SAFETY SWITCH HAVING IMPROVED OPERATING MECHANISM AND INTERLOCK MEANS

Inventor: Tadeusz J. Rys, Monroe, Ohio
Assignee: Square D Company, Park Ridge, Ill.
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UNITED STATES PATENTS
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Primary Examiner—James R. Scott
Attorney, Agent, or Firm—Harold J. Rathbun; Ernest S. Kettelson; Paul J. Rose

ABSTRACT
A generally U-shaped driving member has a first leg portion pivotally mounted on a bracket secured to a side wall of an open-front box and a second leg portion pivotally associated with a base member formed of insulating material and mounted on a rear wall of the box. An operating handle is pivotally mounted between the bracket and the side wall and is provided with a tang extending through an arcuate slot in the bracket. A tension spring is connected at one end to the tang of the handle and at the other end to a bight portion of the U-shaped driving member. The first leg portion of the driving member has a tang extending through a slot in the bracket into an aperture provided in the handle. An interlock member is reciprocally mounted between the bracket and the side wall and driven by the tang of the handle. The second leg portion of the driving member is provided with a slot in which a driving boss of a blade actuator pivotally mounted in the base member is received.

6 Claims, 11 Drawing Figures
SAFETY SWITCH HAVING IMPROVED OPERATING MECHANISM AND INTERLOCK MEANS

This invention relates generally to safety switches, and more particularly to operating mechanisms therefor.

An object of the invention is to provide a safety switch having an improved, simple, inexpensive operating mechanism, with fewer parts than former operating mechanisms have, while still retaining the feature of quick-make, quick-break contacts.

Another object is to provide a simple handle-cover interlock means in association with the improved operating mechanism.

These and other objects will appear when the following specification is considered along with the accompanying drawings in which:

FIG. 1 is a perspective view of a safety switch constructed in accordance with the invention, an operating handle thereof being shown in an OFF position;

FIG. 2 is a front view of the safety switch of FIG. 1, a front cover thereof being fragmentarily shown in an open position and the operating handle being shown in an ON position;

FIG. 3 is a right-hand side view of the safety switch of FIG. 1, a portion of a side wall being broken away;

FIG. 4 is a view similar to FIG. 3, but showing the operating handle in the ON position;

FIG. 5 is a fragmentary sectional view taken generally along the line 5—5 of FIG. 2;

FIG. 6 is a fragmentary sectional view taken generally along the line 6—6 of FIG. 2;

FIG. 7 is a fragmentary sectional view taken generally along the line 7—7 of FIG. 2;

FIG. 8 is a fragmentary sectional view taken generally along the line 8—8 of FIG. 2, certain parts being omitted;

FIG. 9 is a right-hand side view of an insulating base and blade actuator of the safety switch of FIG. 1, taken in the direction of arrows 9—9 of FIG. 7;

FIG. 10 is a perspective view of the blade actuator of the safety switch of FIG. 1, including one full blade and a portion of another blade; and

FIG. 11 is a perspective view of a driving member for the blade actuator of the safety switch of FIG. 1.

With reference to the drawings, a safety switch 20 constructed in accordance with the invention is shown in FIGS. 1–4. The switch 20 includes an open-front box 22 having a flanged front cover 23 pivotally connected to a left-hand side wall 22a thereof. A formed plate member 24 is secured to the inner surface of a right-hand side wall 22b of the box by a pair of rivets 25. The side wall 22b is formed with an outwardly offset central pocket portion 22c best shown in FIG. 1, and cut away in FIGS. 3 and 4. An operating handle 27 is disposed on the inner side of the pocket portion 22c and pivotally mounted on a pin 28 supported adjacent opposite ends respectively in the plate member 24 and in the pocket portion 22c.

The plate member 24 projects forwardly from a front edge of the side wall 22b. To accommodate the plate member 24, the right-hand flange of the cover 23 and the portion of the cover adjacent thereto are partially cut away, as best shown in FIG. 1. Further, the cover 23 is also provided with a suitable slot for receiving a padlock anchoring tongue portion 24a of the plate member 24. The tongue portion 24a is provided with an aperture 24b for receiving a padlock when it is desired to lock the cover 23 in closed position. The plate member 24 is provided with an aperture 24c in a portion thereof adjacent the tongue portion 24a, and the operating handle 27 is provided with an aperture 27a aligned with the aperture 24c in an OFF position of the handle, as shown in FIG. 3, for receiving a padlock when it is desired to lock the handle 27 in the OFF position.

The plate member 24 is provided with an arcuate slot 24d through which a sheared and bent tang 27b (FIG. 2) of the handle 27 extends. An interlock member 30 is reciprocally mounted between the handle 27 and the plate member 24 and is provided with a suitable aperture (not shown) through which the tang 27b extends. The plate member 24 is formed to guide the interlock member 30 in movement upwardly and downwardly in the normal position of the safety switch 20, the member 30 being driven upwardly by the tang 27b when the handle 27 is moved to an ON position and downwardly when the handle 27 is moved to the OFF position. The member 30 is so shaped as to provide a latching portion 30a which overlies a portion of the cover 23 when the handle 27 is in the ON position, as shown in FIG. 4.

A base member 32 formed of insulating material is secured to a rear wall 222 of the box 22 by a pair of screws 33. A blade actuator 34 (FIG. 10) having a pair of switching blades 36 captively mounted therein is mounted in the base member 32 from the rear thereof for limited pivotal movement. A main crossbar portion 34a of the actuator 34 drives the blades 36 to an OFF position, and boss portions 34b and 34c respectively drive the blades to an ON position by engagement with transversely lanced portions 36a (FIG. 2) thereof. As beforeinafter explained, the actuator 34 is driven at a cylindrical boss portion 34d (FIGS. 6 and 9) disposed at the right-hand end portion thereof.

Secured by rivets to the base member 32 are a pair of combination fuse clip and lead terminal members 38 (FIGS. 2 and 7), a pair of combination fuse clip and blade mounting members 40 (FIGS. 2 and 6), and a pair of combination line terminal and stationary contact jaw members 42 (FIGS. 2 and 5). The blades 36 are pivotally mounted respectively on the members 40. A neutral wire connector bar 43 (FIGS. 2 and 7), which maybe constructed in accordance with U.S. Pat. No. 3,426,319, is secured to the base member 32 by a screw 44.

A right-hand end portion of the base member 32 is provided with a recess 32a (FIGS. 6 and 9) and the plate member 24 is provided with a cylindrical extrusion 24e (FIGS. 2–4) extending inwardly of the box 22 for the mounting of a generally U-shaped driving member 46. The member 46 includes a first leg portion 46a having an arcuate recess 46b adjacent a free end thereof in which the cylindrical extrusion 24e is received, a second leg portion 46c having a cylindrical extrusion 46d disposed adjacent a free end thereof and received in the recess 32a, and a bight portion 46e provided with a lanced portion 46f. A rear end portion of a tension spring 48 is anchored on the lanced portion 46f and a front end portion of the tension spring is anchored on the tang 27b. The plate member 24 includes a lanced portion 24f confining the leg portion 46a. The sheared and bent tang 46g extends from the leg portion 46a into an aperture 27c in the handle 27. The leg por-
tion 46c adjacent the base member 32 is provided with a slot 46h in which the cylindrical boss portion 34d is received.

When the handle 27 is moved away from the OFF position of FIG. 3 toward the ON position of FIG. 4, the tang 27h moves the front end portion of the spring 48 upwardly and a portion of the handle defining the aperture 27c engages the tang 46g and moves it upwardly to pivot the driving member 46 and thus also move the rear end portion of the spring 48 upwardly. When the line of action of the spring 48 gets above the pivotal axis of the driving member 46 defined by the center of the extrusion 24c and the center of the extrusion 46d, the spring contracts and moves the handle 27 the rest of the way to the ON position and the driving member 46 the rest of the way to the position of FIG. 4 with a snap action. The tang 27h moves the interlock member 40 to a locking position with respect to the cover 23, and the portion of the leg 46c defining the slot 46h moves the boss portion 34d to the position of FIG. 9 to pivot the blade actuator 34 and blades 36 to the ON position with a quick-mate action relative to the stationary contact jaw portions of the members 42. The reverse operation is readily apparent.

The handle 27 drives both the spring 48 and the driving member 46, and both ends of the spring 48 move, whereby the line of action thereof when the handle 27 is in the ON position is substantially parallel to the line of action thereof when the handle 27 is in the OFF position.

Various modifications may be made in the structure shown and described without departing from the spirit and scope of the invention.

I claim:

1. A safety switch comprising an open-front box including a rear wall and a pair of opposite side walls, a plate member secured to one of the side walls on an inner side thereof, an operating handle including a rear end portion disposed between the plate member and the one side wall. Means mounting the operating handle at the rear end portion thereof for pivotal movement with respect to the plate member and the one side wall to ON and OFF positions, a cover, means mounting the cover at a front edge portion of the other of the side walls for pivotal movement with respect to the box to open and closed positions, a base member of insulating material secured to the rear wall of the box, a blade actuator, means mounting the blade actuator for pivotal movement with respect to the base member, a switch blade, means mounting the switch blade for pivotal movement with respect to the base member to ON and OFF positions, means operatively connecting the switch blade to the blade actuator, a stationary contact member mounted in the box and engaged by the switch blade in the ON position thereof, a generally U-shaped driving member including a bight portion, a first leg portion, and a second leg portion, means mounting the first leg portion adjacent a free end for pivotal movement with respect to the plate member, means operatively connecting the second leg portion to the blade actuator, and a tension spring secured adjacent one end to the bight portion of the driving member and adjacent the other end to the operating handle.

2. A safety switch as claimed in claim 1 including means operatively connecting the first leg portion of the driving member to the operating handle.

3. A safety switch as claimed in claim 1 wherein the plate member is provided with a slot, the operating handle is provided with a bent tang extending through the slot in the plate member, and the spring is secured to the tang on the operating handle.

4. A safety switch as claimed in claim 3 including an interlock member mounted between the operating handle and the plate member for reciprocal movement parallel to the rear wall of the box, the interlock member having an aperture through which the tang of the operating handle extends and having a latching portion latching the cover when the cover is in the closed position and the operating handle is in the ON position.

5. A safety switch as claimed in claim 1 wherein the second leg portion of the driving member is provided with a slot and the blade actuator is provided with a boss portion extending into the slot in the second leg portion of the driving member.

6. A safety switch as claimed in claim 1 wherein the operating handle is provided with an aperture, the plate member is provided with a lanced portion confining the first leg portion of the driving member, and the first leg portion of the driving member is provided with a bent tang extending into the aperture in the operating handle.

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