Sept. 20, 1971 W. F. ROBANDT II, ETAL 3,605,770

DISHWASHER APPARATUS

Filed April 15, 1970

FIG.1

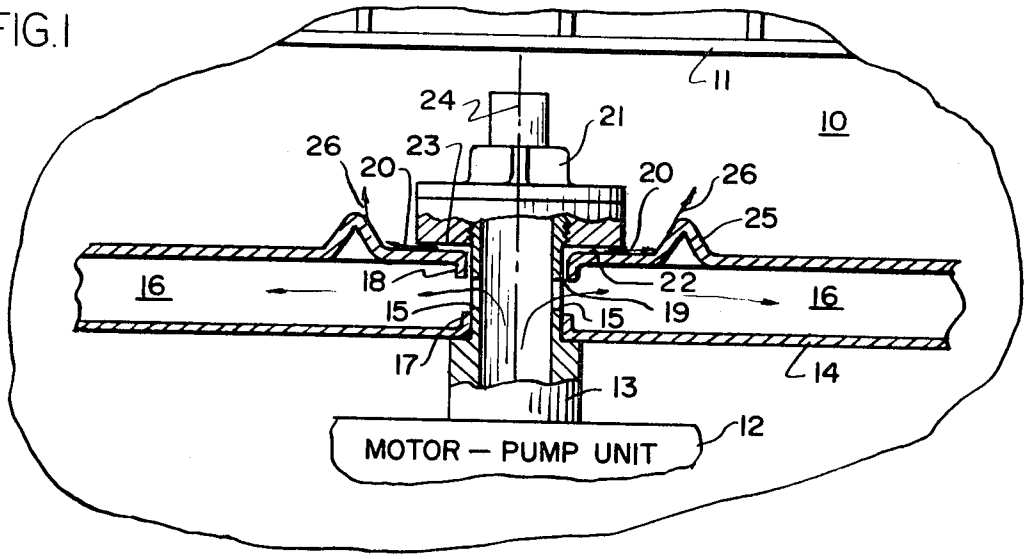


FIG.2

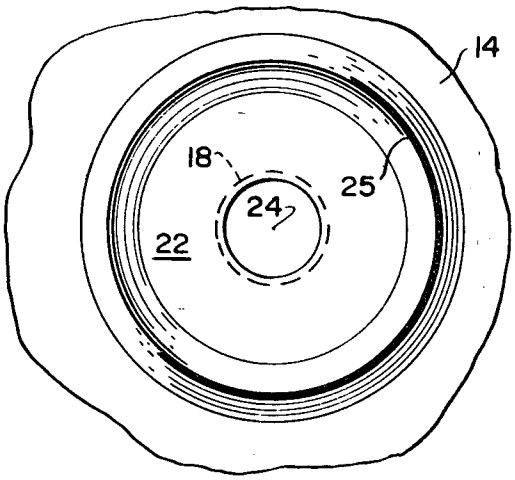
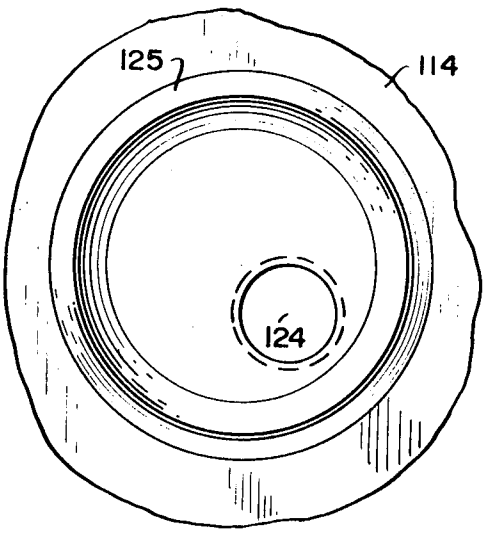


FIG.3



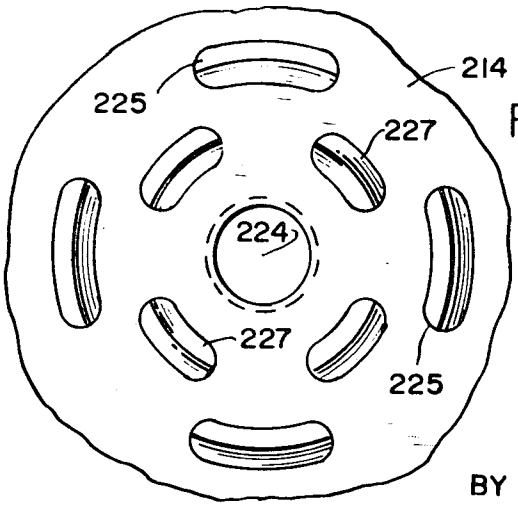


FIG.4

INVENTORS.
WILLIAM F. ROBANDT II
RAYMOND W. SPIEGEL

BY Hofgren, Wegner, Allen, Stallman & McCord.
ATTORNEYS.

United States Patent Office 3,605,770 Patented Sept. 20, 1971

3,605,770

DISHWASHER APPARATUS

William F. Robandt II, St. Joseph, and Raymond W. Spiegel, Stevensville, Mich., assignors to Whirlpool Corporation

Filed Apr. 15, 1970, Ser. No. 28,648
Int. Cl. B08b 3/02
U.S. Cl. 134—179 9 Claims

ABSTRACT OF THE DISCLOSURE

A dishwasher that includes a liquid conduit and a rotatable spray arm and an article holding rack spaced from the spray arm in which a portion of the liquid that is under pressure within the spray arm is permitted to escape to the outside of the arm, and in which intercepting and projecting members are provided for directing this escaping liquid first along the outer surface of the spray arm and then toward the adjacent rack and articles such as dishes therein.

SUMMARY OF THE INVENTION

One of the features of this invention is to provide an improved dishwasher apparatus having the liquid conduit through which liquid is pumped under pressure to a spray arm rotatably mounted thereon with the apparatus providing for leakage or flow of a minor portion of the liquid from the interior of the arm to the exterior thereof together with structure for intercepting this leakage flow and directing it first along the outer surface of the arm and then toward the article rack and the articles therein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary view partially in section of a dishwasher apparatus embodying the invention.

FIG. 2 is a fragmentary plan view of a portion of the spray arm in the area surrounding its axis of rotation.

FIGS. 3 and 4 are views similar to FIG. 2 but each illustrating a further embodiment of the invention.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

In the apparatus illustrated in the accompanying drawings the dishwasher comprises a customary tub **10**, an article or dish retaining rack **11** therein and a motor and pump unit **12** for pumping washing liquid, either detergent liquid or rinse liquid, under pressure in the customary manner.

Leading upwardly from the unit **12** is a liquid conduit means **13** in the form of a vertically arranged liquid conveying pipe. Rotatably mounted on this pipe in a position beneath the rack **11** is a spray arm **14** that is supplied with liquid under pressure from the motor-pump unit **12** by way of the vertical pipe **13** and openings **15** therein within the confines of the spray arm **14**.

The liquid under pressure from the unit **12** flows through the openings **15** and through the hollow interior **16** of the arm in the customary manner. From this interior **16** the liquid under pressure is sprayed upwardly onto articles (not shown) retained within the rack **11**. This upward spray is provided by the customary spray openings (not shown) with also impart rotation to the arm in the customary manner by the reaction of the emerging liquid jets.

The arm **14** is rotatably mounted on the vertical pipe **13** by a mounting means including an upwardly extending annular bottom flange **17** on the bottom of the spray arm **14** and a downwardly projecting top flange **18** on the top of the spray arm.

The top flange **18** is spaced from the adjacent portion of the liquid conduit means pipe **13** to provide an annular leakage space **19** through which liquid flows as indicated by the arrows **20** to the exterior of the spray arm **14**. This flow space **19** is on the side of the arm **14** that is adjacent the rack **11**.

The apparatus also includes intercepting means here embodied in a cross member **21** and specifically a cap on the end of the liquid pipe **13** for maintaining spray arm **14** positioned on pipe **13** and for intercepting the emerging liquid portion **20** and directing it adjacent the outer surface side **22** of the spray arm that is adjacent the rack **11**. This intercepting means cap **21** has a flat bottom surface **23** adjacent the arm **14** so that the liquid flow **20** will be substantially equal around the axis of rotation **24** of the arm.

The dishwasher apparatus of this invention also includes projecting means **25** for intercepting the liquid indicated at **20** and projecting it toward the rack **11** as indicated by the upwardly extending arrows **26**. In the embodiments of FIGS. 1 and 2 this projecting means is in the form of an upward extending protuberance on the upper surface of the spray arm **14** and specifically a circular ridge that is substantially concentric to the axis of rotation **24** and the top flange **18**. This ridge **25** is located radially beyond the cap **21** so that the upwardly projected liquid **26** will not contact the bottom surface **23** of the cap.

In the embodiment of FIG. 3 the spray arm **114** is also provided with a circular ridge **125** but here the ridge is eccentric to the axis of rotation **124** so as to produce a sweeping back and forth action of the upwardly projected liquid that impinges on the ridge **125**.

In the embodiment of FIG. 4 the spray arm **214** is provided with spaced sets of arcuate ridges **225** and **227** with the ridges in one set **225** being spaced a greater distance from the axis of rotation **224** than are the ridges **227** of the other set. As can be seen in FIG. 4 each of the ridges in this embodiment extend arcuately so that the ridges **225** describe a circle and the ridges **227** describe a circle of smaller diameter.

In the preferred embodiments the spray arms **14**, **114** and **214** comprise any sheet material that can be shaped as indicated. Preferably this sheet material is either metal or a rigid plastic.

In the embodiment shown in FIG. 1 the cap **21** may be provided with a central aperture aligned with pipe **13** to allow a jet of water to be projected upwardly to an upper spray arm (not shown). The concept of projecting a column of liquid to an upper spray arm is fully disclosed in U.S. Pats. 3,180,348 and 3,444,870 which are assigned to the assignee of this application.

In the structure of this invention the liquid that normally tends to leak between the rotatable spray arm and the liquid conduit pipe or similar supporting structure as identified at **13** is used to provide an additional liquid spray on the articles such as dishes in the rack **11**. Thus this invention not only provides an additional spray to aid in cleaning the articles but also permits the omission of liquid seals that are normally employed in order to avoid this leakage. Also the top retaining cap illustrated at **21** is used to retain spray arm **14**, to close the upper end of the pipe **13** or alternately form a projecting nozzle, and to provide a liquid directing surface **23** for predetermining the direction of liquid flow as illustrated at **20**.

Having described our invention as related to the embodiments 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 appended claims.

We claim:

1. A dishwasher apparatus, comprising: a liquid conduit; a hollow spray arm; an article retaining rack spaced from said arm; means for rotatably mounting said spray arm on said conduit, said means including a liquid flow space between said conduit and arm on the side thereof adjacent said rack, said flow space thereby providing an outlet for a minor portion of said liquid to the exterior of said arm; intercepting means for intercepting said liquid portion and directing it adjacent the outer surface side of said arm that is adjacent said rack; and projecting means for projecting said liquid portion from said outer surface side toward said rack.

2. The apparatus of claim 1 wherein said intercepting means comprises a cross member having a liquid intercepting surface portion spaced from said spray arm surface side.

3. The apparatus of claim 2 wherein said cross member comprises a spray arm retaining cap on the end of said conduit that is adjacent said rack.

4. The apparatus of claim 1 wherein said projecting means comprises a protuberance on said outer surface side of the spray arm and extending toward said rack.

5. The apparatus of claim 1 wherein said intercepting means comprises a cross member having a liquid intercepting surface portion spaced from said spray arm surface side, said projecting means comprises a protuberance on said outer surface side of the spray arm and extending toward said rack and located radially beyond said cross member.

6. The apparatus of claim 5 wherein said spray arm surface side comprises a sheet material with said protuberance comprising a part thereof.

7. The apparatus of claim 5 wherein said spray arm has an axis of rotation and said protuberance is circularly arranged concentric thereto.

8. The apparatus of claim 5 wherein said spray arm has an axis of rotation and said protuberance is circularly arranged eccentric thereto.

9. The apparatus of claim 5 wherein said spray arm has an axis of rotation and there are provided a plurality of protuberances certain of which are located varying distances from said axis.

References Cited

UNITED STATES PATENTS

2,877,778	3/1959	Kirby	134—183X
3,144,034	8/1964	Lyman et al.	134—176
3,180,348	4/1965	Clearman	239—251X
3,370,869	2/1968	Dutcher	134—176X
3,444,870	5/1969	Lyman	134—179

ROBERT L. BLEUTGE, Primary Examiner

U.S. Cl. X.R.

134—183; 239—251