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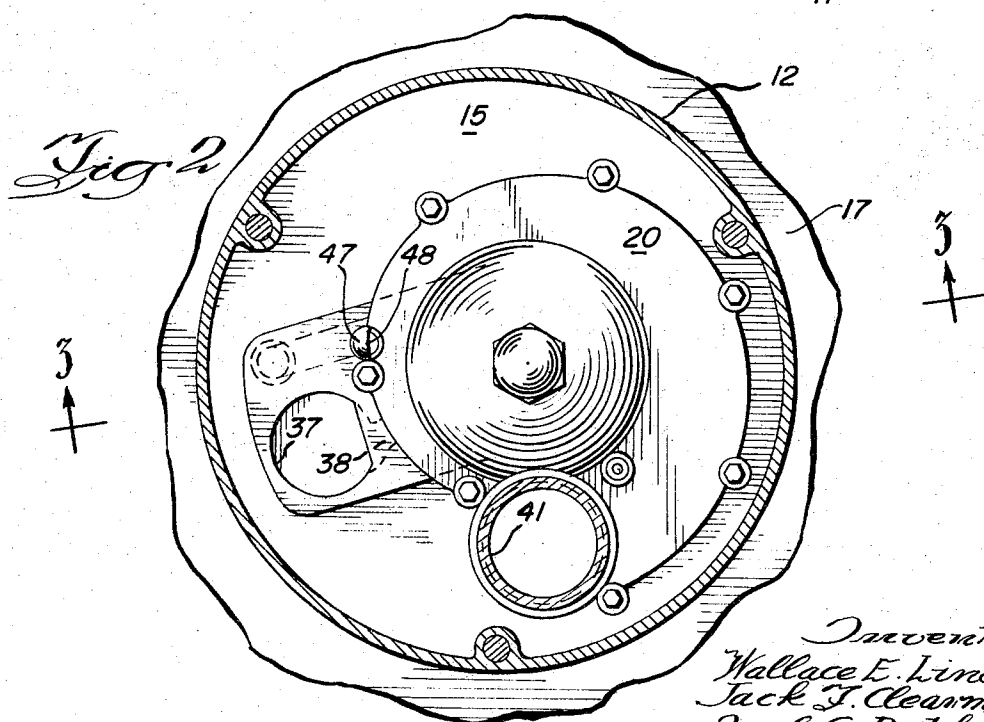
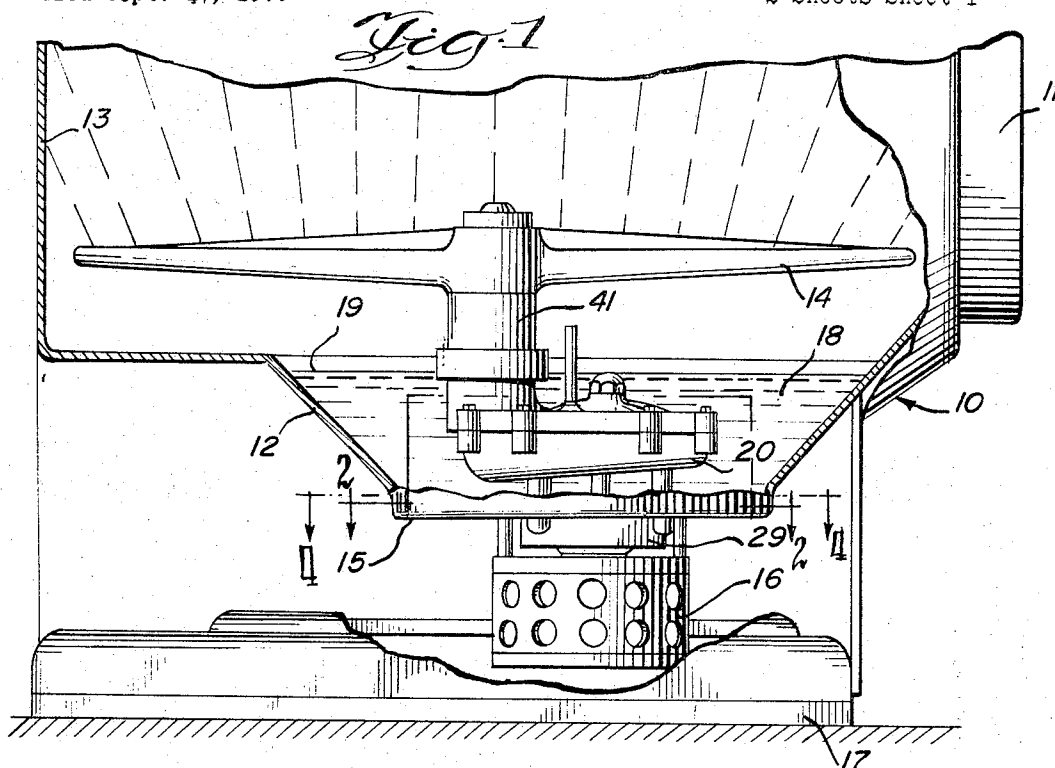
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DISHWASHING APPARATUS

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2 Sheets-Sheet 1



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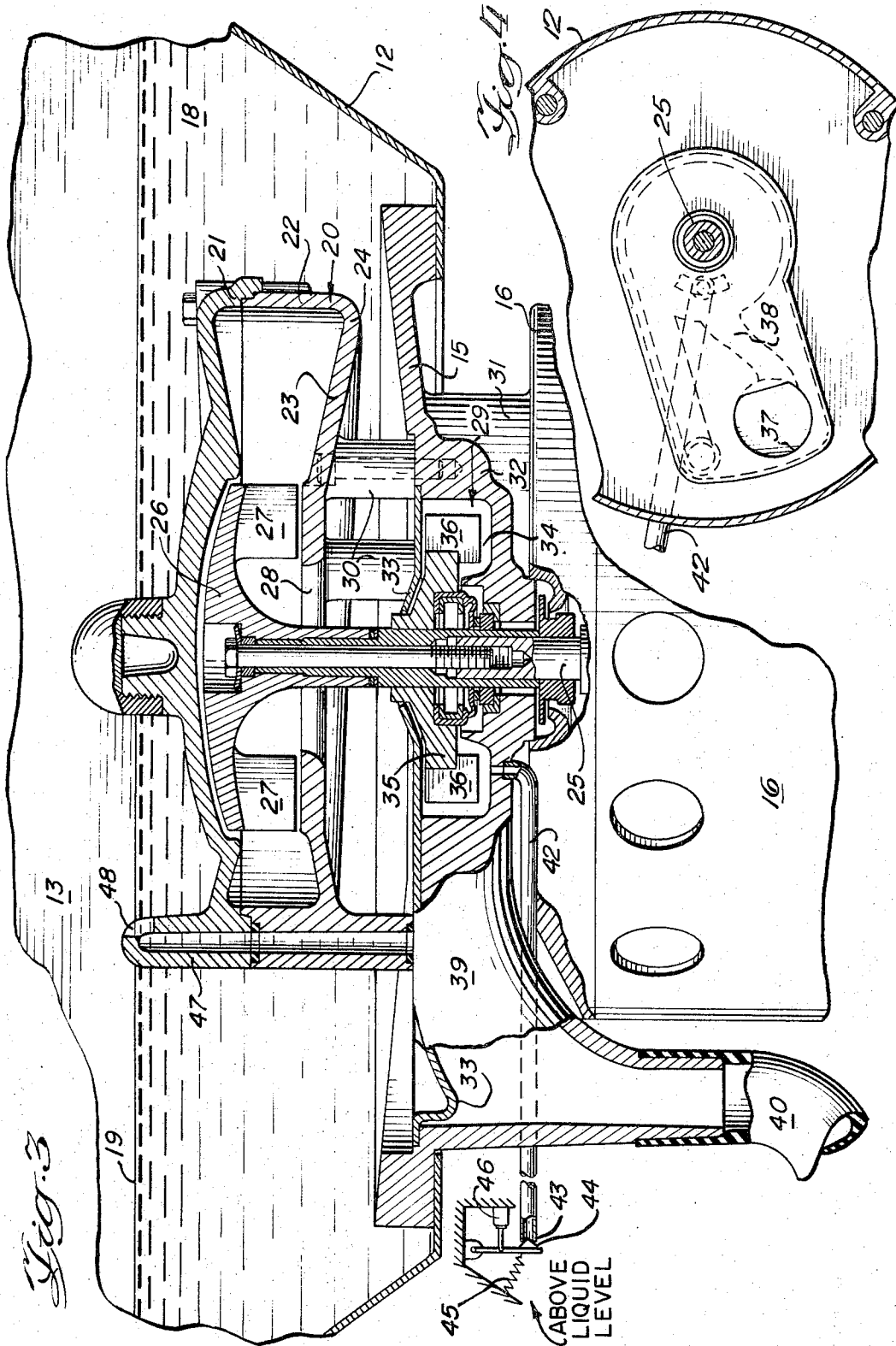
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DISHWASHING APPARATUS

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4 Claims. (Cl. 137—567)

This invention relates to a dishwashing apparatus.

In apparatus such as dishwashers liquid washing and rinsing solutions are circulated through a receptacle for the articles being washed during a portion of the normal operation of the apparatus. Then, at the end of each washing and rinsing operation the liquid is forced from the apparatus as to a drain.

In such an apparatus it is customary to use a first and second pump means operable by a rotatable means with the first pump means used for circulating liquid in the receptacle during the washing, rinsing and the like and the second pump means for expelling liquid from the receptacle as through a drain means.

One of the features of this invention is to provide an apparatus such as a dishwasher having a rotatable means and first and second pump means operable by the rotatable means with the first pump means circulating liquid in the receptacle and the second pump means expelling liquid from the receptacle as through a drain means in which the second pump means includes a pump chamber and a rotatable impeller therein together with means for selectively introducing gaseous fluid such as air to the pump chamber of the second pump means during rotation of the impeller to displace liquid in this chamber and prevent liquid flow through this second pump chamber during the period when the first pump means is circulating liquid in the receptacle.

A more specific feature of the invention is to provide such an apparatus in which the rotatable means is unidirectional and the gaseous fluid such as air is supplied to the chamber by means of an air line controlled by a valve means.

Other features and advantages of the invention will be apparent from the following description of one embodiment thereof taken in conjunction with the accompanying drawings. Of the drawings:

FIGURE 1 is a fragmentary side elevational view partially in section of the lower portion of a dishwasher including a pump system embodying the invention.

FIGURE 2 is a horizontal sectional view taken substantially along line 2—2 of FIGURE 1.

FIGURE 3 is a fragmentary vertical sectional view taken along line 3—3 of FIGURE 2.

FIGURE 4 is a fragmentary sectional view taken substantially along line 4—4 of FIGURE 1;

In FIGURE 1 there is illustrated the lower portion of a dishwasher 10 having a conventional front access door 11, liquid collecting sump 12 at the bottom of a tub 13 and a rotatable spray arm 14 for spraying liquid over dishes (not shown) during the washing and rinsing operation.

The sump 12 is provided with a liquid tight bottom 15 beneath which is located an electric motor 16. The motor 16 is located between the bottom 17 of the dishwasher and the elevated bottom of the sump 12.

The sump 12 is adapted to contain liquid 18 having a normal liquid level 19. The liquid is customarily either a detergent solution during a washing cycle or water during a rinsing cycle. Positioned in the sump 12 and normally completely immersed in the liquid 18 is a first pump means 20 in the form of a centrifugal pump for circulating liquid in the receptacle or tub 13. This first

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pump means 20 includes a housing 21 having a peripheral wall 22 and a bottom 23 whose outer portion slopes outwardly and downwardly to adjacent the bottom of the peripheral wall 22. This bottom 23 has a substantially lowest area 24 adjacent the wall 22.

Extending upwardly from the motor 16 through the bottom 15 of the sump 12 is a motor shaft 25. Mounted on the top of this shaft 25 is the impeller 26 for the first pump means 20. This impeller 26 is located within the housing 21 and has the usual plurality of spaced curved blades 27 that force the liquid outwardly toward the peripheral wall 22 in the customary manner during rotation of the impeller.

The bottom 23 of the pump housing 21 is provided with an inlet opening 28 of the usual type arranged substantially concentrically with the motor shaft 25 and impeller 26. The pump housing 21 is mounted above the bottom 15 of the sump on spaced studs 30. The motor 16 is suspended on spaced downwardly extending studs 31 from the sump bottom 15.

The sump bottom 15 is shaped to define a pump housing 32 for a second pump means 29 which like the first pump means is operable by the rotatable means that includes the motor 16 and the shaft 25. This second pump means 29 is used for expelling liquid from the receptacle or tub 13 during draining in a manner to be described hereinafter.

The second pump means is provided with a metal plate 33 extending across the top of the housing 32 to define a pump chamber 34. The motor shaft 25 extends through this chamber, as shown in FIGURE 3, and has mounted thereon within chamber 34 an impeller 35 with a plurality of radial blades 36 extending therefrom. The pump chamber 34 of this second pump means communicates with the bottom of the sump 12 by an inlet 37 that empties into the chamber 34 at 38. The inner end of passage 38 is adjacent the circle described by the outer edges of the rotating impeller blades 36.

Leading from the drain pump chamber 34 is an exit conduit 39 which empties into a drain 40. The conduit 39 is defined in part by an extension of the sump bottom 15 and the drain pump housing 32 and by the metal plate 33.

In this arrangement of the first pump means 20 for circulating liquid in the tub or receptacle 13 and the second pump means for draining, the motor 16 and its shaft 25 are unidirectional in that both pump impellers 26 and 35 are rotated in the same direction. This causes the first pump means 20 to draw liquid 18 in from the sump 12 through the central inlet opening 28 and to force this liquid outwardly against the peripheral wall 22. Leading from the top of the pump housing 21 is a recirculation conduit 41 which directs liquid into the spray arm 14 in the customary manner.

During this recirculation operation of the first pump means 20 gaseous fluid such as air is introduced into the pump chamber 34 of the second pump means 29 to inactivate this second pump means. This is accomplished by providing an air line 42 leading to the bottom of the pump chamber 34 in the area beneath the rotating blades 36. The outer end 43 of this air line is above the liquid level 19 of the body of liquid 18 as indicated by the legend on FIGURE 3. This outer end 43 is adapted to be opened and closed by a hinged valve 44 urged toward open position by a spring 45 and held in closed position by means of an electric solenoid 46. The outer end 43 of the air line 42 is above the liquid level 19 in order that liquid will not leak outwardly through this line when the valve 44 is opened.

With the valve closed as shown in FIGURE 3 operation of the unidirectional motor 16 would cause the second pump means 29 to draw liquid from the sump 12

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through the passage 38 by way of its inlet 37 and expel this liquid through the exit conduit 39 to the drain 40. At the same time, the first pump means 20 would be rotating in the direction to recirculate liquid by way of the spray arm 14 through the tub 13. However, this first pump means 20 would become inoperative when the liquid level 19 fell beneath the first pump means inlet 23.

During the normal recirculation washing and rinsing of dishes within the dishwasher the solenoid 46 would be de-energized with the result that the spring 45 would pull the valve 44 to the left, as viewed in FIGURE 3, to open the inlet 43 and admit air to the second pump means chamber 34 to displace liquid in this chamber and provide an air lock preventing liquid flow through the second pump chamber 34. The result would be, of course, that no liquid would be forced out the exit conduit 39 to the drain 40. In FIGURE 3 there is illustrated a conventional air bleed tube 47 to the exit conduit 39 to prevent any siphoning of liquid from the drain 40 to the sump 12 during the dishwashing operation. This tube is provided with the usual top inlet opening 48 for in-flowing air.

Having described our invention as related to the embodiment shown in the accompanying drawings, it is our intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. Dishwashing apparatus, comprising: means forming a liquid receptacle; drain means for removing liquid from said receptacle; rotatable means; first pump means operable by said rotatable means for circulating liquid in said receptacle; second pump means operable by said rotatable means for expelling liquid through said drain means, said second pump means including a pump chamber having an inlet from said receptacle, an outlet to said drain means and a rotatable impeller in said chamber; and means for selectively introducing gaseous fluid to said pump chamber during rotation of said impeller to

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displace liquid in said chamber and prevent liquid flow through said second pump chamber.

2. The apparatus of claim 1 wherein said rotatable means is unidirectional during operation of both said pump means.

3. Dishwashing apparatus, comprising: means forming a liquid receptacle; drain means for removing liquid from said receptacle; rotatable means; first pump means operable by said rotatable means for circulating liquid in said receptacle; second pump means operable by said rotatable means for expelling liquid through said drain means, said second pump means including a pump chamber having an inlet from said receptacle, an outlet to said drain means and a rotatable impeller in said chamber; an air line to said chamber; and valve means for selectively opening said air line to introduce air to said chamber during rotation of said impeller to displace liquid in said chamber and prevent liquid flow through said second pump chamber.

4. Dishwashing apparatus, comprising: means forming a liquid receptacle; drain means for removing liquid from said receptacle; unidirectional rotatable means; first pump means rotatable by said rotatable means for circulating liquid in said receptacle; second pump means rotatable by said rotatable means for expelling liquid through said drain means, said second pump means including a pump chamber having an inlet from said receptacle, an outlet to said drain means and a rotatable impeller in said chamber; an air line to said chamber; and valve means for selectively opening said air line to introduce air to said chamber during rotation of said impeller to displace liquid in said chamber and prevent liquid flow through said second pump chamber.

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