May 1, 1928.

1,667,745

D. G. SMELLIE

DISHWASHER

Filed Aug. 29, 1924

2 Sheets-Sheet 1

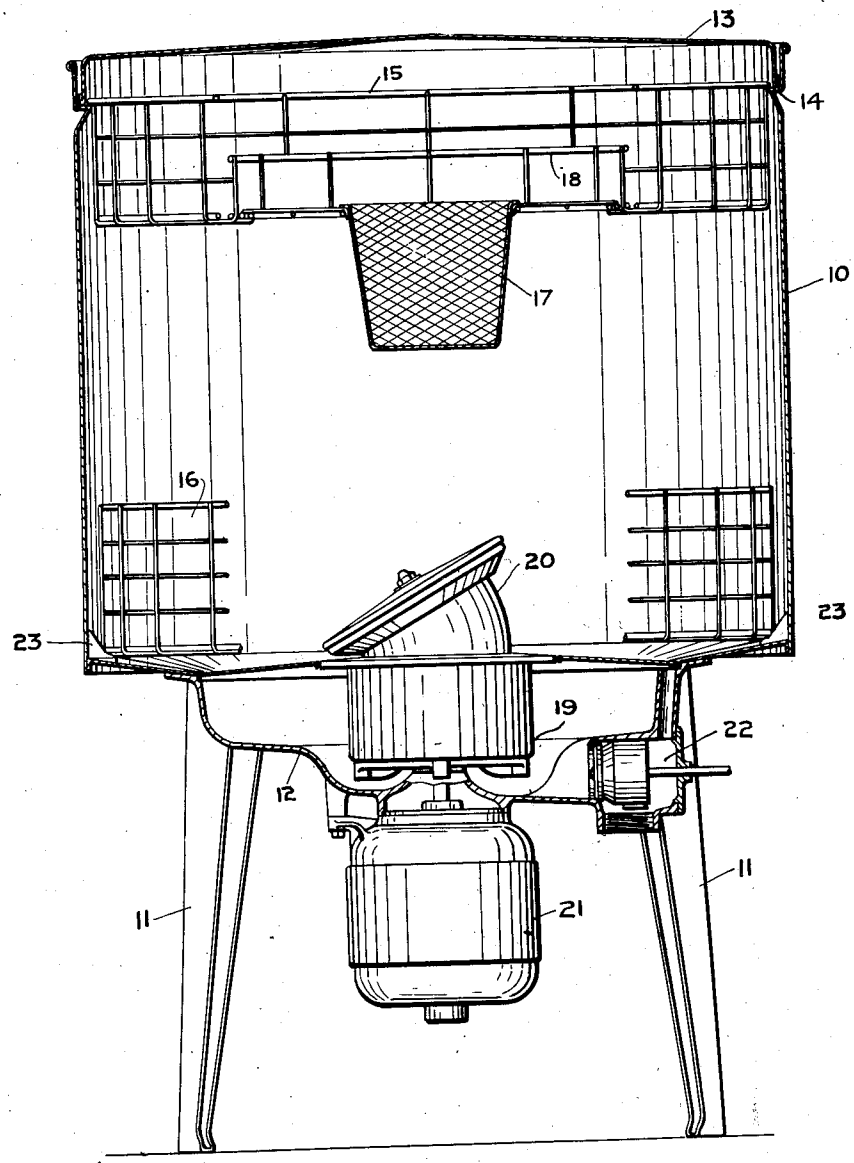


Fig. 1

Inventor
Donald G. Smellie.
By H. S. Dimare
Attorney

May 1, 1928. 1,667,745

D. G. SMELLIE

DISHWASHER

Filed Aug. 29, 1924 2 Sheets-Sheet 2

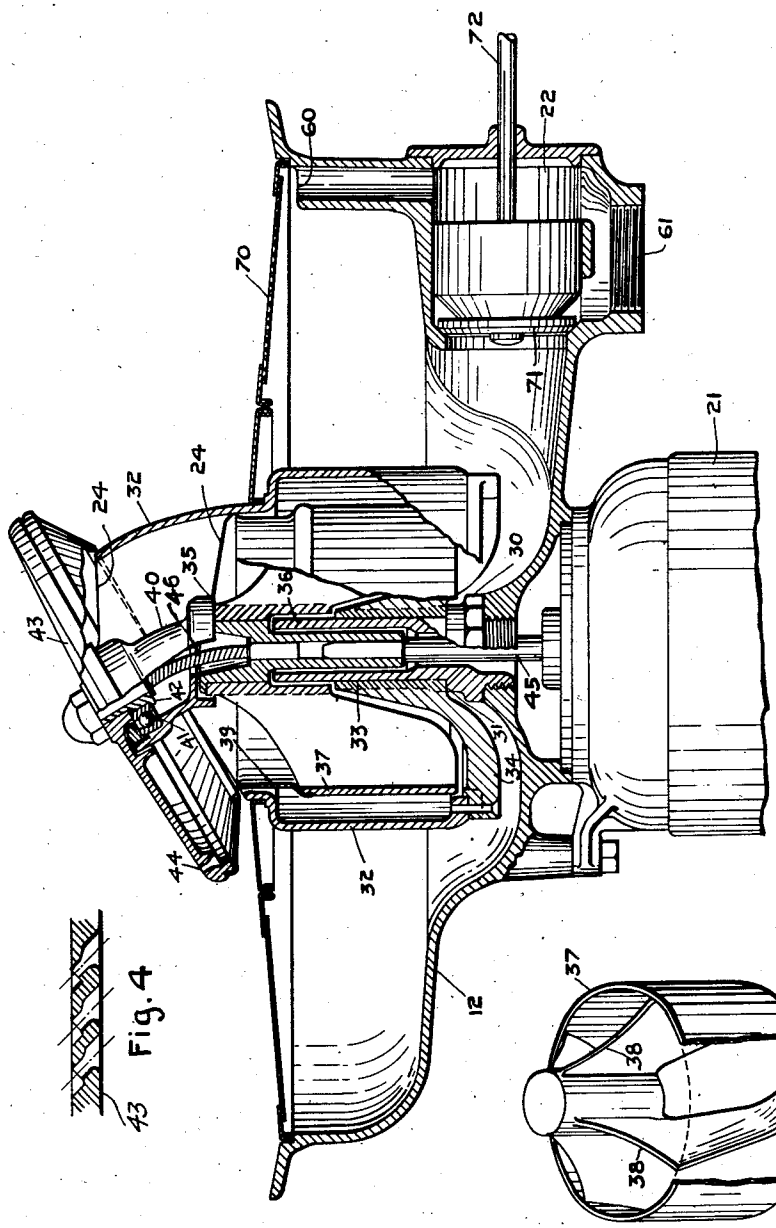


Fig. 2

Fig. 4

Fig. 3

Inventor
Donald G. Smellie.
BY H. S. Dumarr
Attorney.

Patented May 1, 1928. 1,667,745

UNITED STATES PATENT OFFICE.

DONALD G. SMELLIE, OF MAYWOOD, ILLINOIS, ASSIGNOR TO THE HOOVER COMPANY, A CORPORATION OF OHIO.

DISHWASHER.

Application filed August 29, 1924. Serial No. 734,829.

This invention relates to an improvement in dish-washing machines wherein there is provided separate members in the form of a water lifting element and a water distributing element, each separate and distinct from the other, by the co-action of which members the washing solution is lifted and projected against the article to be cleansed. It is a well known fact that in all dish washers heretofore built or proposed soap could not be used in appreciable quantities since any suds more than the very slightest amount would prevent proper operation of the machine, due either to the presence of suds the pump provided would not function to its full capacity, or due to what may be termed blanketing of the water agitation by the suds when other types of agitation of the washing fluid is employed.

The object of this invention is to provide a dish-washing machine wherein soap may be freely employed if desired and one wherein the water distributing member is of such construction that articles placed in the machine will be fully and thoroughly cleaned.

Another object is to provide means whereby the washing solution is subjected to a centrifugal action whereby any suds present will be caused to separate from the water so that the water projected may be taken from a point where there is a solid body of water as distinguished from a body of water having intermingled suds.

A still further object is to provide means whereby the cleansing solution may be projected against the articles to be cleaned at a relatively high pressure and to provide a mechanisn whereby these jets may be discharged in such directions as to fully cover the interior of the washer.

It is a further object of this invention to provide means for lifting and distributing a large quantity of water in a given time, since in this type of machine, as a general rule, the greater the amount of water passed over the articles to be cleaned the quicker and more thoroughly they are cleaned.

Other and further objects of my invention will become apparent in connection with the description of the drawings, wherein

Figure 1 shows a section of a dish washing machine embodying the invention, parts being shown in elevation;

Fig. 2 is a substantial cross-section of the water raising and distributing means;

Fig. 3 is a perspective of the water raising means; and

Fig. 4 is a partial section showing several of the distributing jets.

The dish washing machine illustrated consists essentially of an outer cylindrical container of sheet metal illustrated at 10 supported on legs 11 and sump portion 12 which is ordinarily a casting. The legs 11 supporting the structure are secured to the sheet metal container 10. For closing the open top portion of the cylindrical member 10 there is provided a dished head member 13 adapted to seat on flange 14 formed in the outer member 10. In the cylindrical container 10 there are provided dish racks such as are indicated at 15 and 16, the rack 15 being in this particular instance adapted to be suspended from flange 14 while the rack 16 fits in the bottom of the container 10 resting on supports such as are indicated at 23. The dish rack 15 may be provided with a silver basket such as 17, and with auxiliary rack portions such as 18 to assist in maintaining the dishes in proper relation, the auxiliary rack 18 being separately removable in order that the bottom basket 16 may be loaded without removing top rack 15.

The water lifting and distributing mechanism is located substantially in the sump portion 12 and consists of a water lifting member indicated at 19 and a water distributing head indicated at 20. There is provided a motor indicated at 21 for operating the water lifting and distributing mechanism. Indicated as at 22 is a large valve through the operation of which the container may be readily emptied after a washing is completed.

The general arrangement of the entire dish washing machine having been set out, the specific construction will now be described.

Substantially centrally of the sump portion 12 there is provided an upstanding sleeve member indicated at 30 which member is shown as screw threadedly secured to the sump portion, but which might readily be formed or cast integral therewith. On member 30 there is provided a bearing surface such as 31 which is formed by reducing the exterior diameter of the upper portion of the member, and on this reduced portion is rotatably mounted what will be called a vortex ring indicated at 32, which ring is

connected to a central hub portion 33 by means of radial arms 34, the spaces between the arms constituting the inlet to the water elevating pump. Mounted interiorly of tubular member 30 and adapted to have bearing on the top surface thereof is member 35 having a substantially square opening 36 extending therethrough longitudinally. Secured to member 35 and adapted to be rotated thereby there is a centrifugal elevating pump having an annular external portion indicated at 37 with blades indicated at 38, and there is secured to the upper portion thereof an annulus as 39 for a purpose which will later be fore fully disclosed. Attention is directed to the fact that annular member 32 is not a straight cylinder throughout its entire length but that at the upper end this annulus is turned through about 30 degrees arcuately and is cut off perpendicular to the axis of this top portion. Axially with this upper portion of annular member 32 there is provided a hub portion 40 which is connected to the outer annular member by means of webs 24 only one of which for sake of clearness in illustration is shown in Fig. 2. In the upper portion of this hub member 40 there is provided a bearing 41 which has secured to the inner race thereof bushing 42, having a central opening square in cross-section, and also supported on such bearing on the inner race thereof is the distributor head 43 provided with jet openings 44. The entire distributor head assembly is carried on and rotates with annular vortex ring 32. There is provided a flexible shaft 46 having squared ends, one end of which enters into the square central opening in member 35, the other end entering into square central opening in bushing 42, the lower end of member 35 in the central square opening receiving the motor drive shaft indicated at 45.

The more essential portions of the construction having been fully described, the operation of the machine will now be discussed.

Water or cleansing fluid is admitted to sump portion 12 up to the over-flow 60, above which point the base cannot be filled since the over-flow 60 connects through valve member 22 with the waste at 61. When the base portion has been filled the motor is started and rotation of shaft 45 will cause rotation of member 35 to which the centrifugal lifting pump is attached, thus rotating the centrifugal lifting pump which through the action of blades 38 and annulus 37 will cause water to be drawn up from the base portion and delivered into annular member 39 which confines the flow to a vertical spiral until delivered to the deflector elbow. The water then passes through the upper portion of annular member 32 which portion may be termed a deflecting elbow and passes into distributor member 43 which is also rotated by rotation of motor shaft 45 through the flexible shaft connection 46. It should be noted that for best operation the lifting pump and the distributor head should be so designed as to have equal capacities in order that the distributor head may be kept full at all times when the machine is in operation. The water when it enters distributor head 43 will because of the speed of rotation thereof be carried out to the outer edge and discharged from jets 44 under considerable pressure. Annular member 32 which has been termed the vortex ring has an important function in the operation of the washer. Its function is to prevent the forced vortex existing around the primary or lifting pump unit from being communicated to the entire volume of water in the sump, thus reducing the cavitation effect. This vortex ring and the upper part thereof or deflecting elbow which supports and carries the distributor head are all given a rotary motion about the vertical axis of the machine since the forced vortex created outside of the elevator will, due to skin friction on the interior of the annulus 32 cause this entire assemblage to rotate slowly, which rotation will cause the axis of the water sheet thrown out from the distributor head to cover progressively all parts of the tub with the water particles traveling in different directions each discharged particle of water from a jet describing one element of a hyperboloid of revolution of one nappe. Provided in the upper portion of sump 12 there is a screen member 70 for the purpose of preventing particles washed from the dishes from returning into the sump to be again circulated over the dishes. Thus the water when it again passes over the dishes is free from all particles which might possibly be redeposited if they were not screened out. In order that the water may be quickly emptied when the washing operation is finished, there is provided in the valve casing 22, a valve 71 having secured thereto valve operating rod 72 whereby the discharge may be opened and the dirty water discharged through opening 61.

It should be particularly noted that the washing solution is subjected to centrifugal action during both the raising and discharge periods so that bubbles caused by soap or included by violent agitation will separate, moving toward the center while the water free from bubbles will travel outwardly. Due to this last fact it will be evident that there will always be deaerated water available for projection from the jets.

I claim—

1. In a dish washing machine, a centrifugal fluid lifting means, a journalled annular member spaced from and surrounding the fluid lifting means, a revolubly driven pressure developing fluid distributing means

having a rotational axis about which it rotates, drive means for the fluid distributing means and a driving connection between the fluid distributing means and the driving means, the fluid distributing means carried by the annular member with its rotational axis inclined relatively to the axis of the annular member.

2. In a dish washing machine, a sump having partially submerged therein a revoluble means for elevating a fluid, a journaled annulus surrounding the fluid elevating means rotated by the forced vortex created by revolution of the revoluble fluid elevating means, there being carried by the annulus a revoluble fluid projecting means mounted for rotation on an axis angularly displaced with respect to the axis of the revoluble annulus.

3. In a dish washing machine, a unitary removable fluid elevating and projecting assemblage, the assemblage mounted on a journal member positioned substantially centrally of the dish washer, a drive shaft extending centrally of the journal member, the assemblage comprising an annulus journaled on the journal member, fluid elevating means removably mounted on and driven by the drive shaft and positioned interiorly of the annulus, fluid projecting means rotatably mounted, its bearing carried by the annulus, its rotational axis inclined to that of the annulus, there being provided co-operating surfaces on the annulus and fluid elevating member whereby removal of the annulus from its journal causes removal of the entire assemblage therefrom.

4. In a dish washing machine, a driven combination centrifugal fluid elevating means, a freely journaled annular baffle surrounding the fluid elevating means, the upper portion thereof forming a deflecting elbow, a driven fluid projecting means journaled on the elbow for rotation relative thereto, the rotational axis of the fluid projector being angularly displaced with respect to that of the baffle, the deflecting elbow comprising means directing fluid from the elevating means to the projecting means, and means for driving the elevating and projecting means.

5. In a dish washing machine, a driven pressure fluid distributor comprising a revoluble pressure creating member mounted for rotation on a gyrating axis, the distributor having substantially central intake and peripheral discharge.

6. In a dish washing machine, fluid elevating means, a centrifugal fluid pressure jet projecting means fed by the fluid elevating means, the jet projecting means rotating on an axis inclined from the vertical and a single means driving the fluid elevating means and the fluid pressure jet projecting means, the axis of the fluid pressure jet projecting means traversing a conical surface having its apex at the intersection of its inclined axis at the vertical.

7. In a dishwashing machine, a fluid elevating means supplying cleaning fluid to a rotating jet projecting member, the jet projecting member rotating on an inclined axis having a gyrational movement, means gyrating the axis of revolution of the rotating jet projecting member, mechanical driving means operating the fluid elevating means and imparting to the jet projecting means a motion of rotation on its axis of gyration.

Signed at Chicago, in the county of Cook, and State of Illinois, this 27th day of August, A. D., 1924.

DONALD G. SMELLIE.