

June 3, 1969

A. L. HARDY

3,447,752

REVERSING SPRAY HEAD ASSEMBLY FOR AUTOMATIC DISHWASHER

Filed Aug. 11, 1967

Sheet 1 of 2

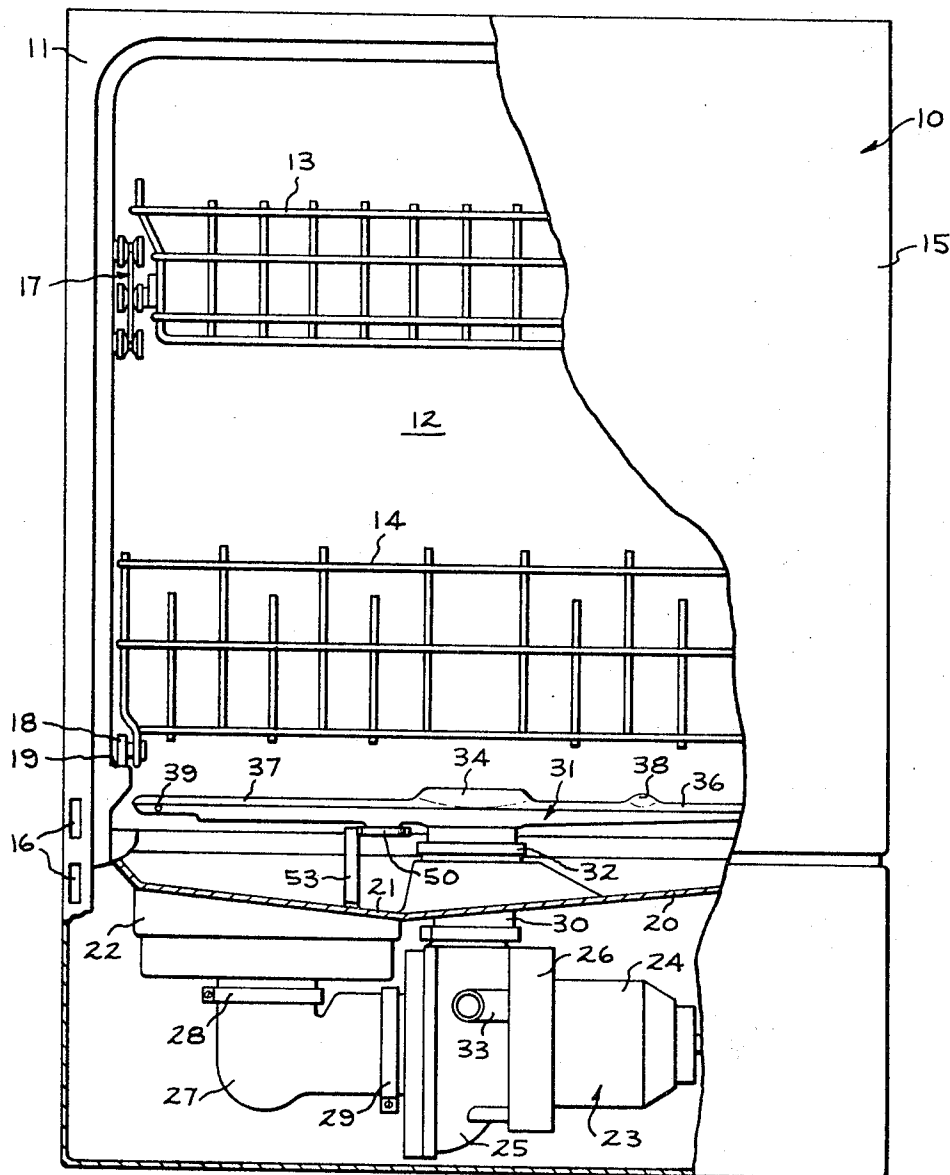


FIG. 1

INVENTOR
ALBERT L. HARDY
BY  Perry S. Donnell, III
HIS ATTORNEY

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FIG. 2

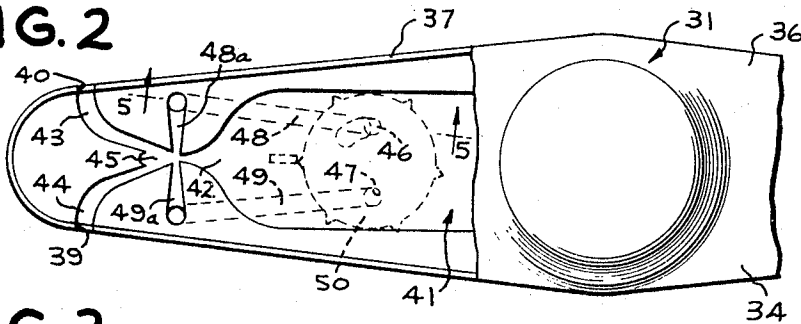


FIG. 3

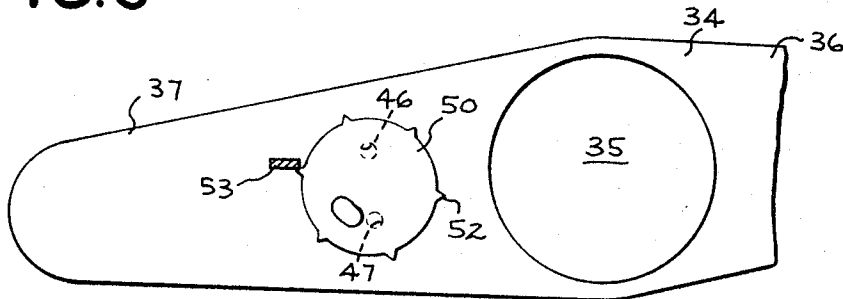


FIG. 4

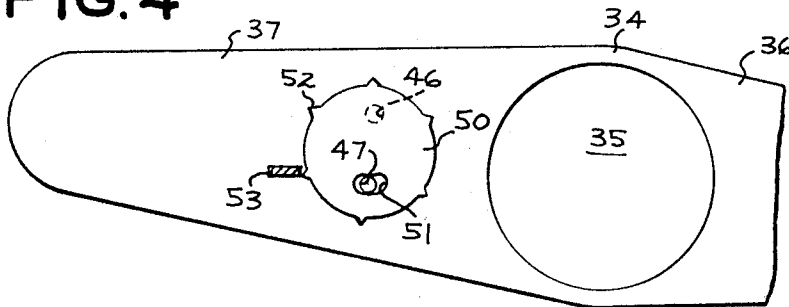
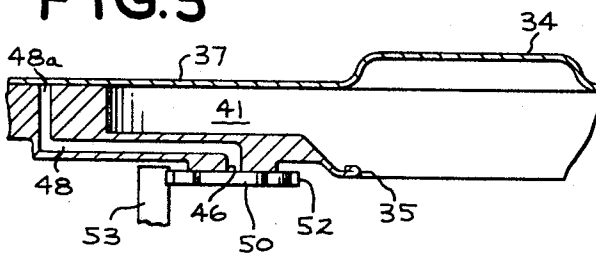


FIG. 5



INVENTOR
ALBERT L. HARDY
BY *Harry B. Darnell, III*
HIS ATTORNEY

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3,447,752

REVERSING SPRAY HEAD ASSEMBLY FOR AUTOMATIC DISHWASHER

Albert L. Hardy, Louisville, Ky., assignor to General
Electric Company, a corporation of New York

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5 Claims

ABSTRACT OF THE DISCLOSURE

A reversing spray head assembly for an automatic dishwasher comprising a hollow casing supported in the dishwasher wash chamber for rotation about an axis transverse to the casing major plane. Pressurized liquid is admitted to the casing through an opening adjacent the axis of rotation and is issued into the wash chamber from orifices provided in the casing. The liquid issued from certain of the orifices generates a washing action. A passageway is formed in an arm of the casing which extends outwardly from the axis, and the liquid conducted through it issues into the wash chamber from either of a pair of jet propelling orifices which open in opposite directions from the arm. Issuance of the liquid from one of the propelling orifices urges rotation of the casing in one direction about the axis, while issuance of liquid from the other urges reverse rotation of the casing. The arm passageway is divided into an inlet portion connected to the casing liquid inlet opening and two outlet portions which have a common intersection with the passageway inlet portion and extend from opposite sides thereof to a respective one of the propelling orifices. A pair of air inlet ports are provided in the casing arm and are connected by separate conduits to the opposite sides of the passageway inlet portion adjacent the intersection. The air conduits have a considerably smaller cross-section than the liquid passageway portions. Control means including a cam-actuated valve plate rotatably mounted on the casing arm are provided for selectively opening and closing the air inlet ports to allow aspiration of air through only one of the ports at one time and thus direct the liquid toward one of the propelling orifices and away from the other whereby direction of rotation of the casing about the axis can be reversed.

Background of the invention

This invention relates to automatic dishwashers. More particularly it relates to a reversing spray head assembly for an automatic dishwasher.

Many automatic dishwashers have a spray head assembly comprising a hollow casing supported for rotation about an axis transverse to its major plane. A plurality of orifices are provided in the casing and wash fluid fed into the casing under pressure by a pump issues from certain of the orifices to generate a vigorous spray action. Others of the orifices are located at the outer ends of a pair of arms that extend outwardly in opposite directions from the axis of rotation and are employed as jet propelling orifices to rotate the casing about the axis. A typical dishwasher spray head assembly of this type is illustrated in U.S. Patent No. 3,288,372, issued Nov. 29, 1966, to Donald S. Cushing, and assigned to the General Electric Company, assignee of the present invention. In such presently known assemblies, the jet propelling orifices provide for rotation of the casing in only one direction. While this unidirectional rotation of the spray head casing helps to distribute the spray about the dishwasher wash chamber, it is possible because the rotation is unidirectional to miss certain portions of the soiled articles contained within the wash chamber. Hence, it would be desirable to periodically reverse the rotation of the spray head casing

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in order to more thoroughly distribute the spray to the soiled articles.

Summary of the invention

The present invention provides a reversing spray head assembly for an automatic dishwasher, comprising: a hollow casing supported in the dishwasher wash chamber for rotation about an axis and having an arm extending outwardly from said axis; an opening in said casing for admitting liquid under pressure to the inner end of said arm; a liquid passageway in said arm for conducting liquid outwardly to a pair of orifices which open in opposite directions from said arm generally in a plane transverse to the axis of rotation, said passageway including an inlet portion connected to said opening and two outlet portions having a common intersection with the inlet portion and extending outwardly from opposite sides thereof to a respective one of the orifices; a pair of control fluid inlet ports in said arm connected to the opposite sides of the passageway inlet portion adjacent the intersection by separate conduits which have a considerably smaller cross-section than the passageway portions; and means for selectively opening or closing the control fluid inlet ports to allow entry of control fluid through only one of the ports at one time and thus direct the liquid toward one and away from the other of said orifices whereby the direction of rotation of the casing about said axis can be reversed. Preferably, the control fluid is aspirated air and the casing is provided with at least one additional orifice for issuing the liquid to generate a washing action within the wash chamber.

Brief description of the drawings

The present invention is illustrated in the accompanying drawings, wherein:

FIGURE 1 is an elevational view, partly cut away to show details, of an automatic dishwasher employing the present invention;

FIGURE 2 is a fragmentary partly broken top plan view of the portion of the spray head of the present invention which appears at the lower left of FIGURE 1;

FIGURE 3 is a fragmentary bottom plan view of the spray head portion of FIGURE 2, showing the air inlet valve plate in a first condition;

FIGURE 4 is a view similar to FIGURE 3 but showing the valve plate in another condition; and

FIGURE 5 is a section taken substantially along line 5—5 of FIGURE 2.

Description of the preferred embodiment

Referring now to the drawings and particularly to FIGURE 1 thereof, there is illustrated an automatic dishwasher 10 having an outer cabinet 11 defining therein a wash chamber 12. Disposed within the wash chamber 12 are dish-supporting racks 13 and 14 which are adapted to receive and support dishes or other articles to be washed within the wash chamber 12. A closure member or door 15 is provided in one wall of the cabinet 11, pivotal about a hinge means 16 to provide access to the wash chamber 12. When the door is pivoted downwardly, the rack 13 can be at least partially withdrawn from the wash chamber 12. The rack 13 is mounted by means of a slide and roller system 17 provided at each side of the rack 13 and slidably supporting the rack 13 from the inner wall of the cabinet 11. Similarly, the rack 14 can be at least partially withdrawn from the wash chamber 12 by means of a roller 18, which rides upon a surface 19 provided at each side of the cabinet 11.

The lower extremity of the wash chamber 12 is defined by a bottom wall 20 which gradually slopes to a low point 21 near the center of the dishwasher. Disposed below the low point 21 is a sump 22 which may be formed

integrally with the bottom wall 20 or which may be a separate element secured to the bottom wall 20. Disposed below and supported by the bottom wall 20 is a motor-pump assembly 23 which includes an electric motor 24, pump 25 and an electrically-operated valve 26 (shown in block). The sump 22 and the inlet of the pump 25 are interconnected by a large diameter conduit 27. The conduit 27 is secured to the sump 22 by means of a clamp 28 and to the housing of the pump 25 by means of a clamp 29. The pump 25 has a main outlet communicating with a conduit 30 which in turn communicates with a spray head 31 which is rotatably mounted atop a centrally-bored pedestal 32 formed in the bottom wall 20.

The pump 25 is also provided with an effluent discharge outlet 33 which is controlled by the valve 26 and is connected to the household sewer system by suitable conduit means (not shown). The valve 26 includes an element (not shown) within the housing of a pump 25 that is movable between two positions. In one of these positions the element closes the effluent discharge outlet 33 and opens the main outlet and, in the other of these positions, closes the main outlet and opens the effluent discharge outlet. An electrical resistance heating element (not shown) may be provided in the lower portion of the wash chamber 12 to facilitate drying of articles supported by the racks 13 and 14 upon completion of the normal wash and rinse operations.

An electrically-operated fill valve (not shown) is provided to admit water to the wash chamber 12 and electrical sequence control means (not shown) of a well-known type are provided for sequentially operating the pump valve 26 and the fill valve.

It should, of course, be understood that all of the structure thus far described may be modified a great deal without seriously affecting the present invention since this structure is substantially conventional and comprises only one illustrative structure with which the present invention is compatible.

As discussed above, the present invention is primarily concerned with providing a reversing spray head assembly which will permit periodic reversal of the direction of rotation of a dishwasher spray head, such as spray head 31, about its axis of rotation, such as the pedestal 32.

In accordance with a presently preferred embodiment of the present invention, this is accomplished by making the spray head 31 in the form of a hollow elongate casing 34 having a liquid inlet opening 35 adjacent its bottom center which is rotatably mounted atop the pedestal 32 in a fluid-sealing relationship and a pair of arms 36 and 37 extending in opposite directions from the inlet opening 35. During the washing and rinsing operations, wash fluid from the sump 22 is propelled under pressure into the opening 35 of the hollow casing 34 by the motor-pump assembly 23 through the conduit 30 and is conducted outwardly through the hollow casing arms 36 and 37. At least one of the casing arms 36 (the right as seen in the drawings) is provided with at least one orifice 38 in its upper surface through which the pressurized wash fluid is issued upwardly to generate a wash action within the wash chamber 12.

As best shown in FIGURE 2, the other hollow casing arm 37 (the left as seen in the drawings) is provided adjacent its outer end with a pair of jet propelling orifices 39 and 40 which open in opposite directions generally in a plane transverse to the axis of rotation of the spray head casing 34 about the pedestal 32. The upper interior of the casing arm 37 is further provided with a passageway 41 which extends outwardly from the liquid inlet opening 35. The passageway 41 is divided into an inlet portion 42 connected to the casing liquid inlet opening 35 and two outlet portions 43 and 44 which have a common intersection 45 with the passageway inlet portion 42 and extend from opposite sides thereof to a respective one of the propelling orifices 39 and 40. With this arrange-

ment, the pressurized wash fluid can be conducted outwardly along the passageway 41 to issue from either of the two propelling orifices 39 or 40. As viewed from the top of the dishwasher, issuance of the pressurized wash fluid from the propelling orifice 39 will urge the spray head casing 34 to rotate in a clockwise direction about the pedestal 32, while issuance of the pressurized wash fluid from the other propelling orifice 40 will urge the spray head casing 34 to rotate in a reverse or counter-clockwise direction about the pedestal axis 32.

As shown in FIGURES 3 and 4, the bottom of the hollow casing arm 37 is also provided with a pair of transversely-spaced aligned control fluid inlet ports 46 and 47 which are connected to the passageway 41 by separate conduits 48 and 49 (partially shown in dotted lines in FIGURE 2). While various control fluids may be used, air is preferably employed in accordance with the presently preferred embodiment.

Each of the air conduits 48 and 49 has a similar cross-sectional area that is considerably smaller than those of the liquid passageway portions 42-44. The outlet sections 48a and 49a of the air conduits 48 and 49 are connected to the opposite sides of the liquid passageway inlet portion 42 at a point adjacent the intersection 45, opening directly across from one another and disposed substantially perpendicular to the long axis of the inlet portion 42. A substantially circular valve plate 50 is rotatably mounted on the bottom of the casing arm 37 adjacent the ports 46 and 47. The valve plate 50 extends over the ports 46 and 47 in a fluid-sealing relationship and is provided with an aperture 51 somewhat larger than those ports which may be selectively aligned over either of the ports 46 and 47 to open the same by 180° rotation of the valve plate 50.

With this arrangement, the pressurized wash fluid in the passageway 41 may be selectively directed toward one and away from the other of the propelling orifices 39 and 40 by rotation of the valve plate 50. Upon rotation of the valve plate 50 to a position opening the port 46, air will be aspirated through its conduit 48 to the liquid passageway inlet portion 42 adjacent the intersection 45 and will direct pressurized fluid toward propelling orifice 39 and away from the other propelling orifice 40. As seen from the top of the dishwasher, this will cause the spray head casing 34 to rotate in a clockwise direction. Even though the valve plate 50 may subsequently be rotated to close both ports 46 and 47, the pressurized wash fluid in the passageway 41 will continue to be directed toward the propelling orifice 39 by the so-called "Coanda effect" until the valve plate 50 is rotated to open the other air port 47. When the valve plate 50 is rotated sufficiently to open the other port 47, air will then be aspirated through that port 47 and its conduit 49 into the liquid passageway inlet portion 42 adjacent the intersection 45 and will shift the flow of wash fluid to the propelling orifice 40. As seen from the top of the dishwasher, the spray head casing 34 will now be rotated in a counter-clockwise direction about the pedestal axis 32.

In order to provide for periodic reversal of the rotation of the spray head casing 34, the peripheral edge of the valve plate 50 is provided with a gear-like intermittent cam surface 52, and an upstanding arm 53 is rigidly attached to the wash chamber bottom wall 20 with its upper end aligned for engagement with cam surface 52. With this arrangement, one of the spaced teeth on the valve plate cam surface 52 intermittently engages the upstanding arm 53 with each revolution of spray head casing 34 about the pedestal axis 32 to rotate the valve plate 50 relative to the bottom of the casing 34. As viewed in FIGURES 2 and 3, the casing 34 revolves clockwise and the valve plate 50 is intermittently rotated counterclockwise moving the aperture 51 toward the port 47 until it is aligned hereover as shown in FIGURE 4. When the condition shown in FIGURE 4 is reached, the casing 34 then will be revolved counterclockwise and the valve plate 50 intermit-

tently rotated clockwise until the aperture 51 is again aligned over the port 46, and so on.

The particular cam surface 52 shown in FIGURES 2-4, will cause the spray head casing 34 to reverse its direction of rotation about the pedestal axis 32 after three revolutions; the valve plate aperture 51 being rotated one-third of the 180° between the two ports 46 and 47 with each revolution of the casing 34. However, it is evident that such reversal can be made to occur after a greater or fewer revolutions of the casing 34 by altering the configuration of the valve plate cam surface 52.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that other variations, modifications or applications will occur to those skilled in the art.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an automatic dishwasher, a reversing spray head assembly, comprising:

(a) a hollow casing supported in the dashwasher for rotation about an axis and having an arm extending outwardly from said axis,

(b) an opening in said casing for admitting liquid under pressure to the inner end of said arm,

(c) a liquid passageway in said arm for conducting said liquid outwardly through a pair of orifices which open in opposite directions from said arm generally in a plane transverse to said axis so that issuance of said liquid from one of said orifices urges rotation of said casing about said axis in a first direction and issuance of said liquid from the other of said orifices urges rotation of said casing about said axis in a second direction reversed from said first direction,

(d) said liquid passageway including an inlet portion connected to said opening and two outlet portions having a common intersection with said inlet portion and extending from opposite sides thereof to a respective one of said orifices,

(e) a pair of control fluid inlet ports in said arm con-

nected to said opposite sides of said inlet portion adjacent said intersection by separate conduits in said arm which have a considerably smaller cross-section than said passageway portions, and

(f) control means for selectively opening and closing said control fluid inlet ports to allow entry of control fluid through only one of said ports at one time and thus direct said liquid toward one and away from the other of said orifices whereby the direction of rotation of said casing about said axis can be reversed.

2. The invention of claim 1, wherein:

(a) said control fluid is air.

3. The invention of claim 2, wherein:

(a) said control means comprises

(i) a valve plate rotatably mounted on said arm adjacent said ports and having a peripheral cam surface, and

(ii) a stationary member engageable with said cam surface to rotate said valve plate relative to said ports.

4. The invention of claim 1, wherein:

(a) said casing includes at least one additional orifice for issuing said liquid to generate a wash action.

5. The invention of claim 1, wherein:

(a) said liquid comprises wash fluid from a sump in the dishwasher.

References Cited

UNITED STATES PATENTS

2,358,377	9/1944	Bilde	239—98
3,178,117	4/1965	Hanifan	239—98 X
3,285,262	11/1966	Ernst et al.	137—81.5
3,312,264	4/1967	Morey	137—81.5

ALLEN N. KNOWLES, *Primary Examiner*.

B. BELKIN, *Assistant Examiner*.

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137—81.5; 239—98