

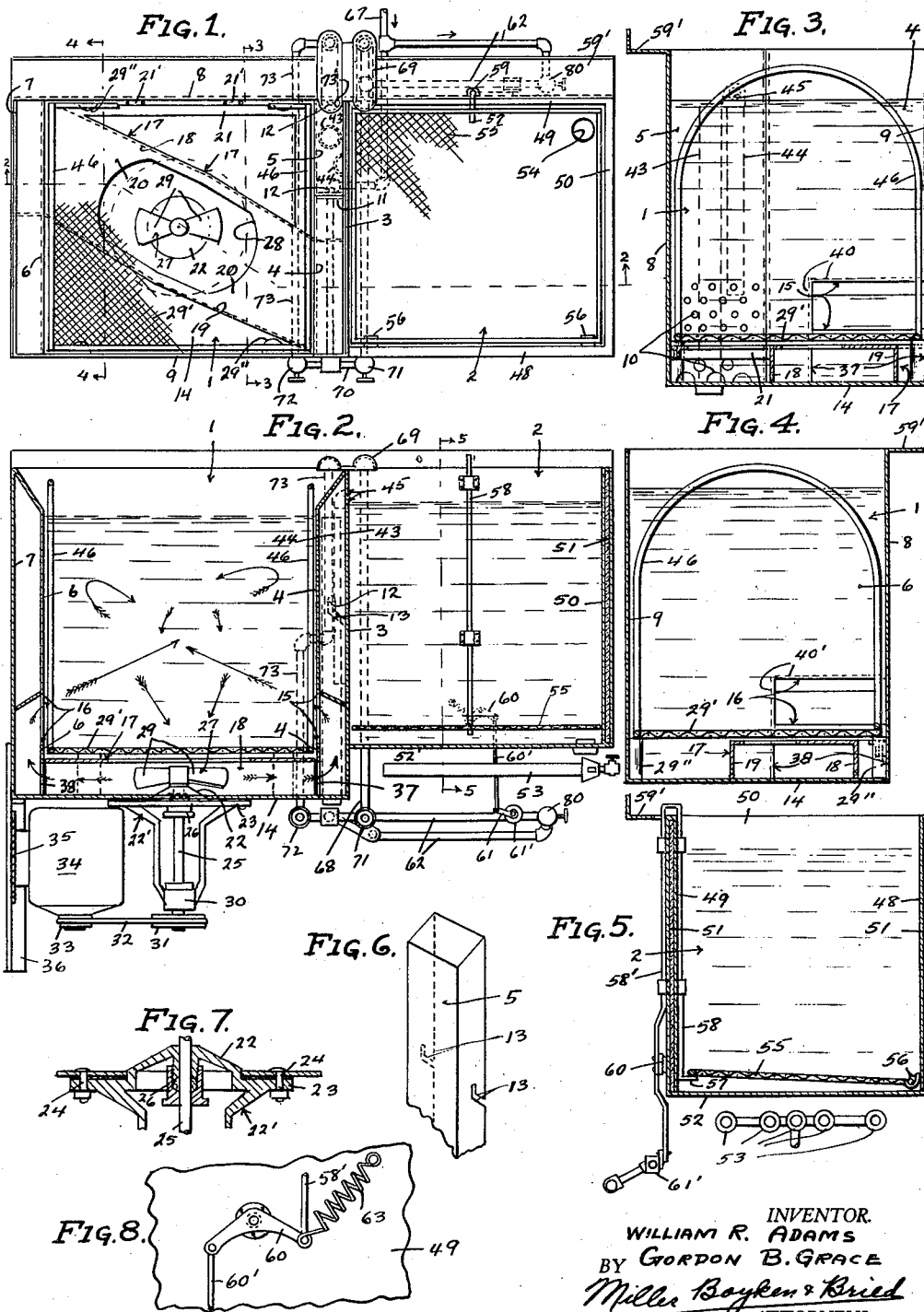
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DISHWASHING APPARATUS

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DISHWASHING APPARATUS

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This invention relates to dish-washing machines and has for its objects a more compact and a more efficient machine than has heretofore been available and which machine is economical in operation and simple in construction. Another object is the provision of a rinse tank in combination with the washing tank and improved means for replenishing the washing tank with heated water and for maintaining the water heated in the rinse tank and washing tank. Other objects and advantages will appear in the specification and drawing.

In the drawing, Fig. 1 is a plan view of our machine.

Fig. 2 is a sectional view as seen from line 2-2 of Fig. 1 with the propeller and its mounting and the motor shown in elevation.

Fig. 3 is a sectional view taken along the line 3-3 of Fig. 1.

Fig. 4 is a sectional view taken along the line 4-4 of Fig. 1.

Fig. 5 is a sectional view taken along the line 5-5 of Fig. 2.

Fig. 6 is a perspective view of a portion of an inner wall of the washing tank of Fig. 1 adjacent the rinse tank.

Fig. 7 is an enlarged sectional view of the casting through which the propeller shaft extends.

Fig. 8 is an enlarged fragmentary elevation of the spring and bell crank on the rinse tank that operates the water inlet valve.

Briefly described, we provide a rectangular dish-washing tank and adjacent thereto a rectangular rinse tank with a common separating wall between the two tanks. Both tanks have drain openings in their bottoms adapted to connect to a sewer. Means is provided for limiting the maximum water level in the dish-washing tank below a maximum water level in the rinse tank, and the maximum water level in the rinse tank is regulated by an overflow opening in the wall between the wash and rinse tank whereby the water from the rinse tank flows into the wash tank upon rising to said opening.

The rinse tank is provided with means adapted to automatically open a source of fresh water to admit the same to the rinse tank upon dishes being placed in the rinse tank. Heating means is provided for heating the water of the rinse tank, which heating means is also arranged and adapted to also help to heat the water in the dish-washing tank to maintain it at the proper temperature.

Associated with the dish-washing tank are large water injecting slots in opposite ends of the

tank at about the same height from the bottom of the tank, and large conduits, each extending at one end respectively from one of the slots to adjacent opposite sides of a motor driven screw propeller positioned in the bottom of the dish-washing tank at their opposite ends. The propeller, slots and conduits are relatively proportioned and arranged so as to enable free circulation of the water without building up a back pressure by reason of any restriction of the conduits and discharge slots to a degree below the capacity of the propeller to deliver water through the conduits and slots. For example, such proportioned machine is generally shown in the drawing in which the dish-washing tank is about 17 inches square with a working capacity of about 11 gallons of water. With about a five-inch propeller in the bottom and offset slots in two opposite ends of about 7 x 2½ inches, which slots connect by conduits of cross sectional diameter substantially the same as the dimensions of the slots, we circulate the eleven gallons of water at a rate appreciably in excess of 200 gallons per minute at a propeller speed of approximately 1750 R. P. M.

The movement of the water in the dish-washing tank is generally in three major directions, namely, horizontally and upwardly across the tank in opposite directions, downwardly toward the propeller in the bottom of the tank, and a rotary movement, the latter being less pronounced than the former two movements.

The effect of the principle of operation generally is similar to that of placing the dishes in a large conduit filled with water and rapidly moving the entire body of water through the conduit. The dishes themselves break up the general directional flow of the water to some extent and in our arrangement in which there are several major and distinct changes effected in the directional flow by reason of the offset discharge slots in opposite ends and the propeller in the bottom of the tank, a complete scouring of the dishes results and we have found that the time for a complete cleansing of a basket of soiled dishes is accomplished in from eight to fifteen seconds time, according to whether the food particles on the dishes are moist or are dried thereon, the latter time being the average maximum time required under the most unfavorable conditions encountered in homes, clubs or public eating places.

In detail my machine comprises a rectangular open top main tank with a vertical partition 3 dividing the main tank into a rectangular dish-washing tank 1 and a rectangular rinse tank 2. An inner wall is positioned in spaced opposed re-

lation to wall 3 adjacent thereto, which inner wall is vertically divided about centrally thereof into portions 4, 5. An inner wall 6 is positioned in spaced opposed relation to end wall 7 of the main tank. These two inner walls are within the dish-washing tank and accordingly form two opposite inner end walls of said tank, while the other two opposite walls 8 and 9 comprise portions of the rear and front main walls of the tank.

Referring to the portions 4 and 5 which make up one inner end wall of the dish-washing tank adjacent wall 3, the portion 5 is perforated in its face as at 10. The portion 4 is secured along one side edge to front wall 9 of the tank and along its opposite edge it is bent at right angles to form a flange 11 that is secured along its free edge to wall 3.

The inner wall 6 extends between walls 8, 9, and is secured along its side edges to said side walls. The inner walls 4, 5, and wall 6, are similarly outwardly inclined at their upper ends to respectively connect with wall 3 and wall 7 respectively, at their upper edges the portion 4 and inner wall 6 being secured along their upper edges to the walls 3 and 7 respectively, walls 6, 7 being integral, if desired, as indicated in Fig. 2. The portion 5 is provided with flanges along its side edges, similar to flange 11 on portion 4, that closely fit against the flange or wall 11 of portion 4 and the wall 8 of the tank respectively, one or both of the walls 11 and 8 being provided with projections as at 12 adapted to fit in an upwardly inclined slot or slots 13 provided along the free edges of the flanges on portion 5, thus removably securing portion 5 in position with its outer exposed surface flush with the outer exposed surface of portion 4. The portion 5 is easily removed by merely lifting it vertically, and it is guided into position by co-action between the aforesaid slot or slots 13 and projections 12 when dropped in place.

From the foregoing it is seen that an enclosed vertically extending space is provided between the walls 3, 7 and inner walls 4, 6, respectively.

A short distance above the bottom 14 of tank 1, the portion 4 forming part of the inner wall at one side of the washing tank, and the inner wall 6 opposite thereto, are respectively provided with elongated horizontally extending slots relatively wide, or openings 15, 16, which will be referred to as "discharge openings" since that is the function they perform, as will be later described.

Discharge opening 15 preferably extends from wall 9 to substantially halfway across the tank toward wall 8, while opening 16 preferably extends from wall 8 to substantially halfway across the tank toward wall 9. These openings are consequently of about equal length, and they are also of substantially the same dimensions and at substantially the same distance from the bottom of the tank.

Supported on the bottom of tank 1 is a frame generally designated 17 in the general form of a relatively wide inverted channel strip having depending flanges 18, 19, along opposite sides that rest on the bottom of the tank along their lower edges. This frame is disposed diagonally across the tank 1 so that flange 18 extends from wall 4 at a point directly below the inner end of slot 15 to the corner formed by walls 6 and 8, and flange 19 extends from wall 6 at a point directly below the inner end of slot 16 to the corner formed by walls 4 and 9. These flanges are connected at their upper edges by a hori-

zontally extending plate 20 and extending from opposite ends of flange 18, and connected thereto at opposite ends is a horizontally disposed right angle strip 21 extending along walls 8 and 5 and fitting the corner formed by said walls. This angle strip is hingedly connected by hinges 21' to wall 8, thus allowing the frame 17 to be swung upwardly against side 8 for cleaning the bottom of tank 1.

The center of the bottom 14 is provided with an opening in which is fitted an inverted funnel-shaped portion 22 of a casting 22' having a horizontal flange 23 around the lower edge of said funnel-shaped portion, which flange engages the lower side of the bottom around the edge of said opening. This flange is bolted against the bottom by bolts 24. The casting 22' is provided with a central vertical opening extending through the apex of the funnel through which a vertical shaft 25 extends. This shaft also extends through a stuffing box 26 on the underside of the casting around said opening. The upper end of said shaft 25 is threaded to threadedly engage the hub of a two-bladed screw propeller 27, the blades 29 of the propeller being relatively wide and the propeller being wholly disposed below the horizontal plane of plate 20, which plate has a large, elongated central opening 28 therein of appreciably greater dimensions than the overall dimensions of the propeller. A wire screen 29' is supported on lugs 29'' above and free of the propeller, spaced above plate 20 so as to avoid interference with the propeller if the screen sags. The shaft 25 extends below the aforesaid casting through a bearing 30 provided thereon and at its lower end is provided with a pulley 31 adapted to receive a belt 32 connecting with a pulley 33 of the shaft of an electric motor 34, said motor being secured to a cross-brace 35 extending between supporting legs 36 of the main tank. The motor is inverted with the pulley lowermost so as to keep the motor as close to the tank as is possible and to facilitate changing the pulleys if it is desired to modify the ratio between pulleys.

From the foregoing it is seen that the propeller in the bottom of the dish-washing tank is disposed within a horizontally extending channel formed by the flanges 18, 19, the opposite ends of which channel extend to the lower ends of walls 4 and 6 adjacent diagonally opposite corners of tank 1. The lower ends of walls 4 and 6 respectively are cut away at the ends of said channel as at 37, 38. Extending from the inner end of the opening 37 in the lower end of wall 4, which opening is approximately the same size as opening 15, a rib or strip 40 extends upwardly to the inner end of opening 15 and across the top thereof to wall 9, thus providing a vertically extending conduit between walls 3 and 4 from opening 37 to opening 15, and a rib or strip 40' extends from one end of the lower opening 38 in wall 6 to the inner end of opening 16 in said wall and continues around the top of the opening 16 to wall 8, thus providing a similar vertical conduit between opening 38 and opening 16.

The bottom 14 of the washing tank 1 is generally inclined toward the corner covered by the perforated plate or portion 5, and a drain opening is provided in said corner adapted to removably receive the lower end of an open-ended vertical pipe 43, which pipe extends at its upper end to a short distance below the inclined upper end of the portion 5. This pipe accord-

ingly determines the maximum water level of the water in tank 1, and a pipe (not shown) connects with the drain opening and sewer.

Adjacent pipe 43 is a vertical pipe 44 that extends at its upper end above the upper end of pipe 43 and terminates in an open lower end at a point spaced somewhat above the bottom 14. This pipe 44 is secured against wall 3 and at its upper end is provided with a laterally directed opening that communicates with an opening 45 in wall 3 at a point spaced above the upper open end of the pipe 43. Thus water in the main tank will pass into the wash tank when displaced by a basket of dishes being placed in the rinse tank and this water is introduced into the washing tank at a point below the water level in the washing tank. Or water may be introduced in the rinse tank until it rises to opening 45 to pass into the washing tank.

Screen 29' in the bottom of the washing tank has already been mentioned. This screen is provided with vertically extending handles 46 at opposite sides, which handles terminate at their upper ends above the water level in the washing tank. The screen 29' may have an upstanding margin forming the frame for the screen, which frame fits closely within the area defined by the walls of the washing tank. Thus the refuse from the dishes that will not pass through the mesh of the screen will be caught by the screen and can easily and quickly be removed by lifting the screen out of the washing tank and jarring or knocking the refuse from the screen. The fact that the propeller draws the water downwardly through the screen results in holding the refuse by suction against said screen and thus keeps the circulating water free of refuse.

Referring now to the rinse tank, the walls adjacent wall 3 are designated (front) 48, (back) 49, and the end opposite wall 3 is designated 50. These walls 48 to 50 are double and have heat insulation, such as asbestos, etc., therebetween, as indicated at 51.

The bottom 52 of the rinse tank is raised above the level of the bottom 14 of the washing tank, and gas burners 53 are disposed therebelow to heat the water in the tank to the desired temperature. Steam coils or electrical heating may, of course, be used if desired, although for small installations burners are most convenient.

A drain opening 54 is provided in one corner of the rinse tank and the bottom may slightly incline toward said opening, and an ordinary removable plug is used in said opening. Both the drain opening 54 and the drain opening in the washing tank connect with a sewer or drain pipe, not shown.

At the bottom of the rinse tank is a screen 55 removably hinged along one edge to side 48 as at 56 and at the opposite edge the screen is supported in normally slightly inclined position on a laterally extended end 57 of a vertically disposed rod 58. Rod 58 extends upwardly along a side of the tank and then is doubled on itself, passing through an opening 59 in a shelf 59' at the top of the tank, and downwardly as at 58' along the outer side of the tank to pivotally connect at its lower end to one end of a bell crank 60. The crank 60 is pivoted to the side of the tank intermediate its ends and at its end opposite the connection with rod 58' it is pivotally connected to one end of a rod 60', the opposite end of said rod connecting with the end of a handle 61, said handle being on a water valve 61' for turning and opening the valve upon move-

ment of the screen from its inclined to horizontal position. A coil spring 63 connecting at one end to an end of the bell crank normally maintains the rod 58 in a position so as to yieldably support the screen 55 slightly tilted and also to urge the crank to close the valve 61' against passing water.

Valve 61' is in a water supply pipe 62 and just behind the valve in the same water supply is a needle valve 80 that adjustably regulates the flow of water from valve 80 for passage through valve 61'.

Water supply pipe 62 connects with a main supply pipe 67 at one end and at the opposite end connects with pipe connections 68 which open through a fitting 69 into the upper end of the rinse tank.

In view of the above description, it will be seen that when a basket of dishes is lifted from the washing tank and deposited into the rinse tank, the weight of the dishes on screen 55 will depress the screen to a horizontal position and thus actuate the water valve 61' whereby water is automatically admitted to the rinse tank, in an amount regulated by valve 80, which water will pass into the washing tank upon rising to opening 45 in the overflow pipe between the two tanks. The water in the rinse tank being heated by the burners, affords a supply of hot water to the washing tank and when the dishes are lifted out of the rinse tank the flow between the tanks automatically ceases. Of course it is obvious that a treadle or other means may be used to operate the water valve 61', the idea broadly being to operate the valve by operation of the rinsing operation after the dishes are washed.

It will also be noted that merely by pressing downwardly on the upper end of rod 58, we may manually open valve 61' to fill the washing tank and rinse tank simultaneously with hot water, the water being heated in the rinse tank. There being no insulation between the washing and rinse tanks, the washing tank thereafter is kept hot through both the admission of hot water to the washing tank through opening 45 and by circulation of heat through wall 3.

Since screen 55 is only supported on the top of hook 57, the screen may be pivotally lifted to lie alongside wall 48 for cleaning the bottom of the rinse tank, or if desired the screen can be lifted from the hinges 56 to entirely remove it from the rinse tank.

The main water supply pipe 67 connects between the water main and a cross branch 70, which cross branch has manually operated valves 71, 72 at opposite ends thereof disposed in front of the washing and rinse tanks as indicated in Fig. 1. From valve 71 the heretofore mentioned pipe 68 leads to the fitting 69, so that a manual injection of water into the rinse tank may be had as desired without operating screen 55.

From valve 72 a pipe 73 leads to a portion of fitting 69 that has a separate outlet 73' adapted to discharge water into the dish-washing tank, thereby providing manual control for injecting water into the dish-washing tank as desired.

The basket used for dishes is a wire basket substantially the same in shape and size as the screen 29' except that the mesh is much larger to permit refuse to pass therethrough and onto the screen 29' and it is provided with high screen sides for retaining the dishes in position therein. The dish basket has handles similar to the handles of screen 29' for lifting the basket from one

tank to the other, this basket not being shown since it is deemed unnecessary.

When the dishes are in the basket and in the dish-washing tank, the discharge slots 15, 16, are adapted to eject the water upwardly toward and between the dishes, such as large plates set edge-wise or transversely of the plane of the slots 15, 16. Thus no portion of the dishes is out of the maximum force of the water and a complete scouring takes place.

The walls 6 and 4 may, of course, be terminated immediately above openings 15, 16, if desired, and the connection between openings 15, 37 and 16, 38, respectively, may be separately formed U-shaped conduits, but the structure shown is economical to make and provides a washing tank with straight sides, the tapered upper ends of walls 4 and 6 greatly assisting in quickly guiding the dish basket into place.

One point in particular is to be considered in this invention. High pressure injection nozzles for spraying the dishes are of no value in this invention. We have found that one of the most essential things is to provide for circulating the body of water in the washing tank bodily as rapidly as is possible, and by disposing the openings 15, 16, as shown relative to the propeller and channels leading therefrom, the body of water is moved into and out of the tank and through the dishes many times without splashing and yet the dishes are scoured clean in a minimum of time.

Having described our invention, we claim:

1. Apparatus for washing dishes comprising a tank for water having a bottom and sides, a horizontal screen positioned adjacent the bottom of the tank spaced thereabove for supporting dishes thereon, a power driven propeller positioned between the screen and bottom arranged and adapted for drawing water in the tank downwardly through the screen upon actuation thereof, a generally vertically extending relatively short conduit at one side of the tank terminating at its lower and upper ends respectively in laterally directed inlet and outlet openings communicating with the interior of the tank, said inlet opening being positioned adjacent the bottom of the tank below the level of the screen and the outlet opening being positioned above the level of the screen and closely adjacent thereto, a pair of spaced opposed walls, other than the lateral sides of the tank, extending from opposite lateral side edges of said inlet opening, said pair of opposed walls being disposed over the bottom of the tank, and below said screen and past the propeller at opposite sides thereof for directing water drawn downwardly by the propeller toward said inlet opening.

2. Apparatus for washing dishes comprising a tank for water having a bottom and including two opposed flat side walls, a horizontal dish supporting screen positioned adjacent the bottom of the tank and spaced thereabove, a horizontally disposed power driven propeller disposed between the screen and bottom arranged and adapted for drawing water in the tank downwardly through the screen upon actuation thereof, a relatively short generally vertically extending conduit disposed adjacent each of the opposed flat side walls of the tank, each of the conduits terminating at its lower end in a laterally directed inlet communicating with the space between the bottom and screen and opening toward the propeller and said conduits terminating at their upper ends in outlets commu-

nicating with the inside of the tank adjacent the upper side of the screen whereby water drawn downwardly by the propeller will be deflected by the bottom toward the inlet openings for passing into the conduits and out of the outlet openings, said outlets being arranged to direct water ejected therethrough in a lateral and upward direction toward the flat side of the tank opposite thereto, and said outlets being horizontally offset relatively and the flat side of the tank directly opposite each outlet being imperforate whereby water ejected from each of the outlets respectively will be deflected by the imperforate flat side directly opposite thereto.

3. In a construction as defined in claim 2, said outlets being positioned wholly below a horizontal plane disposed midway between the upper and lower ends of the tank and means for maintaining the normal water level in the tank at an elevation above such plane.

4. Apparatus for washing dishes comprising a tank for water having a bottom and including two opposed flat side walls, a horizontal dish supporting screen positioned adjacent the bottom of the tank and spaced thereabove, a power driven propeller disposed between the screen and bottom arranged and adapted for drawing water in the tank downwardly through the screen upon actuation thereof, a relatively short generally vertically extending conduit disposed adjacent each of the opposed flat side walls of the tank, each of the conduits terminating at its lower end in a laterally directed inlet communicating with the space between the bottom and screen and terminating at its upper end in an outlet communicating with the inside of the tank adjacent the upper side of the screen, said outlets being arranged to direct water ejected therethrough in a lateral and upward direction towards the flat side of the tank opposite thereto, and said outlets being horizontally offset relatively and the flat side of the tank directly opposite each outlet being imperforate whereby water ejected from each of the outlets respectively will be deflected by the imperforate flat side directly opposite thereto, a pair of spaced opposed walls extending across the bottom of the tank past opposite sides of the propeller to opposite side edges of the inlets for guiding water drawn downwardly by the propeller to said inlets, said propeller being positioned substantially midway between said opposed flat sides.

5. Apparatus for washing dishes comprising a tank for water having a bottom and including two opposed flat side walls, a horizontal dish supporting screen positioned adjacent the bottom of the tank and spaced thereabove, a power driven propeller disposed between the screen and bottom arranged and adapted for drawing water in the tank downwardly through the screen upon actuation thereof, a relatively short generally vertically extending conduit disposed adjacent each of the opposed flat side walls of the tank, each of the conduits terminating at its lower end in a laterally directed inlet communicating with the space between the bottom and screen and terminating at its upper end in an outlet communicating with the inside of the tank adjacent the upper side of the screen, said outlets being arranged to direct water ejected therethrough in a lateral and upward direction toward the flat side of the tank opposite thereto, and said outlets being horizontally offset relatively and the flat side of the tank directly opposite each outlet being imperforate whereby water ejected from

5 each of the outlets respectively will be deflected by the imperforate flat side directly opposite thereto, guide means on the bottom of the tank arranged for directing water drawn downwardly by the propeller toward said inlets for passage through the conduits and ejection back into the tank through said outlets, and the lateral sides

of the tank other than said two opposed flat side walls being imperforate whereby the water drawn downwardly by the propeller will be ejected back into the tank through the two outlets only.

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