating the shaft 23.

An eccentric 37 is fixed to the shaft 23 inside the housing 33 and rotatably mounted on the eccentric is a strap 38 having a detent 39 extending therefrom. The strap is shown as consisting of two arcuate members 40 and 41 engaging around the eccentric and held thereon by a spring 42 extending around the peripheries of said arcuate members. The spring effects resilient engagement of the arcuate members with the eccentric whereby rotation of said eccentric holds the end of the detent in engagement with the teeth 43 of a ratchet wheel 44 fixed on the trunnion 28. Rotation of the eccentric 37 moves the detent to turn the ratchet wheel by increments, said ratchet wheel being held against backward movement by means of a spring pawl 45 secured to the housing 33 and having its end engaging in teeth 43 of said ratchet wheel.

An outlet fitting 46 communicating with the interior of the receptacle is in the sump portion of the bottom 7 adjacent the sloping portion, said outlet having a valve 47 for controlling the drainage of liquid from the receptacle. A deflector 48 is preferably arranged over the outlet opening facing toward the sloping portion to receive liquid flowing down same. Connected to the receptacle adjacent the impeller is an inlet 49 having a valve 50 for controlling admission of liquid from a source of supply, for example a hot water tank in the water system of a house. The inlet for water is arranged to distribute same for the length of the impeller and in the illustrated structure a deflector 51 is positioned over the opening of the inlet fitting and extends longitudinally of the receptacle 2 and preferably for the full length thereof, said deflector consisting of a vertical wall 52 terminating in a horizontally directed wall 53, directed toward the arcuate portion 8 and having a downwardly sloping flange 54 terminating in spaced relation to the bottom 7 to provide a slot 55 of such size that the pressure of the water or other liquid entering the receptacle will cause same to be discharged through the slot 55 in a substantially uniform flow throughout the length of the sump.

A substantially V-shaped deflector 56 is arranged on the interior of the side wall 4 above the arcuate portion 8, the legs of said deflector being suitably connected to the wall 4 with the lower leg curved adjacent said wall, as at 57, to form a continuation of the arcuate surface 8. The portion 58 of the lower leg adjacent the apex of the V is tangential to the arcuate portion at 57 and is directed substantially in alignment with the axis of the baffle 26.

A rack 59 is provided in the receptacle for supporting dishes or other articles to be washed. In the illustrated structure the rack consists of end members 61 adjacent the end walls 5 and 6, having ends connected to the side wall 4 and bottom 7 whereby said members extend over the baffle 26 and are spaced therefrom and also spaced from the shaft 23 and provide clearance for the baffle 26 and impeller to rotate. Secured to the end members are a plurality of wires 62, the ends of which pass through openings in the members 61 and terminate in hook portions 63 for securing said wires to said end member. Outwardly extending wires 64 suitably secured to the wires 62 to provide a plurality of wire frames substantially resiliently mounted to provide for

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supporting various size dishes. Also a horizontal rack 65 is preferably provided adjacent the bottom 7 whereby one side will lie on the sloping portion 9 at its point of connection with the wall 3 and the other side will be supported on the end members 61 to provide for supporting glassware, cups and the like. A rack 66, preferably formed of wire, is suitably mounted in the upper portion of the receptacle as, for example, in the corner opposite to the arcuate portion 8 as shown in Fig. 2, said rack 66 being adapted to support silverware and the like.

In operating a dishwashing machine constructed as described, the cover 15 is raised and articles to be cleaned placed within the receptacle in proper positions on the rack. The cover is then lowered to close the receptacle, the spring latch 19 securing said cover in closed position. The valve 47 is left open and the valve 50 opened to permit flow of water from a source of supply into the receptacle. Normally the first water running from a hot water system of a house is relatively cold. This water is discharged into the receptacle through the slot 55. Then the impeller 22 is started to rotate by driving the belt 36 from a suitable prime mover, said impeller rotating in a clockwise direction (Fig. 2). The blades of the impeller throw the water upwardly around the arcuate portion 8, whereby the entire delivery of the impeller is concentrated in a relatively flat stream or jet that is discharged from the tangential portion 58 of the deflector 56. As the impeller is rotated, the eccentric 37 is also rotated to move the detent 39, thereby rotating the ratchet wheel 44 by increments. The stream of water discharged from the tangential portion 58 of the deflector 56 strikes the flat side surfaces of the baffle 26 and is deflected thereby in a flat, thin sheet or jet having considerable velocity to impinge on the articles to be washed. As the baffle is rotated, it presents a gradual changing angularity of the side faces relative to the tangential portion 58 of the deflector 56, this gradual changing surface deflecting the stream of water in a sheet which sweeps the entire washing compartment. The cold water tends to wet and rinse loose material from the dishes and when the water gets sufficiently hot in running from the hot water system of a house, the valve 47 is closed, the flow of water continued until there is a quantity equal to about one to two inches of depth on the bottom, then the water supply valve 50 is closed, the impeller is stopped, the clip 19 released and the cover raised and suitable soap or other washing detergent placed in the water. The cover is closed and the impeller again started and operated to supply a flat stream of water discharged from the baffle 26 with the rotation of the baffle 26 moving the sheet of washing liquid in intermittent sweeps over the entire washing compartment.

It is preferred to lay the glasses and cups on the horizontal portion 65 of the rack as it has been found that when such articles are placed above the baffle 26, the force of the sheet of water will throw the glasses against the cover and break same. However, in the position shown in Fig. 2, the pressure of the jet is diminished and glasses can be safely washed. After operation for approximately two minutes or other suitable period of time to wash the dishes and silverware, the valve 47 is opened to permit the water to drain from the receptacle. After most of the water is drained from the receptacle, the valve 50 is opened for clear hot rinse water which rinses the

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entire interior of the washing compartment by the sweeping sheet of water deflected from the baffle 26 as the machine is continuing to operate. After thoroughly rinsing the dishes the valve 50 is closed and the remaining water allowed to drain from the receptacle to the discharge fitting. The hot rinse water naturally will heat the dishes causing same to dry and said dishes may be left in the receptacle if so desired up to the time for use.

In the form of the invention illustrated in Fig. 5, the receptacle 67 has a cover 68 and a bottom 69, said bottom sloping from each side of the receptacle to form a sump 70 in the longitudinal center of the receptacle. Racks 71 are arranged relative to the longitudinal center of the receptacle for supporting dishes on each side thereof. A drain 72 is placed in the sump, a liquid inlet 73 is connected to an end wall and arranged to direct a stream of water longitudinally of and adjacent the impeller 74 whereby the blades 75 on said impeller cut the stream of water and throw same upwardly in the receptacle. A baffle 76 is provided adjacent the impeller and extends throughout the length of the receptacle. The baffle 76 preferably is formed of a sheet metal having one edge below the baffle and spaced above the sump, the other end being directed vertically as at 77 and having an arcuate portion 78 therebetween. The free end of the vertical portion terminates short of the reach 71 whereby a flat baffle 79 may be rotatably mounted upon a longitudinal axis substantially in alignment with the vertical portion 77.

The impeller 74 is of similar construction to the impeller 22, with blades 75 secured to the shaft 80 and extending on both sides thereof and other blades disposed on the shaft at 90° to increase the capacity of the impeller. The shaft 80 is rotatably mounted on an axis concentric with the arcuate portion 78 whereby rotation of the impeller directs liquid upwardly in a relatively flat stream which is discharged in alignment with the vertical portion 77 of the baffle. Slow simultaneous rotation of the baffle 79 will direct the discharge of the impeller in a substantially flat sheet which, due to the changing angularity of the baffle 79, will move across the receptacle to substantially sweep the entire washing compartment.

In the form of the invention shown in Fig. 6, the receptacle rack and drain are constructed in the same manner as in the form illustrated in Figs. 1 to 3 inclusive. In place of the impeller and arcuate wall a pump 81 is mounted on the bottom of the receptacle and suitably driven as by a belt 82, the inlet of the pump being connected by a suitable pipe fitting 83 communicating as at 84 with the sump portion of the receptacle. The discharge of the pump is connected by suitable pipe fittings 85 with a chamber 86 mounted on the side wall 87, said chamber extending for the full length of the receptacle. The chamber has a slot 88 for directing a thin sheet of liquid toward the axis of rotation of the baffle 89. The pipe fittings 85 are connected by suitable fittings 90 to a suitable source of liquid supply such as the hot water system of a house.

In the operation of the form of the apparatus shown in Fig. 6, liquid is admitted through the fitting 90, fittings 85, chamber 86 and discharged through the slot 88 into the receptacle. The baffle 89 is rotated in the same manner as in the preferred form of the machine, whereby the sheet of liquid discharged from the slot 88 is

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deflected in a thin sheet from the baffle 89 as it is rotated and sweeps through the entire washing compartment. After sufficient liquid is supplied to the receptacle, the supply is cut off and the pump then removes the liquid from the receptacle to pump said liquid under pressure into the chamber 86 for discharge through the slot 88. The discharged liquid is deflected from the baffle 89 to effect application of the washing liquid to the articles to be washed in a thin sheet at considerable velocity which sweeps the interior of the washing compartment impinging on the dishes to wash same. The rinsing operation is performed in substantially the same manner.

It is believed obvious that we have provided an improved dishwashing machine of simple, economical construction that is easy and efficient to operate with a controlled stream of liquid sweeping over the articles to be washed.

What we claim and desire to secure by Letters Patent is:

1. An impeller and deflector structure for use in a dishwashing machine having a housing and a sump for collecting liquid comprising, an impeller having a plurality of radially arranged blades journaled in the housing above the sump with the blades being of such lengths to dip into the liquid in the sump, an arcuate member coextensive and coaxial with the impeller and acting as an extension from the sump upwardly in the direction of rotation of the impeller and adjacent the periphery thereof, said arcuate member terminating in a tangential portion for directing the discharge of liquid moved by the impeller in a relatively flat tangential stream, an elongated baffle parallel and spaced from the impeller and mounted to rotate on an axis longitudinally of said baffle and midway the width thereof whereby said baffle has oppositely directed vanes, said axis of rotation of the baffle being above and extending longitudinally of the impeller, said axis of rotation of the baffle being substantially in the plane of the flat stream of liquid from the arcuate member and perpendicular to the direction of said stream whereby said discharge strikes the baffle substantially along said axis of rotation, means for rotating the impeller to move liquid from the sump and effect discharge of same against the baffle, and means operated in response to rotation of the impeller for rotating the baffle by increments in the same direction as the impeller to deflect the discharge of liquid and cause same to sweep the remainder of the housing.

2. An impeller and deflector structure for use in a dishwashing machine having a housing and a sump for collecting liquid comprising, an impeller journaled in the housing above the sump and having blades of such length to dip into the liquid in the sump, an arcuate member coextensive and coaxial with the impeller and acting as an extension from the sump upwardly in the direction of rotation adjacent the periphery of the impeller, said arcuate member terminating in a tangential portion for directing discharge of liquid moved by the impeller in a relatively flat tangential stream, a baffle having oppositely directed vanes coextensive with the impeller and mounted to rotate on an axis above the impeller and extending longitudinally thereof and in the line of discharge of the flat stream of liquid from the arcuate member whereby said discharge strikes the baffle, means for rotating the impeller to move liquid from the sump and effect discharge of same against the impeller, an eccentric

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fixed to the impeller, a ratchet wheel fixed to the baffle, and a pawl operated by the eccentric and engaging the ratchet wheel and operated in response to rotation of the impeller for rotating the baffle in the same direction as the impeller to deflect the discharge of liquid, said deflected liquid being in a thin flat sheet which sweeps the remainder of the housing as the baffle is rotated.

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