Nov. 5, 1968 W. A. ECKERLE 3,409,320

LATCH AND SWITCH OPERATING MECHANISM FOR CABINET CLOSURE

Filed Sept. 15, 1966 3 Sheets-Sheet 1

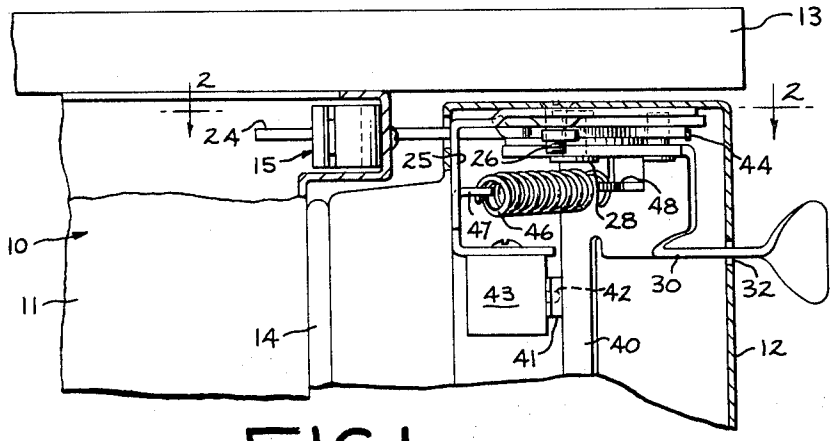


FIG.1

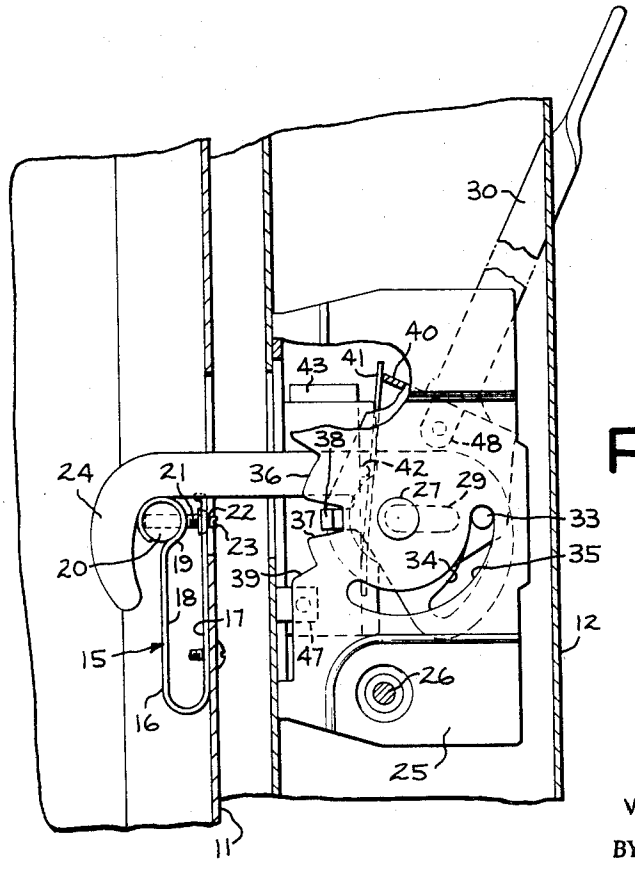


FIG.2

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LATCH AND SWITCH OPERATING MECHANISM FOR CABINET CLOSURE

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FIG. 3

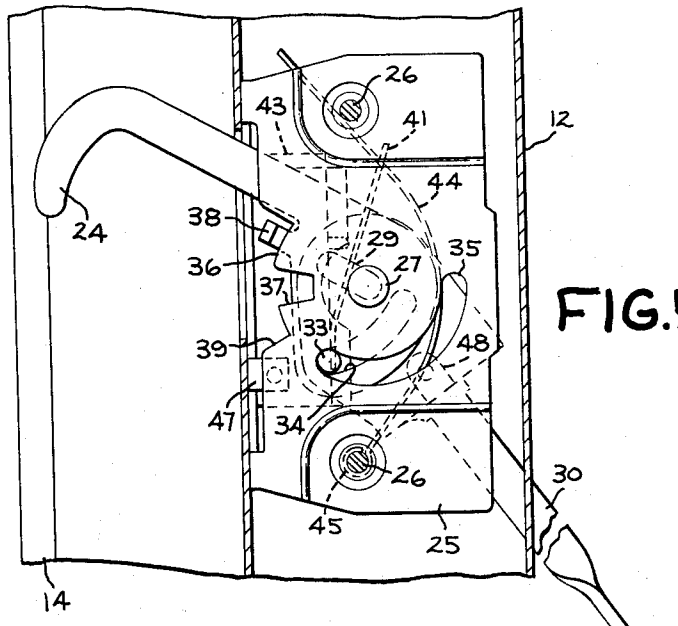


FIG. 5

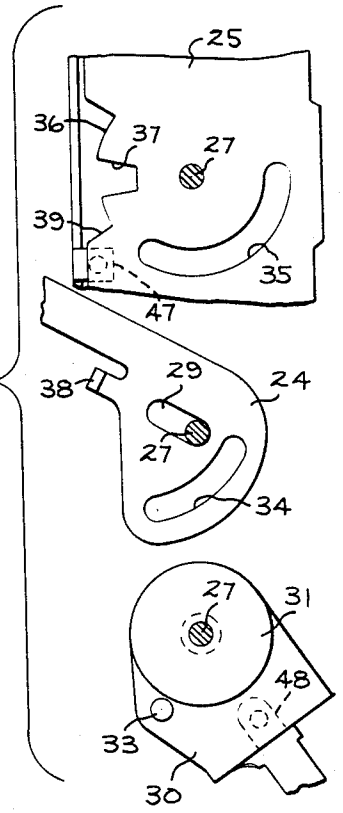
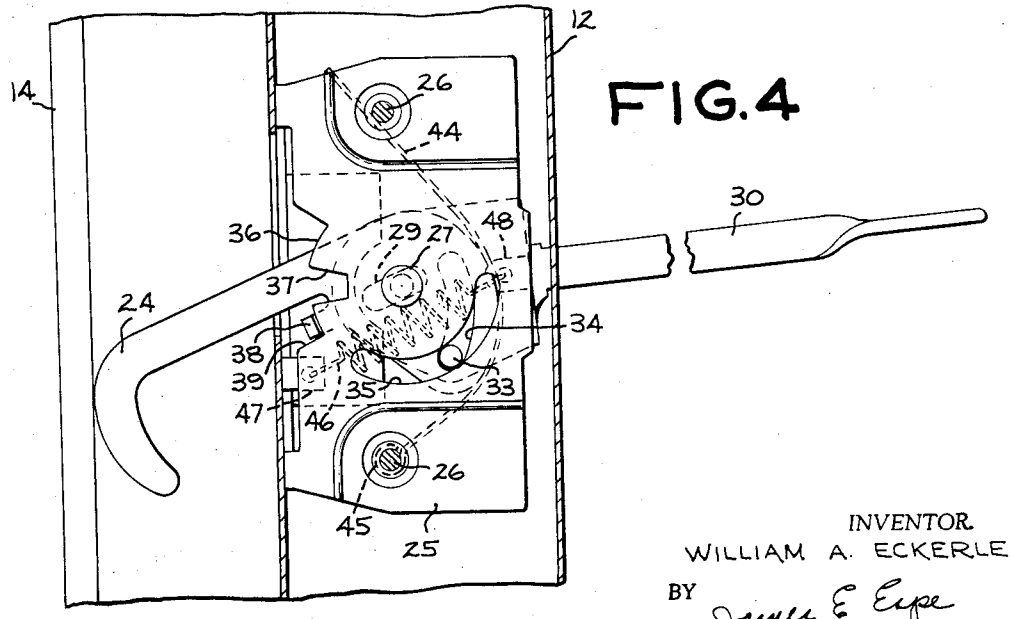


FIG. 4



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LATCH AND SWITCH OPERATING MECHANISM FOR CABINET CLOSURE

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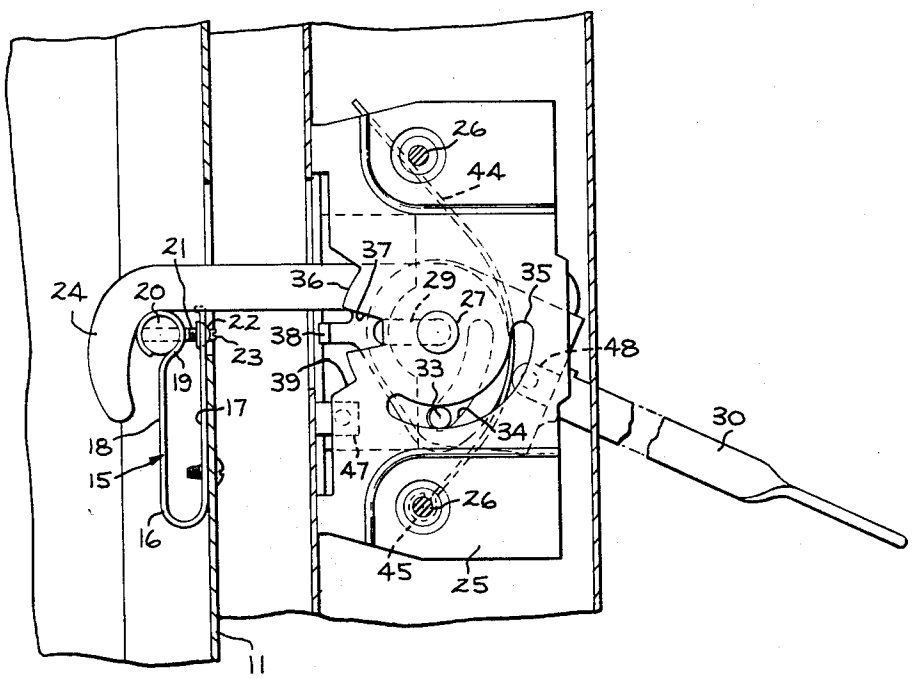


FIG.6

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LATCH AND SWITCH-OPERATING MECHANISM FOR CABINET CLOSURE

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10 Claims. (Cl. 292—113)

ABSTRACT OF THE DISCLOSURE

A combination latch and switch-operating mechanism for a cabinet member and a closure member. The mechanism comprises a strike on one of the members and a latch on the other of the members. A manually-operable handle is provided to move the latch between an unlatched position and a latched position, and to also operate a switch when the latch is in the latched position. The latch has a tab which is moved with it by the handle with respect to a relatively stationary member that is provided with a slot and a notch. The latch, strike and tab are arranged relative to each other such that the tab will enter the slot only when the latch properly engages the strike, but will be prevented from entering the slot and will instead enter the notch and prevent the handle from operating the switch when the latch fails to properly engage the strike.

This invention relates generally to cabinets having closure members or doors and, more specifically, to an improved latch and switch-operating mechanism to latch a cabinet door and operate a switch.

The invention is particularly useful with washing appliances such as, for example, automatic dishwashers. In such appliances water or other wash fluid is agitated, splashed or sprayed about within a wash chamber defined by a cabinet. An access opening is provided in the cabinet to allow articles to be inserted into or removed from the wash chamber. A closure member or door is provided to seal the access opening during operation of the appliance. The door has a latch to assure a liquid-tight seal with the cabinet and a switch is usually associated with the latch to automatically de-energize the appliance as the door is unlatched. The de-energization ceases agitation, splash and spray of fluid within the wash chamber thus preventing escape of fluid through the unlatched door.

Arrangements heretofore available involved relatively expensive and complicated mechanisms in order to avoid closing of the switch, by manipulation of the latch operating, handle, when the door was ajar. It is important, of course, that the switch be prevented from inadvertent closing at any time other than when the door is properly sealed since such closing may result in escape of fluid through the access opening.

Accordingly, it is an object of the present invention to provide an improved latch and switch-operating mechanism for a cabinet closure particularly adapted for use with an automatic washing appliance.

It is another object of this invention to provide a latch and switch-operating mechanism which will de-energize the appliance as the closure member is unlatched.

It is another object of this invention to provide a latch and switch-operating mechanism which will prevent energization of the washing appliance until the closure member is in proper liquid-tight seal with the appliance cabinet.

It is another object of this invention to provide a latch and switch-operating mechanism of the type described which is mechanically simple and is economical to manufacture.

It is another object of this invention to provide an adjustable strike for use with a latch for a cabinet closure member.

Briefly stated, in accordance with one aspect of the present invention, there is provided a combination latch and switch-operating mechanism for a cabinet member and a closure member. The mechanism comprises a strike on one of the members and a latch on the other of the members. A manually-operable handle is movable between an unlatched position and a latched position to move the latch between an unlatched position and a latched position. A switch is adapted to be operated by the handle as the handle moves to the latched position. A tab is movable with the latch. A relatively stationary member is provided and has a slot adjacent the path followed by the tab as the latch moves from the unlatched position toward the latched position. The latch, strike and tab are arranged relative to each other whereby the tab will enter the slot when the latch properly engages the strike. The latch, strike and tab are further arranged relative to each other whereby the tab will be prevented from entering the slot when the latch fails to properly engage the strike. The handle is prevented from operating the switch unless the tab enters the slot.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a fragmentary elevational view, partially cut away to show details, of an automatic washing machine employing the present invention;

FIGURE 2 is a view taken along line 2—2 of FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2 but showing the latch and switch operating mechanism of the present invention in a different condition of operation;

FIGURE 4 is a view similar to FIGURE 2 but showing the latch and switch operating mechanism in another condition of operation;

FIGURE 5 is an exploded view of some of the elements comprising the latch and switch-operating mechanism of the present invention; and,

FIGURE 6 is a view similar to FIGURE 2 but showing the latch and switch-operating mechanism in yet another condition of operation.

Referring now to the drawings, and initially to FIGURE 1 thereof, there is illustrated an automatic washing appliance in the form of an automatic dishwasher **10** having a cabinet **11** and a closure member or door **12**. It is to be understood that door **12** is pivotal about a horizontal axis defined by hinge means (not shown) adjacent the bottom of door **12**. Thus, door **12**, as shown in the closed position in FIGURE 1, would swing to the right and downwardly as viewed in FIGURE 1 as it is opened. However, the present invention is equally applicable to cabinets having closure members of the top opening and pull out drawer types. Since dishwasher **10** may be of the built-in variety wherein it is incorporated directly into a kitchen cabinet, a countertop **13** is illustrated adjacent the top of cabinet **11**. The present invention, as indicated above, is not limited to a built-in dishwasher and, in fact, may be employed with any cabinet structure having a closure member associated therewith as will become more evident as the description proceeds.

Door **12** is provided with a gasket **14** which effectuates a seal between door **12** and cabinet **11**. Door **12** is maintained in its closed position relative to cabinet **11** by means of a combination latch and switch-operating mechanism comprising the present invention. A strike **15** i

carried by either the door or the cabinet but in the preferred embodiment of the present invention, is carried by cabinet **11**. As best seen in FIGURE 2, strike **15** includes a generally U-shaped spring element **16** having one leg **17** secured to cabinet **11** and the other leg **18** having a loop **19** at the distal end thereof. Loop **19** receives a cylindrical nut **20** which threadedly receives an adjusting screw **21**. The resiliency of element **16** tends to urge the distal end of leg **18** toward door **12**. Adjusting screw **21** has a spherical head **22** which engages leg **17** to prevent the distal end of leg **18** from moving toward door **12**. Screw **21** further includes a slotted projection **23** into which a screw driver may be inserted to adjust the position of loop **19** by rotating screw **21** relative to nut **20**. Thus, the present invention provides an adjustable strike, the function of which will be discussed in greater detail hereinafter, which may be adjusted from outside cabinet **11** when door **12** is opened.

Cooperating with strike **15** is a latch **24** which is carried by a frame **25**. Frame **25** is, in turn, secured to door **12** by means of a pair of screws or bolts **26**. A pin **27** is rigidly attached to frame **25** and extends downwardly to terminate with an enlarged portion **28**. Latch **24** is provided with an elongated slot **29** which receives pin **27**. Additionally, a manually-operable handle **30** has an opening therethrough which also receives pin **27**. Manually-operable handle **30** and latch **24** are captured between enlarged portion **28** and frame **25**. A washer **31** is disposed between handle **30** and latch **24** and is preferably made from a plastic material so that, when properly lubricated, relative sliding movement between handle **30** and latch **24** may easily take place. If desired, a similar washer (not shown) may be disposed between latch **24** and frame **25** for the same purpose. Handle **30** has a portion which extends through an opening **32** in the front wall or door **12** to be conveniently accessible to the operator of dishwasher **10** so that the latch and switch-operating mechanism of the present invention may be operated.

Handle **30** has a pin **33** rigidly secured thereto and extending upwardly therefrom at a point eccentric to pin **27**. Pin **33** extends upwardly through an arcuate slot **34** in latch **24** and an arcuate slot **35** in frame **25**. The radius of curvature of the arcuate slot **35** is equal to the distance between pin **33** and pin **27**. Thus, as handle **30** is moved, pin **33** follows a circular path about pin **27** within slot **35**.

Frame **25** has an arcuate edge **36** with a slot **37** opening toward edge **36**. Latch **24** has a tab **38** movable with the latch and, in the preferred form of the present invention, formed integrally with the latch. As will be discussed in greater detail hereinafter, tab **38** follows an arcuate path adjacent edge **36** as latch **24** moves among the various positions illustrated in the figures. As latch **24** moves from the unlatched position of FIGURE 3, toward the latched position of FIGURE 2 or the position of FIGURE 4, tab **38** will travel along edge **36** and either enter slot **37** or enter and engage a notch or stop **39**.

The operation of the arrangement thus far described, is as follows. FIGURE 3 illustrates the arrangement in the unlatched position, i.e. when in the position of FIGURE 3, the latch and switch-operating mechanism allows door **12** to be opened. After the door has been pivoted to a substantially closed position, i.e., to a position wherein door **12** is spaced from cabinet **11** approximately the distance illustrated in FIGURE 6, handle **30** is moved from the position of FIGURE 3 to the position of FIGURE 6. Due to the movement of pin **33** about pin **27** as handle **30** is moved, pin **33** moves latch **24** to the position of FIGURE 6. It is to be noted that in FIGURE 6, pin **33** has the same relative position with slot **34** as it did in FIGURE 3. In other words, handle **30** and latch **34** have not moved relative to each other during the change of condition from that in FIGURE 3 to that in FIGURE 5. As latch **24** moves to the position of FIGURE 6, it engages loop **19** of strike **15** whereupon further arcuate movement of latch **24** is prevented.

As movement of handle **30** continues, the condition of the arrangement changes from that in FIGURE 6 to that of FIGURE 2. It should be noted in FIGURE 2 tab **38** has entered slot **37** and pin **33** has moved relative to slot **34** substantially the full length of slot **34**. The relative movement between pin **33** and slot **34**, causes latch **24** to move substantially rectilinearly while handle **30** is moving in a rotary manner. It should also be noted that latch **24** has moved relative to pin **27** substantially the full length of slot **29**. The rectilinear movement of latch **24** relative to the other components of the latch and switch-operating mechanism, results in door **12** moving closer to cabinet **11** to assure compression of gasket **14**.

As handle **30** moves to the latched position of FIGURE 2, a projection **40**, depending downwardly from handle **30**, engages a lever **41** and pivots lever **41** to depress a button **42** projecting from an electrical switch **43**. Depression of button **42** operates switch **43**. Thus, when handle **30** moves to the position of FIGURE 2, switch **43** is operated.

As mentioned above, the present invention is particularly applicable to those situations wherein it is desirable to prevent operation of a switch such as switch **43** unless door **12** is properly sealed against cabinet **11**. Referring now to FIGURE 4, the latch and switch-operating mechanism is illustrated in a position which it assumes if handle **30** is moved toward the latched position when door **12** is not properly closed. It should be noted that the position of handle **30** in FIGURE 4 is beyond the position of handle **30** in FIGURE 6. When latch **24** reaches the position of FIGURE 6 but does not engage strike **15**, latch **24** moves beyond that position at which tab **38** may enter slot **37**. Latch **24** continues to move until tab **38** engages stop **39**. At this point, the latch **24** can move no further. Of course, slot **34** in latch **24** is also prevented from further movement. Because pin **33** on handle **30** extends through slot **34** in latch and slot **35** in frame **25**, pin **33** is prevented from further movement as tab **38** engages stop **39**. This prevention of movement of pin **33** results in prevention of movement of handle **30**. Thus, engagement of tab **38** with stop **39** prevents movement of handle **30** beyond that position illustrated in FIGURE 4. This position is short of that at which projection **40** engages lever **41** to operate switch **43**. Accordingly, when latch **24** fails to properly engage strike **15**, tab **38** will pass slot **37** and engage stop **39** and handle **30** will be prevented from operating switch **43**.

A spring **44** is provided to gently bias latch **24** to the left as viewed in the drawings. The purpose of this bias effect is to insure that tab **38** enters slot **39** only as a result of latch **24** engaging strike **15**. Spring **44** is in the form of a leaf spring having a loop **45** at one end which slips over one of the screws **26**. The other end of the spring **44** extends beyond the other of screws **26** and bears against that screw in a manner wherein it is free to slide relative thereto as latch **24** moves rectilinearly relative to frame **25**. A coil spring **46** extends between a tab **47** on frame **25** and a tab **48** on handle **30** to make the latch and switch-operating mechanism stable in both the position of FIGURE 2 and the position of FIGURE 3.

Thus it can be seen that the present invention provides an improved latch and switch-operating mechanism for a cabinet closure particularly adapted for use with an automatic washing appliance which will de-energize the appliance as the closure member is unlatched and which will prevent energization of the appliance until the closure member is in proper liquid-tight seal with the cabinet. It is also important to note that the present invention provides a latch and switch-operating mechanism of the type described which is exceptionally mechanically simple and is economical to manufacture.

As will be evident from the foregoing description, cer-

tain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A combination latch and switch-operating mechanism for a cabinet or the like having an access opening and a closure member therefor comprising:
(a) a strike on said cabinet adjacent said access opening,
(b) a latch on said closure member,
(c) a manually-operable handle movable between an unlatched position and a latched position,
(d) means interconnecting said latch and said handle whereby said latch is moved between an unlatched position and a latched position with said handle,
(e) a switch adapted to be operated by said handle as said handle moves to said latched position,
(f) a tab movable with said latch, and
(g) a relatively stationary member having a notch and a slot adjacent the path followed by said tab as said latch moves from said unlatched position toward said latched position,
(h) said latch, said strike and said tab being arranged relative to each other whereby said tab will enter said slot when said latch properly engages said strike,
(i) said latch, said strike and said tab being further arranged relative to each other whereby said tab will enter said notch when said latch fails to properly engage said strike,
(j) said means interconnecting said latch and said handle preventing said handle from operating said switch when said tab enters said notch.

2. A combination latch and switching-operating mechanism for a cabinet member and a closure member comprising:
(a) a strike on one of said members,
(b) a latch on the other of said members,
(c) a manually-operable handle movable between an unlatched position and a latched position to move said latch between an unlatched position and a latched position,
(d) a switch adapted to be operated by said handle as said handle moves to said latched position,
(e) a tab movable with said latch, and
(f) a relatively stationary member having a slot and a notch adjacent the path followed by said tab as said latch moves from said unlatched position toward said latched position,
(g) said latch, said strike and said tab being arranged relative to each other whereby said tab will enter said slot when said latch properly engages said strike,
(h) said latch, said strike and said tab being further arranged relative to each other whereby said tab will be prevented from entering said slot and will instead enter said notch when said latch fails to properly engage said strike,
(i) said handle being prevented from operating said switch unless said tab enters said slot.

3. The invention of claim 2 further comprising means interconnecting said latch and said handle comprising an arcuate slot in said latch and a pin rigid with said handle extending into said arcuate slot whereby said latch may travel in an irregular path while said handle travels an arcuate path.

4. The invention of claim 3 further comprising a frame element having an arcuate slot therein into which said pin further extends.

5. The invention of claim 2 wherein said relatively stationary member comprises a frame element by which said latch and said handle are movably carried.

6. A combination latch and switch-operating mechanism for a cabinet member and a closure member comprising:
(a) a strike on one of said members,
(b) a frame secured to the other of said members,
(c) a latch carried by said frame,
(d) a manually-operable handle carried by said frame and interconnected with said latch,
(e) said latch and said handle each having a latched position and an unlatched position,
(f) a switch carried by said frame and adapted to be operated by said handle as said handle moves to said latched position,
(g) a tab movable with said latch,
(h) said frame having an edge adjacent the path travelled by said tab as said latch moves,
(i) a stop at one end of said edge,
(j) a slot in said frame at said edge opening toward the path of said tab,
(k) said latch, said strike and said tab being arranged relative to each other whereby said tab will enter said slot when said latch properly engages said strike,
(l) said latch, said strike and said tab being further arranged relative to each other whereby said tab will pass said slot and engage said stop when said latch fails to properly engage said strike,
(m) said handle being prevented from operating said switch when said tab engages said stop.

7. The invention of claim 6 wherein said edge is arcuate and said tab travels an arcuate path.

8. The invention of claim 6 where said frame is secured to said other of said members by a pair of screws and a leaf spring is provided and has a loop at one end to receive one of said pairs of screws with the other end of said spring slidably engaging the other of said pair of screws, said spring gently bearing against said latch.

9. The invention of claim 6 wherein said strike comprises a generally U-shaped spring element having one leg secured to said cabinet and the other leg having a loop at the distal end thereof, a threaded nut disposed within said loop and an adjusting screw received by said nut, said screw having an enlarged head bearing against said one leg.

10. An adjustable strike for use with a latch for a cabinet closure comprising:
(a) a generally U-shaped spring element having one leg adapted to be secured to a cabinet,
(b) the other leg of said element having a loop at the distal end thereof,
(c) a threaded nut disposed within said loop, and
(d) an adjusting screw received by said nut and having an enlarged head at one end,
(e) said enlarged head bearing against said one leg.

References Cited

UNITED STATES PATENTS

3,189,375 6/1965 Getman ---------- 292—11

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