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T. E. JENKINS

3,134,386

WASHING MACHINE WITH SELECTIVELY VARIABLE WASHING ACTION

Filed Jan. 24, 1963

2 Sheets-Sheet 1

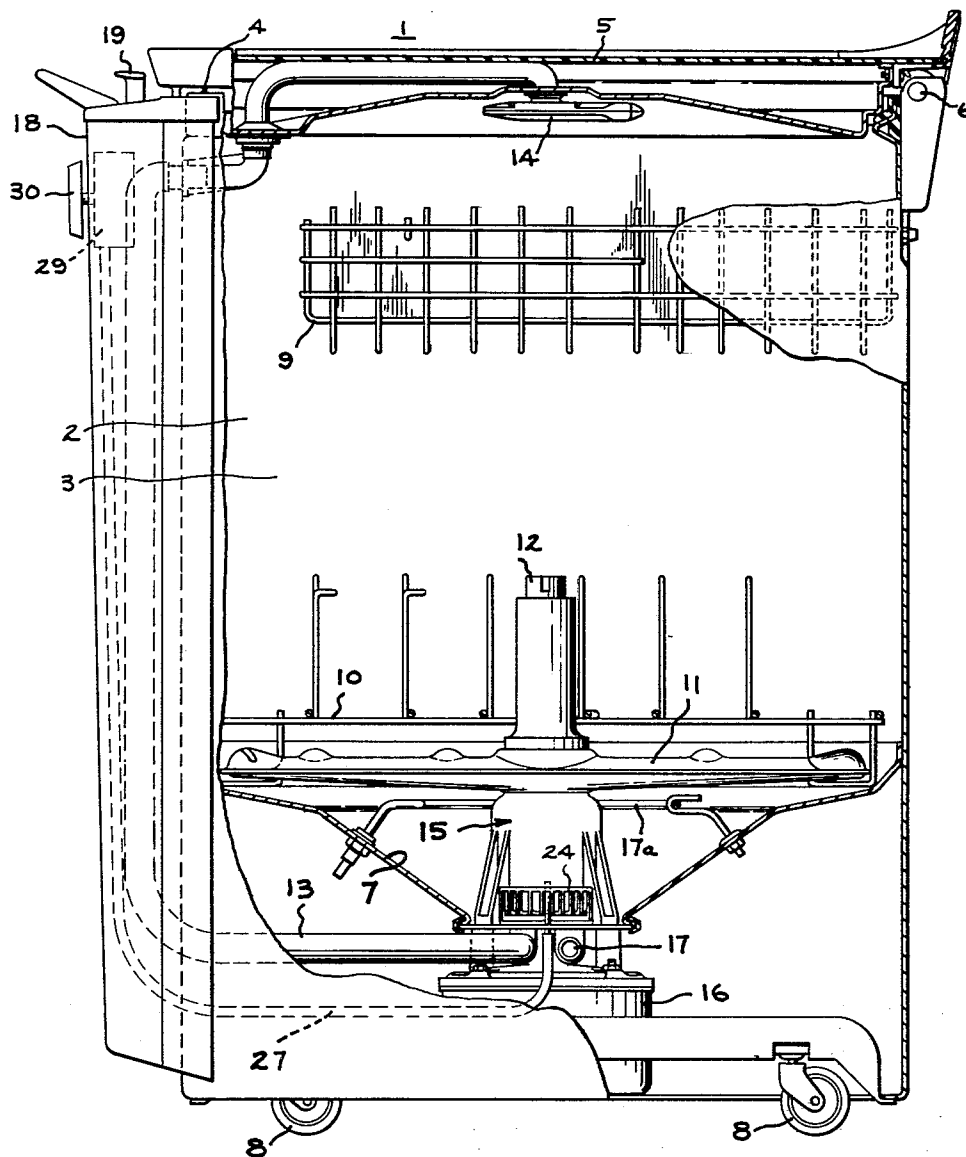


FIG. 1

INVENTOR
THOMAS E. JENKINS

BY *David P. Lawrence*
HIS ATTORNEY

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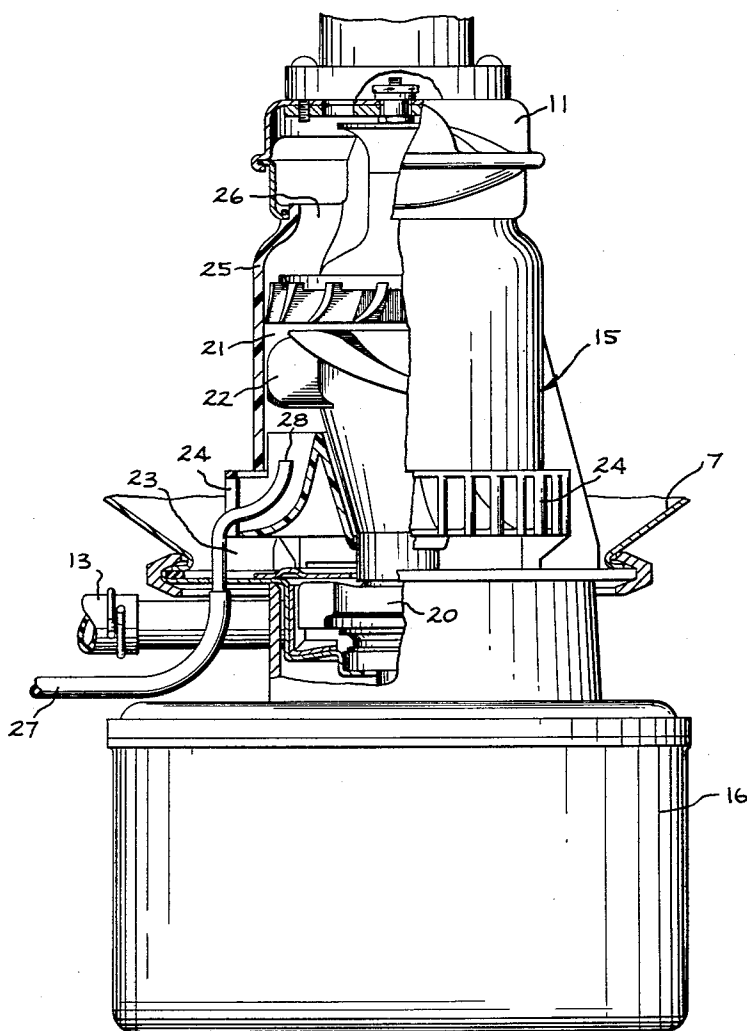


FIG. 2

INVENTOR
THOMAS E. JENKINS

BY *David P. Lawrence*
HIS ATTORNEY

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3,134,386

WASHING MACHINE WITH SELECTIVELY VARIABLE WASHING ACTION

Thomas E. Jenkins, Louisville, Ky., assignor to General Electric Company, a corporation of New York
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2 Claims. (Cl. 134-102)

This invention relates to washing machines such as dishwashers, and more particularly to an arrangement for effecting selectively variations in the washing action of the machine.

It is known that different washing actions in the same machine are often desirable for different articles. For instance, in a dishwasher, some dishes are quite sturdy and get heavily soiled; in such a case, a high energy level of the water impacting against them is desirable. On the other hand, other dishes, such as fine china and crystal, are quite delicate and do not usually get so soiled; in such a case, a lower energy level is desired.

It is therefore an object of my invention to provide an improved washing machine with a pump capable of providing, selectively, two different washing actions in the machine even though the pump is operated at only a single speed.

A further more specific object of my invention is to provide such an effect by selectively introducing gas into the inlet of the pump so as to provide, to a predetermined extent, the phenomenon known as "air locking."

A further specific object of my invention is to provide such a structure in a dishwashing machine of the type having a rotatable spray arm connected to the output of the pump.

In carrying out my invention in one form thereof, I provide a washing tub in which there is provided washing means for ejecting liquid into the tub so as to wash articles therein. The washing means communicates with the outlet of a pump whose inlet is connected to be supplied both by liquid conduit means and gas conduit means. In this connection it will be understood that the gas conduit means may simply be a tube having one end extending into the pump inlet and having its other end extending up to atmosphere so that air is sucked into the pump. Together with this structure, I provide means for selectively opening and closing the gas conduit means and, as a result, the pump may selectively be "air locked." As is well known to those in the pump art, "air locking" of a pump causes a decrease in the amount of liquid passed by the pump, the decrease being dependent upon the extent to which air or another gas is admitted to the pump.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. My invention, however, both as to organization and method of operation together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings.

In the drawings, FIGURE 1 is side elevational view, partly broken away and partly in cross section, of a portable automatic dishwasher incorporating my invention; and

FIGURE 2 is an enlarged side elevational view, partly broken away and partly in cross section, of the pumping mechanism for the machine of FIGURE 1 embodying my invention.

Referring now to FIGURE 1, there is shown for illustrative purposes a portable automatic dishwasher 1, although my invention will be understood to apply equally well to built-in machines. The dishwasher has a dishwashing compartment 2 formed by a tub 3 with a top opening 4 adapted to be closed by a cover 5 hingedly mounted at the rear of the machine by an assembly 6. The bottom of

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the tub may have a downwardly sloped portion 7 forming a sump at the center thereof. Tub 3 may have side walls which continue down almost to the base upon which the machine rests so as to form an enclosure or cabinet for the machine. Also, these walls may support casters 8 in any conventional manner so as to make the machine movable.

Within compartment 2 there may be provided a number of openwork dish supporting members such as an upper rack 9 and a lower rack 10 which are designed so as to support dishes and other eating and cooking articles. Dishwasher 1 incorporates suitable washing means which in this case is embodied in a water ejecting member 11 positioned below rack 10 and rotatable on a vertical axis, together with a telescoping member 12 positioned at the center of member 11. When under pressure, member 12 rises somewhat; member 12 is provided with apertures in its top so as to eject water with substantial force against dishes in the upper rack 9 at the same time that member 11 is rotating under the reaction force of the water and is ejecting that water against the dishes in the racks through appropriately formed openings, as is well known in the art.

In addition, at the same time that water is being ejected from member 11 and member 12, water is also passing upwardly through a conduit 13 to a rotatable spray means 14. Spray means 14 is mounted to spray downwardly upon the dishes in upper rack 9, as best described and claimed in Patent 2,987,260 issued on June 6, 1961 to Russell M. Sasnett, and assigned to the same assignee as the present invention. Both the arm 11 and member 14 are furnished with liquid by a pump unit, generally indicated by numeral 15, which will be more fully discussed herebelow. The unit is powered by a motor 16 so that when the motor operates in one direction the pump unit 15 receives water from the bottom of the sump 7 and then forces the liquid up through members 11, 12 and 14. When the motor 16 is reversed, the structure is such as to cause the pumping assembly to act as a drain pump and pass the liquid out to drain through an outlet 17.

In addition, for drying dishes after they have been cleansed, a suitable electric heating element 17a may be provided in the conventional manner. Heating element 17a as well as the motor 16 and a conventional water inlet valve (not shown) are normally under the control of a sequence control assembly (also not specifically shown). This sequence control assembly is normally secured within the hollow front wall 18 of the dishwasher, with suitable manually operable members such as 19 extending up so as to be readily accessible to an operator for the selection of a sequence of operation of the machine. It will be understood that all the components described thus far are conventional and are provided in dishwashers widely available for purchase by the public.

Referring now to FIGURE 2 in conjunction with FIGURE 1, pump assembly 15 includes a pair of superimposed pumps: a pump 20 of the centrifugal type is positioned below a pump 21 which has a vaned rotor 22 and is of the axial type. For one direction of rotation of motor 16, pump 20 draws in liquid through its inlet 23 at the bottom of sump 7 and discharges the liquid through conduit 13 to rotary spray member 14 as described. At the same time, liquid is passing to pump 21 from sump 7 which, in effect, acts as a conduit for recirculating liquid back to the pumps. The liquid is taken in through inlet 24 of the axial pump, the structure being such that the inlet is preferably provided in a series of circumferentially spaced openings. The liquid taken in at the inlet 24 is moved by rotor 22 up through the housing 25 to outlet 26 of the pump, whence it passes into the rotatable members 11 and 12, it being understood that member 11 is rotatably secured at the top of housing 25.

When the shaft of motor 16 is rotated in the other direction, pump 20 takes liquid into inlet 23 as before, being of

the centrifugal type, but discharges it through the drain outlet 17 instead of through outlet 13. Many types of pumps for accomplishing this type of discharge selectively, dependent upon direction of rotation, are known; for instance, Patent 2,946,986 to Sholtes et al., assigned to the same assignee as the present invention, discloses such a structure. However, for this opposite direction of rotation the rotor 22, having vanes formed as part of an axial pump, tends to reverse its direction of flow and to cause pumping downwardly toward the inlet 24. Thus, liquid is no longer taken into inlet 24, and the draining is accomplished by causing all the liquid to pass through inlet 23 to pump 20 and then be discharged to drain opening 17. The structure shown in FIGURE 2, as described thus far, is more fully described and claimed in U.S. Patent 3,084,701 issued May 9, 1963 to A. L. Hardy et al. and assigned to the assignee of the present invention.

In summary, during rinsing and washing operations in tub 3 there is a primary washing action by pump 21 as a result of liquid being taken in through inlet 24 at the bottom of sump 7. A secondary washing effect is obtained by pump 20, causing liquid to be sprayed down from member 14. It is to be understood, however, that the liquid passing down from member 14 is primarily to wash solid particles off the dishes, and that the rotating arm 11, with its telescoping member 12, effects the primary washing action, with relatively high energy jets of water issuing therefrom and impinging on dishes in tub 3 in order to remove soil from the dishes.

As previously described, it is considered desirable to provide for the selection for two different energy levels for the impingement of water on the dishes. While this may obviously be done by varying the speed of pump motor 16, I propose to effect the desired goal by a more economical approach. In this connection, a conduit 27 is provided with its outlet end 28 positioned at the inlet of pump 21. As seen in FIGURE 1, conduit 27 then extends up to a valve member 29 controlled by a handle 30 projecting from the front of wall 18 so as to be manually operable. Handle 30 is movable to at least two different positions, so as to selectively close off tube 27 or to provide tube 27 with an opening to atmosphere, it being understood that, for instance, the bottom of the hollow section behind wall 18 may be left open to permit free communication with the atmosphere. Thus, in essence, conduit 27 constitutes a gas conduit having an inlet which may be connected to atmosphere under the manual control of member 30 and valve 29, and having an outlet 28 positioned at the inlet 24 of pump 21.

When ordinary high energy operation of pump 21 is desired for the washing of relatively sturdy dishes which frequently have a high soil content, handle 30 is moved to the position wherein it closes off the end of conduit 27. As a result, the operation of pump 21, when motor 16 operates in the direction to effect rinsing and washing operations in tub 3, is precisely as described. That is, liquid enters through inlet 24 and is passed by the rotor member 22 up into spray arm 11. This causes the arm to rotate, and the liquid issues from the openings therein with a relatively high energy content to impinge on the dishes in tub 3.

However, when a relatively low energy level is deemed desirable because the dishes are delicate, such as when fine china or crystal is being washed, handle 30 is turned so that valve 29 opens the end of conduit 27 to atmosphere. As a result, there is a suction exerted through conduit 27 tending to draw air through the conduit 27 and into the pump 21. As is well known, the introduction of a gas such as air at the inlet of a liquid pump tends to air lock that pump. The air locking effect, in this case, is only a partial one, this being determined by the relative size

of conduit 27 compared to the inlet 24 through which the liquid flows. However, it has been found by experimentation that a relatively small amount of air introduced into the inlet of pump 21 is sufficient to decrease noticeably the rate at which liquid is pumped up into arm 11. As a result, there is a lower energy level of the liquid passing into arm 11, and the impingement of liquid on the dishes is gentler, the desired result.

Thus, by the selective introduction of a limited amount of ambient air to pump 21 its pumping rate may be varied. Of course, the valve 29 may be formed in any conventional way so as to permit the conduit 27 to be fully or partially unblocked to ambient air; if this is done, more than one pumping rate may be achieved, with the maximum pumping rate again occurring when the conduit 27 is entirely closed off by the valve. It will further be seen that where multiple washing systems are provided, as in the present case where there are primary and secondary washing structures, the energy level at which each dispenses water onto the dishes may be varied, even though, in the present case, only the energy level of the primary washing member 11 is varied. This has been done in the present case since it is considered that the particular structure disclosed has an energy level of liquid issuing from member 14 that is low enough not to harm even the more delicate dishes which are washed.

While in accordance with the Patent Statutes I have described what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and I therefore aim in the appended claims to cover all such changes and modifications which fall within the true spirit and scope of my invention.

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

1. A dishwashing machine comprising:

- (a) a tub adapted to receive and contain dishes to be washed therein,
- (b) washing means within said tub to effect a washing action upon the dishes by ejecting liquid into said tub,
- (c) the washing action effected by said washing means being dependent upon the energy level at which the liquid is ejected by said washing means,
- (d) a substantially constant speed pump to supply liquid to said washing means, and
- (e) means to vary the energy level at which the liquid is ejected by said washing means comprising:
 - (aa) gas conduit means connected to said pump in supply relation thereto, and
 - (bb) valve means to selectively open and close said gas conduit means.

2. The dishwashing machine defined in claim 1 wherein said washing means comprises a member having openings for passage of liquid into said tub, said member being rotatably mounted and said openings being formed to cause rotation of said member by reaction thereof.

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