ABSTRACT
A dishwashing machine having a hot water rinse compartment through which a train of dish-carrying dollys is moved and a switch actuating comb is mounted in the compartment and has depending tines that are swung in one direction by a dish basket carried by a dolly so as to close a magnetic switch that opens a solenoid valve for spraying hot rinse water onto the dishes. The comb tines are so mounted that they can freely swing in the opposite direction should it become necessary to reverse the movement of a dolly and its dish basket in the rinse compartment and the magnetic switch will not be closed and neither will the tines be damaged during this movement.

6 Claims, 4 Drawing Figures
SWINGABLE COMB FOR CLOSING MAGNETIC SWITCH FOR CONTROLLING HOT RINSE WATER IN A DISHWASHER

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RELATED APPLICATION

This patent application is a division of my copending application, Ser. No. 105,471, filed Jan. 11, 1971, now Pat. No. 3,669,346.

BACKGROUND OF THE INVENTION

1. Field of the Invention

In the patent just referred to claims were allowed to a swingable comb that could be used for any purpose. In the present case the claims will be directed to a swingable comb used in a dishwashing machine. Some dishwashers have an oval table for supporting a train of dollies on which dish-carrying baskets are removably mounted. These dollies are moved through the dishwasher where the dishes are washed and rinsed. Hot water is not used for the rinsing of the dishes and it is necessary to open the hot water valve only when there are dishes in the rinse compartment to be rinsed in order to conserve on the quantity of hot water used. A comb with tines has been used in the rinse compartment and the comb will close a magnetic switch for opening the hot water valve when the comb is swung in one direction by a dish-carrying basket as the dolly moves the basket through the rinse compartment. The tines of the comb are free to be swung in the opposite direction without effecting the closing of the magnetic switch or damaging the tines, should it become necessary to reverse the movement of a dolly and move it for a short distance past the tines for any reason.

2. Description of the Prior Art

A Patent No. 2,668,548 was issued on Feb. 9, 1954 to George J. Federighi and Tore H. Noren on a Magnetic Mechanism for Controlling Flow of Rinse Water in a Dishwashing Machine. This patent discloses a dish-carrying basket movable through a dishwashing compartment and one or more dish-rinsing compartments. A mercury switch is mounted outside of the dishwasher and a trip is mounted within the machine and is actuated by a dish-carrying basket and carries a magnet for controlling the opening and closing of the switch. When the trip is in normal position, a magnet is disposed close to the mercury switch for holding the switch open. An electrically operated rinse water valve is connected to the switch and remains closed so long as the switch remains open.

It is vital that the final rinse water be turned on only when the dishes are in a position to be given a final rinse in order to save on the quantity of hot water used. The dish basket will actuate the trip for closing the switch that opens the hot water valve so that the dishes can be rinsed.

Another Patent No. 2,864,387 was issued on Dec. 16, 1958 to the same two above-mentioned patentees and it pertains to a Dishwashing Machine with Automatic Final Rinse Control. An endless conveyor is disclosed in this patent for conveying dishes through the dishwasher rather than using dollies for supporting dish-carrying baskets. A comb with tines is placed in the rinse compartment and any tines being carried by the upper reach of the endless conveyor will strike one or more tines and swing the comb in one direction causing the latter to close a mercury switch and open a valve controlling the flow of hot water into the rinse compartment. No mechanism is shown in this patent for permitting the tines to swing in the opposite direction because there was no need for this since the upper reach of the endless dish-carrying conveyor travelled in only one direction for conveying the dishes through the dishwasher including the rinse compartment.

SUMMARY OF THE INVENTION

An object of my invention is to provide a comb in the rinsing compartment of a dishwasher that will be swung in one direction for opening the valve for the hot water when the comb tines are contacted by a dish-carrying basket as it is moved by its supporting dolly through the rinse compartment. A train of dollies is mounted for movement along an oval table that will successively move the dollies one at a time into the dishwasher and through the rinse compartment. The tines are so mounted on the comb that they are free to swing in an opposite direction should it become necessary to move the dollies and dish-carrying baskets in a reverse direction through the rinse compartment. Each tine is removably secured to the comb and it may be readily replaced by a new tine in case it becomes damaged.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of an oval table adapted to feed a train of dish-carrying dollies through a dishwashing machine. The train of dollies and the endless track for supporting the dollies are not shown in this figure.

FIG. 2 is an enlarged transverse section through the final rinse compartment of the dishwasher and is taken substantially along the line 2—2 of FIG. 1. A comb is illustrated in this figure as having tines that lie in the path of the moving dish-carrying baskets so as to be actuated thereby for swinging the comb to close an electric switch that will open the rinse water valve for rinsing the dishes. A dolly and a dish-carrying basket are shown in this figure.

FIG. 3 is a longitudinal section through the final rinse compartment of the dishwasher and is taken substantially along the line 3—of FIG. 2.

FIG. 4 is an enlarged transverse section through a portion of the comb that controls the opening of the hot water valve for the final rinsing of the dishes. It is taken along the line 4—4 of FIG. 2 when looking from the right hand side of the FIG. 2. This is looking from the opposite direction to that of FIG. 3 where one is looking from the left hand side of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In carrying out my invention I make use of a dishwashing machine that is schematically shown in a top plan view in FIG. 1, and it includes a power wash compartment A, a power rinse compartment B and a final rinse compartment C. I do not wish to be confined to any particular type of dishwasher and it is not vital to the invention that the dishwasher be provided with both a power rinse and a final rinse compartment. All that is necessary is that my invention be placed to control the flow of hot water in the final rinse so that the hot rinse water is turned on only when there are dishes in the compartment to be rinsed.

An oval table D is associated with the dishwasher and it is preferably made in sections as shown in FIG. 1 of
my Patent No. 3,447,491, issued June 3, 1969, and entitled Sectional Oval-Shaped Table for Endless Conveyor for Dishwasher; and in my Patent No. 3,511,192, issued May 12, 1970, on a Sectional Oval-Shaped Table with Side Walls and U-Shaped Tongues Interconnecting Adjacent Sections. The sectional oval table D is provided with an endless pair of doily guiding rails, not shown in FIG. 1, but shown in transverse cross section at E and F in FIG. 2. In the enlarged longitudinal section through the final rinse compartment C, see FIG. 3, I show one of the doily guide rails F. Each guide rail is provided with a longitudinally extending groove in which doily-supporting wheels 1 and 2 ride. These wheels support a doily, shown by dot-dash lines at G in FIG. 2, and the doily carries a dish-retaining basket H, also indicated by dot-dash lines. The particular type of doily that is preferably used is shown in my Patent No. 3,550,755, issued Dec. 29, 1970, on an Endless Conveyor for a Dishwasher with Links Interconnection Adjacent Dollies. I do not wish, however, to be confined to any particular type of doily or dish-carrying basket. Any means may be used for moving the basket H through the final rinse compartment C and my invention pertains to a novel type of the comb that will be contacted and swung by the moving basket and the swinging of the comb will close the electric switch which will open the hot water valve and direct rinse water against the dishes for rinsing them.

In FIGS. 2 and 3, I show a comb, indicated generally at J, as being mounted in the final rinse compartment C of the dishwasher. The comb consists of a number of tines 3, see also FIG. 4, that are mounted in tubular supports 4. The latter are welded or otherwise secured to sleeve 5 which in turn are rotatably mounted in an abutting relation on a transversely extending shaft 6. The ends of the shaft 6 are received in bearings 7 which in turn are secured to the side walls 8 of the final rinse compartment C. Each tine 3 has its upper end projecting above its tubular support 4 and a cotter pin 9 is inserted through an opening in the tine and it rests on the top of the support for removably supporting the tine. The lower portion of the tine that is contacted by the basket H may be provided with a plastic or rubber sleeve 10 that will protect the tine. If any tine becomes damaged it is a simple matter to remove its cotter pin 9 and slip the tine out of its tubular support 4 and then substitute a new tine for the damaged one.

I will now describe how the swinging of the tines 3 by a moving basket H will actuate a mechanism for closing a switch that will open a hot water valve. Both FIGS. 2 and 4 show the shaft 6 provided with a pair of arms K that are keyed to the shaft so that a swinging of the arms will rock the shaft. A transversely extending bar L is connected to the two arms K by threaded shanks 11 that extend through the bar and have their other ends connected to the arms. It is possible to adjust the bar L toward or away from the arms K by adjusting the nuts 12 and 13 on the threaded shanks 11, these nuts being placed on opposite sides of the bar as is clearly shown in FIG. 4. A lock nut 14, also mounted on each threaded shank 11, aids in securing the shanks to the arms K. The bar L can be adjusted on the threaded shanks 11 so that the weight of the bar will counterbalance the weight of the tines 3 and sleeves 4.

It will be noted from FIG. 4 that the arms K, threaded shanks 11 and bar L extend off at an angle from the axis of the shaft 6 instead of depending vertically in a downward direction from the shaft. This is due to the fact that the weight of the arms K, threaded shanks 11 and bar L is counterbalanced not only by the tines 3 and sleeves 4, but also by an arm M that is keyed to the shaft 6 and extends vertically above the shaft and carries a threaded horizontal shank 15 that projects on the opposite side of the shaft from that of the bar L. A magnet holding casing N is mounted at the outer end of the shank 15 and it contains a horseshoe magnet, shown by dotted lines P in FIG. 2. The casing N is held in adjusted position on the shank 15 by nuts 16 and 17 and a lock nut 18 secures the shank in the arm M, see FIG. 4.

It is important that the magnet holding casing N and the magnet P be positioned near to the top wall 19 of the final rinse compartment C when the magnet is in normal position, see FIG. 3. The reason for this is so that the magnet can act on a magnetizable arm 20 of an electric switch Q to hold this arm out of contact with the other stationary arm 21 of the switch and thus normally hold the switch in open position. The bar L can be adjusted on the threaded shanks 11 so as to cause the bar to be disposed to the left of the shaft 6, as shown in FIG. 3, and the magnet P will be disposed to the right of the shaft and positioned under the switch Q to maintain it in open position. When the bar L is in this position and if there is no basket H of dishes moving through the final rinse compartment C, the tines 3 will hang straight down and will lie in a vertical plane as shown by the fully line position of the tines.

In FIG. 3, I show a doily G with a dish-containing basket H moving from the right to the left. The basket H will strike the tines 3 of the comb J and swing them in a clockwise direction about the shaft 6 as a center. The sleeves 5 will freely rotate on the shaft 6 as the tines 3 are swung by the basket H contacting therewith. The swinging tines will have no effect on moving the transverse bar L until they actually strike the bar as is clearly shown by dot-dash lines in FIG. 3. When this takes place, the bar L will be swung from its horizontal line position and the magnet P and its housing N will be moved away from the electric switch Q. The magnetizable switch arm 20 will be freed from its magnetic attraction to the magnet P and it will swing to contact with the stationary switch arm 21 and close an electric circuit to open a solenoid controlled valve R, see FIG. 3. A main switch 22 has already been closed which will connect the solenoid valve R to a current source, not shown, when the switch Q is closed.

Again referring to FIGS. 2 and 3, it will be seen that the hot water pipe S leads to a spray head T in the final rinse compartment, and this spray head has outlet spray nozzles 22. Dot-dash lines 23 indicate how the hot rinse water will be sprayed onto the dishes only when a basket H of dishes is actually moving through the rinse compartment. As soon as the dish basket H clears the tines 3 of the comb J, the tines will swing back into a vertical depending position and will free the bar L so that its weight will swing it from the dot-dash line position of FIG. 3 back into the full line position in the same Figure. This will swing the magnet P and its housing N in a counter-clockwise direction from the dot-dash to the full line position. The magnet P will again attract the magnetizable arm 20 of the switch Q to open it and permit the spring-biased solenoid valve R to close and stop any further flow of hot rinse water from the spray head T.
One important feature of the invention is the free swinging of the tines 3 in a counter-clockwise direction when looking at FIG. 3, should it become necessary to move the dolly G and basket H in a reverse direction, i.e. from the left to the right in this Figure. The tines 3 will not be damaged through such swinging movement and they will not contact with the bar L during such a counter-clockwise movement. FIG. 3 shows by dot-dash lines how the tines 3 of the comb J are free to swing to the right from the full line position should it become necessary to reverse the direction of movement of the dolly G and basket H, which will cause the right hand edge of the basket to contact and swing the tines. In this manner the tines 3 will not be damaged nor will the shank 15 and the magnet P be moved when it becomes necessary to move the basket H in a relative direction for any reason.

I claim:

1. The combination with the rinse compartment of a dishwashing machine, a dish-carrying basket and means for moving the basket through the compartment:
   a. a comb comprising a rockably supported shaft extending transversely across the rinse compartment;
   b. a plurality of downwardly depending tines mounted for free swinging movement on said shaft, said tines normally lying in the same plane and being positioned in the path of the moving basket;
   c. a substantially horizontal sleeve connected to each tubular support and being freely rockable on said shaft.

2. The combination as set forth in claim 1: and in which
   a. the mounting of the tines for free swinging about said shaft includes;
   b. a separate substantially vertical tubular support for receiving each tine; and
   c. a substantially horizontal sleeve connected to each tubular support and being freely rockable on said shaft.

3. The combination as set forth in claim 1: and in which
   a. said valve actuating means includes a solenoid for opening the valve when the solenoid is energized;
   b. a switch disposed outside of the rinse compartment and used for connecting the solenoid to an electric current for opening the valve, said switch being self-closing but held in open position when in the presence of a magnetic field;
   c. a shank connected to said shaft and extending radially therefrom; and
   d. a magnet carried by the outer end of said shank and disposed within said rinse compartment, said magnet being disposed close to said switch when the tines are moved by contacting a moving basket and contact the bar for swinging the latter and rocking said shaft, whereby the switch will close and cause the solenoid to open the valve and permit hot water to flow out through said spray head to rinse the dishes.

4. The combination with the rinse compartment of a dishwashing machine, a dish-carrying basket and means for moving the basket through the compartment:
   a. a comb extending transversely across the rinse compartment and including a shaft with depending tines freely swingable about said shaft in the direction of the path of the moving basket when contacted by the basket;
   b. a hot water spray head mounted in said rinse compartment and connected to a source of hot water including a valve for directing rinse water through the spray head and over the dishes in the basket when the valve is open; and
   c. valve actuating means actuated by any one or more of the tines when they are rocked only in one direction about said shaft by the moving basket for opening the valve for rinsing the dishes, the tines returning to their depending position by gravity after the basket has passed, said tines being free to swing in the opposite direction about said shaft without actuating said valve actuating means should the basket be moved in a reverse direction past said tines.

5. The combination as set forth in claim 4: and in which
   a. said valve actuating means includes a solenoid for opening the valve when the solenoid is energized;
   b. a switch disposed outside of the rinse compartment and used for connecting the solenoid to an electric current for opening the valve, said switch being self-closing but held in open position when in the presence of a magnetic field;
   c. a shank connected to said shaft and offset laterally therefrom; and
   d. a magnet carried by the outer end of said shank and disposed within said rinse compartment, said magnet being disposed close to said switch when the tines are in normal depending position so that...
the magnetic field will maintain the switch open, said shank swinging the magnet away from the switch when the tines are moved by contacting a moving basket and actuate the valve actuating means, whereby the switch will close and cause the solenoid to open the valve and permit hot water to flow out through said spray head to rinse the dishes.

6. The combination with the rinse compartment of a dishwasher machine, a dish-carrying basket and means for moving the basket through the compartment:

a. a comb extending transversely across the rinse compartment and including depending tines swingable in the direction of the path of the moving basket when contacted by the basket;

b. a hot water spray head mounted in said rinse compartment and connected to a source of hot water including a valve for directing rinse water over the dishes in the basket when the valve is open;

c. valve actuating means actuated by the tines when they are rocked only in one direction by the moving basket for opening the valve for rinsing the dishes, the tines returning to their depending position after the basket has passed, said tines being free to swing in the opposite direction without actuating said valve actuating means should the basket be moved in a reverse direction;

d. said comb also including a rockably supported shaft, said tines being mounted for free swinging movement on said shaft and normally lying in the same plane; and

e. said valve actuating means including a transversely extending bar paralleling and spaced from said shaft with means connecting the bar to the shaft so that a swinging of the bar about the shaft axis will rock said shaft, said bar when in normal position being spaced from the plane of the tines, said tines being swung by the basket and striking and swinging the bar when the basket is moved in one direction for operating said valve actuating means and opening said valve for rinsing the dishes, said tines being free to swing in the opposite direction and not strike the bar should the basket be reversed in its movement and contact the tines in its reverse movement, whereby said valve will not be opened during this reverse movement.