May 28, 1963 G. T. SHOLTES 3,091,675

COMBINATION LATCHING AND SWITCH CONTROL ARRANGEMENT FOR ELECTRICAL APPLIANCES

Filed Feb. 14, 1962 2 Sheets-Sheet 1

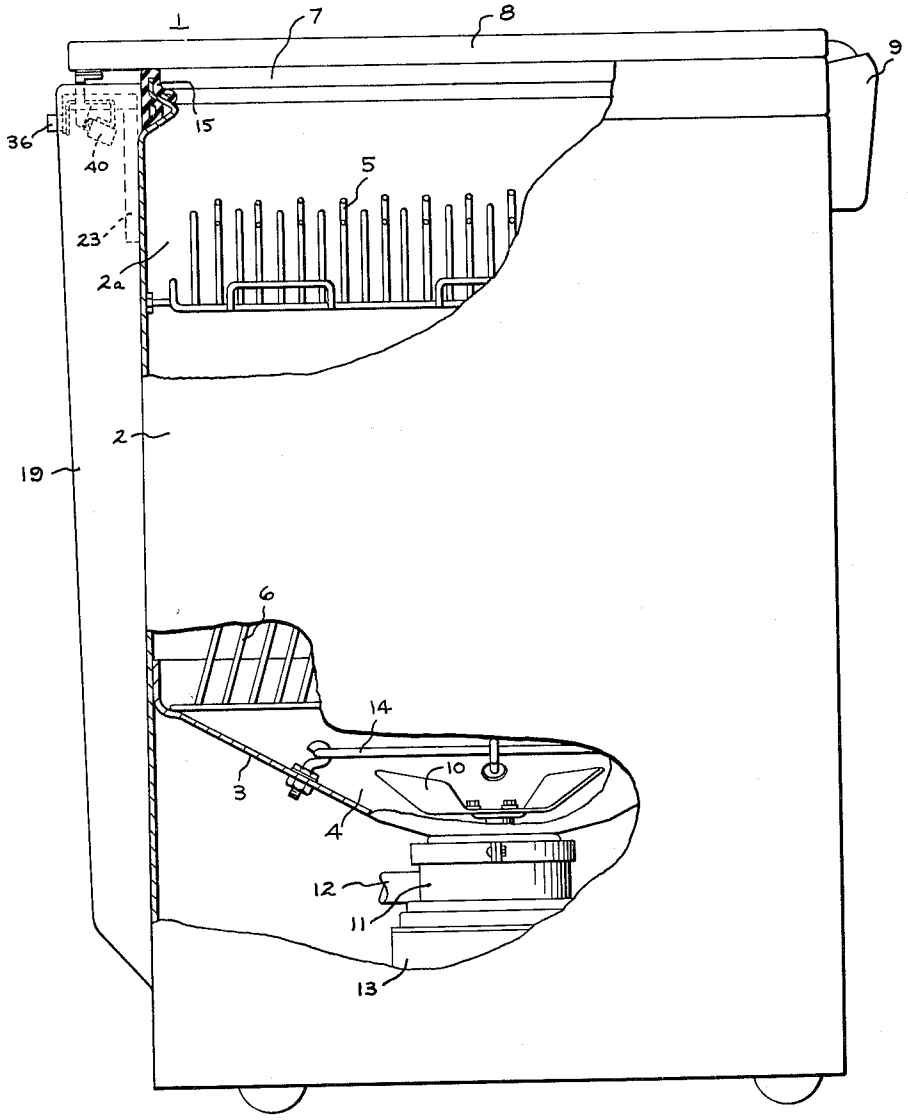


FIG. 1

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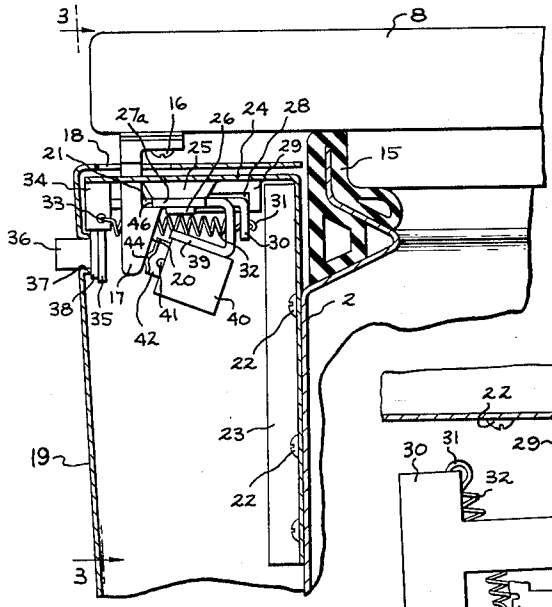


FIG.2

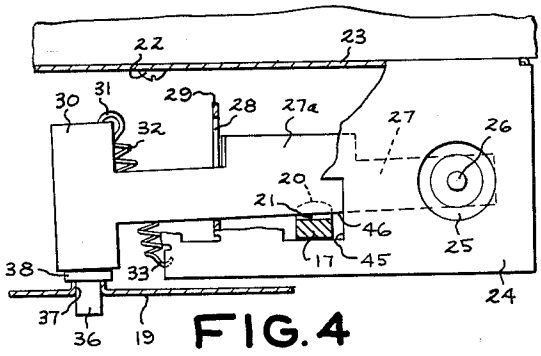


FIG.4

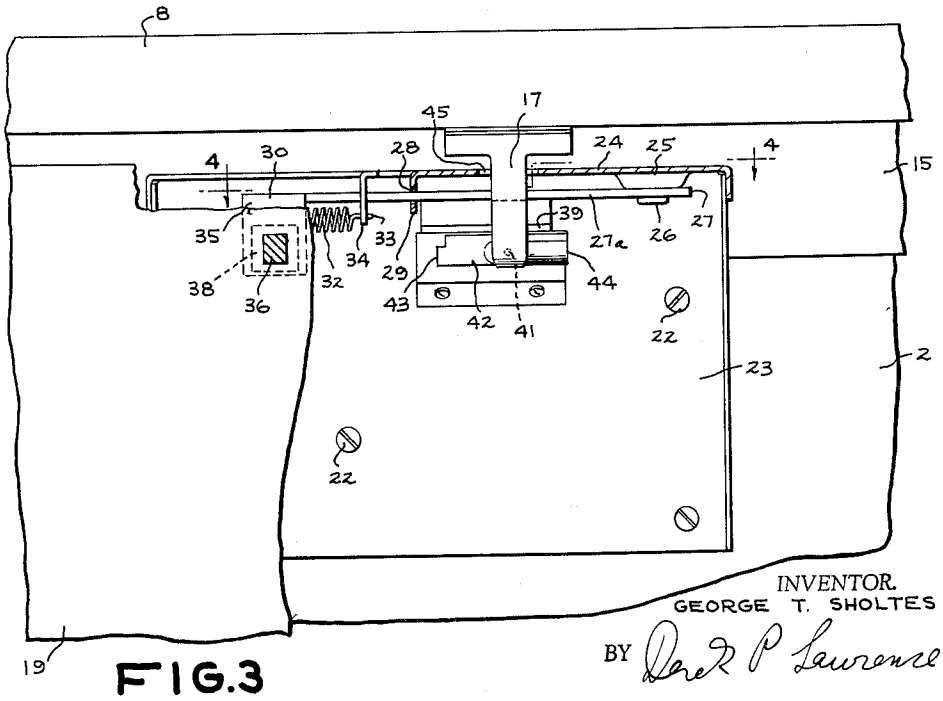


FIG.3

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3,091,675

COMBINATION LATCHING AND SWITCH CONTROL ARRANGEMENT FOR ELECTRICAL APPLIANCES

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5 Claims. (Cl. 200—61.62)

This invention relates to latching equipment, and more particularly to combination latching and switch control apparatus for use in electric appliances such as dishwashers.

It is an object of the present invention to provide an improved latching and switch control arrangement for appliances such as dishwashers, where closure of the switch only when the latch is closed, and opening of the switch as soon as opening of the latch starts, are insured by the construction and relation of the parts.

A more specfic object of my invention is to achieve the aforementioned object by providing a latch assembly to which is rigidly secured a switch member, the switch member being closed by a striker member only when the striker member has engaged the latch assembly in fully closed position.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In accordance with one aspect of my invention, I provide an electric appliance, such as a dishwasher for instance, of the type which has a cabinet, a closure member for the cabinet, and at least one electrical component, such as a motor, which should be deenergized when the closure member is opened to provide access to the cabinet. A latch assembly is pivotally mounted on a support which, in turn, is rigidly secured to the cabinet and is biased to a predetermined position by any appropriate means. A switch assembly is rigidly mounted on the latch assembly; in the conventional manner, the switch assembly may be included in the control circuit for the electrical component so as to control its energization. The switch assembly is biased to open position, but has a member movable to closed position to cause the switch assembly to be closed.

A striker member secured to the closure member has both a camming surface and a latching recess formed thereon. As the closure member moves into closed position, the camming surface of the striker engages the latch assembly and pivots it away from its pre-determined position until the camming surface ceases to engage the latch assembly. At this time, the biasing means forces the latch assembly back toward its pre-determined position into the recess. This occurs when the closure member is fully closed. As the latch assembly moves into the recess of the striker member, the switch assembly is carried into a position relative to the striker member such that the switch assembly is closed and energization of the electrical components is made possible. Together with the foregoing, I provide conventional manually operable means so as to permit the latch assembly to be moved away from its predetermined position to release the striker member and allow opening of the closure member. Of course, as soon as this movement of the latch assembly occurs, the switch is opened.

Thus, without any need for observing close tolerances, the provision of the switch assembly rigidly mounted on the latch assembly gives the desired relationship to the striker member so as to cause the switch to be closed only as latching is completed and to be opened as soon as unlatching is started.

The novel features which are believed to be characteristic of my invention are set forth with particularity in the appended claims. My invention, however, both as to its organization and method of operation, may best be understood by reference to the following description taken in conjunction with the accompanying drawings.

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

FIGURE 2 is a fragmentary side elevational view, partly broken away and partly in section, of the parts of the dishwasher of FIGURE 1 which incorporate the cooperating parts which form my invention;

FIGURE 3 is a sectional view along line 3—3 of FIGURE 2; and

FIGURE 4 is a sectional view along line 4—4 of FIGURE 3.

Referring to FIGURE 1 of the drawing, there is shown a portable automatic dishwasher, generally indicated by the numeral **1**, having a cabinet **2** forming an enclosed tub **2***a* of generally rectangular configuration, it being understood that the tub forms the washing compartment. Tub **2***a* may be provided with a sloping bottom **3** which forms a sump space **4**. In the interior of the tub **2***a* are appropriate racks, shown by the numerals **5** and **6**, on which dishes to be washed may be placed, access to the interior of tub **2***a* being provided through the top **7** thereof when closure member or cover **8** is pivoted about hinges **9** to an open position from the closed position shown. It is preferable, although not essential, that the hinge assembly **9** include appropriate biasing means to cause the cover **8** to move upwardly at least a small distance when, as is to be explained, it is unlatched from its closed position.

Liquid is supplied to the machine by any suitable means (not shown), the particular supply arrangement forming no part of the present invention. Positioned at the bottom of the tub **2***a* and arranged to circulate the washing fluid through the washing compartment is a rotary impeller **10**. A drain pump **11** having an inlet communicating with tub **2** and an outlet connected to drain conduit **12** is supported beneath the tub, the housing of pump **11** being arranged to support an electric motor **13** which drives the impeller **10** so as to circulate fluid in the tub when rotating in one direction and to operate pump **11** so as to discharge fluid through conduit **12** when driven in the other direction. Automatic operation of the dishwasher **1** is effected by a suitable timer controlled assembly (not shown) which controls the energization of the water supply means as well as of the electric motor **13**, it being understood that motor **13** is illustrated as being one typical electrical component of the type conventionally provided in appliances such as the dishwasher illustrated.

Typically, a dishwasher of the type illustrated in FIGURE 1 is arranged to provide a plurality of washing steps, in each of which a measured quantity of water is admitted to the tub, circulated for a pre-determined period of time, and then discharged from the tub in preparation for the next washing step. At the end of the complete washing operation, the dishes in the washing compartment may be dried, preferably by circulation of heated air, a heating unit such as sheathed electrical heating unit **14** being useful for this purpose.

The top of the walls forming the tub **2***a* are provided with a gasket **15** as shown in FIGURES 1 and 2; the gasket extends entirely around the top of the tub, so that when lid or cover member **8** is moved to the closed position shown its lower surface engages the gasket **15** and

prevents escape of liquid from the tub 2*a* during dishwashing operations. At the front of the cover 8, there is secured by any suitable means, such as threaded members 16, a striker member 17. Member 17 extends downwardly from the cover member, and passes through an opening 18 provided in a decorative front cover panel piece 19 as the cover 8 reaches its closed position. The striker 17 includes a camming surface 20 starting at its lower end, and which terminates abruptly so that the striker member then forms a latching recess 21.

Secured to the front wall of cabinet 2 by any suitable means, such as threaded members 22, there is provided a rigid support member 23 which fits within the decorative front piece 19. The supporting member 23 has a substantially horizontally extending top section 24 in which is formed a downwardly projecting boss 25. Pivotally secured to the boss 25 by any suitable means such as a rivet 26 is a latching assembly structure 27 which, as best seen by reference to FIGURES 3 and 4, includes a flat section 27*a* extending through a slot 28 formed in a flange 29 projecting downwardly from section 24. The slot 28 serves as a horizontal support for the assembly 27 thereby taking a large part of the load off rivet 26 and preventing an undesirable cantilever action. In addition, by appropriate selection of the width of the slot 28 it provides limits on the extent of movement of assembly 27.

The left end of assembly 27, as viewed in FIGURE 4, is formed as a broadened support section 30 for one end 31 of a spring 32 whose other end 33 is secured to a flange 34 (FIGURE 2) extending downwardly from section 24 of member 23. The spring 32 serves to bias the assembly 27 in a counter clockwise direction as viewed in FIGURE 4, that is, against the lower end of the slot 28.

The side of portion 30 which is toward the decorative front wall 19 is formed with a downwardly extending flange 35. A pushbutton member 36 is positioned within an opening 37 in the member 19; member 36 has a base 38 larger than the opening 37 so as to limit outward movement of the button and also serve as a part to be engaged by the flange 35. It will thus be seen that the spring 32 serves to keep the pushbutton member 36 biased outwardly through opening 37 in this manner.

Yet another part 39 is provided extending downwardly from the flat portion 27*a* of latching assembly 27, and to this extension 39 there is secured a switching assembly, shown by the numeral 40. Assembly 40 has only its outline indicated since the switch structure may be any of many conventional types wherein depression of a projecting outwardly biased member 41 causes closure of the switch, and the normal biased position of the member 41 causes the switch to be open. A suitable switch assembly for this purpose is, for instance, marketed by the General Electric Company, assignee of the present invention.

A spring arm 42, seen in FIGURES 2 and 3, is secured at one end 43 to the remainder of the switch assembly 40 and is free at its other outer end 44, as best seen in FIGURE 2. The spring arm 42 is in contact with the switch operating member 41 so that when the spring arm is forced down toward the body of switch assembly 40 it pushes the member 41 inwardly and causes closure of the switch. As soon as pressure on the spring arm is released it returns to a position wherein the member 41 may move outwardly to cause the switch to assume its normal open position. It will be understood that, while it is not shown, the switch assembly 40 will normally be so connected with certain of the electrical components of dishwasher 1, such as the motor 13, that when the switch is open it prevents energization of those components which should not be energized during an open condition of the cover 8 such as, for instance, motor 13.

It is to be noted from FIGURES 2 and 4 that the striker member 17 is so positioned relative to the flat part 27*a* of assembly 27 that when the cover 8 is brought down, the striker member 17 will pass down through an opening 45 in section 24 of member 23, and the camming surface 20 thereof will engage the edge 46 of flat part 27*a*. This camming engagement of surface 20 with the flat part 27*a* forces the assembly 27 in a clockwise direction, as viewed in FIGURE 4, that is, against the action of spring 32, as the striker member 17 continues on its downward passage. When the upper end of the camming surface 20 is reached, the spring 32 then pivots the assembly 27 back toward its previous position so that the flat part 27*a* enters the latching recess 21 of the striker member 17. This performs a double function: first, it latches the cover in tightly shut position, and second, it pulls the latching assembly over so that the spring arm 42 is cammed by the surface 20 down to a position where it pushes the member 41 into its closed position so as to close the switch 40.

Thus, by securing the switch 40 on the latching assembly 27 as shown, and by providing a conventional latching relationship between the latching assembly and the striker member 17, the highly desirable effect is obtained of causing closure of switch 40 only in the event that a latched position exists. Furthermore, this can occur only upon a fully latched condition being provided rather than at any instant prior thereto, so that full safety is provided and at the same time problems of tolerance variations in manufacturing are completely avoided.

In summary then, it will be seen that pushing the cover 8 downwardly causes, first, a camming of the latch assembly 27*a* away from its biased position and then a release thereof so that the spring 32 causes the assembly 27*a* to return toward its position at the bottom of slot 28 (FIGURE 4). This causes a completion of the latching and at the same time, because of the fact that the switch assembly 40 is mounted on the movable latching member and is rigidly secured thereto, it also effects the closure of the switch when, and only when, the latching operation is complete.

To unlatch the cover, it is merely necessary to push inwardly on the button 36, as best seen in FIGURE 4. This causes the assembly 27 to be moved clockwise or upwardly within slot 28 to a position where the flat part 27*a* of assembly 27 is no longer engaged within the recess 21. As a result, the cover 8 and striker member 17 are released and may be raised either manually, or, where biasing means are provided in the hinge 9, the movement will occur by itself. Also, where compression of the gasket 15 is necessary to effect closure, the spring of the gasket 15 itself may cause sufficient upward movement to insure disengagement of the flat part 27*a* from within the recess 21. Of course, as soon as this disengagement occurs, the switch 40 moves with the assembly 27 and therefore opens. Thus, immediately upon depression of button 36 to effect an unlatching, the switch 40 is opened to insure de-energization of those electrical components which are desired to be de-energized during an open condition of the cover 8.

It will thus be seen from the foregoing that my invention provides a highly effective and economical structure, by means of which latching and switching are synchronized with each other in an effective and desirable way without any necessity for worrying about manufacturing tolerances since the structures are assembled in such a way that the correct relationship is insured. Of course, the same effect is achieved if the striker member is slidably mounted and the latching and switch assemblies are stationary, and this reversal of parts is intended to be included within the scope of my invention; the primary point is that the movable part move generally perpendicular to the direction of movement of the cover as it reaches closed position.

Thus, while I have shown and described the specific embodiment of my invention, I do not desire the invention to be limited to the particular construction disclosed, and I intend by the appended claims to cover all modifications 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. For use in an electric appliance having a cabinet, a closure member for said cabinet, and an electrical component which is to be de-energized when said closure member is open to provide access to said cabinet:

(*a*) a latch assembly support rigidly secured to said cabinet;

(*b*) a latch assembly pivotally mounted on said support;

(*c*) means biasing said latch assembly to a pre-determined position;

(*d*) a switch assembly rigidly mounted on said latch assembly, said switch assembly being adapted to control energization of said electrical component and biased to open position, said switch assembly having a member movable to a closed position wherein said switch assembly is closed;

(*e*) a striker member secured to said closure member and positioned to move substantially perpendicularly to the plane of movement of said latch assembly into engagement therewith, said striker member having a camming surface and a latching recess formed thereon;

(*f*) said camming surface being formed to engage said latch assembly as said closure member closes and pivot said latch assembly away from its predetermined position, said biasing means forcing said latch assembly toward said predetermined position into said recess when said closure member is fully closed, said striker member and said switch assembly being relatively positioned so that said switch assembly member is engaged by said striker member and is moved to its closed position only when said latch assembly is in said striker member recess; and

(*g*) manually operable means for moving said latch assembly away from its predetermined position thereby to release said striker member and allow opening of said closure member.

2. The apparatus defined in claim 1 wherein said cabinet includes a front appearance cabinet panel enclosing said latch assembly, and said manually operable means includes a button member having one end extending out through said appearance panel for manual operation and its other end positioned against said latch assembly so that upon manual depression of said button said latch assembly is moved away from its predetermined position.

3. The apparatus defined in claim 1 wherein said switch assembly member is engaged by said camming surface of said striker member when said latch assembly is in said striker member recess.

4. For use in an electric appliance having a cabinet, a closure member for said cabinet, and an electrical component which is to be de-energized when said closure member is open to provide access to said cabinet:

(*a*) a latch assembly mounted on said cabinet;

(*b*) a switch assembly rigidly mounted on said latch assembly, said switch assembly being adapted to control energization of said electrical component and biased to open position, said switch assembly having a member movable to a closed position wherein said switch assembly is closed;

(*c*) a striker member secured to said closure member and positioned to move into engagement with said latch assembly, said striker member having a camming surface and a latching recess formed thereon;

(*d*) one of said latch assembly and striker member being biased to a predetermined position and movably mounted in a plane substantially perpendicular to the direction of movement of said striker member as it moves into engagement with said latch assembly;

(*e*) said camming surface being formed to engage said latch assembly as said closure member closes and pivot said one of said latch assembly and said striker member away from its predetermined position, said one of said latch assembly and striker member moving toward its predetermined position into said recess when said closure member is fully closed, said striker member and said switch assembly being relatively positioned so that said switch assembly member is engaged by said striker member and is moved to its closed position only when said latch assembly is in said striker member recess; and

(*f*) manually operable means for moving said one of said latch assembly and striker member away from its predetermined position thereby to release said striker member from said latch assembly and allow opening of said closure member.

5. For use in an electric appliance having a cabinet, a closure member for said cabinet, and an electrical component which is to be de-energized when said closure member is open to provide access to said cabinet:

(*a*) a latch assembly support rigidly secured to said cabinet;

(*b*) a latch assembly pivotally mounted on said support;

(*c*) means biasing said latch assembly to a predetermined position;

(*d*) a switch assembly rigidly mounted on said latch assembly, said switch assembly being adapted to control energization of said electrical component and biased to open position, said switch assembly having a member movable to a closed position wherein said switch assembly is closed;

(*e*) a striker member secured to said closure member and positioned to move toward said latch assembly into engagement therewith, said striker member having a camming surface and a latching recess formed thereon;

(*f*) said camming surface being formed to engage said latch assembly as said closure member closes and pivot said latch assembly away from its predetermined position, said biasing means forcing said latch assembly toward said predetermined position into said recess when said closure member is fully closed, said striker member and said switch assembly being relatively positioned so that said switch assembly member is engaged by said striker member and is moved to its closed position only when said latch assembly is in said striker member recess; and

(*g*) manually operable means for moving said latch assembly away from its predetermined position thereby to release said striker member and allow opening of said closure member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,649,475	Jones	Nov. 15, 1927
2,618,282	Stanitz et al.	Nov. 18, 1952
3,005,065	Jellies	Oct. 17, 1961
3,007,479	Jacobs et al.	Nov. 7, 1961