April 22, 1969 G. W. BLEWITT, JR 3,440,373

COMBINED HINGE AND SWITCH MECHANISM WITH PIN AND SLOT CONNECTION

Filed April 26, 1967

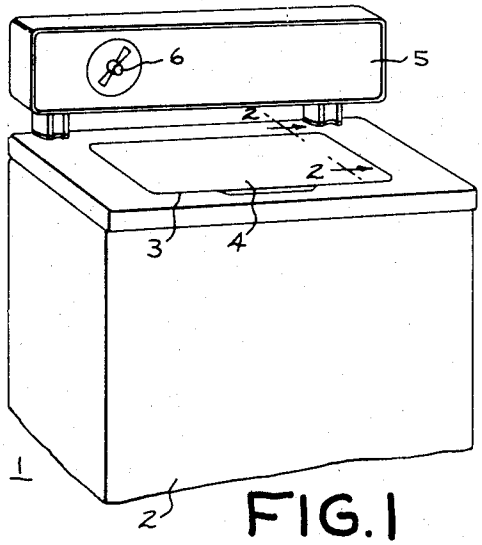
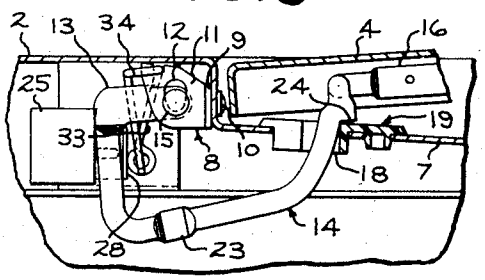


FIG. 1

FIG. 3



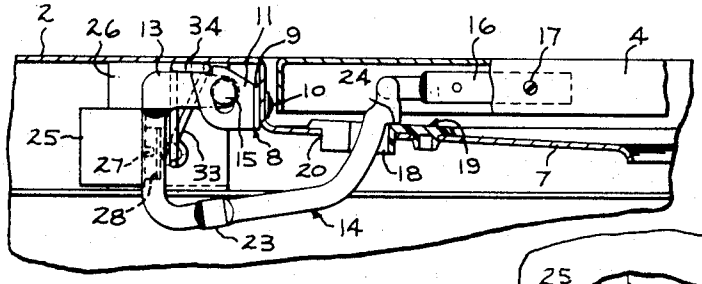
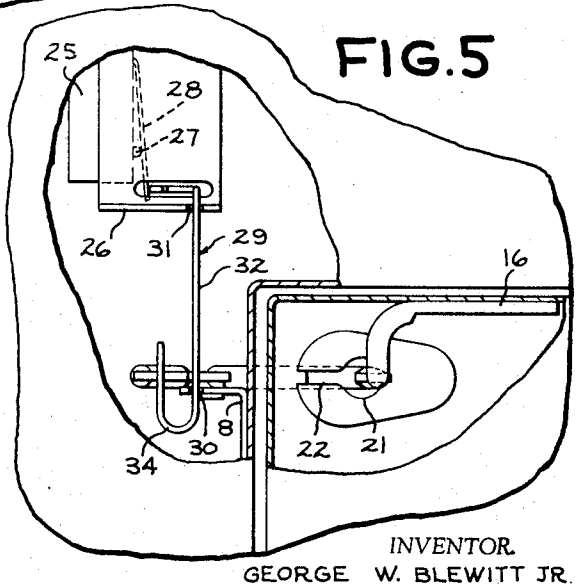


FIG. 2

FIG. 5



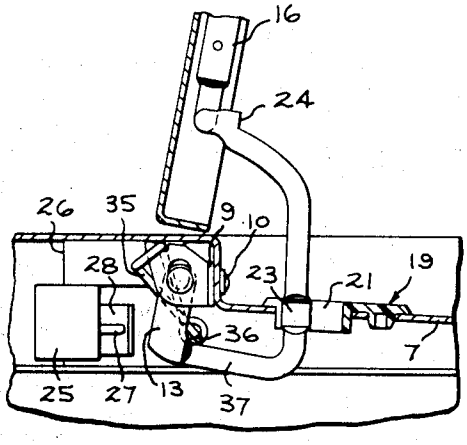


FIG. 4

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United States Patent Office 3,440,373
Patented Apr. 22, 1969

3,440,373

COMBINED HINGE AND SWITCH MECHANISM WITH PIN AND SLOT CONNECTION

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Filed Apr. 26, 1967, Ser. No. 633,941
Int. Cl. H01h 3/16
U.S. Cl. 200—61.7 7 Claims

ABSTRACT OF THE DISCLOSURE

A combined hinge and switch mechanism to operate the immediately upon the hinge switch being moved from a first position. The hinge has a pin and slot mounting which provides an initial, essentially linear movement to free the switch when the hinge member is initially moved, the switch being biased for operation when freed.

Background of the invention

With many machines, such as laundry washing machines for instance, it is desirable to automatically interrupt the operation of the machine whenever the lid or closure member of the machine is opened. Some prior art mechanisms connected the control switch for the machine directly to the lid. Such arrangements usually operated upon initial movement of the lid but were easily "fooled." That is, the switch operator was exposed and could be manually operated when the lid was open. Other prior art mechanisms connected the switch to the hinge for operation by the hinge. Some of them, while operating the switch upon initial lid movement, were not successful in providing a mechanism immune to manual "fooling." Others, while reasonably successful in preventing manual operation, required too much lid movement to operate the switch. Thus the lid could be opened a substantial portion of the way without operating the switch.

An object of this invention is to provide a new and improved hinge and switch mechanism.

Another object is to provide such a mechanism which is effective to cause operation of the switch in response to initial movement of the closure member attached to the hinge while preventing manual operation of the switch.

A further object is to provide such a mechanism which is simple in design, inexpensive to manufacture and sure in operation.

Summary of the invention

In one aspect of the invention, there is provided a combined closure member hinge and switch mechanism including a hinge adapted to be rigidly secured to a closure member and a bracket rigidly secured to the support structure for the closure member. The hinge and bracket together form a pin and slot connection so that the hinge will move first substantially linearly and then pivotally with respect to the bracket, as the closure member is moved from a first position. A switch mechanism is included and has an actuator biased to a first switch setting position and movable to a second switch setting position. The actuator is interconnected with the hinge so that the hinge causes the actuator to be restrained in its second position when the closure member is in its first position. The linear movement of the hinge with respect to the bracket, as the closure member is moved from its first position frees the actuator for movement to its first position.

Brief description of the drawing

FIGURE 1 is a fragmentary view in perspective of a typical clothes washing machine which may include a combined hinge and switch mechanism according to this invention;

FIGURE 2 is a fragmentary view, partly in cross section along line 2—2 in FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2, but with the closure member in a partly open position;

FIGURE 4 is another view similar to FIGURE 2, but with the closure member in its fully open position; and

FIGURE 5 is a fragmentary plan view, partly broken away and partly in cross section for purposes of illustration.

Description of the preferred embodiments

Referring first to FIGURE 1 there is shown a typical clothes washing machine **1** of the type having a cabinet **2** which encloses clothes washing apparatus (not shown). The washing apparatus is accessible through an opening **3** having a closure member or lid **4**, which normally blocks off the opening except when the operator wishes to load or unload the machine. A typical backsplasher **5** including a control member **6** may be included in the usual manner to provide effective operative control of the sequence of operations being performed by the apparatus contained within cabinet **2**.

Referring now to FIGURE 2 it will be seen that lid **4** is provided with a seat **7** formed in cabinet **2**. There also is provided a bracket member **8** including a foot **9** which is secured by suitable means such as a screw **10** to the cabinet structure. The bracket **8** also includes a planar flange **11** extending into the cabinet structure and defining a generally elongated slot **12**, which is slightly wider at its upper end than at its lower end. One end **13** of a hinge **14** is provided with a pin **15** which fits within the slot **12** for both generally linear movement and pivotal movement. The other end **16** of the hinge **14** is secured to the lid **4** by any suitable means such as members **17**. A portion of the hinge between the ends **13** and **16** passes through an opening **18** formed in a flexible member **19** (which may, for instance, be formed of plastic) which is secured in an opening **20** provided in seat **7**.

The opening **18** includes a large portion **21** and a small portion **22** (as best seen in FIGURE 5) and the hinge **14** includes a reduced diameter section **23**. As the closure member **4** is lifted from its closed position (shown in FIGURE 2) toward its fully open position (shown in FIGURE 4) the hinge first moves through the large portion **21** of the opening **18** and then the small portion **22** until the reduced diameter section **23** of the hinge comes into registry with the small portion **22** of the opening. At this time the closure member is in its fully open position and the engagement between the reduced diameter portion **23** of the hinge **14** and the small portion **22** of opening **18** releasably holds the lid open. The additional details of construction to accomplish this holding action and a more detailed description of the interaction between hinge **14** and flexible member **19** will be found in U.S. Patent No. 2,892,209, issued to R. E. Condit and assigned to the General Electric Company, assignee of the present application.

When the lid is in its closed position (shown in FIGURE 2) a projecting foot or tang **24** provided on the hinge **14** rests on flexible member **19** adjacent the edge of the large portion **21** of the opening **18** and the pin **15**, provided in the end **13** of the hinge, is in the upper end of slot **12**. As the lid is tilted for opening, it first pivots about the engagement of foot **24** with flexible member **19**. This causes the pin **15** to move within the slot **12** so that the end **13** of the hinge moves substantially linearly with respect to the bracket **11** until the pin **15** reaches the lower end of the slot **12**. Thereafter, continued tilting of the lid toward its open position causes the hinge **14** to move about the pivot formed by the engagement of pin **15** with the lower end of slot **12**.

A switch **25** is mounted within the supporting structure

or cabinet 2 by means of a second bracket 26 which is attached to the cabinet in spaced relationship to the hinge 14. As is usual, the switch may include appropriate contacts, not shown, which are in one position, for instance closed, when the button 27 is depressed (as shown in FIGURE 2) and are in another position, for instance open, when the button is extended (as shown in FIGURES 3 and 4). The button 27 typically may be spring loaded to its extended position so that the switch is normally open and may be closed by holding the button in its depressed position. The particular switch construction shown also includes an actuator 28 which may be in the form of a leaf spring attached to the switch 25 to one side of the button 27 and extending over the button. The actuator is formed and mounted so as to normally assume the position shown in FIGURES 3 and 4, in which it allows the button 27 to be in its extended position. By depressing the actuator, that is, flexing its free end toward the switch 25, the pushbutton may be depressed so as to move the switch to its other setting. Since both the button 27 and the actuator 28 are biased to the other or switch open position, they will automatically move to that position when released.

A link 29 is provided to interconnect the switch actuator and the hinge so that the setting of the switch may be controlled by the positioning of the hinge. To this end the brackets 8 and 26 have notches 30 and 31 respectively and the link includes an elongated mid-portion 32 which is received within the notches so as to be held between the brackets and the adjacent wall of the support structure or cabinet 2. Thus, the link is disposed for rotation about the longitudinal axis of its mid-portion. The end of the mid-portion 32 adjacent the switch is formed as a first arm portion 33, extending at an angle to the mid-portion 32 so as to be disposed to selectively engage the switch actuator 28. The other end of the mid-portion 32 is formed as a return bent section 34 which terminates in a second arm portion 35, also extending at an angle to a mid-portion 32. The second arm portion 35 terminates in a tab 36 disposed to be engaged by an intermediate section 37 of the hinge 14.

As seen in FIGURE 2, when the lid or closure member 4 is in its closed position, the end 13 of the hinge 14 extends generally parallel to the cabinet or support structure 2 and engages the return bent section 34 of the link 29. This holds the link in the position shown, so that its first arm portion 33 engages the actuator 28 and restrains it in the position holding the button 27 depressed.

When closure member 4 is tilted or rotated about the engagement of foot 24 with resilient member 19 to begin opening the lid, the pin 15 moves generally linearly through the slot 12 to the bottom of the slot (as shown in FIGURE 3). This generally linear movement of the hinge 14 with respect to the bracket 8 moves the end 13 out of engagement with the return bent section 34. This frees the link 29 and the biasing force of the switch, in this instance the biasing spring associated with the button 27 and the actuator 28, cause the button 27 and actuator 28 to push against the first arm portion 33. This rotates the link 29 about its mid-portion 32 and these members move to the positions shown in FIGURE 3. Thus, the switch is changed from one switch setting to the other. It can be seen that this arrangement of parts causes the switch to be actuated upon an initial, very small, movement of the lid. At the same time it is very difficult to manually "fool" it.

After the end 13 of the hinge has moved substantially linearly with respect to the bracket 8 sufficiently for the pin 15 to be moved to the bottom of the slot 12, further movement of the lid 4 will cause the hinge to pivot about the pin and slot until it is brought to the position shown in FIGURE 4. As shown in FIGURE 4, this pivotal movement causes the intermediate section 37 of the hinge to engage the tab 36 of the link 29 and positively pivot the link 29 about its mid-portion 32 to move the first arm 33 out of contact with actuator 28. This positive movement is of some advantage in machines such as laundry washing machines, which normally include a seal of some type between the tub containing the water and fabrics and the remainder of the cabinet. This seal prevents water vapor from getting out of the tub and causing other portions of the machine to rust. Thus, the switch 25 normally would be mounted on one side of this seal and the hinge on the other so that the mid-portion 32 of the link would be required to extend through the seal and have a tight engagement therewith. In the event the seal exerted so much pressure on the link that the biasing force associated with the switch did not rotate the link, the subsequent engagement of intermediate section 37 with tab 36 would positively move the link so as to free the switch for movement to its second setting.

The foregoing is a description of an illustrative embodiment of the invention and it is applicant's intention in the appended claims to cover all forms which fall within the scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A combined closured member hinge and switch mechanism including:
   (a) a hinge secured to a closure member;
   (b) means connecting said hinge to a support structure for said closure member and forming a first pivot for said closure member, said first pivot providing for generally linear and for pivotal movement of said hinge with respect to said first pivot;
   (c) means forming a second pivot for said closure member so that said closure member pivots about said second pivot and said hinge moves generally linearly with respect to said first pivot and then said closure member and said hinge pivot about said second pivot as said closure member is moved from a first position; and
   (d) a switch mechanism including an actuator biased to a first switch setting position and movable to a second switch setting position;
   (e) said actuator being interconnected with said hinge so that said hinge causes said actuator to be restrained in its second position when said closure member is in its first position and the linear movement of said hinge as said closure member is moved from its first position frees said actuator for movement to its first position.

2. A combined closure member hinge and switch mechanism including:
   (a) a hinge secured to a closure member;
   (b) a bracket secured to the support structure for said closure member;
   (c) said bracket and said hinge together forming a pin and slot connection so that said hinge will first move substantially linearly and then pivotally with respect to said bracket as said closure member is moved from a first position; and
   (d) a switch mechanism including an actuator biased to a first switch setting position and movable to a second switch setting position;
   (e) said actuator being interconnected with said hinge so that said hinge causes said actuator to be restrained in its second position when said closure member is in its first position and the linear movement of said hinge as said closure member is moved from its first position frees said actuator for movement to its first position.

3. The mechanism as set forth in claim 2 wherein said support structure defines an opening through which said hinge extends and said hinge includes a projection positioned to engage said support structure adjacent said opening to provide a pivoted support for said closure member when said hinge is moving substantially linearly with respect to said bracket.

4. The mechanism as set forth in claim 2 wherein a

link member interconnects said hinge and said actuator; said hinge engaging said link to hold it in a position restraining said actuator in its second position when said closure member is in its first position; said hinge releasing said link member when said hinge moves generally linearly with respect to said bracket thereby to free said actuator for movement to its first position; and said hinge engaging said link member to move it free of said actuator when said hinge pivots with respect to said bracket.

5. A combined closure member hinge and switch mechanism including:

(a) a hinge secured to a closure member;

(b) a bracket secured to the support structure for said closure member;

(c) said bracket defining an elongated slot therein and said hinge including a pin adapted to be received in said slot so that said hinge first will move substantially linearly and, subsequently, pivotally with respect to said bracket as said closure member is moved from a first position;

(d) a switch mechanism mounted in spaced relationship to said hinge and including an actuator biased to a first switch setting position and movable to a second switch setting position;

(e) a link pivotally mounted between said hinge and said actuator;

(f) said hinge being adapted to engage said link and hold it in a position in which it restrains said actuator in its second position when said closure member is in its first position and the linear movement of said hinge relative to said bracket as said closure member is moved from its first position freeing said link so that said actuator may move to its first position.

6. The mechanism as set forth in claim 5 wherein said support structure defines an opening through which said hinge extends and said hinge includes a projection positioned to engage said support structure adjacent said

opening to provide a pivoted support for said closure member when said hinge is moving substantially linearly with respect to said bracket.

7. The mechanism as set forth in claim 5 wherein said link includes an elongated mid-portion mounted for rotation about its longitudinal axis, a first arm portion extending at an angle to said mid-portion at one end thereof, the other end of said mid-portion being formed as a return bent section terminating in a second arm portion extending at an angle to said mid-portion; said hinge including a first section which engages said return bent section to hold said link in a position in which sad first arm portion restrains said actuator in its second position when said closure member is in its first position; said linear movement of said hinge relative to said bracket as said closure member is moved from its first position freeing said return bent section from said first section of said hinge so that said actuator may rotate said first arm portion and move to its first position; said subsequent pivotal movement of said hinge causing a second section of said hinge member to engage said second arm portion and pivot said link about its longitudinal axis, thereby positively to move said first arm portion out of engagement with said actuator.

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U.S. Cl. X.R.

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