United States Patent [19]

Johnson et al.

[11] **3,784,766**

[45] **Jan. 8, 1974**

[54] **POSITIVE LOCK TOGGLE GUARD**

[75] Inventors: **Norman F. Johnson**, San Diego; **Elmer R. Smith**, La Mesa, both of Calif.

[73] Assignee: **The United States of America as represented by the Secretary of the Navy**, Washington, D.C.

[22] Filed: **Feb. 9, 1973**

[21] Appl. No.: **330,939**

[52] **U.S. Cl.** ..... **200/42 T**

[51] **Int. Cl.** **H01h 27/00**

[58] **Field of Search** ..... 70/203; 200/42 T

[56] **References Cited**

UNITED STATES PATENTS

2,523,943	9/1950	Choppa	200/42 T
3,214,530	10/1965	Tharp et al.	200/42 T
2,192,060	2/1940	Wise	200/42 T
3,678,228	7/1972	Adamson	200/42 T

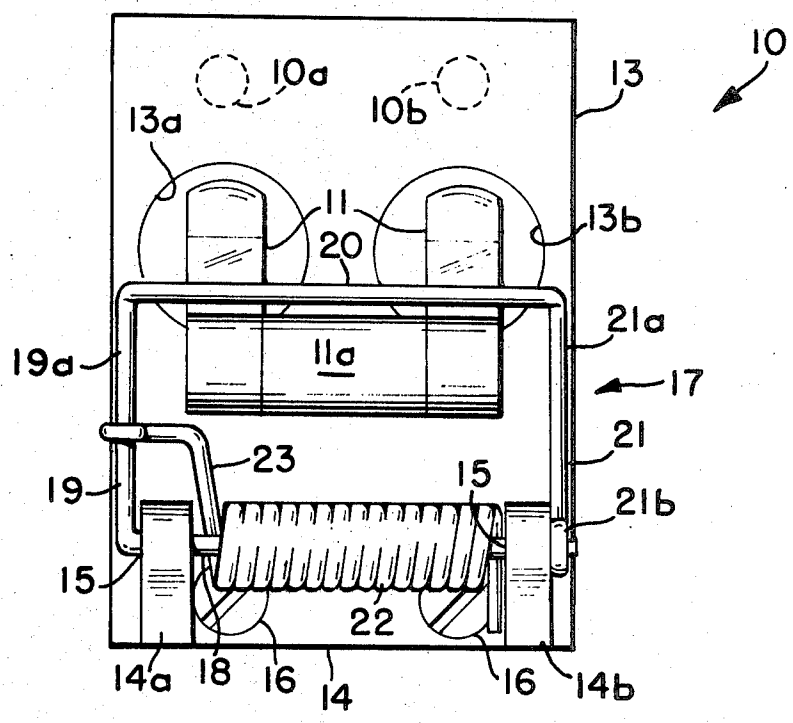
Primary Examiner—Herman J. Hohauser

Attorney—Richard S. Sciascia, Ervin F. Johnston and Thomas G. Keough

[57] **ABSTRACT**

A toggle switch has a uniquely configured bail spring-biased in-place which allows one-handed operation while positively preventing the accidental actuation of the switch. Separate, oppositely directed motions by an operator to remove the bail and to displace the toggle lever ensure against the accidental actuation of the switch. By its simplicity of design the toggle lock guard is capable of being mass produced at minimal cost to provide a markedly high degree of reliability.

4 Claims, 7 Drawing Figures



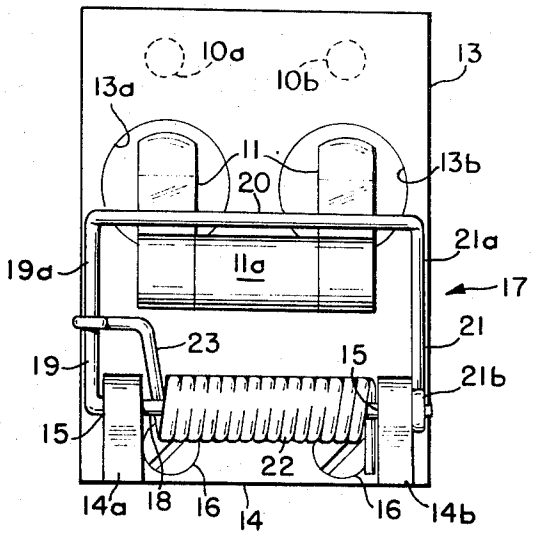


FIG. 1

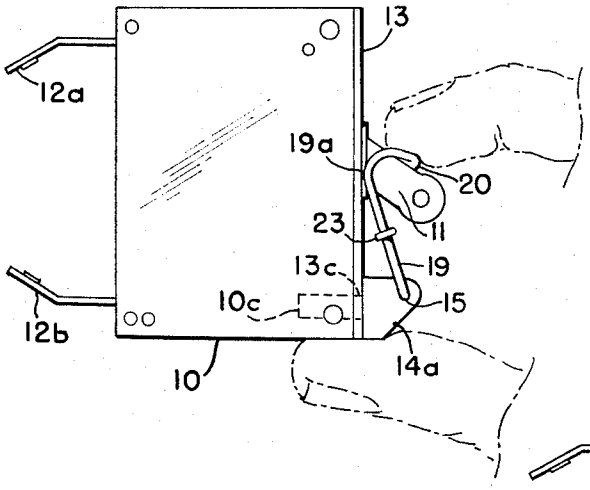


FIG. 2

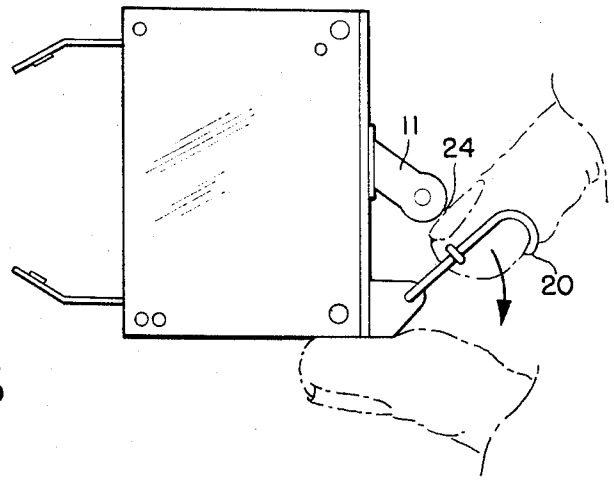


FIG. 3

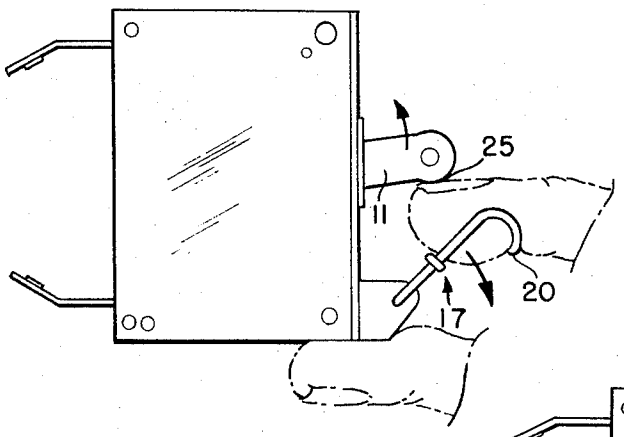


FIG. 4

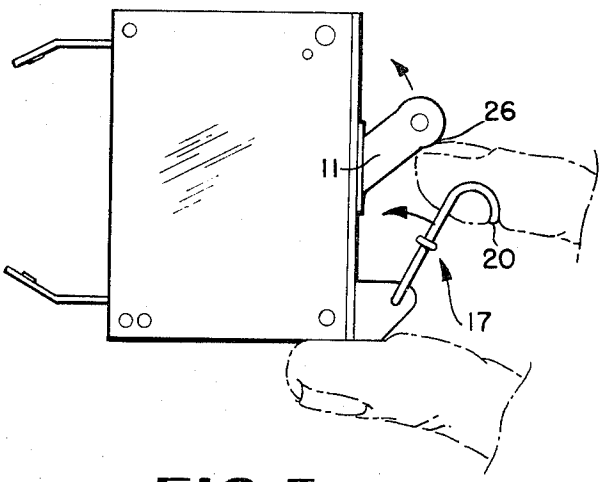


FIG. 5

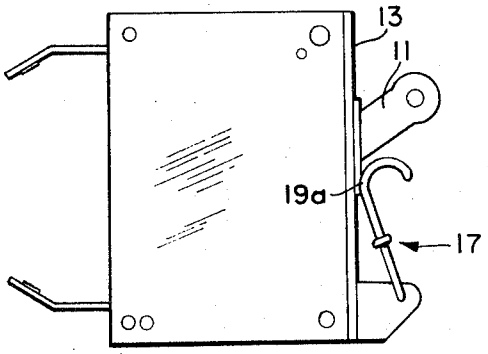


FIG. 6

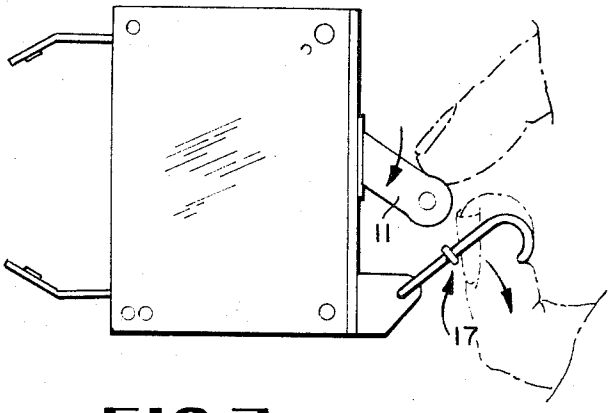


FIG. 7

POSITIVE LOCK TOGGLE GUARD

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

Mechanisms for holding a switch in one position or for preventing its accidental actuation are many and varied in design. Locking devices for toggle switches usually have assumed the shape of pivoted panels having a plurality of holes for receiving toggle levers. While these arrangements generally guard against the untimely actuation of the toggle switches, their bulk and cost of fabrication have discouraged their use in a number of applications. For example, in submersibles where space is often at a premium and electrical actuators are found in abundance, a satisfactory safeguard must be included which does not overly occupy the narrow confines. In particularly compact submersibles there simply isn't enough space to accommodate the conventional bulky toggle lever guard panels and, consequently, the hazard of having exposed switches must be tolerated. There is a continuing need for a positive lock toggle guard which, by its compact and uncomplicated design, lends itself to widespread use and which adequately safeguards against the hazard of an untimely actuation of an on-board circuit.

SUMMARY OF THE INVENTION

An improved toggle lock guard for a switch having an externally reaching toggle lever includes a base plate having an aperture for receiving the toggle lever. A mounting member carried on the base plate has a pair of aligned bores for journaling an elongate portion of a wire-like bail. A helical biasing spring is wrapped about the elongate portion and holds a lock portion of the wire-like bail against the toggle lever. By the orientation and configuration of the toggle lock guard a one-handed distinct disengagement motion of the bail from the toggle lever must occur before the toggle lever is moved in a direction angularly opposite the disengagement motion to actuate the switch. Because of the sequence of separate and oppositely directed motions, accidental actuation of the toggle switch is prevented.

It is a prime object of the invention to provide an improved toggle lock guard.

A further object is to provide a toggle lock guard which allows one-handed disengagement and actuation of a switch.

Another object of the invention is to provide a toggle lock guard requiring separate and distinct disengagement from and actuation of a toggle switch.

It is another object of the invention to provide an inexpensive toggle lock guard employing a wire-like bail.

Still another object of the invention is to provide a toggle lock guard requiring a rotary disengaging motion oppositely directed with respect to the direction of switch actuation.

These and other objects of the invention will become more readily apparent from the ensuing description when taken with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view showing the bail in-place on the toggle switch.

FIG. **2** is a side view showing the toggle lever in the normal "off" position with the index finger in contact with the toggle lever.

FIG. **3** is a side view showing the bail disengaged and the top of the index finger in contact with the toggle lever.

FIG. **4** is a side view showing the toggle lever being partially rotated toward the "on" position.

FIG. **5** is a side view showing the toggle lever rotated to the "on" position with the bail not yet released to rest on the switch.

FIG. **6** is a side view showing the toggle lever switched to the "on" position and the bail released to rest in-place on the switch.

FIG. **7** is a side view showing the bail pulled away from the switch and the toggle lever being rotated to the "off" position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown a typical toggle switch **10** lending itself to modification by inclusion of the invention to eliminate the hazard of being accidently actuated along with its resultant consequences. One switch so modified is a switch manufactured under the trade designation "RE-CIRK-IT" by the Heinemann Electric Company of Trenton, New Jersey. This switch has its moveable contacts encased in a plastic-like material having four tapped holes **10***a*, **10***b*, **10***c*, and **10***d* molded on its front side and an externally reaching dual-element toggle lever **11** including an interconnecting toggle roller **11**a. When the toggle lever is in the down-position, the switch is "off", that is, the circuit between the output terminals **12***a* and **12***b* is open. Rotating the toggle lever in a counterclockwise direction, as shown in the drawings, the switch is "on" and a conductive path across the output terminals **12***a* and **12***b* is created.

Switches of this type usually are mounted in banks with each switch connected to have a separate function in a discrete circuit. With so many switches in close proximity there is an ever present danger that one or more switches could become accidently actuated. The present invention provides a means for allowing only intentional actuation by an operator using only one hand. A flat metal base plate **13** reaches across the front of the toggle switch and is provided with a pair of apertures **13***a* and **13***b* through which the dual-element toggle lever protrudes. Another pair of holes **13***c* and **13***d* are formed in a position to align with either of a pair of tapped holes **10***a* and **10***b* or a pair **10***c* and **10***d*. In the drawings only hole **13***c* is shown, it being understood that hole **13***d* lies within the same lateral projection at a point to align with tapped hole **10***d*, also not shown.

A U-shaped mounting member **14** includes a pair of upright sections **14***a* and **14***b* each provided with a bore **15** aligned with one another. The U-shaped mounting member is formed with a pair of openings through which threaded bolts **16** are inserted to secure the mounting member and base plate **13** onto the switch via a mechanical cooperation between a pair of

threaded holes **10***a* and **10***b* or **10***c* and **10***d* and the threaded bolts.

Journaled through aligned bores **15** is a wire-like bail **17** or, more specifically, an elongate portion **18,** which functions to define an axis about which the bail rotates to engage the toggle lever. Orthogonally extending from one end of elongate portion **18,** a first leg portion **19** is fashioned to assume a J-shaped configuration to place a bearing section **19***a* adjacent the outer face of base plate **13,** the purpose of which will be elaborated on below.

The wire-like bail further includes a lock portion **20** which extends across the lateral reaches of base plate **13** in a parallel relationship with respect to elongate portion **18.** It should be noted that the lock portion engages the toggle lever at a point approximately two-thirds up its length. This gives an operator an unrestricted access to the lock portion by a single finger to facilitate the bail's disengagement from the dual-element toggle lever. A second J-shaped leg portion **21** extends from lock portion **20** back toward elongate portion **18.** The second leg portion also has a bearing section **21**a where the bail rests on the surface of base plate **13.** The end of the second leg portion is formed in a loop **21***b* which is tightly wrapped about the free end of elongate portion **18** and gives wire-like bail **17** the structural integrity of an integral unit.

A biasing spring **22** coils about and extends substantially the entire length of elongate portion **18.** An arm **23** of the biasing spring is crimped onto first leg portion **19** and, by being so joined, urges lock portion **20** of wire-like bail **17** to engage and restrict birotational motion of the dual element toggle lever.

A toggle lock guard, designed as described above, possesses a high degree of reliability for preventing the accidental actuation of the switch, as well as assuring one-handed operation. This one-handed operation consists of a distinct sequence of steps which must be separately executed and does thereby prevent all but an intentional actuation of the switch.

Looking to FIG. **2** of the drawings an operator places the index finger on lock portion **20** of the wire-like bail and, noting FIG. **3,** rotates the bail from its locking engagement on the dual element toggle lever. Because inter-connecting toggle roller **11***a* is journaled onto the dual element toggle lever and rotates freely, the withdrawal of lock portion **20** requires only a force sufficient to overcome the force exerted by biasing spring **22.** After the wire-like bail has been disengaged, toggle roller **11***a* allows the operator's index finger to roll under the dual element toggle lever to a point **24** and to permit actuation of the switch, see FIG. **3.** As the operator continues to insert index finger under the toggle lever to a point **25**; see FIG. **4,** the toggle lever starts to be rotated to the "on" position. At this point may it be emphasized that the direction of rotation of the toggle lever to the "on" position is opposite in direction and later in time than the displacement of the bail.

Further counterclockwise rotation by the index finger at point **26** displaces the dual element toggle lever to the "on" position completing the circuit across terminals **12***a* and **12***b*, see FIG. **5.** The bail begins to automatically rotate back to its normal position resting on the face of a base plate **13.** After the finger is withdrawn, the bail securely is held against the surface of base plate **13** on the oppositely located bearing sections **19***a* and **21***a* of the leg portions, see FIG. **6.**

FIG. **7** depicts the thumb rotating bail **17** in a clockwise direction away from the surface of base plate **13** to free the toggle lever **11** allowing it to be rotated back to the "off" position. Next, the index finger rotates toggle in a clockwise direction back to the "on" position. Here again, a distinct motion for releasing the bail and for displacing the toggle lever ensures against the accidental reswitching the switch to the "off" position.

While the drawings and specification have given a typical actuation sequence in terms of using the index finger and thumb, any combination of digits is optionally used. The index finger-thumb combination was used to demonstrate the ease of disengaging the bail and actuating the switch using only one hand.

The toggle lock guard defined above is capable of being mounted to engage the toggle lever in the "on" position merely by rotating the base plate and its supported elements 180° and inserting threaded bolts **16** in threaded holes **10***a* and **10***b*.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings, and, it is therefore understood that within the scope of the disclosed inventive concept, the invention may be practiced otherwise than specifically described.

What is claimed is:

1. On a switch having an externally reaching dual element toggle lever displaced in a first direction to an "on" position and in an opposite direction to an "off" position, an improved toggle lock guard allowing one-handed operation is provided therefor comprising:

a base plate covering the front of said switch having two apertures for receiving said dual element toggle lever therethrough;

a U-shaped mounting member having a pair of aligned bores in the upright sections and at least one hole in the base section disposed on said base plate;

a threaded bolt reaching through said hole being screwed into a correspondingly tapped cavity in the switch for securing said base plate and said U-shaped mounting member on said switch in one of two possible positions;

a helical biasing spring for exerting a continuous biasing force; and

a wire-like bail including an elongate portion extending through and journaled in said aligned bores, a pair of parallel leg portions connected to opposite ends of said elongate portion and extending therefrom in a J-shaped configuration and a lock portion integrally extending to interconnect said leg portions being parallel to the elongate portion and in contact with said dual element toggle lever, said wire-like bail is disposed and adapted to be angularly rotated oppositely to the displacement of said toggle lever in said first direction first in time and separate in motion with respect to the displacement of said toggle lever to the "on" position and further disposed and adapted to be angularly rotated in the same direction as the displacement of said toggle lever in said opposite direction first in time and separate in motion with respect to the displacement of said toggle lever to the "off" position to prevent the accidental actuation of said switch.

2. An improved toggle lock guard according to claim **1** (amended) in which said helical biasing spring is wrapped about said elongate portion and coupled to

one of the J-shaped leg portions via an arm of said biasing spring to hold both the curved parts thereof against said base plate and said lock portion on said toggle lever.

3. An improved toggle lock guard according to claim 2 in which said base plate is provided with two apertures for receiving a said dual element toggle lever therethrough and said lock portion is suitably dimensioned to extend parallel to a toggle connector element interconnecting the dual elements of said toggle lever.

4. An improved toggle lock guard according to claim 3 in which one of the J-shaped leg portions integrally extends from one end of said elongate portion and the other J-shaped leg portion is secured to the opposite end of said elongate portion in a tightly wrapped loop giving said wire-like bail the structural integrity of an integral unit.

* * * * *