DOOR LOCK SAFETY SYSTEM FOR AUTOMATIC APPLIANCES

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ABSTRACT OF THE DISCLOSURE

A door lock safety system for a dishwasher that includes an electromagnet for controlling the door lock mechanism. The safety system is arranged so that the door can only be unlocked when the magnet is energized. The energizing circuit for the electromagnet includes a centrifugal switch actuated by the washer motor to open said circuit when the motor rotates at high speed.

The invention relates to a safety device for use in a washing machine, a dish-washer or the like, of the type comprising a rotatable part to be driven at different speeds, and a door or lid leading to the rotatable part and a locking mechanism for said door, said mechanism comprising an electromagnet.

Numerous safety systems are known. They may be classified in two categories, i.e., mechanical systems and electrical systems. In the first-mentioned systems use is made of a delay system, which prevents the user from opening the door for a predetermined period of time after the current supply to the motor is interrupted. The main disadvantage of these systems is that they require a complicated rod system. In electrical systems, an electromagnet is employed which locks the door when the magnet is excited. However, this system is not entirely safe since it depends upon the satisfactory operation of the electro-magnet.

The present invention obviates these disadvantages and is characterized in that the device comprises, in addition, a centrifugal switch which opens the energizing circuit of the electro-magnet during high speed rotation of the rotatable part and closes it during low speed rotation of said part such that the door can only be opened when the magnet is energized.

The invention will now be described more fully with reference to the accompanying drawing, in which:

FIGURE 1 illustrates the basic diagram of the safety device according to the invention.

FIGURE 2 shows an embodiment of a washing machine according to the invention which shows only those parts which are necessary for a good understanding of the invention.

FIGURE 1 symbolically shows the motor driving the drum (not shown) of a washing machine by means of a winding 1. Through a mechanical system, illustrated by the broken line 2, said motor drives a centrifugal switch 3, through which an electro-magnet, represented by a coil 4 and an armature core 5, can be energized. The energizing circuit also includes a switch 6, which can be closed by depressing a push-button 7, which has to be pushed for opening the door 8 (FIG. 2). A second push-button 9, which is mechanically coupled to push-button 7 so that if one button is depressed the other is released, actuates a switch 10 for connecting the winding 1 of the motor to the terminals 11 and 12 of the electric supply source.

In order to put the machine in operation, the user has to depress the push-button 9, so that the switch 10 is closed. The door 8 must be closed first. A hook 16 of a mortise and hook joint is pivotally mounted so that closing the door causes the hook to pivot clockwise to engage a hole in the lug 23 mounted on the door. The rod 15, which is coupled to the hook, then moves to the right. A lever arm 14 couples rod 15 to the armature 5 of the electromagnet so that the armature is withdrawn from the coil 4 when rod 15 moves to the right. A micro-switch 13 is coupled to rod 15 and is closed when rod 15 is moved to its extreme right hand position. Owing to a micro-switch 13, the motor winding 1 only receives a current, when the door 8 has previously been closed.

In order to open the door 8 the user has to depress the push-button 7 which closes switch 6. The push-button 9 then returns to its initial position, so that the current supply to the motor is interrupted by the opening of the switch 10. If at this instant the drum rotates at the lower speed required for washing, the centrifugal switch 3 is closed and the electro-magnet is energized. The core 5 is drawn into the coil and this displacement is transferred by the rods 14 and 15 (FIG. 2) to the hook 16, which is thus changed over and slightly lifts the door 8.

If the push-button 7 is depressed when the drum rotates at the speed of centrifuging, the centrifugal switch 3 is then open so that the electro-magnet cannot be energized and the door cannot be opened until the speed of rotation of the drum has again become sufficiently low to allow the centrifugal switch 3 to close. Depressing button 7 opens switch 10 so that the motor is deenergized and begins to slow down. At a given low speed, the centrifugal switch 3 closes and energizes winding 4 of the electro-magnet. The armature 5 is drawn into the coil 4. Rod 14 then moves rod 15 to the left so that hook 16 pivots counterclockwise out of the hole in lug 23 thereby unlocking the door 8. At the same time, rod 15 opens switch 13 in series with the motor winding 1.

When the electro-magnet is in the rest position, a spring 22 holds part of the core 5 outside the coil 4.

If the supply source is disturbed, it is not possible to energize the electro-magnet. The hook 16 can then be changed over by means of a cable 17, which is adapted to move in a housing 18. One end of the cable 17 is secured to the rod 14, whereas the other end is connected to a plate 19, which is adapted to slide in a support 20. The vertical displacement of the plate 19 is facilitated by using a member 21, for example, a screw driver. Since the cable for mechanical actuation is used only in emergency, it is accommodated in the washer at a place which is accessible only after part of the machine housing is dismounted, thereby avoiding accidental actuation during normal operation.

We claim:

1. In a washing and centrifugal machine including a rotatable part driven at two or more different speeds and a door or lid providing access to the rotatable part, the improvement comprising a locking mechanism for said door, said mechanism comprising an electro-magnet, having a movable core coupled to the door latching member to lock the door when the winding of the electromagnet is energized, an electrical energizing circuit for the winding of the electromagnet that includes a centrifugal switch actuated by said rotatable part so as to open the energizing circuit of the electro-magnet during high speed rotation of the rotatable part and closes it during low speed rotation of said part, said movable core being arranged to unlock the door only when the magnet is energized.

2. A motor driven electric appliance including a rotatable member adapted to be driven at two or more different speeds, a housing having a door and a locking mech-
3. An appliance as claimed in claim 2 further comprising a switch connected in said second energizing circuit and actuated by the door lock mechanism so as to energize said motor only in the locked position of the door.

4. An appliance as claimed in claim 2 wherein said door lock mechanism comprises a mortise and hook joint, said appliance further comprising a movable rod coupled to said hook, a lever coupled to said rod and to the electromagnet armature for transferring the motion of said armature to said hook so as to unlock the hook when the electromagnet winding is energized.

5. In an electric appliance having a rotatable member driven by a motor, a housing for said rotatable member having a door and a lock mechanism for the door, the combination therewith of a safety lock system for the door comprising, a source of electric energy, an electromagnet having a winding and an armature core coupled to the door lock mechanism so as to lock the door when said winding is deenergized and to unlock the door when the winding is energized, a first electrical energizing circuit for energizing said electromagnet winding, a second electrical energizing circuit adapted to energize said motor, switch means arranged to energize said first and second energizing circuits during mutually exclusive time intervals, and a centrifugal switch connected in said first energizing circuit and actuated by said motor so as to interrupt the energizing circuit for electromagnet winding when the rotatable member is rotated at high speed and to close said circuit when the rotatable member is rotated at low speed.

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