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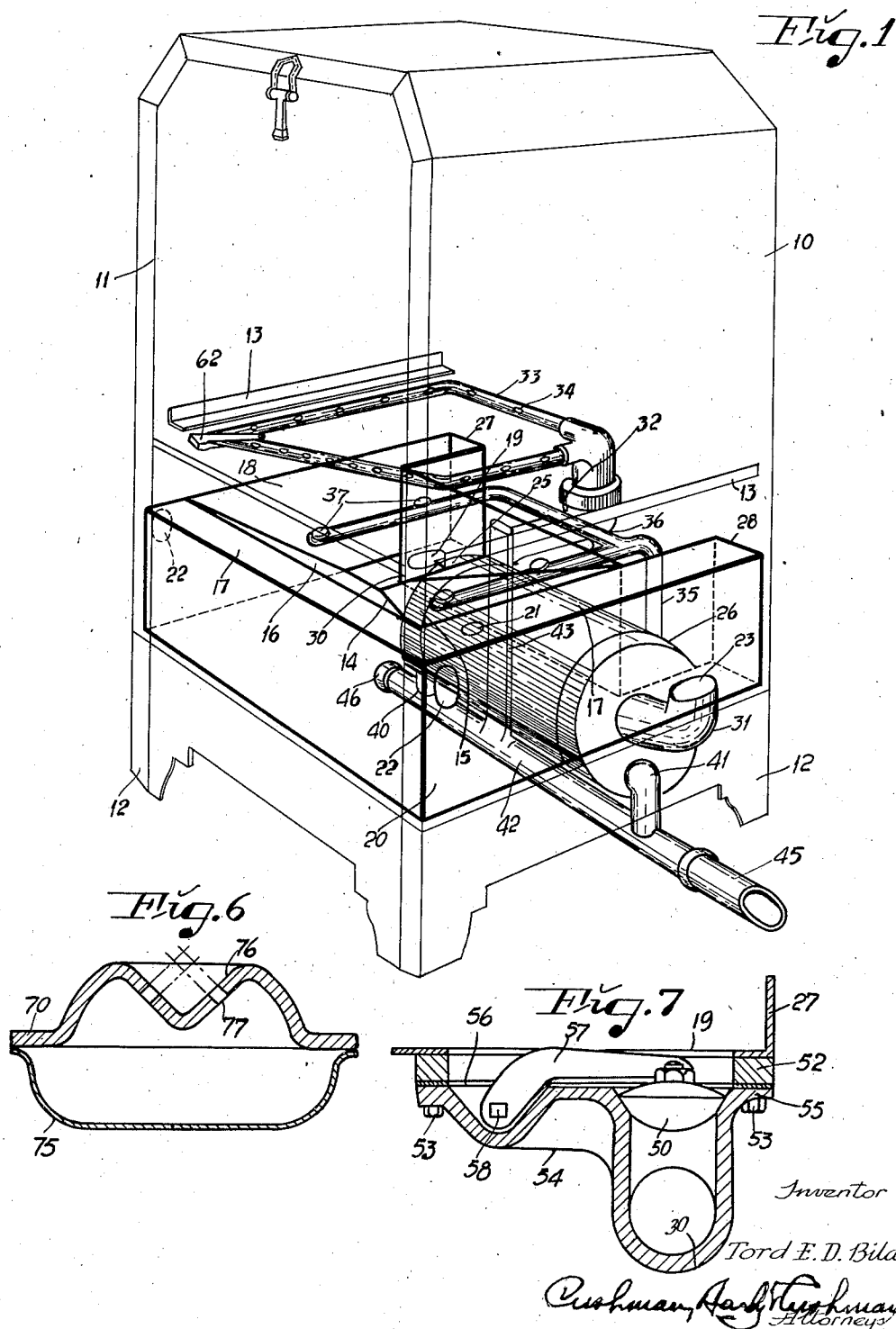
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2,201,284

DISH-WASHING MACHINE

Filed Nov. 24, 1937

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

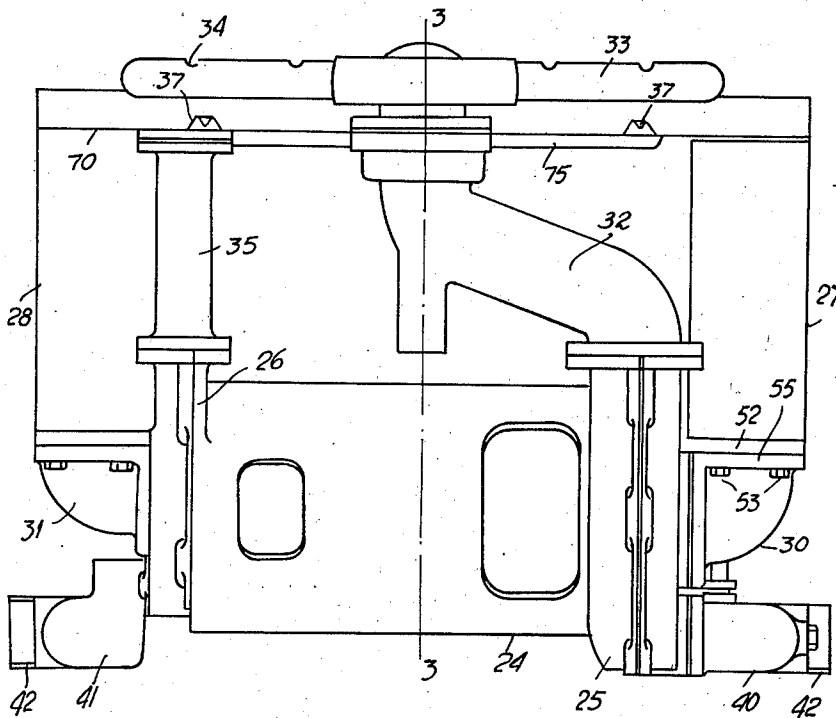


Fig. 2

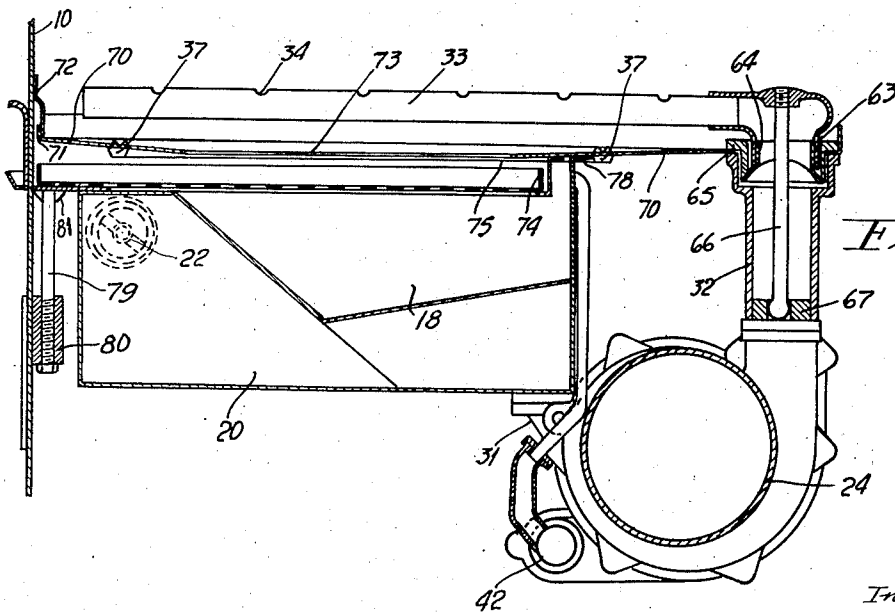


Fig. 3

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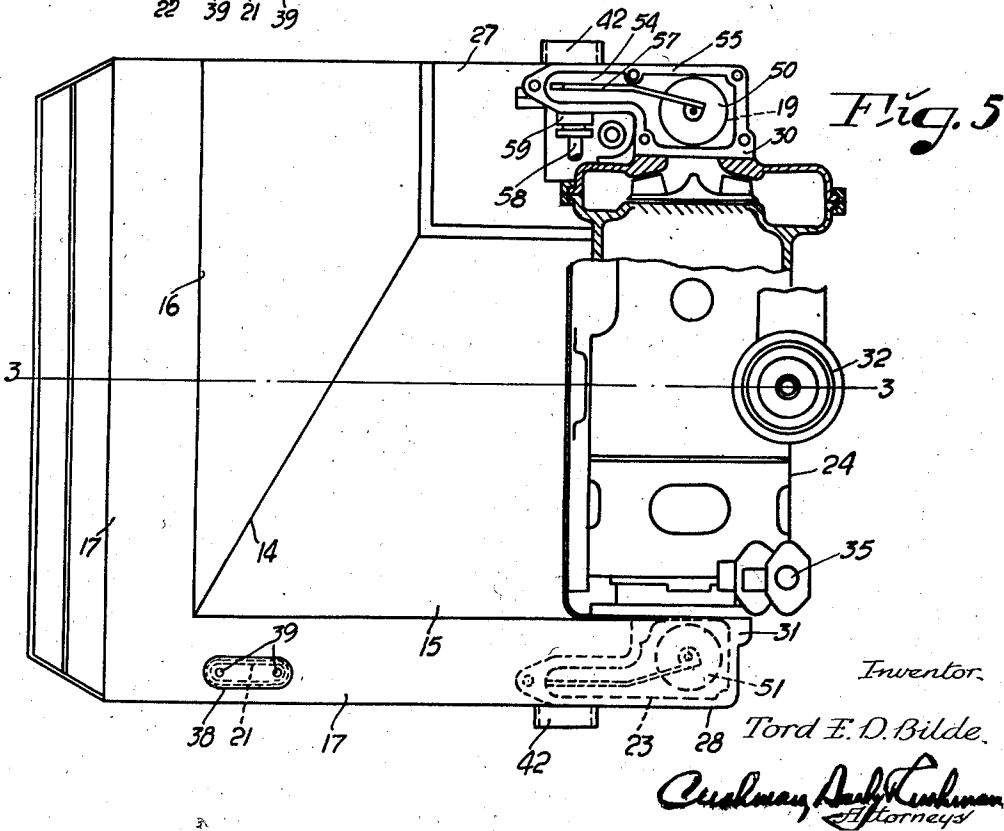
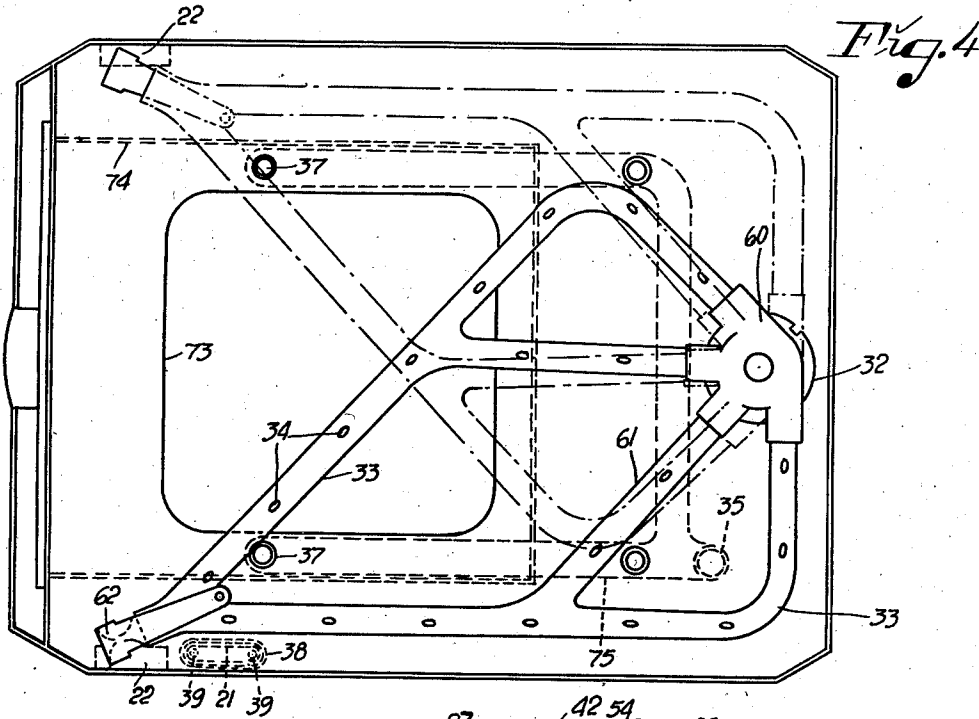
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UNITED STATES PATENT OFFICE

2,201,284

DISH-WASHING MACHINE

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In Sweden November 30, 1936

6 Claims. (Cl. 141—9)

The present invention relates to dish-washing machines, especially for domestic purposes, having two tanks, one for washing liquid and the other for rinsing liquid, and more particularly to dish-washing machines of this type having separate spraying systems for the washing and rinsing liquids, each system comprising one of said tanks and a pump.

The principal object of the invention is to provide a dish-washing machine of the class described in which the tanks take up a small space, have small heat transmitting surfaces and permit short connecting conduits between pumps and tanks.

Another object of the invention is to provide a dish-washing machine of the class described in which, in spite of the compactness of the tanks, the rinsing tank has a volume sufficiently large to ensure an effective rinsing of the dishes while circulating the rinsing liquid only one time.

These and further objects will be apparent according as the following description proceeds, reference being had to the accompanying drawings in which an embodiment of the invention is illustrated by way of example.

In the drawings:

Figure 1 is a perspective phantom view of a dish-washing machine according to the invention;

Fig. 2 is a side view of the lower portion of the machine on an enlarged scale;

Fig. 3 is a vertical sectional view along the line 3—3 in Figs. 2 and 5;

Fig. 4 is a plan view of the lower portion of the machine;

Fig. 5 is also a plan view of said lower portion, the spraying devices as well as a partition forming the bottom of the spraying compartment being omitted;

Fig. 6 is a sectional view on an enlarged scale of a nozzle for rinsing liquid; and

Fig. 7 is a sectional view on an enlarged scale of a suction valve of the washing liquid pump.

With reference especially to Fig. 1, reference numeral 10 designates a casing enclosing the dish-washing machine and having substantially the form of a right-angled parallelepiped with a door 11 and four feet 12. The two spraying systems of the machine for washing liquid and rinsing liquid are in their entirety located in the lower portion of the machine casing, whereas the upper portion thereof forms a spraying compartment. A basket or the like supporting the dishes and introduced on guides 13 into said spraying compartment will be sprayed exclu-

sively from below with washing liquid as well as with rinsing liquid.

The spraying systems comprise each a motor driven pump, a liquid tank and a spraying device. As shown especially in Figures 1 and 5, the two tanks for washing and rinsing liquid form part of a common receptacle of substantially parallelepipedic shape but for two lateral wings 27 and 28. An inclined partition 15 extends from a horizontal top border 17 along the front edge of the receptacle towards the bottom of the wing 27, said partition being welded to the left-hand side wall of the receptacle, and another inclined partition 16 extends from the horizontal top border 17 along the right-hand edge of the receptacle towards the bottom of the wing 27, said partition being welded to the rear side wall of the receptacle. The two partitions 15, 16 are welded to each other along a contiguous edge 14. By these partitions 15, 16 an open washing tank 18 is formed by side and bottom walls of wing 27, partitions 15, 16 and part of left-hand and rear side walls of the receptacle and a closed rinsing tank 20 by top, side and bottom walls of wing 28, partitions 15, 16, borders 17, 17 front and right-hand side walls and part of left-hand and rear side walls of the receptacle and bottom wall thereof. Thus, the partitions 15, 16 form bottom wall of the washing tank 18 and top wall of the rinsing tank 20. By building together the two tanks in this manner a compact design is obtained and further it is possible during a relatively long time to maintain the temperature of the warm liquid, usually water, within the two tanks due to the heat transmitting surface being reduced to a minimum. Provided in the bottom wall of wing 27 of the washing tank 18 is an outlet 19 and in the bottom wall of wing 28 of the rinsing tank 20 an outlet 23. On account of the inclination of the partition 15, 16 the washing liquid gets a favorable flow towards the washing pump. The outlets 19 and 23 are arranged at places where the depth of liquid in the respective tank is greatest facilitating the charging of the pumps. The rinsing tank 20 has a charging opening 22, or preferably such an opening is arranged on each side of the machine (Fig. 4) to permit connection by shortest possible conduit with a domestic water conduit disposed at right-hand or left-hand side thereof. Another opening 21 is provided in the top border 17 of the rinsing tank 20, said opening serving as over-flow to the washing tank 18. Consequently, the rinsing tank 20 is wholly closed but for the over-flow 21, one or more charging

openings 22 and the outlet 23 to the suction conduit of the pump. Thereby the advantage is gained that the rinsing liquid becomes wholly insulated and, thus, free from impurities and infectious matter.

The opening 21 may be covered by a disk 38 resting loosely on the borders thereof and guided therein by guiding pins 39 (see Figs. 4 and 5). This disk represents a safety means to eliminate any possibility of communication in the direction from the washing tank to the rinsing tank which is of importance to attain a hygienic washing.

The housing 24 of an electric motor and the housings 25 and 26 of the washing and rinsing pumps located one on either side of the motor are, as shown, built together to form a unit disposed between the wings 27 and 28 of the washing tank 18 and the rinsing tank 20, respectively. By providing the tanks with such projecting wings which is rendered possible by the tanks being built together in the above said manner a symmetric and simple connection of said tanks with the motor pump unit is obtained in the following manner.

Communicating with a central inlet opening of each pump is rigid conduit 30 and 31, respectively, fixed to the motor pump unit and having its free opening connected to the outlet 19 or 23 at the bottom of the wing 27 or 28, respectively. In this manner these wings form part of the suction conduit of the respective pump. Communicating with a peripheral outlet of the washing pump is a pipe 32 communicating with the spraying device for washing liquid which latter is shown to comprise a spray pipe 33 swinging to and fro and having outlet holes 34. Communicating with a peripheral outlet of the rinsing pump is a pipe 35 communicating with the spraying device for rinsing liquid which latter is shown to comprise a stationary fork-shaped spray pipe 36 having outlet nozzles 37.

At their lowest point the pumps are each provided with an outlet pipe 40 and 41, respectively, which pipes are connected with a common discharge pipe 42. Communicating with said discharge pipe 42 is also an overflow pipe 43 extending from the top of the washing tank. The discharge pipe 42 is adapted to be emptied at the right-hand side of the machine (see Fig. 1), a discharge conduit, e. g., a rubber hose 45, being connected with the right-hand end of said pipe through which conduit the liquid may be discharged, e. g. into a sink-hole in a drain board, whereas a plug 46 or the like is inserted into the left-hand end of the pipe. By interchanging the plug 46 and the hose 45 the machine may be adapted to be emptied at its left-hand side.

The rigid conduits 30 and 31 are each directly connected with the central inlet of the corresponding pump and has the shape of an elbow with a wholly free passage (see Figs. 2 and 5). At its free end the conduit is formed to provide a seat for a flap valve having a spherical valve body 50 and 51, respectively. Similar valves (not shown) may be provided in the outlet pipes 40 and 41 of the pumps.

The conduits 30 and 31 have an upper lateral extension 54 and a flange 55 extending around the upper edge thereof (see Figs. 5 and 7), the openings 19 and 23 at the bottom of the wings of the tanks corresponding in shape to the upper opening 56 of the conduits 30 and 31. The openings 19 and 23 are adapted each to enclose the valve body 50 and 51, respectively, as well as

an operating arm 57 connected thereto and having secured to its opposite end a shaft 58 passing through a stuffing box 59 in the extension 54 (thus not in the wall of the tank). On mounting, the whole motor pump unit together with conduits 30 and 31, valves 50 and 51 and operating arms 57 are secured to the tank wings 27 and 28 by screws 53 passing through the flange 55 of the conduits 30 and 31 and a corresponding supporting flange 52 on the wings (see also Fig. 2).

As shown in Fig. 4, the spray pipe 33 for washing liquid has the shape of a quadrangle having an obtuse angle, an opposite acute angle and the other angles substantially right, two additional spray pipes 61 extending from a distributing chamber 60 arranged at the obtuse angle of the quadrangle and connected with the sides thereof embracing the acute angle. As shown in the figure which by full and chain-dotted lines illustrates the spray pipe 33 in the two end positions thereof, this shape of the spraying device permits an effective spraying of the hole cross section of the spraying compartment. Provided at the acute angle of the quadrangle is a reversing nozzle 62 of any known type.

The distributing chamber 60 has a downwardly extending tubular piece 63 (see Fig. 3). Screwed into said piece is a sleeve 64 having a spherical surface bearing on a conical valve seat 30 on a socket 65 screwed into the pipe 32. The spray pipe 33 is further guided by a pin 66 secured to and extending downwardly from the wall of the distributing chamber 60 and mounted in a bushing 67 in the pipe 32. On account of the axial pressure arising on operation of the washing pump the bearing surface on the sleeve 64 is pressed against the valve seat on the socket 65 thereby ensuring good tightening. On the other hand the spherical shape of said bearing surface permits a certain adjustability of the spray pipe 33 without the tightening effect being reduced.

Provided above the two tanks is a plate 70 forming the bottom of the spraying compartment. This plate engages by an upwardly extending peripheral flange 71 the space between the casing 10 and a downwardly extending flange 72 secured thereto (see Fig. 3), the tanks 18 and 20 being secured to said plate, for instance by soldering as shown at 78. The motor pump unit together with the tanks and the plate are kept in position by means of threaded bolts 79 screwed into fittings 80 secured to the casing 10 and guided in guidances 81 fixed to the plate 70 or any part connected thereto. Provided in the plate 70 is an opening 73 communicating with the open washing tank 18, and provided below said opening is a removable strainer 74.

According to Figs. 2, 3 and 4 the pipe 36 for rinsing liquid as shown in Fig. 1 has the form of a duct 75 fixed to the underside of the plate 70. The rinsing nozzles 37 are rigidly connected to the plate 70 and consist of projections pressed up in said plate at suitable places above the duct 75, said projections having a central conical depression 76 (see especially Fig. 6) and two opposite holes 77 the diameter of which is not essentially smaller than the thickness of the plate 70. On account of this shape of said nozzles the rinsing liquid will be atomized into a fine rain or drizzle causing an effective rinsing of the dishes by means of a relatively small volume of rinsing liquid.

The operation of the machine is as follows:

Through the charging opening 22 the machine is filled with any suitable liquid, usually warm

water. Thereby the rinsing tank 20 is first filled with liquid, and when said tank is full, the water flows through the overflow 21 into the washing tank 18 which is filled up to the overflow 43.

When water begins to escape through the rubber hose 45, the machine is filled with liquid. The dishes are placed in a suitable basket which, sliding on the guides 13, is inserted into the spraying compartment, whereafter the door 11 is closed. Valve 50 is opened, valve 51 closed and the valve in outlet pipe 40 is closed. The motor is started causing the washing pump to be set into function whereby the dishes are sprayed from below by a plurality of efficacious water jets issuing through the holes 34 in the spray pipe 33 which by the reversing nozzle 62 is brought into the spraying swinging motion. Washing liquid from the spraying compartment is returned to the washing liquid tank 18, impurities being collected on the strainer 74. Consequently, the dishes will be sprayed repeatedly by one and the same washing liquid. When the washing is considered to be completed, valve 50 is closed, valve 51 opened, and the valve in outlet pipe 41 is closed. Thereby the rinsing pump is set into operation resulting in the dishes being sprayed by pure water from the rinsing tank 20 in the form of a fine drizzle. Rinsing liquid is not returned to the rinsing tank but through the strainer 74 to the washing tank 18 which now begins to empty itself through overflow 43 and discharge pipe 42. Consequently, the rinsing liquid is used only one time which is of advantage for obtaining a hygienic rinsing action. When the rinsing tank is empty, the rinsing is completed, whereafter the clean dishes may be removed from the machine.

What I claim is:

1. In a dish-washing machine, separate tanks for washing liquid and rinsing liquid, the washing tank being open at its top and the rinsing tank closed at its top, said tanks being situated side by side but superposed in such manner that the bottom wall of the washing tank forms top wall of the rinsing tank.

2. In a dish-washing machine, a liquid receptacle of substantially parallelepipedic shape and having an upper opening, and a wall in said receptacle inclined to horizontal and extending from an edge of the opening towards the bottom of the receptacle, said wall dividing the receptacle into two separate compartments and extending substantially diagonally of the receptacle and being securely connected with two side walls and the bottom wall thereof, an open compartment for washing liquid having said wall as bottom wall and a closed compartment for rinsing liquid having the wall as top wall.

3. In a dish-washing machine, a liquid receptacle of substantially parallelepipedic shape and having an opening of substantially rectangular shape, two walls in said receptacle inclined to horizontal, each wall extending from one of two

adjacent edges of said opening towards the common opposite corner of the receptacle, the walls dividing the receptacle into two separate compartments each of said walls extending substantially diagonally of the receptacle and being securely connected with two side walls and the bottom wall thereof, thus forming an open compartment for washing liquid having said walls as bottom wall and a closed compartment for rinsing liquid having the walls as top wall.

4. In a dish-washing machine, a liquid receptacle of substantially parallelepipedic shape and having an upper opening of substantially rectangular shape, a wall in said receptacle inclined to horizontal and extending from an edge of said opening towards the bottom of the receptacle, said wall dividing the receptacle into two separate compartments, each of said walls extending substantially diagonally of the receptacle and being securely connected with two side walls and the bottom wall thereof an open compartment for washing liquid having said wall as bottom wall and a closed compartment for rinsing liquid having the wall as top wall, an overflow from the rinsing tank to the washing tank and another overflow from the washing tank to waste.

5. In a dish-washing machine having in combination two spraying devices, one for washing liquids comprising a pump, a tank open at its top, a spraying device, and connections between said tank, pump and spraying device, and the other for rinsing liquid including a rinsing tank closed at its top, a rinsing pump, a rinsing spraying device and connections between said rinsing tank, pump and spraying device, said tanks being situated substantially side by side but superposed in such a manner that the bottom wall of the washing tank forms the top wall of the rinsing tank, means to connect the suction side of each pump with an opening in the corresponding tank located at a place of the latter where the depth of the liquid is greatest, and a valve in each opening for controlling the flow of liquid between its associated tank and pump.

6. A dish-washing machine having in combination a casing, an apertured partition in said casing, dividing the same into an upper chamber and a lower chamber, a spraying system for washing liquid comprising a pump and an open tank both located in said lower chamber, a spraying device located in said upper chamber, connecting means between said tank, pump and spraying device, a rinsing spraying system for rinsing liquid comprising a rinsing pump and rinsing tank both located in said lower chamber, spraying means formed in said partition, the washing tank communicating with the aperture in said partition and having its bottom wall adapted to form the top wall of the rinsing tank, and connecting means between said rinsing tank, pump and spraying means.

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