United States Patent [19]

BEST AVAILABLE COPY

Tharp

[11] **3,895,205**

[45] **July 15, 1975**

[54] **PUSH-TO-TRIP BUTTON STRUCTURE FOR A MOLDED CASE CIRCUIT BREAKER**

[75] Inventor: **James A. Tharp,** Cedar Rapids, Iowa

[73] Assignee: **Square D Company,** Park Ridge, Ill.

[22] Filed: **May 20, 1974**

[21] Appl. No.: **471,399**

[52] **U.S. Cl.** ..... **200/340;** 200/42 R; 200/153 LA

[51] **Int. Cl.** **H01h 3/12;** H01h 3/42

[58] **Field of Search** ..... 200/153 LA, 159 R, 329, 200/330, 42 T, 42 R

[56] **References Cited**

UNITED STATES PATENTS

1,521,530	12/1924	Hammerstrom	200/329
2,991,343	7/1961	Norden	200/153 LA
3,675,168	7/1972	Olley	200/153 LA X
3,714,383	1/1973	Leonard et al.	200/42 T X

Primary Examiner—B. Dobeck
Assistant Examiner—William J. Smith
Attorney, Agent, or Firm—C. Patti; H. J. Rathbun

[57] **ABSTRACT**

The structure comprises a push button having a cylindrical body portion provided with a head portion at one end and a flattened end portion at the other end and a mounting receptacle formed in a cover of a circuit breaker. An opening through the mounting receptacle has a larger outer portion and a smaller inner portion which define an outwardly facing shoulder. The smaller inner portion has a pair of diametrically opposed slots. A longer one of the slots extends along the entire longitudinal length of the wall of the inner portion, and a shorter one of the slots extends partially along the wall of the inner portion commencing at the innermost end of the receptacle portion. In one turned position, the push button fits slidably within the opening with a laterally extending part of the flattened end portion fitting within the longer slot. When the button is pushed inwardly and rotated 180°, the laterally extending part is aligned with the shorter slot. Upon release of the button, the outer biasing action of a helical spring positioned around the body portion results in the entry of the extending part into the shorter slot thereby securing the button within the opening of the receptacle.

5 Claims, 4 Drawing Figures

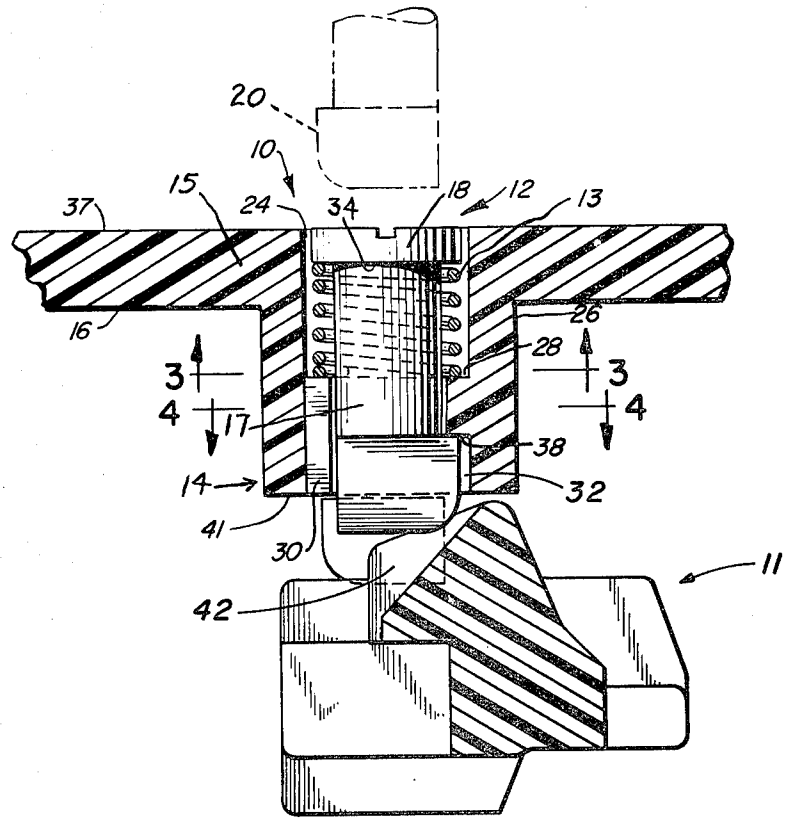


FIG. 1

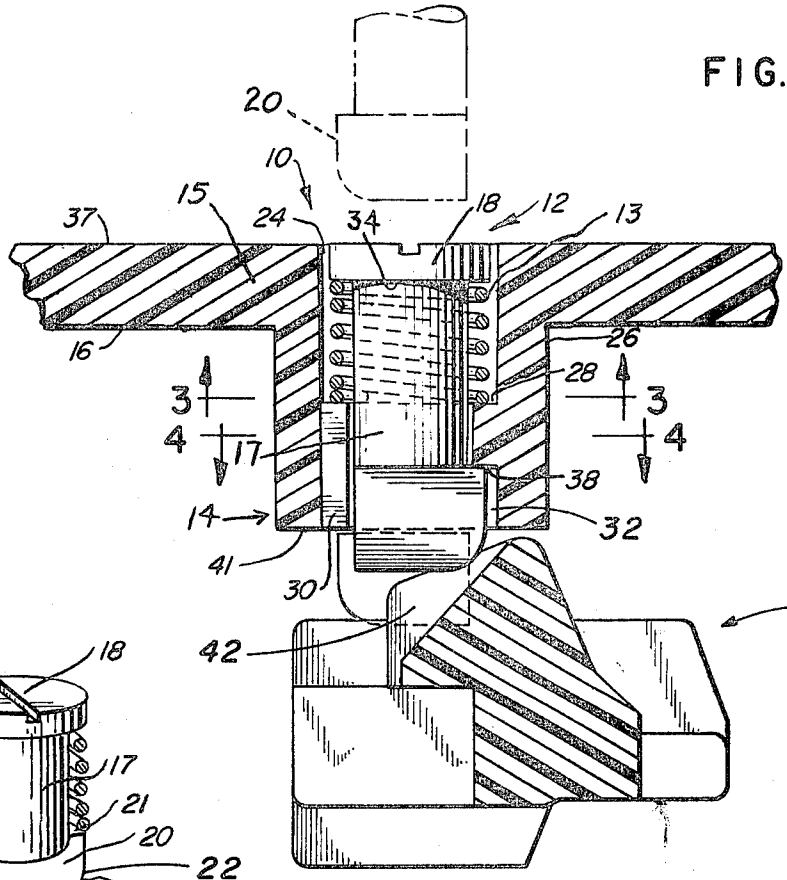
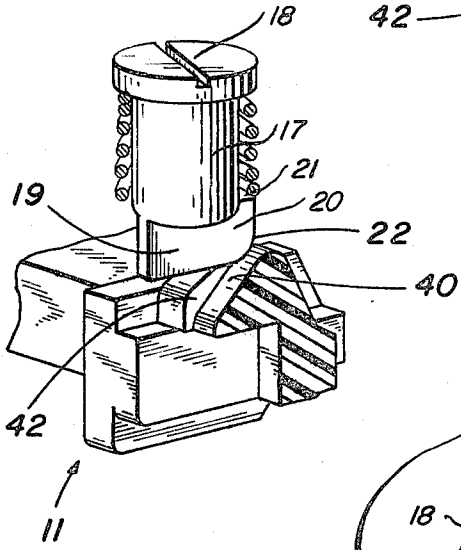


FIG. 2



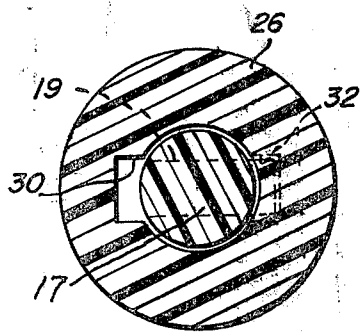


FIG. 4

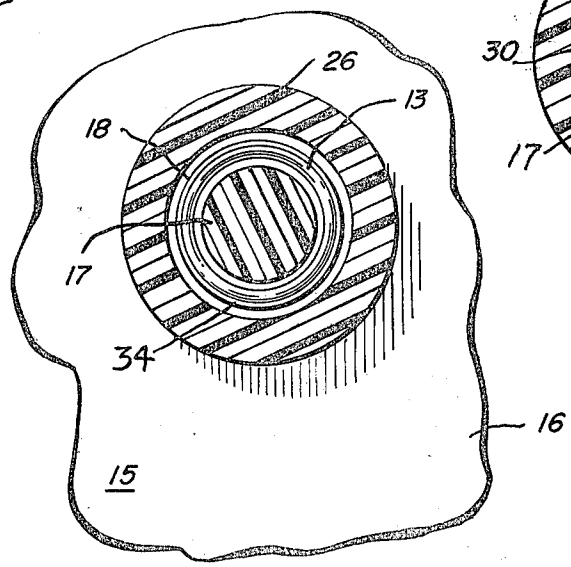


FIG. 3

PUSH-TO-TRIP BUTTON STRUCTURE FOR A MOLDED CASE CIRCUIT BREAKER

BACKGROUND OF THE INVENTION

A push-to-trip button is commonly employed in combination with a trip bar of a molded-case circuit breaker to provide a means for testing the trip mechanism of the circuit breaker without having to subject the circuit breaker to an actual fault. A shortcoming of the present push-to-trip buttons is that their installation within a cover of a circuit breaker requires that the cover be fully removed so that a fastening means can be attached at the inner end of the button to secure it in position.

A need exists for a push-to-trip button structure in which the button can be secured in a cover of a molded case circuit breaker from the front with only small movement of the cover from its normal position and without having to resort to fasteners or sophisticated tools for the assembly operation.

SUMMARY OF THE INVENTION

A push-to-trip button is received within an opening in a mounting receptacle portion formed in a cover of a molded case circuit breaker. The opening extends through a cylindrical projection which extends inwardly from an inner side of the cover. The opening has a larger outer portion and a smaller inner portion which define an outwardly facing shoulder. A pair of slots are formed in the wall of the inner portion. A longer one of the slots transverses the entire length of the wall of the inner portion, and a shorter one of the slots partially transverses the wall commencing from an inner end of the cylindrical projection. The button has a cylindrical body portion with a disc shaped head at an outer end and a flattened portion at an inner end having an extending portion which extends laterally beyond the periphery of the body portion and which engages a common trip bar of the circuit breaker upon pushing the button thus tripping the circuit breaker and opening its contacts. A spring means returns the push-to-trip button to its neutral position after pressure is removed.

The push-to-trip button is installed from the front side of the cover with a tool, such as a screwdriver, without requiring access to the inner side of the cover. In one relative turned position, the button slidably fits within the opening with the extending portion received in the longer slot. When the button is pushed far enough so that the extending portion is beyond the longer slot, the button is then rotated until the extending portion is aligned with the shorter slot, removal of pressure on the button and the outward biasing action of a helical spring surrounding the cylindrical body portion results in the extending portion being received within the shorter slot trapping the button in the opening in the cover.

An object of this invention is to provide an improved push-to-trip button which can be easily installed without having access to an inner side of a cover of a molded-case circuit breaker.

A further object is to provide an improved push-to-trip button structure having a button fitting releasably received within an opening in a mounting receptacle in one turned position and non-releasably received within the opening in another turned position.

A still further object is to provide an improved push-to-trip button structure which can be installed in the cover of a molded case circuit breaker with a common tool without opening the cover.

BRIEF DESCRIPTION OF THE DRAWING

Other objects and advantages of the invention will become apparent from the following description wherein reference is made to the drawings in which:

FIG. **1** is a side view, partially in cross section, of a push-to-trip button and a portion of a cover of a molded case circuit breaker constructed in accordance with this invention in association with a trip bar of the circuit breaker;

FIG. **2** is a perspective view, partially in cross section, showing the push-to-trip button and the trip bar; and

FIGS. **3** and **4** are sectional views taken along the lines **3—3** and **4—4** of FIG. **1**, respectively.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, a push-to-trip button structure **10** in accordance with this invention is shown in combination with a trip bar **11** which is a well-known component of many molded case circuit breakers. The trip bar shown is for a current limiting circuit breaker completely shown and described in copending application, Ser. No. 465,012, filed Apr. 29, 1974 and assigned to the assignee of this application.

The push-to-trip button structure comprises a push button **12** and a helical spring **13** carried within a mounting receptacle portion **14** formed in a molded cover **15** of a circuit breaker. The invention permits the push button **12** and spring **13** to be installed in the receptacle portion **14** without having access to an inner side **16** of the cover **15.**

The button **12** has a cylindrical portion **17** between a slotted disc-shaped outer head **18** and an inner flattened end portion **19.** As will become apparent, the head serves as a stop for one end of the spring **13.** The end portion **19** is preferrably of generally rectangular parallelpiped shape having an extending portion **20** projecting laterally beyond the periphery of the portion **17** and defining an upwardly facing flat shoulder **21** and a curved inwardly directed surface **22.**

The mounting receptacle portion **14** has an opening **24** extending through a cylindrical projection or boss **26** which extends inwardly from the inner side **16** of the cover **15.** The opening **24** is of two different diameters defining an upwardly directed annular shoulder **28.** A pair of diametrically opposed slots **30** and **32** extend laterally from the lower smaller portion of the opening **24,** the slot **30** being exposed at the outer portion of the opening **24** at the shoulder **28** and being exposed at the inner end of the projection **26,** and the slot **32** being shorter than the slot **30** and extending upwardly from the inner end of the projection **26** about half way to the shoulder **28.**

The spring **13** is disposed around the periphery of the cylindrical portion **17** of the button **12.** In the assembled position, one end of the spring **13** abuts an inner side **34** of the head **18,** and the other end of the spring **13** abuts the shoulder **28.** The button **12** is slidable and rotatable within the opening **24,** and in the neutral assembled position, the head **18** of the button **12** is preferably flush with an outer surface **37** of the cover **15** and the shoulder **21** abuts an inwardly facing end wall **38** of the slot **32.**

In operation, the head **18** is depressed below the surface **37** and the curved surface **22** of the flattened end portion **19** engages the trip bar **11.** As the head **18** is depressed inwardly with a tool (the opening **24** preferably being smaller than a person's finger), the curved surface **22** pushes against a sloping edge **40** of the trip bar **11** thus moving the trip bar **11** laterally by a camming action thereby tripping the circuit breaker mechanism (not shown) and thus opening contacts (not shown) within the circuit breaker.

The procedure for installing the button **12** and the spring **13** within the mounting receptacle **14** will now be described.

The push button **12** is aligned as shown in dotted lines above the opening **24** in FIG. **1** and in a rotated position so that the extending portion **20** is positioned above the slot **30.** The spring **13** is placed around the cylindrical portion **17** with one end of the spring **13** abutting the inner side **34** of the head **18.** The cover **15** of the case is then slightly opened thus moving the mounting receptacle **14** a short distance further away from the trip bar **11** so that the shoulder **21** of the end portion **19** will clear an inner end **41** of the cylindrical projection **26,** as shown in broken lines in FIG. **1,** when the head **18** is pushed inwardly to a level beneath the surface **37.** The push button **12** is then rotated as by a screw driver received in the slot in the head **18** until the shoulder **21** is beneath and aligned with the slot **32.** Pressure is then removed from the head **18** thus allowing the spring **13** to move the push button **12** outwardly until the shoulder **21** abuts the outer end **38** of the slot **32.** The cover **15** is then closed thus returning it to its normal position. When the cover is closed, the end portion **19,** is positioned between guide surfaces **42** of the trip bar **11.** Guide surfaces **42** are provided adjacent each side of the sloping surface **40** thus insuring that the curved surface **22** will engage the sloping edge **40** of the trip bar **11** when the button **12** is pushed inwardly. Only one guide surface **42** is shown in FIGS. **1** and **2.**

Thus it is apparent that there has been provided, in accordance with the invention, a push-to-trip button structure for a molded case circuit breaker that fully satisfies the objects, aims, and advantages set forth above. While the invention has been described in conjunction with a specific embodiment, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and scope of the appended claims.

I claim:

1. A circuit breaker and push-to-trip button combination comprising a molded case for the circuit breaker having a wall provided with an opening, an elongated push-to-trip button insertable into the opening from the outer side of the wall and rotatable and reciprocative in the opening, resilient means urging the button outwardly of the opening, and interlocking means on the button and the wall rendered operative upon rotation of the button for retaining the button in the opening against the bias of the resilient means.

2. A push-to-trip push button structure for a molded case circuit breaker comprising a push button having a body with a spring stop at one end portion and an extending portion projecting laterally beyond a peripheral surface of the body at the other end portion, a helical spring disposed around the body and having one end abutting the spring stop, a cover for the circuit breaker, a mounting receptacle portion extending inwardly of the cover and having an opening therethrough, the opening being of two different diameters defining an outwardly directed annular shoulder and having a pair of slots extending laterally from the smaller portion of the opening, a longer one of the slots being exposed at the outer portion of the opening and at an inner end of the mounting receptacle portion, a shorter one of the slots being exposed at the inner end of the mounting receptacle portion but terminating inwardly of the annular shoulder, the body fitting slidably within the opening with the inner end of the spring abutting the annular shoulder and opposing inward movement of the push button, and the extending portion of the body being receivable within the longer slot when the button is inserted into the opening from the outer end thereof, whereby depression of the body to a position wherein the extending portion is positioned inwardly of the inner end of the mounting receptacle portion permits rotation of the body within the opening to a position wherein the extending portion is aligned with the shorter slot and whereby release of the push button permits the spring to move the body outwardly with the extending portion received in the shorter slot.

3. A push-to-trip button structure as claimed in claim **2** wherein the major portion of the body has a generally cylindrical shape.

4. A push-to-trip button structure as claimed in claim **2** wherein said other end portion of the body has a generally rectangular parallelpiped shape and the extending portion extends therefrom.

5. A push-to-trip button structure as claimed in claim **2** wherein the spring stop is a disc shaped head, said one end of the spring abuts an inner side of the head.

* * * * *