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REMOTELY OPERATED LATCH MECHANISM FOR LAUNDRY MACHINES

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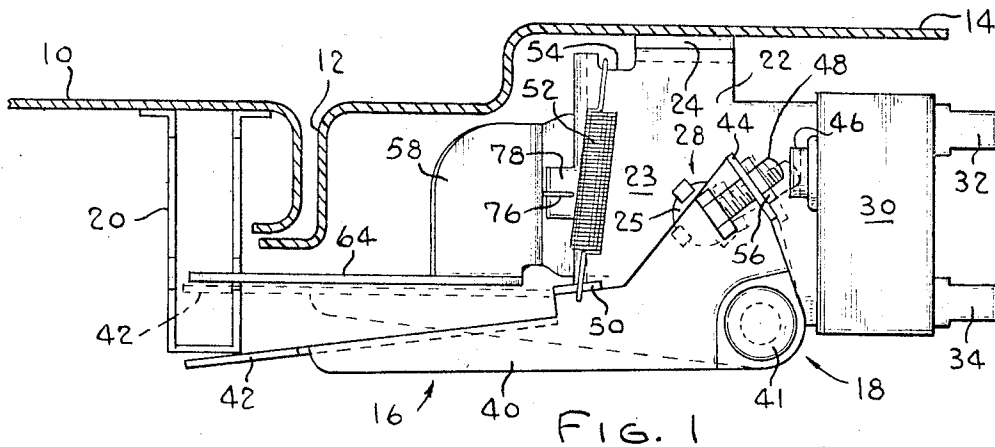


FIG. 1

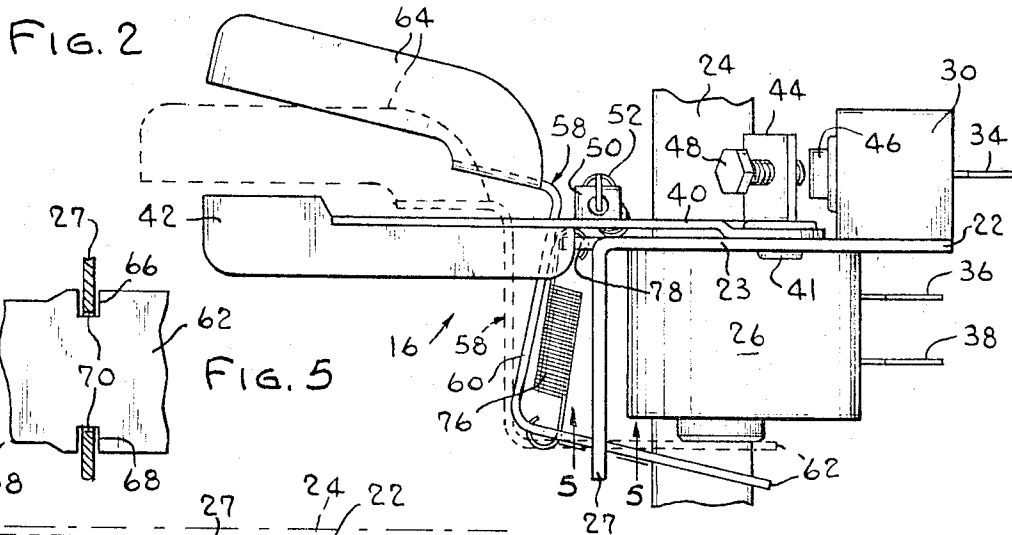


FIG. 2

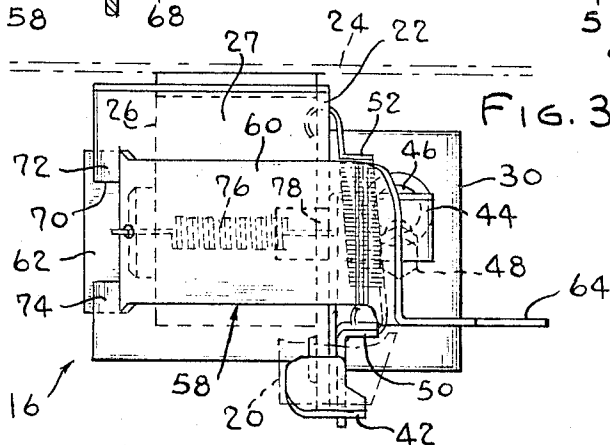


FIG. 3

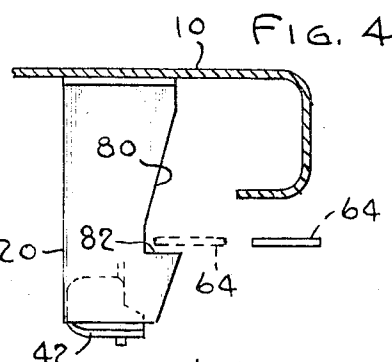


FIG. 4

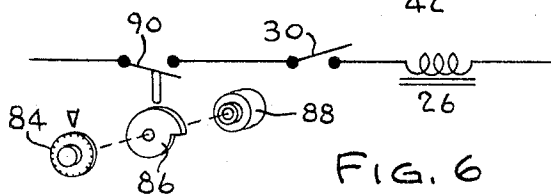


FIG. 5

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1

2

3,272,935

REMOTELY OPERATED LATCH MECHANISM FOR LAUNDRY MACHINES

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This invention relates to latch mechanisms and, more particularly, to a remotely operated latch mechanism particularly adapted for use as, but not limited to, a lid latch for an automatic washer, dryer or the like.

An object of this invention is to provide a latch mechanism of simple and economical construction.

Another object of this invention is to provide an effective and reliably operable latch mechanism without the need for precision parts.

A further object of this invention is to simplify assembly of a latch mechanism of this type.

A still further object of this invention is to provide an electrical, remotely actuated latch mechanism which can be used in the environment of an automatic washer, dryer or the like without being adversely affected by rough handling to which it may be subjected in such an application.

For the completion of these and other objects, this invention contemplates a latch mechanism for a closure member which includes electrically actuated holding means adapted to be connected with and hold the closure member in its closed position. The latch mechanism also includes control means for the holding means which is arranged for operation in response to movement of the closure member to its closed position to set-up an electrical energizing circuit to the holding means which, when completed, causes actuation of the holding means to hold the closure member in its closed position.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims, as will obvious modifications of the embodiment shown in the drawings, in which:

FIG. 1 is a side elevation of a latch mechanism constructed in accordance with the teachings of this invention;

FIG. 2 is a bottom plan view of the latch mechanism;

FIG. 3 illustrates the latch mechanism as viewed from the left in FIG. 1;

FIG. 4 illustrates the latch mechanism in both its latched and unlatched positions and as viewed from the left in FIG. 1;

FIG. 5 is a partial section view taken generally along line 5-5 of FIG. 2; and

FIG. 6 is a schematic illustration of a portion of a washer control circuit.

The latch mechanism of this invention can be utilized with any type of closure, for example the loading door of an automatic washer or dryer. As viewed in FIG. 1, lid 10 is suitably supported (in a manner well known in the art and not shown) for movement relative to opening 12 to assume either a closed or an open position with respect to housing 14 of the particular apparatus with which the latch mechanism is being used. Latch mechanism 16 is supported adjacent opening 12 and includes latching assembly 18 connected to housing 14 and a combination latch and striker member 20 connected to and movable with lid 10 toward and away from latching assembly 18.

Latching assembly 18 includes support frame 22 connected to housing 14 through mounting plate 24. A coil and core assembly 26 is suitably attached to one side of planar portion 23 of frame 22, for example by staking core 25 to the planar portion as illustrated at 28. Elec-

trical switch 30 is suitably connected to the opposite side of the planar portion of the frame and its terminals 32 and 34 are connected to terminals 36 and 38 in a manner well known in the art, and as shown schematically in FIG. 6, to connect switch 30 in the circuit of the coil and core assembly where it is operative to enable and disable coil and core assembly 26 by setting up or opening an energizing circuit to the coil and core assembly. It will be noted that terminals 32, 34, 36 and 38 of switch 30 and coil and core assembly 26 extend in the same direction and from the same side of the latch mechanism to facilitate wiring.

Switch actuating lever 40 is pivotally mounted on frame 22 by a rivet 41 staked to the planar portion of the frame. Lever 40 is movable in a plane parallel to the plane of frame portion 23 and includes an end 42 formed to extend generally transversely of the plane of movement of the lever 40 about its pivotal axis and in the path of latch member 20. A turned tab 44 is provided at the opposite end of lever 40 and is arranged adjacent actuating button 46 of switch 30. Tab 44 carries an adjustable screw 48 which is moved into and out of engagement with button 46 in accordance with movement of lever 40. Lever 40 is also provided with a turned tab 50 located intermediate the ends of the lever and so that it and screw 48 are located on opposite sides of rivet 41. Tension spring 52 is seated between tab 50 and notch 54 in planar portion 23 of the frame to bias lever 40 in a clockwise direction, as viewed in FIG. 1, and toward engagement with button 46. Accordingly, lever 40 normally assumes the dotted line position of FIG. 1 with switch button 46 depressed and, as lid 10 is closed, latch member 20 engages and pivots lever 40 counterclockwise to release button 46, i.e. lever 40 is moved to the full line position of FIG. 1.

Preferably, switch 30 is of the normally closed type so that the circuit through the switch is made upon release of button 46. With a normally closed switch, actuating lever 40 can be arranged as illustrated so that closure of the switch circuit occurs with movement of the lever away from the switch button so that the actuating mechanism will accommodate any amount of over-travel without damage to the switch due to either excessive over-travel or high impact forces on the actuating mechanism. A thread mounting for screw 48 is provided by nut 56 fixed to tab 44 for receipt of screw 48. The screw may pass through a clearance hole (not shown) in the tab and into nut 56 so that it can be adjusted relative to the tab to vary the point at which actuation of switch 30 occurs.

Latching assembly 18 includes a latch lever 58 which is engageable with latch member 20 to hold the lid in its closed position. Structurally, lever 58 includes a central portion 60, one end 62 extending laterally of central portion 60 to a point adjacent coil and core assembly 26 and another end 64 extending laterally to the opposite side of central portion 60. Lever 58 is pivotally mounted on frame portion 27, which extends transversely of the planar frame portion 23, through cooperation of opposed notches 66 and 68 provided in the sides of end 62 and a cut-out portion 70 in frame portion 27. More particularly, in assembly tabs 72 and 74 are turned up to permit entry of lever 58 into cut-out 70. Notches 66 and 68 engage portions of end 62 defining the cut-out and when the lever is properly positioned, tabs 72 and 74 are turned down to hold the lever assembled in the cut-out. Tension spring 76 extends between tab 78 formed on frame 22 and lever 58 and in a manner to bias lever 58 in a clockwise direction (as viewed in FIG. 2) and to the illustrated full line position wherein end 62 is spaced from core 26 and end 64 is positioned out of the path of

movement of latch member 20 (see FIG. 4). Lever 58 is mounted so that movement thereof about its pivotal axis moves end 64 generally transversely of the path of movement of latch member 20 and it will be noted that end 64 is formed so that it extends in that transverse direction. End 64, when lever 58 is in its full line position, is spaced from the path of movement of latch member 20 but, when the lever is in its dotted line position, is disposed in the path of movement of the latch member. The combination of coil and core assembly 26 and spring 76 control the position of lever 58 so that, when the coil and core is deenergized, the lever will assume its full line position under the influence of spring 76; however, when the coil and core assembly is energized, it moves the lever against the force of spring 76 into its dotted line where it will be disposed in the path of movement of latch member 20. At this point it should be noted that latch member 20 includes a cut-out 80 defining a notch opening toward latch lever 58 and a surface 82 facing upwardly for engagement with the latch lever. Cut-out 80 and surface 82 are arranged relative to latch lever 58 so that when the lid is closed and the coil and core assembly is energized interengagement between the latch lever and surface 82 holds the lid in its locked position.

As was mentioned above, the latch mechanism of this invention can be used in combination with the closure member of any one of a number of various apparatus. To assist in the description of the operation of the latch mechanism, it has been schematically illustrated in FIG. 6 with a portion of the control circuit of an automatic washing machine where it is intended to lock the washer lid closed during a spin cycle. More particularly and with reference to FIG. 6, a portion of a motor driven timer used to control the various cycles of a washing machine includes selector dial 84, control cam 86 and timer motor 88. It will be appreciated that only that portion of washer circuit pertaining to the latch mechanism and specifically coil and core assembly 26, has been illustrated. Closure of switch 30 merely sets up a circuit to coil and core assembly 26 and the coil and core assembly is not energized until switch 90 is closed by cam 86, and, similarly, if switch 90 is closed but switch 30 is open coil and core assembly 26 is not energized. Assuming a spin cycle to have been selected by manipulation of dial 84, switch 90 will be closed and, if lid 10 is closed, coil and core assembly 26 is energized to pivot lever 58 and position end 64 thereof for engagement with latch member 20 to prevent opening of the lid during the spin cycle. If the lid had not been closed when the spin cycle was selected, latch member 20 will engage and pivot lever 40 as the lid is closed, pivoting lever 40 releases button 46 allowing switch 30 to close and complete the circuit to coil and core assembly 26. Lever 58 pivots into cut-out 80 to lock the lid in its closed position. During automatic sequencing through washer cycles, other than the spin cycle, and with the lid 10 closed, the circuit to coil and core assembly 26 is set-up but the latch is not activated until the spin cycle is reached at which time switch 90 is closed to complete the circuit and lock the lid in its down position.

Accordingly, a particularly simplified and yet effective operating remotely controlled latch mechanism is provided which also accommodates excessive amounts of over-travel and/or high impact actuating forces and which provides a simplified mounting for the various components thereof. It will be noted that cut-out 80 is sufficiently large which, together with movement of the latch lever and control lever in mutually perpendicular planes, permits the use of low tolerance components and simplified manufacturing techniques as opposed to the requirements of precision components.

Although but one embodiment of the present invention has been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from 75

the spirit of the invention or from the scope of the appended claims.

What we claim is:

1. A latch mechanism comprising, in combination, support means including a generally planar portion, switch means connected on one side of said planar portion and electrically actuated means connected on the other side thereof, said switch means connected in circuit with said electrically actuated means and operative, when actuated, to set-up a circuit to said electrically actuated means the completion of which energizes said electrically actuated means, actuating means for said switch means pivotally mounted on said planar portion for movement in a plane parallel to said planar portion to actuate said switch means, said support means including a portion extending laterally of said planar portion on said other side thereof, and a first latch member having one end positioned adjacent said switch actuating means, its other end positioned adjacent said electrically actuated means and being pivotally supported intermediate its ends on said lateral portion for movement transversely of said plane, said electrically actuated means operative when actuated to pivot said first latch member.
2. The combination of claim 1 wherein said latch mechanism is used in combination with a closure member movable between open and closed positions and is positioned adjacent the path of movement of said closure member, and including, a second latch member connected to and movable with said closure member toward and away from said first latch member, said actuating means arranged in the path of said second latch member and operative to actuate said switch means as said closure member moves toward its closed position, and wherein said first latch member is arranged to move into engagement with said second latch member to hold said closure member in its closed position.
3. A latch assembly comprising, in combination, support means, a latch member mounted on said support means for movement between a first and a second position, electrically actuated means mounted on said support means adjacent said latch member and operative when energized to move said latch member from said first and to said second position, switch means mounted on said support means and connected in circuit with said electrically actuated means and operative when actuated to set-up an electrical circuit to said electrically actuated means the completion of which energizes said electrically actuated means, and actuating means for said switch means mounted on said support means for movement, said support means supporting said latch member and said actuating means for movement in mutually perpendicular planes and with said latch member being movable toward and away from the path of movement of said actuating means.
4. A latch mechanism for use in combination with a closure member movable between an open and closed position and comprising, in combination, a frame disposed adjacent the path of movement of said closure member, a first latch member on said frame, a second latch member connected to and movable with said closure member toward and away from said first latch member, said first latch member being mounted on said frame for movement between a first position removed from the path of movement of said second latch member

5

and a second position disposed in said path of movement for engagement with said second latch member, electrically actuated means mounted on said frame adjacent said first latch member and operative, when energized, to move said second latch member to its second position,

switch means mounted on said frame and connected in circuit with said electrically actuated means and operative when actuated to set-up electrical circuit to said electrically actuated means the completion of which actuates said electrically actuated means to move said first latch member to its second position, and actuating means for said switch means mounted on said frame for movement relative to said switch means and having a portion arranged in the path of movement of said second latch member for engagement with and movement by said second latch member to actuate said switch means as said closure member moves toward its closed position.

5. The combination of claim 4 wherein said actuating means and said second latch member move in mutually perpendicular planes.

6. A latch mechanism for use in combination with a closure member movable between an open and closed position and comprising, in combination,

a first latch portion arranged adjacent the path of movement of said closure member,

a second latch portion connected to and movable with said closure member toward and away from said first latch portion,

said first latch portion having a first position removed from the path of movement of said second latch portion and a second position disposed in said path of movement for engagement with said second latch portion,

electrically energized means arranged adjacent said first latch portion and operative, when energized, to move said first latch portion to its second position,

switch means connected with and operative when actuated to setup an electrical circuit to said coil and core assembly the completion of which energizes said coil and core assembly to move said first latch portion to its second position,

and actuating means for said switch means arranged to transmit movement of said closure member toward its closed position to said switch means for actuation thereof.

7. The combination of a closure member movable between an open and closed position and a latch mechanism for selectively locking said closure member in a closed position, and wherein said latch mechanism comprises, a first latch portion connected to and movable with said closure member,

a second latch portion having a first position removed from the path of movement of said first latch portion and a second position disposed in said path of

6

movement for engagement with said first latch portion,

electrically actuated means for moving said second latch portion to its second position,

and switch means in circuit with and controlling said electrically actuated means and including a switch and an operating portion disposed in the path of movement of said first latch portion for engagement with and operation by said first latch portion as said closure member moves toward its closed position, said operating portion actuating said switch in response to engagement thereof by said first latch portion and said switch, when activated by said operating portion, setting up a circuit to said electrically actuated means the completion of which actuates said electrically actuated means to move said second latch portion to its second position to engage said second latch portion and hold said closure member in its closed position.

8. The combination of a closure member movable between an open and closed position and a latch mechanism for selectively locking said closure member in a closed position, said latch mechanism comprising,

latch means,

means supporting said latch means for movement from an inoperative position free from said closure member to an operative position engaging said closure member when said closure member is in its closed position to hold said closure member in its closed position and against movement to its open position,

electrically energized operating means,

switch means connected in the circuit of said electrically energized operating means,

means for connecting said switch means to said closure member and operative to close said switch means and to set up a circuit to said electrically energized operating means in response to movement of said closure member from its open to its closed position and the completion of which actuates said operating means,

and means for connecting said electrically energized operating means to said latch means and operative to transmit movement of said operating means, which occurs when said circuit is completed, to move said latch means from said inoperative to said operative position.

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