

July 19, 1938.

J. L. CLOUGH

2,124,052

METHOD AND APPARATUS FOR WASHING DISHES

Filed July 12, 1935

6 Sheets-Sheet 1

Fig. 1.

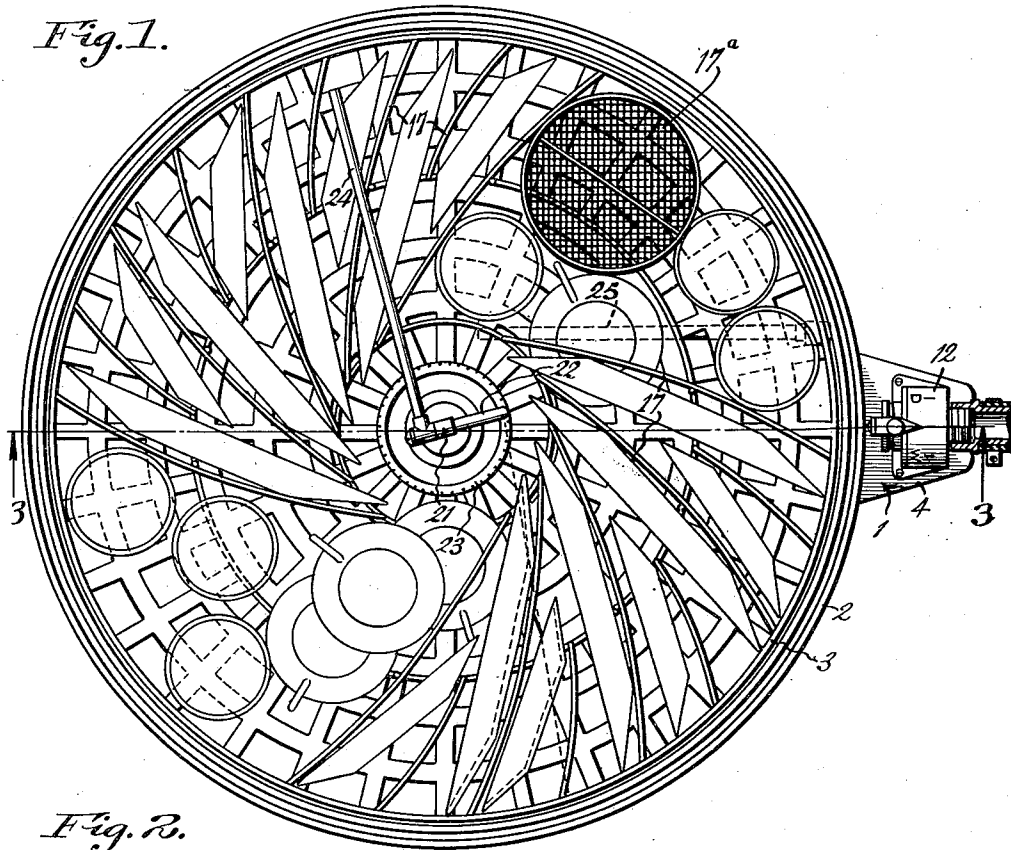
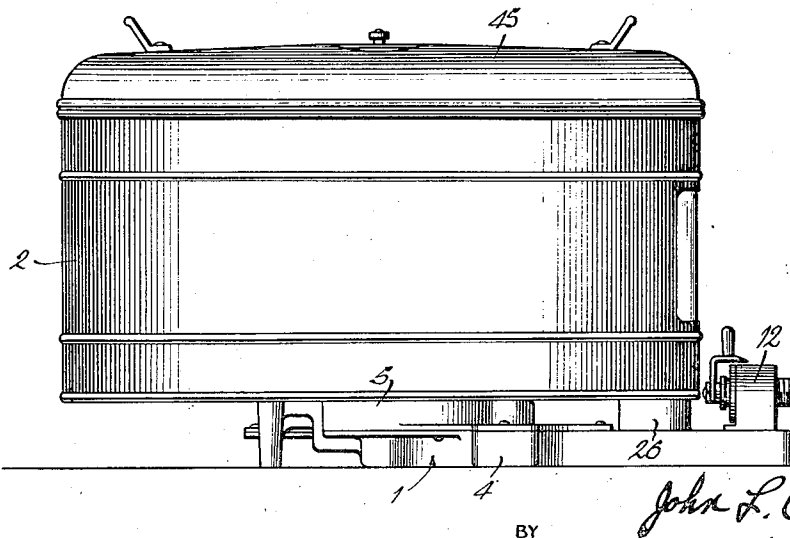


Fig. 2.



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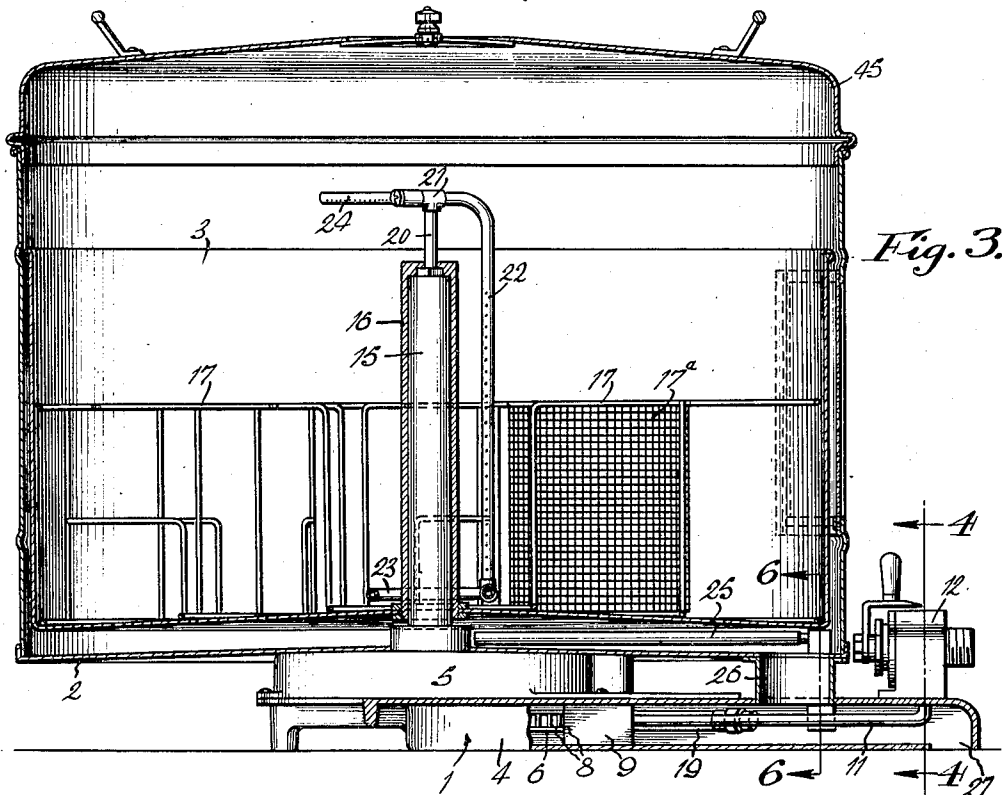


Fig. 3.

Fig. 5.

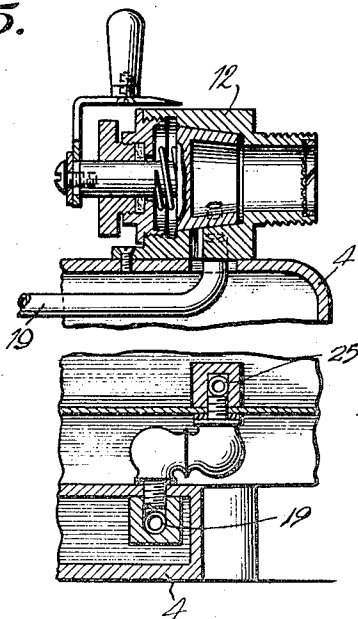


Fig. 4.

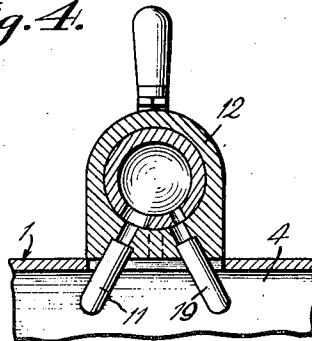
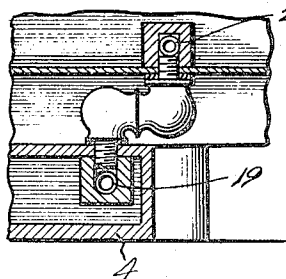


Fig. 6.



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Fig. 7.

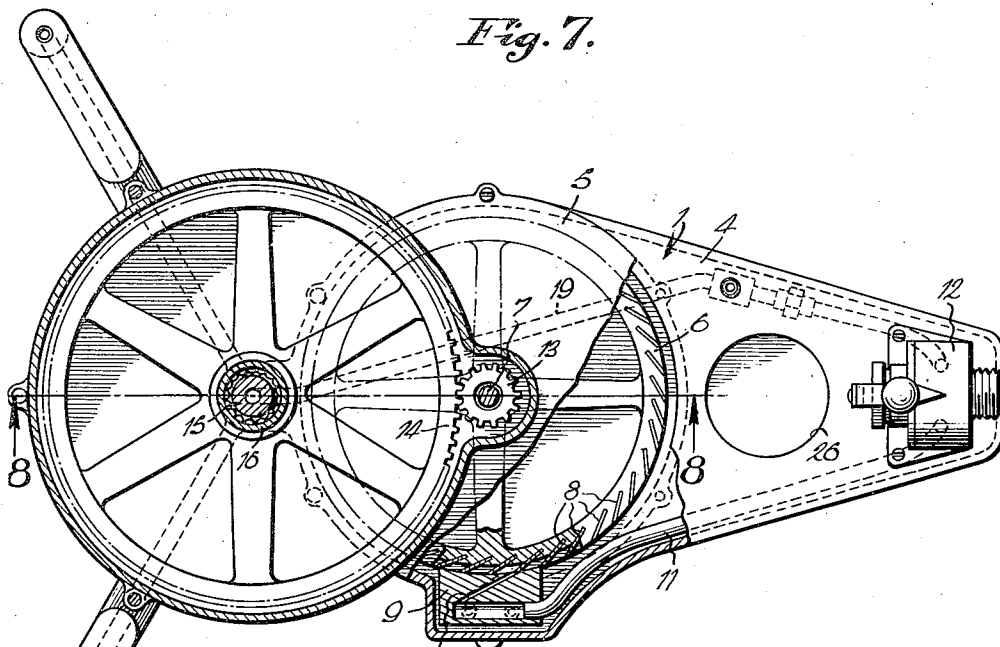


Fig. 9.

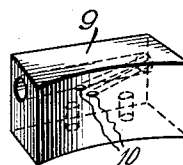
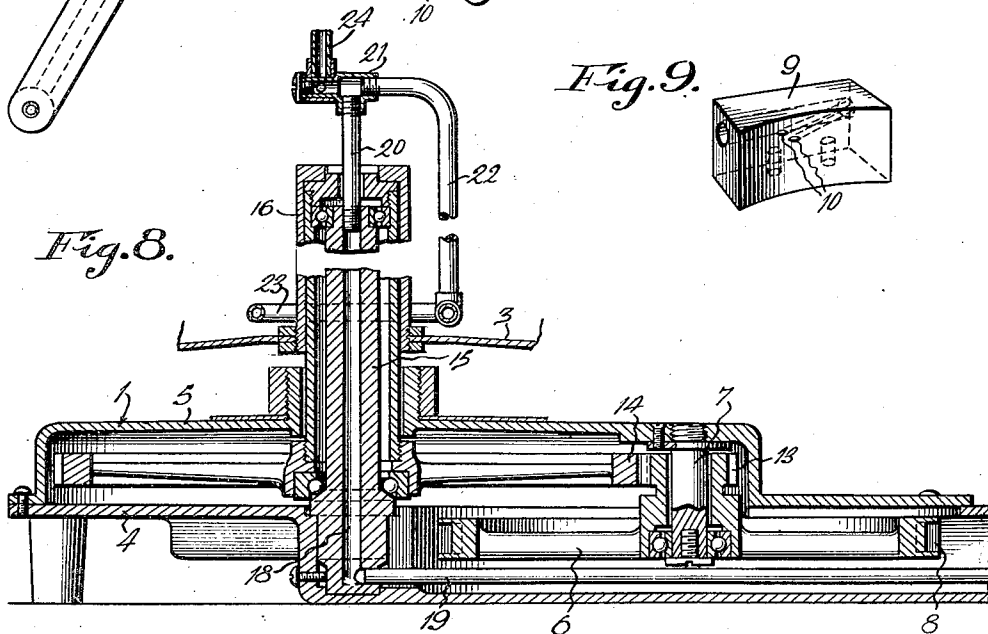


Fig. 8.



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Fig. 10.

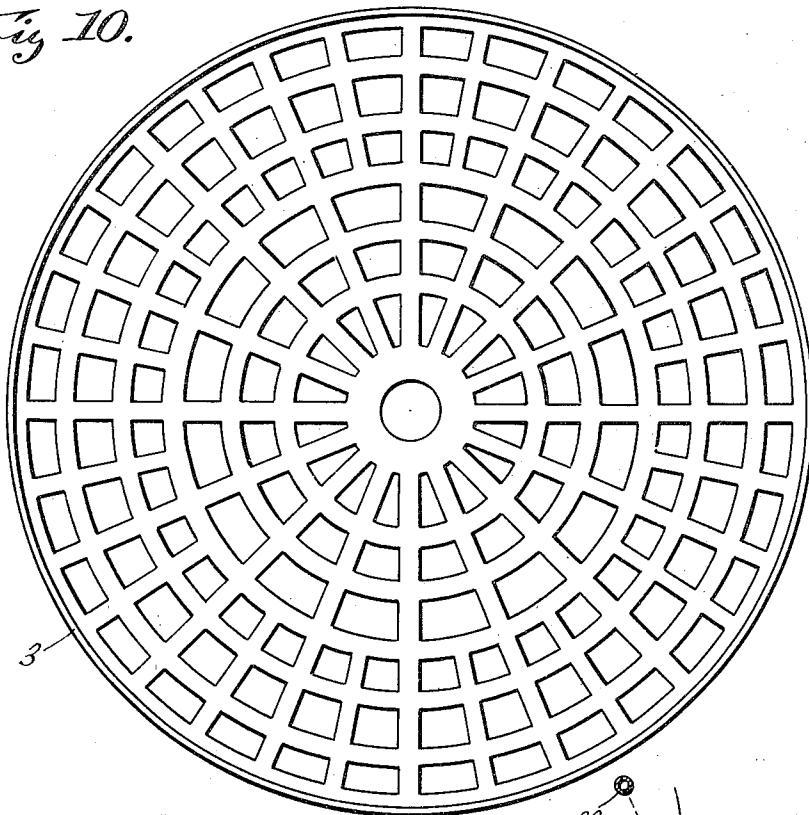


Fig. 11.

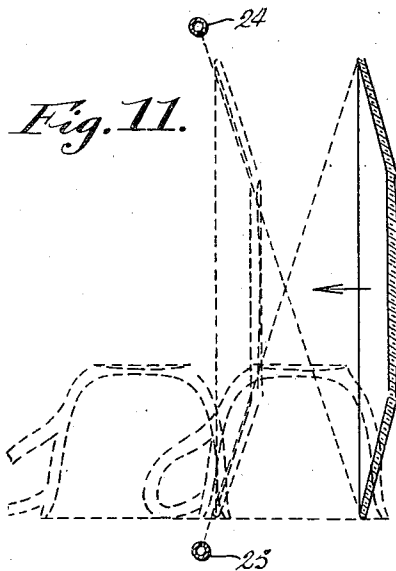
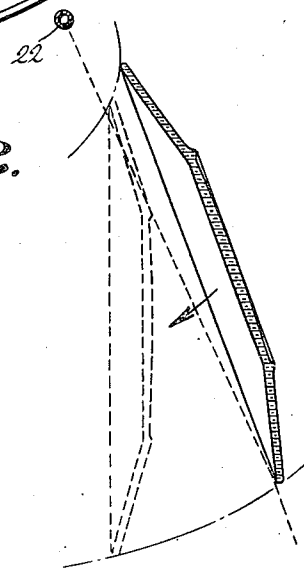


Fig. 12.



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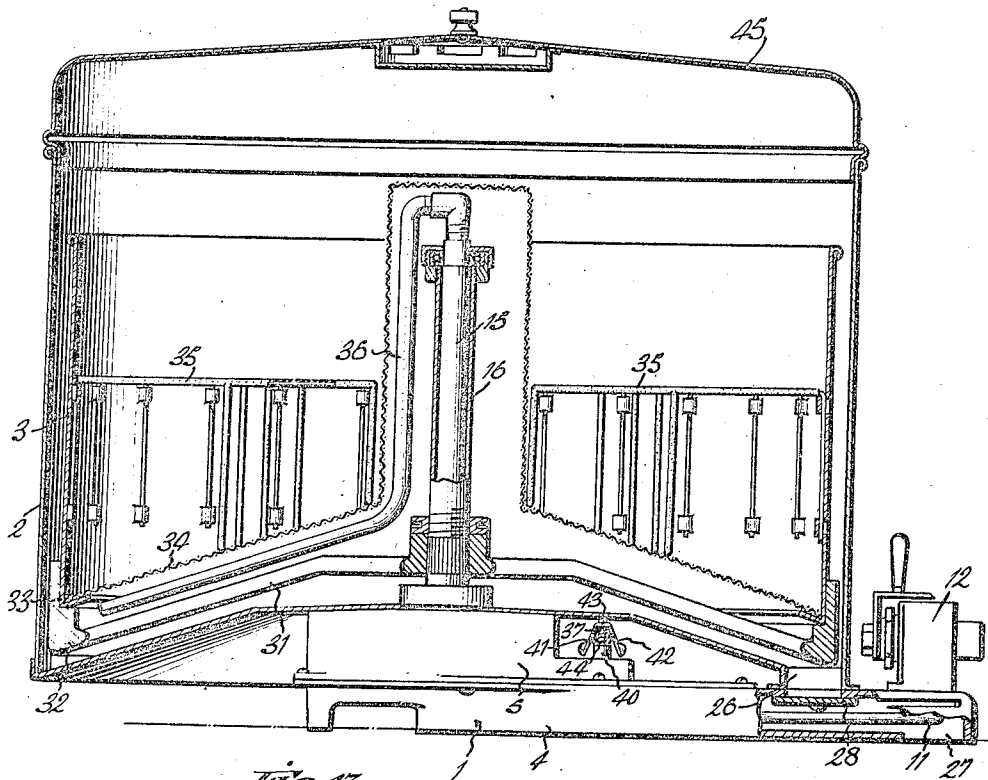


Fig. 13

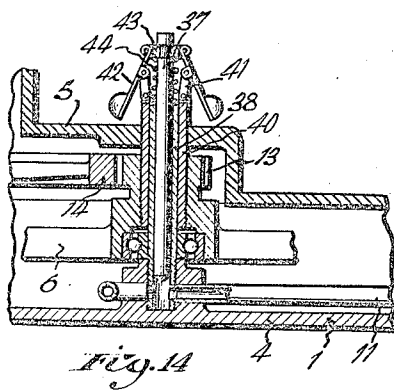


Fig. 14

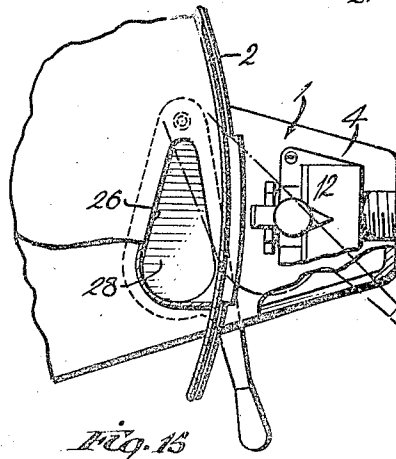


Fig. 15

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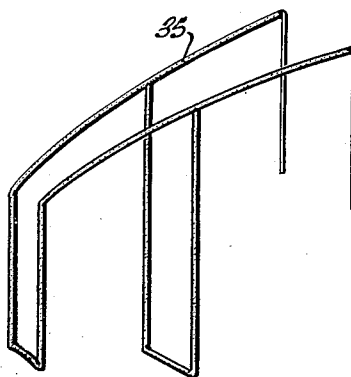
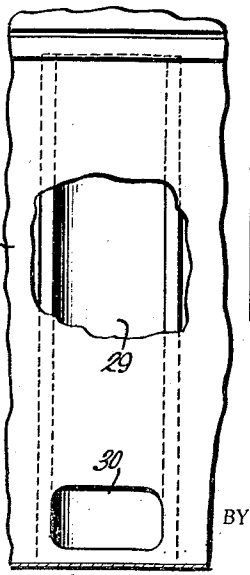
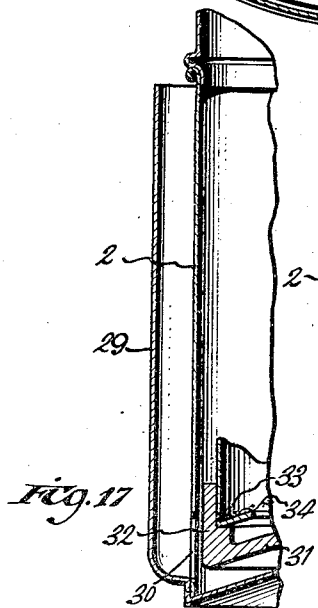
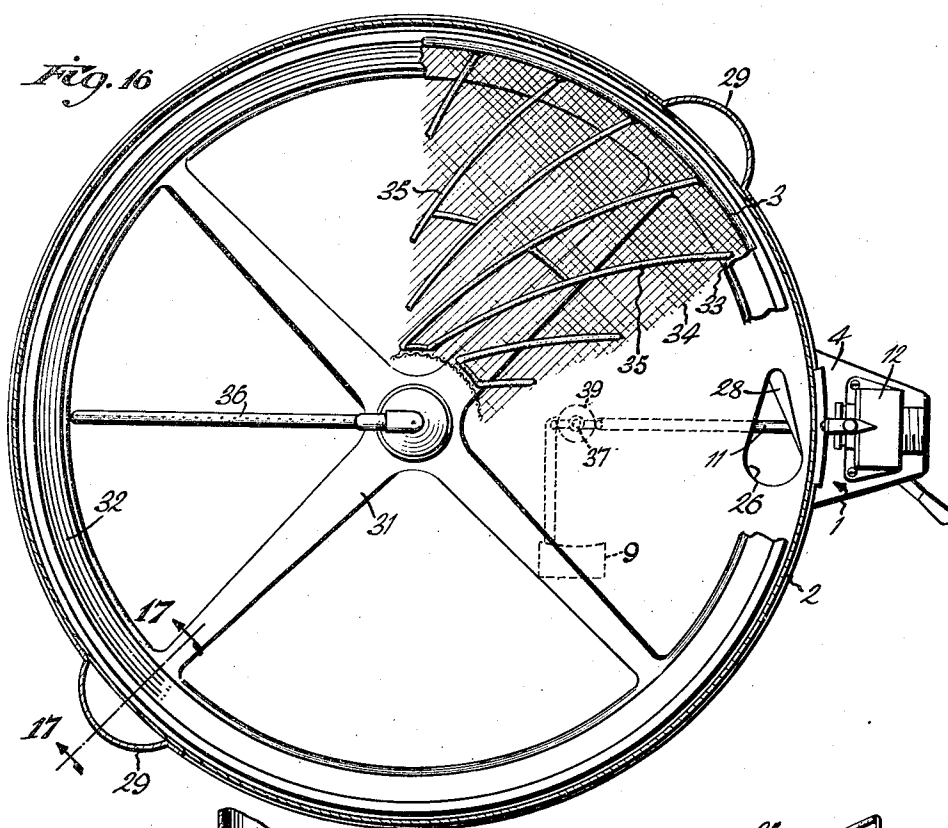
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METHOD AND APPARATUS FOR WASHING DISHES

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,124,052

METHOD AND APPARATUS FOR WASHING DISHES

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Application July 12, 1935, Serial No. 31,089

3 Claims. (Cl. 141-9)

This invention relates to improvements in dish washing machines, primarily applicable for cleansing dishes under a preferred method, consisting in conveying the dishes in a circuitous path for successive intervals of alternately flushing and draining until completely cleansed.

The flushing is accomplished by moving the dishes against sprays of water, principally hot water, directed from different directions or angles forcibly delivered from a continuous clear water service supply and then allowed to drain before again flushing, and when cleansed, idly traversed for a slight period for centrifugal drying whereby the dishes are cleansed and sterilized without the use of a detergent.

In the machine the dishes are preferably packed within a rotative, foraminous container to allow the water to freely drain therefrom, the dishes deposited in appropriate spacings apart to expose as much of the entire surface of each article to a spray or sprays forcibly administered from various directions to avoid undue repositioning of the articles during a cleansing operation. Provision is also made for traversing the dishes in a bath of water if necessary to preliminarily soften the soil thereon.

It is common in prevailing methods of machine washing dishes to spray the same with a soap or detergent treated heated water, the draining liquid being collected and resprayed. The water under such use becomes quickly chilled, requiring reheating, and it has been experienced that a soapy, lukewarm water leaves the dishes with a greasy film. Due to the rapid chilling of the water it is difficult to quickly reheat the same to a proper degree during the short period in which it is collected and conveyed for reuse.

Hot water applied forcibly to the surface of a dish for a short interval and then allowed to drain therefrom for an intervening interval before again flushing will remove all soil and grease adhering to the dish under ordinary table use, adapting the dishes to be thoroughly cleansed and sterilized and readily dried under the heat of the dishes upon discontinuing the hot water application and all accomplished within a very short or minimum period of time. The dispensation of the use of soap or detergent and manually wiping or drying the dishes effects quite an economy and in using a continuous supply of clear hot water obtained from a hot water hydrant service line an abundant quantity of hot water is constantly available. In avoiding reuse of the water the delivered water is always clear.

In the present instance the dishes are deposited

in a rotative dish holding basket or container actuated by an hydraulic motor operated from a hydrant service supply which may be either hot or cold water and which furnishes sufficient pressure to rotate the basket at a required rate with a low water consumption and low cost of operation.

Therefore, an object of the invention is to provide a dish washing machine with a rotatable dish holding basket or container from which the water can be quickly and completely drained and in which the dishes can be deposited and sustained in a spaced relation so that the surfaces thereof are appropriately accessible for flushing with hot water forcibly administered thereagainst from a continuous clear water supply, and rapidly drained therefrom for administering a successive flushing application of hot water and for rotating the basket by an hydraulic motor receiving its pressure supply from the hydrant service.

Another object of the invention relates to the method of washing dishes by forcibly delivering hot water in jets supplied from a continuous clear water pressure service against the dishes for an interval in each cycle of a rotative translation of the dishes so that the water collected by the surfaces of the dishes will be conveyed thereacross under centrifugal force, with the soil dispensed therefrom.

Various other features and advantages of the invention will be more fully set forth in a description of the accompanying drawings, in which:

Figure 1 is a top plan view of the improved dish washer.

Figure 2 is a side elevation thereof.

Figure 3 is a section on line 3-3, Figure 1.

Figure 4 is an enlarged section on line 4-4, Figure 3.

Figure 5 is an enlarged vertical section through the water service valve, as shown in Figure 4.

Figure 6 is an enlarged section on line 6-6, Figure 3.

Figure 7 is a top plan view, partly in section, of the base of the machine, illustrating a portion of the transmission mechanism housed therein for revolving the dish holding basket rotatable within a container support upon the base.

Figure 8 is a section on line 8-8, Figure 7.

Figure 9 is an enlarged perspective view of a nozzle or sprayer block employed for directing the water pressure against the vanes of a turbine wheel furnishing the power for propelling the dish holding basket.

Figure 10 is a top plan view of the dish holding tray or basket.

Figures 11 and 12 are diagrammatic views illustrating the method in which the dish cleansing liquid is jetted against the dishes disposed within the basket, preferably in a specific relation rotatively conveyed so that the liquid can be jetted over the entire surface and all sides of the articles to be cleansed or washed.

Figure 13 is a central vertical section similar to Figure 3 of a modified construction.

Figure 14 is a central vertical section through a governor device for transmission speed control.

Figure 15 is an enlarged top plan view of a portion of the container, illustrating a valve controlled discharge port located in the bottom of the container for the liquid drainage therefrom.

Figure 16 is a top plan view of the structure shown in Figure 13 with the cover removed, and illustrating only a portion of the dish holding tray or basket.

Figure 17 is a section on line 17—17, Figure 16. Figure 18 is an inside elevation of the details shown in Figure 17.

Figure 19 is a perspective view of one of the dish holding racks installed within the dish holding tray or basket.

Referring to the drawings, 1 indicates a base of hollow casing construction for journalling and housing the transmission employed for revolving the dish holding basket, providing a support for the dish holding container 2, and also providing a drainage conduit for the waste water from the container and water motor. A dish holding basket 3 is concentrically and rotatively disposed within the container 2, within which the dishes or articles to be cleansed are disposed, and preferably in a spaced relation so that the cleansing liquid can be sprayed or jetted against the entire surface of all sides of each article.

The basket may be bodily removable from the container for loading or unloading, as illustrated in the modified form. The washer is herein disclosed as a portable unit although it may be installed as a permanent kitchen plumbing fixture as a separate unit, or it may be incorporated within a sink or other type of plumbing fixture. The dish holding basket preferably, as disclosed, is propelled by water power although it is obvious that other power means may be employed. As the dishes or articles are cleansed by a liquid spray, necessitating a connection with a water service line of a building through the medium of a hose for temporary connection, or a pipe for a permanent connection, it is expedient to use a part of the water service as a pressure medium, operating a water motor or turbine for revolving the dish holding basket.

The base or hollow casing 1 is of sectional construction constituting a body member 4 and a cover 5 bolted or otherwise secured together for access to the interior of the casing or unit for installing the transmission or other parts housed therein.

A turbine wheel 6 is journaled within the body 4 of the casing upon a stud 7 fixed to and depending from within the cover 5 (see Figure 8). The turbine wheel 6 is provided with a plurality of uniformly spaced vanes 8 set obliquely within the channelled periphery of the wheel, against which one or more jets of water or fluid under pressure is directed for rotating the wheel. The water pressure is jetted from a nozzle 9 in the form of a block having a concaved face sheathing a portion of the periphery of the wheel to close the pocket spacing between the vanes in their travel across the nozzle. The nozzle has a pair of re-

stricted, angularly disposed passages 10—10 directed in a line tangentially to the wheel to have the discharging fluid pressure appropriately strike the vanes to motivate the wheel. The passages 10 communicate with a common passage in the nozzle which, in turn, connects with a pipe 11 housed within the body of the casing and leading from a valve 12 to which the water service connections are made.

Various designs of turbine wheels may be employed, the type of hydraulic motor being optional, although the form disclosed is very efficient for the capacity of washer in which it is employed.

The valve 12 is of a two-way sleeve type for a control of the fluid pressure or water to the turbine wheel and sprayer mechanism within the container or basket of the washer. The structure of the valve not forming a part of the present invention a detailed description thereof is not made herein, it being recognized that any conventional or commercial type of valve adapted for two-way control may be employed.

In the arrangement shown, a single service line furnishes the fluid supply for both motor and dish cleansing and as the principle for cleansing primarily provides for continuously spraying or flushing the articles with hot water supplied from a service line, it may in some instances, for economical reasons or when the supply of hot water is limited, provide for making duplex water service connections; one for hot and a second for cold water and operating the motor with cold water to conserve the hot water supply.

The water or turbine wheel 6, either integral therewith or fixed thereto, carries a pinion 13 in mesh with a gear 14 journaled upon a tubular post 15 fixed to and extending vertically from the body 4 of the casing and vertically through the cover 5 thereof. The gear 14 is fixed to the lower end of a sleeve which supports the sleeve or hub 16 of the dish holding basket 3 and is concentrically engaged over the tubular post 15 and journaled upon the upper end thereof.

The basket 3 is provided with a foraminous bottom, as shown in Figure 10, allowing for a free drainage of the water from the gasket. The structure of basket may be materially modified over the form herein illustrated, and may be of wire work formation as long as it is of the necessary stability to sustain the weight of the dishes or articles for the full capacity of the washer and provide for a free and unrestricted drainage of the flushing water therefrom.

In the form of basket shown in Figure 3, it is provided with a plurality of different dimensioned wire racks 17, either permanently or removably fixed within the basket, for appropriately sustaining and spacing the various sizes or kinds of dishes in the best adapted position so that the entire surfaces of all sides of the articles may be reached and flushed to avoid unduly repositioning the articles during a cleansing operation. As exemplified in Figure 3, the racks provide for positioning different sizes of plates, set upon edge in a vertical position and obtusely to a radial line extending therethrough from the axis of the basket in spaced relation relatively. Provision is also made for holding kitchen and table utensils in a wire mesh compartment 17a for holding articles such as silver ware, which could not be advantageously sustained by the racks or foraminous bottom of the basket. The characteristic feature is to deposit the articles in a most advantageous manner to avoid contacting one

another and to expose each article as fully as possible to the flushing water.

The tubular post 15 has the lower end of its bore 18 communicating with a pipe 19 leading from the valve 12 as a supply connection. The upper end of the bore of the post communicates with a pipe section 20 fixed at one end to the top of the post. The opposite end of the pipe section 20 communicates with a T-fitting 21 fixed thereto and to which a downwardly extending sprayer pipe section or tube 22 is fixed. The lower extremity of the sprayer tube 22 has a circular sprayer tube section 23 fixed thereto surrounding the sleeve or hub 16 of the basket 3.

A second sprayer tube 24 is pivotally connected to the T-fitting 21 adapted, during the operation of the washer, to extend in a horizontal direction over or above the articles in the basket and may be swung to an upright or vertical position so as not to form an obstruction in loading or unloading the basket. The sprayer tube sections 22, 23 and 24 have ports or openings at determined spacings apart and in a row or rows lengthwise of the tube sections for appropriately directing the water jetted therefrom in a plurality of directions against the articles deposited in the basket for continuously flushing the same to remove the soil.

A stationary sprayer tube 25 is located below the foraminated or perforated bottom of the basket in a spacing between the bottom of the basket and bottom of the container for jetting water upwardly from below the articles in the basket. Thus, as diagrammatically shown in Figures 11 and 12, the cleansing water or liquid is sprayed in horizontal and vertical directions, and in relatively different angular directions above and below and at one side, against the revolving or rotatively traversing articles within the basket, in addition to the circular spray from the tube section 23. The washing or cleansing of the dishes is therefore accomplished by continuously flushing the same with hot water jetted thereagainst in various directions and from different angles horizontally and vertically, and continuously during a rotative traverse of the articles.

A drain outlet 26 is appropriately located in the bottom of the container 2 and in the preferred arrangement communicates with the drainage passage in the lower casing, which also serves for the hydraulic motor and from which the water is discharged through an outlet 27 in the bottom side of the casing 1. As shown in the modified construction, Figures 13 and 15, the drain outlet 26 and the container are valve controlled by a horizontally swinging plate valve 28, pivotally mounted upon the underside of the top wall of the motor casing 1. The valve 28 permits the drainage from the container to be cut off and the dishes revolved or held in a bath supply of water within the container for an immersing period before or after flushing.

Referring to Figures 13, 16 to 19 inclusive, I illustrate a modified form of container 2 and dish holding basket 3. The container is shown as provided with several vent passages 29—29 formed on the outer side of the periphery of the container extending vertically for the height of the container walls and communicating with the interior of the bottom thereof, each respectively through a port or opening 30 in the wall of the container.

This is to afford ventilation of the interior of the container for a period in which the basket is revolved idly after flushing the dishes for a cen-

trifugal drying operation. The bottom of the container is convex for more aptly draining the water outwardly from the axis of the container to a marginal annular channel in communication with the outlet port 26.

The basket is sustained upon a spider 31 with the rim 32 thereof, at its upper side, recessed or rabbeted for socketing the inturned annular marginal flange 33 of the basket 3. The bottom 34 of the basket is of woven wire construction and centrally is of cylindrical form extended upwardly to envelop the vertical sleeve or hub 16 of the spider journalled upon the tubular post 15.

The basket similarly, as described for the forms shown in Figures 1 and 3, is provided with wire racks 35 of a particular design as shown in Figure 19, each rack having a pair of terminals or right angle bends removably clipped to the inner side of the vertical sheet metal wall of the basket. The basket can be readily removed from the spider and container to facilitate loading and unloading.

A sprayer tube 36 connects with the top of the tubular column or post 15 and therefrom extends vertically downwardly and thence in an inclined position laterally, which is suitably perforated for jetting the cleansing water in horizontal directions outwardly and relatively vertical directions upwardly.

In Figure 14 the feed pipe 11 for supplying the fluid pressure to the turbine wheel or motor has a governor control valve 37 interposed therein for automatically regulating the water flow to control and maintain a definite motor speed. The valve 37 is slidably mounted within a stationary sleeve 38 fixed to and projecting upwardly from a support 39 as an integral part of the bottom of the casing, which also serves as a support and journal for the extended hub sleeve 40 telescopically engaging over the stationary sleeve 38 and concentric with the axis of the pinion 13 in driven connection with the turbine wheel or rotor of the hydraulic motor.

The hub or sleeve 40 pivotally carries links 41 respectively pivotally connected to governor arms 42 which in turn are pivotally connected to a collar 43 fixed upon the upper end of the stem of the valve 37. The arms, under centrifugal action, swing outwardly for moving the valve in a closing direction as the speed of the motor increases and against the pressure of a spring 44 interposed between the collar 43 and upper end of the stationary journal sleeve 38.

A removable cover 45 furnishes a top closure for the outer or main container 2, having vent openings centrally of its dome suitably guarded on the inside of the cover.

In the operation of the washer the basket is loaded with dishes, the plates or flat dishes are packed in a vertically upstanding position within the racks and thereby sustained in spaced relation, while the cups or vessel dishes are in an inverted position deposited upon the bottom of the basket or other support as may be provided therefor. With the main vessel closed by the cover, the valve 12 is opened for a required setting, it being assumed that for a portable type of washer the water service connection to the valve is appropriately made. The valve 12, in the preferred arrangement disclosed, controls the water pressure supply for both the sprayer tubes and the hydraulic motor so that when the valve is opened they are rendered simultaneously effective. The hydraulic motor rotates the basket with its load in a suitable direction and at a

required rate, and the sprayer tubes discharge hot water upon the dishes moving within a flushing zone.

Due to the rotative translation of the basket a quantity of the water jetted from the sprayer tubes is deposited or collected upon the surfaces of the dishes and thence conveyed thereover and dispensed outwardly centrifugally, induced by the rotative translation of the dishes. The dishes are only flushed for an interval in each cycle of the basket rotation, thereby allowing for a period or non-flushing interval for softening the soil before the dishes are again submitted to a flushing operation.

In providing a sprayer tube beneath the dishes jetting water vertically, a quantity of water which will pass up between the dishes will serve in its descent to flush the upper surfaces of the articles, the jetted water being of sufficient force to strike the cover and thence deflect downwardly. After the operation of the washer has continued for a period sufficient to satisfactorily cleanse the dishes, the valve 12 is adjusted to cut off the water supply to the sprayer tubes and the basket is allowed to continue to rotate for an idle translation of the dishes for a centrifugal drying period.

Also, the dishes may be immersed in a bath of water or rotated therein by closing the valve 28 controlling the drainage of the main container 2 and cutting off the water supply from the sprayer tubes after the container has been filled to a desired height.

Having described my invention, I claim:

1. In a dish washing machine, a container having a drain outlet at its base, a dish holding basket rotatable within the container and from which the water used in cleansing the dishes packed therein is freely dispelled into the container, said basket having means for sustaining plates, saucers and the like in a vertical spaced position obtusely to a radial line extending therethrough from the axis of the basket, a plurality of sprayer tubes for directing sprays of water in relatively different directions against the dishes, one of said sprayer tubes extending in a horizontal position in a radial line with the axis of the basket for discharging the water from the line of jets therein vertically, and a second sprayer tube vertically within the basket

adjacent its axis for discharging water from a line of jets therein parallel with the axis of the basket and in a direction outwardly centrally from the basket for administering a flushing supply of water against the vertically positioned plates, which, upon striking the plates, continues outwardly across the plate surfaces under the impetus of centrifugal force induced by the rotative translation of the plates, for an interval in each cycle of rotation of the basket, allowing the dishes to redrain before refushing.

2. In a dish washing machine, a container having a drain outlet at its base, a dish holding basket rotatable within the container and from which the water used in cleansing the dishes packed therein is freely dispelled into the container, said basket having means for sustaining plates, saucers and the like in a vertical spaced position obtusely to a radial line extending therethrough from the axis of the basket, and a sprayer tube vertically within the basket adjacent its axis for discharging water from a line of jets therein parallel with the axis of the basket and in a direction outwardly centrally from the basket for administering a flushing supply of water against the vertically positioned plates, which, upon striking the plates, continues outwardly across the plate surfaces under the impetus of centrifugal force induced by the rotative translation of the plates, for an interval in each cycle of rotation of the basket, allowing the dishes to redrain before refushing.

3. The method of washing plates, saucers and the like, consisting in packing the same in a vertically spaced position within a rotatable basket, from which the water is freely expelled, at an angle to a radial line extending therethrough from the axis of the basket, rotating the basket and flushing the surfaces of the plates with hot water for an interval in each cycle of the basket, discharged thereon from a row of jets in a line parallel with the axis of the basket, directing the water outwardly from the center of the basket, whereupon, upon striking the surfaces of the plates, the water continues outwardly across and is shedded therefrom under the impetus of centrifugal force induced by the rotative translation of the plates.

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