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2,808,842

APPARATUS FOR WASHING DISHES

Filed Dec. 17, 1954

2 Sheets-Sheet 1

FIG-1

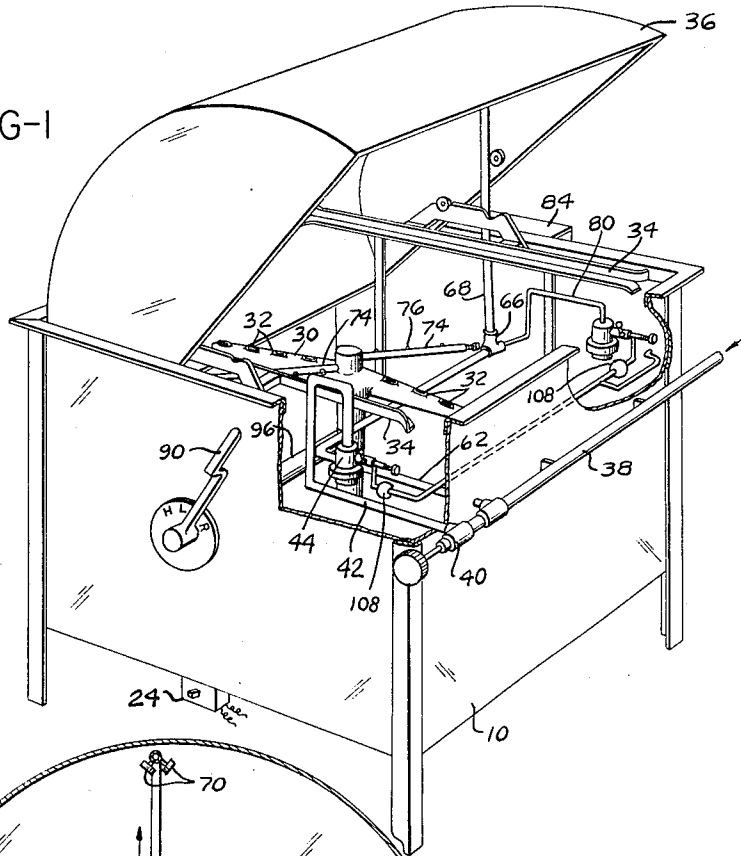
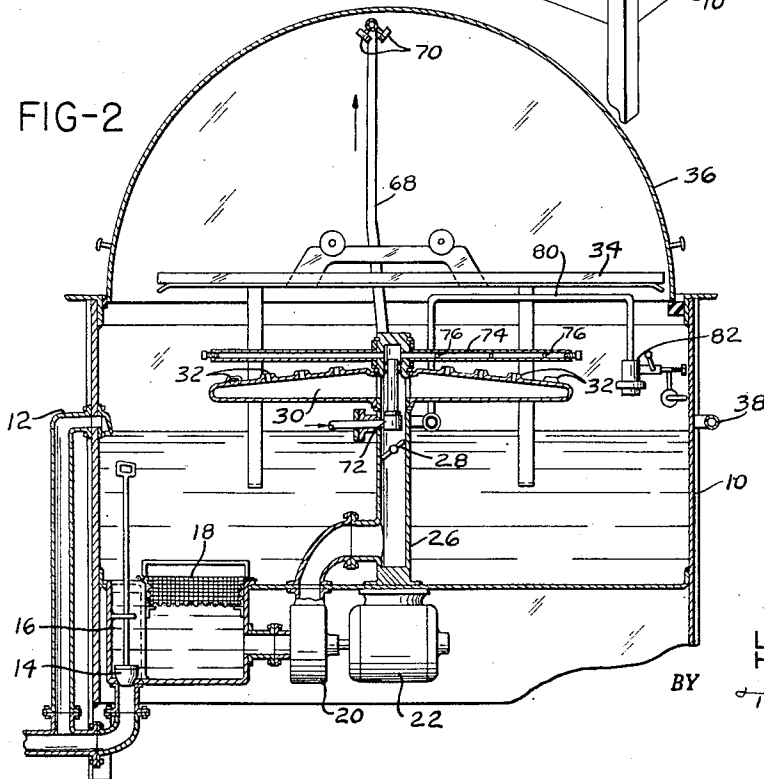


FIG-2



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FIG-3

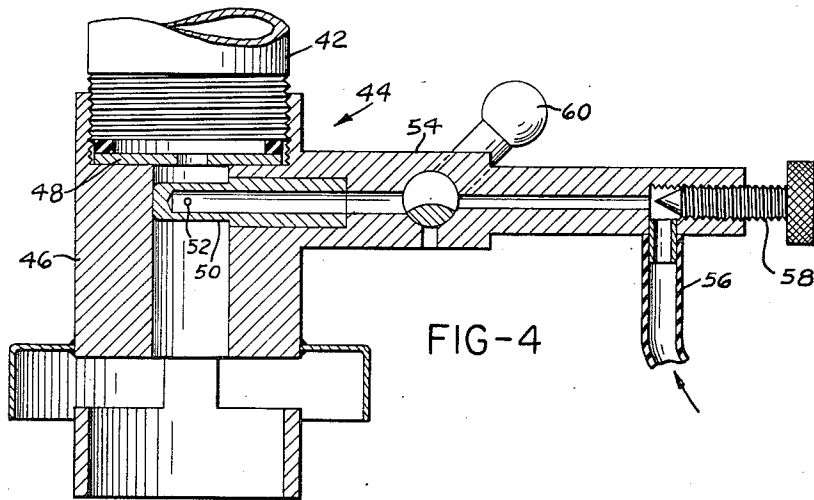
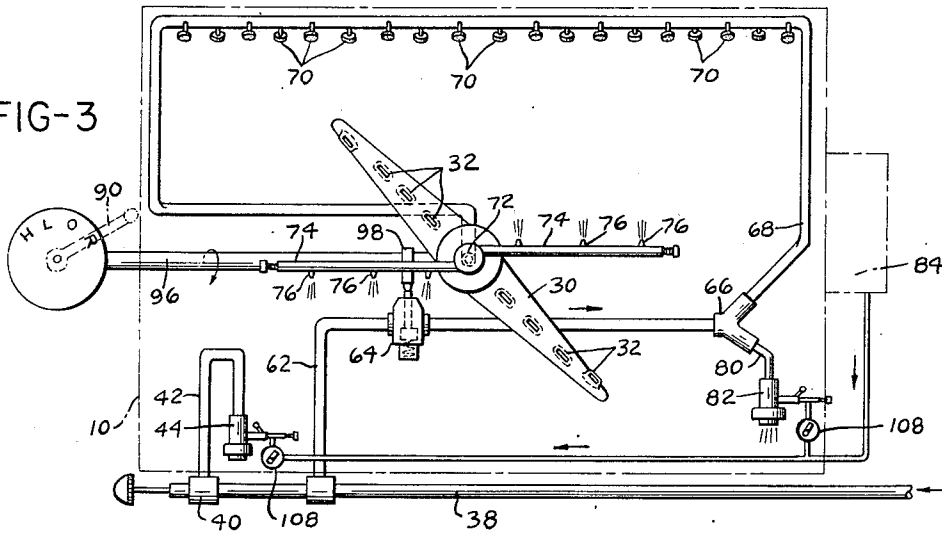


FIG-4

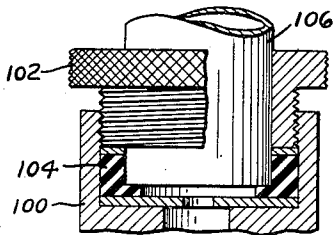


FIG-5

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## APPARATUS FOR WASHING DISHES

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Application December 17, 1954, Serial No. 476,047

6 Claims. (Cl. 134—101)

This invention relates to a washing device, and is particularly concerned with a dishwasher.

Dishwashers are well known devices, particularly in connection with restaurants and other public eating establishments, and are extremely important pieces of equipment.

In connection with dishwashers utilized under these circumstances, however, the dishwasher is in substantially continuous service rather than being intermittently used as a dishwasher would be in the home. Because of the substantially continuous cycle on which such a commercial dishwasher operates, it is a matter of economy to retain the same body of wash water in the washer as long as possible.

The dishwashing cycle, in addition to washing the dishes with the body of water containing soap or detergent, includes a spraying or rinsing operation with clear hot water which, at one time, washes the soapy water off the dishes and also gets them hot enough that they will dry quickly when removed from the washer.

In the operation of the usual type dishwasher further clear water is added to the body of wash water so that, over a period of time, the concentration of the soap in the body of wash water is gradually reduced to a point that it is not sufficiently effective in washing the dishes without the addition of further soap or detergent.

Heretofore soap or detergent has been added to the body of wash water at intervals, depending on what the operator of the machine observes in the effectiveness of the wash water, and elaborate and expensive mechanisms have been devised for detecting the concentration of the soap or detergent, giving an indication on an instrument dial or the like so that the operator can determine when soap or detergent is to be added.

Neither of these expedients have been particularly successful, and it is, accordingly, a primary object of the present invention to provide a dishwasher which will avoid the drawbacks referred to above that have been experienced in connection with the operation of conventional commercial dishwashing machines.

Another particular object of the present invention is the provision of a dishwashing machine in which the concentration of the soap or detergent in the body of wash water remains substantially constant for as long as it is desired to retain the machine in operation, say, for a half day or a complete day.

A further object of the present invention is the provision of a commercial dishwashing machine in which the rinsing of the dishes with clear water does not diminish the concentration of the soap or detergent in the body of wash water.

A still further object of the present invention is the provision of a dishwashing machine of the nature referred to in which the rinsing of the dishes that have been washed tends to clean the body of wash water without, however, diminishing the concentration of the soap or detergent therein.

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It is also an important object of the present invention to provide a simple attachment adapted for being associated with a conventional dishwashing machine which will enable the machine to be operated according to the present invention.

These and other objects and advantages of this invention will become more apparent upon reference to the following specification, taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view partly broken away of a manually-operated commercial dishwashing machine according to the present invention;

Figure 2 is a transverse sectional view through the dishwashing machine showing the various important parts thereof;

Figure 3 is a diagrammatic view showing the water circulating system of the washer and the connection therein of the nozzles, by means of which soap or detergent is supplied to the body of water to retain the concentration thereof constant;

Figure 4 is a vertical sectional view showing a nozzle forming a part of the combination of the present invention; and

Figure 5 is a fragmentary view showing a nozzle structure adapted for ready detachable connection to an unthreaded pipe.

Referring to the drawings somewhat more in detail, the commercial dishwasher illustrated is conventional except as to the portions thereof that have been modified and adapted to the practice of the present invention, as will become hereinafter apparent. The dishwasher comprises a tank portion 10 which, toward the rear, comprises an overflow fitting 12. The overflow fitting is connected with a drain conduit which is also connected through a drain valve 14 with a sump 16 that communicates via screen 18 with tank 10. Sump 16 is also connected with the inlet of a pump 20 driven by a motor 22 that is controlled by the on-off switch 24.

Pump 20 discharges into a conduit 26 which leads upwardly through a valve 28 to the interior of a two-armed spinner member or sprayhead 30 having nozzles 32, at least the outer end one of which is skewed so that when the pump delivers water to the sprayhead the said sprayhead will rotate thereby to discharge a high velocity spray of water upwardly through dishes carried in a tray (not shown) resting on rails 34 inside tilttable hood 36.

Tank 10 is adapted for being filled with hot water from a conduit 38 via a manually-operated shut-off valve 40, the outlet of which is connected to a conduit 42 which discharges into tank 10. The discharge end of conduit 42 is fitted within a nozzle 44, which is illustrated more in detail in Figure 4 where it will be seen that the nozzle consists of the body part 46 threaded on to the end of conduit 42, and said body part having a centrally located axial bore, at the upper end of which there is a restricted opening formed by the apertured washer 48.

Beneath apertured washer 48, in a region that will be under reduced pressure due to the jet action emerging from the washer 48, is a tube 50 having a port 52 therein.

In operation, when water is flowing through conduit 42 a suction will be created on port 52 to draw from tube 50 fluids therein which will admix with the water stream.

Tube 50, externally of body part 46 of the nozzle, is connected with a tubular member 54 which is connected adjacent its outer end with a conduit or flexible tube 56 leading to a supply of liquid soap or liquid detergent. A knurled needle 58, threaded in the outer end of tubular member 54, provides means for controlling the rate of flow of the liquid material through tubular member 54, tube 50, and port 52 into the water stream flowing

through the body of the nozzle. A valve member 60 may be provided in tubular member 54 so that the interior of tube 50 may be either connected with the supply of liquid material, or may be connected to atmosphere should it be desired to interrupt the supply of liquid material to the water stream.

The arrangement just described provides for the supply of liquid soap or liquid detergent to the wash water when the washer is first filled merely by opening valve 40 and by permitting the tank 10 to be filled with wash water up to the level of overflow fitting 12.

The dishwasher also comprises an arrangement for rinsing the dishes, which consists of a conduit 62 branching off from supply pipe 38 ahead of valve 40 and leading through a normally closed spring valve 64 to a fitting 66. Fitting 66 has one branch conduit 63 leading upwardly and across inside hood 36, and having located therein the nozzles 70 to provide for a downwardly directed spray of clear water when the dishes are being rinsed. Conduit 68, on the other side of the hood from fitting 66, again leads downwardly into tank 10 and then across toward the center of the washer and up through conduit 26, as will be observed at 72 in Figure 2, to communicate with a second spinner member 74 provided with nozzle openings 76 that provide for an upwardly directed spray of water toward the dishes that have been washed. Some, or all of nozzles 76 are inclined so that the spray of water to the spinner 74 will cause it to rotate.

According to the present invention a second conduit 80 branches off from fitting 66 and leads to a nozzle 82 which may be identical with nozzle 44 previously described. Nozzle 82, similarly to nozzle 44, is connected with the supply tank 84 which contains the liquid soap or detergent that is drawn in through the nozzles. The nozzle 82 is located adjacent the front wall of tank 10 so that it is remote from overflow fitting 12 and, thus, when the dishes are rinsed by a supply of clear water through the nozzles 70 and the spinner 74, there will be a flow of fresh hot water through nozzle 82 that will draw liquid soap or detergent from tank 84 into the liquid stream, whereby at least the amount of liquid soap or detergent lost in the body of wash water by the overflowing through overflow fitting 12 will be made up by the new solution supplied through nozzle 82.

It will be noted that the new supply, as mentioned, is supplied at a point remote from the overflow fitting so that substantially all of the fresh water will be retained in tank 10 and the overflow through overflow fitting 12 will consist of used wash water.

It will also be observed that the conduit 80 is considerably smaller than conduit 68 whereby a substantially smaller amount of water passes through conduit 80 than passes through conduit 68. This ratio between the two streams of water during the rinsing operation could, of course, be obtained by placing the restrictor valve in conduit 80 if this proved desirable or necessary.

While the washing machine may be automatic in operation, the specific arrangement illustrated is manual, and in carrying out a washing and rinsing cycle a tray of dishes is placed on the tracks or rails 34, the hood 36 is then closed, and the lever 90 is then availed of for rocking shaft 96, thereby to open valve 28, either to an intermediate or a wide open position. With motor 22 energized this provides for the washing action previously described. Thereafter lever 90 is moved in the opposite direction and this will close valve 28, and thereafter a cam 98 on shaft 96 will open spring valve 64 to carry out the described rinsing cycle.

The nozzles 44 and 82, which are disclosed and described in detail in our copending applications, Serial No. 293,718, filed January 16, 1952, now Patent No. 2,728,609 dated December 27, 1955, and Serial No. 266,956, filed January 17, 1952, now Patent No. 2,699,731, dated January 18, 1955, are shown in Figures 1, 2,

3 and 4 as being threaded to the ends of the conduits to which they are attached. However, the arrangement of the present invention is also adapted for being sold as a kit for connection with a conventional type dishwasher, and in which case a connecting arrangement, as illustrated in Figure 5, might be preferred.

In Figure 5 the upper end of the nozzle 100 is bored and threaded and receives a gland 102 adapted for compressing a rubber-like ring 104 about the conduit 106 on which the nozzle is to be mounted. This provides for ready detachability of the nozzle for cleaning or other purposes.

Inasmuch as tank 84 may occupy various positions, even to setting on the floor beneath the washer, it is preferred that there be located either in the nozzles, or closely adjacent thereto in the liquid supply line, the check valve 108 so that the column of liquid material that is to be entrained in the water passing through the nozzles will not drain away from the nozzles, thus making it difficult to regulate the needle valves of the nozzles.

With the check valves located, as illustrated in Figures 1 and 3, there is a continuous supply of the liquid soap or liquid detergent to the nozzle as soon as water flow therethrough commences.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

We claim:

1. In a dishwashing machine; a tank having an overflow and adapted for holding a body of wash water up to the level of said overflow, a rinse pipe for supplying a spray of water to dishes supported above the tank whereby the rinse water drains into the tank and causes a portion of the body of wash water to overflow therefrom, a supply of liquid cleaning agent, an inductor nozzle having a suction port connected to said cleaning agent supply and arranged to discharge into said tank, and a bypass line leading from said rinse pipe through said nozzle whereby a supply of water through said rinse pipe is accompanied by a supply of cleaning agent to the body of wash water to make up for the loss of cleaning agent that passed out said overflow, said nozzle being located in said tank at a point adjacent the opposite wall of said tank and diagonally across from said overflow whereby substantially all of the cleaning agent added during a rinsing operation remains in the tank and only the used wash water overflows.

2. In a dishwasher, a tank for holding a body of water, an overflow in one wall of said tank, a supply of liquid cleaning agent, a water supply line, a fill pipe extending from said supply line for supplying the body of water to said tank, and an inductor nozzle mounted on the end of said fill pipe and having a suction port connected to said cleaning agent supply, a rinse pipe extending from said supply line to supply a spray of water to dishes supported above said tank whereby the rinse water drains into the tank and causes a portion of the body of water to overflow, a second inductor nozzle having a suction port connected to said cleaning agent supply and arranged to discharge into said tank at a point remote from the point of overflow, a by-pass line leading from said rinse pipe through said second nozzle whereby a supply of water through said rinse pipe is accompanied by a supply of cleaning agent to the body of water to replace the loss of cleaning agent through the overflow.

3. In a dishwasher, a tank for holding a body of water, an overflow in one wall of said tank, a supply of liquid cleaning agent, a water supply line, a fill pipe extending from said supply line for supplying a body of water to said tank, a first inductor nozzle mounted on the end of said fill pipe and having a suction port connected to said cleaning agent supply, a rinse pipe extending from said supply line to supply a spray of water for dishes supported

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above said tank whereby the rinse water drains into the tank and causes a portion of the body of water to overflow, rinsing means connected to said rinse pipe to supply a spray of water to a basket of dishes supported above said body of water whereby the rinse water drains into the tank and causes a portion of the body of water to overflow, said rinse means being located both above and below the basket of dishes, a second inductor nozzle having a suction port connected to said cleaning agent supply and arranged to discharge into said tank at a point remote from the point of overflow, a by-pass line leading from said rinse pipe to said second nozzle whereby a supply of water through said rinse pipe is accompanied by a supply of cleaning agent to the body of water to replace the loss of the cleaning agent through the overflow.

4. In a dishwasher, as claimed in claim 3 with the rinsing means below the basket of dishes comprising a rotatable spray member.

5. In a dishwasher, as claimed in claim 3 with said rinsing means comprising a plurality of nozzles extending across said dishwasher and above said basket of dishes, a rotatable spray head mounted beneath said dish basket, and a continuous rinse pipe connecting said nozzles and spray head with a supply of water.

6. In a dishwasher, a tank for holding a body of water, and overflow in one wall of said tank, a supply of liquid cleaning agent, a water supply line, a fill pipe extending from said supply line for supplying the body of water to said tank, an inductor nozzle mounted on the end of said fill pipe to discharge into said tank and having a suction port connected to said cleaning agent supply, a plurality of nozzles extending across said dishwasher and above a

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basket of dishes supported above said tank, a rotatable spray head mounted beneath said basket of dishes, a continuous rinse pipe connecting said nozzles and spray head with said supply line to supply a spray of water to the basket of dishes whereby the rinse water drains into the tank and causes a portion of the body of water therein to overflow, a second inductor nozzle having a suction port connected to said cleaning agent supply and arranged to discharge into said tank at a point remote from the point of overflow, and a by-pass line leading from said rinse pipe through said second nozzle whereby a supply of water through said rinse pipe is accompanied by a supply of cleaning agent to the body of water to replace the loss of cleaning agent through the overflow.

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