

[54] **ELECTRICAL CIRCUIT BREAKER
WITH ILLUMINATED TRIP
INDICATOR**

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[51] Int. Cl. **H01h**, G08b 21/00

[58] Field of Search... 340/248, 253, 267; 200/167 A, 200/153 G, 153 T; 331/129; 335/13, 17, 174, 8, 9, 10; 337/79

[56] **References Cited**

UNITED STATES PATENTS

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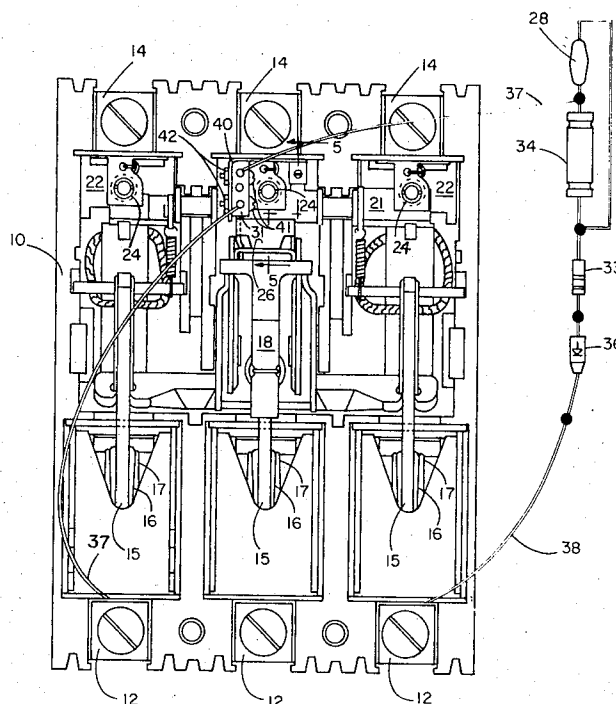
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[57] **ABSTRACT**

The circuit breaker has a window in a cover of its molded case through which light from a neon lamp is visible. The lamp is connected in an RC flashing circuit energized from the line side of the circuit breaker through a circuit controlled by a small snap switch. The snap switch is operated upon release of a releasably latchable member of the circuit breaker operating mechanism to cause flashing of the lamp whenever the circuit breaker is in its tripped condition.

3 Claims, 6 Drawing Figures



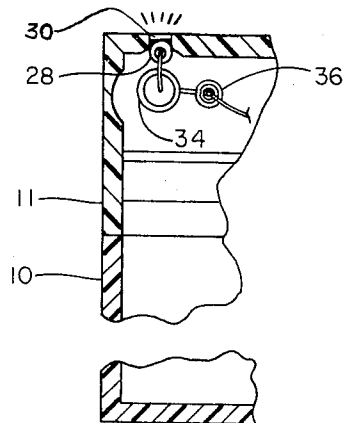


FIG. 2

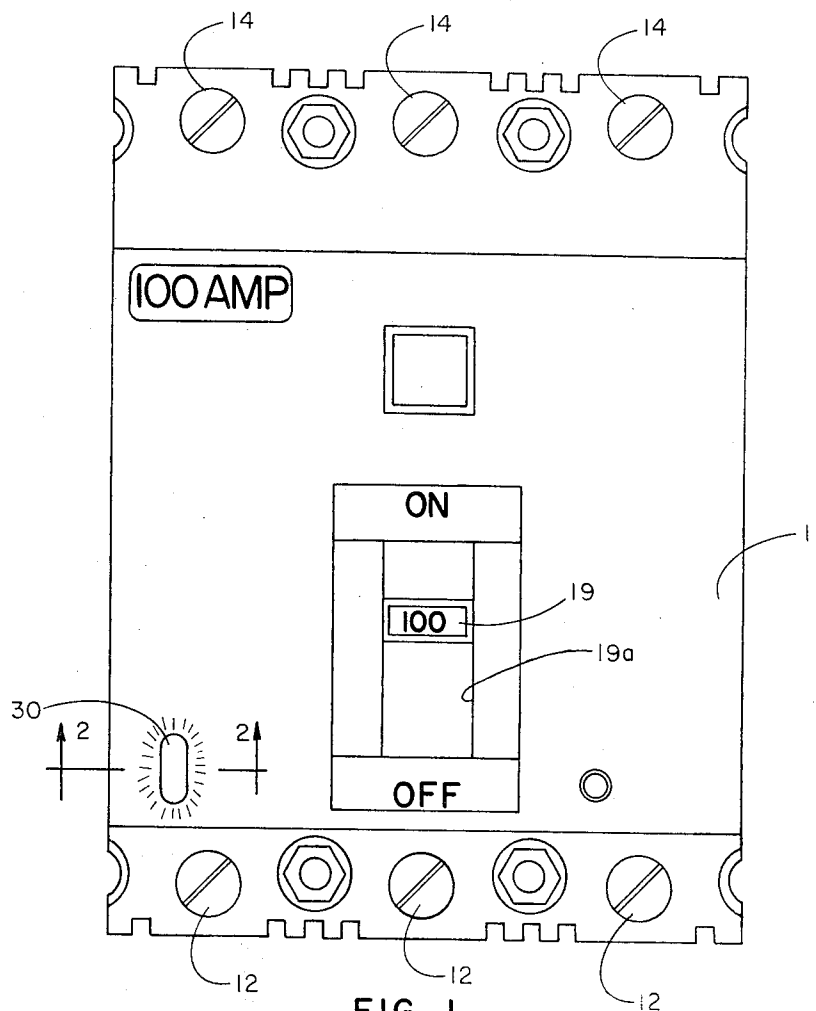


FIG. 1

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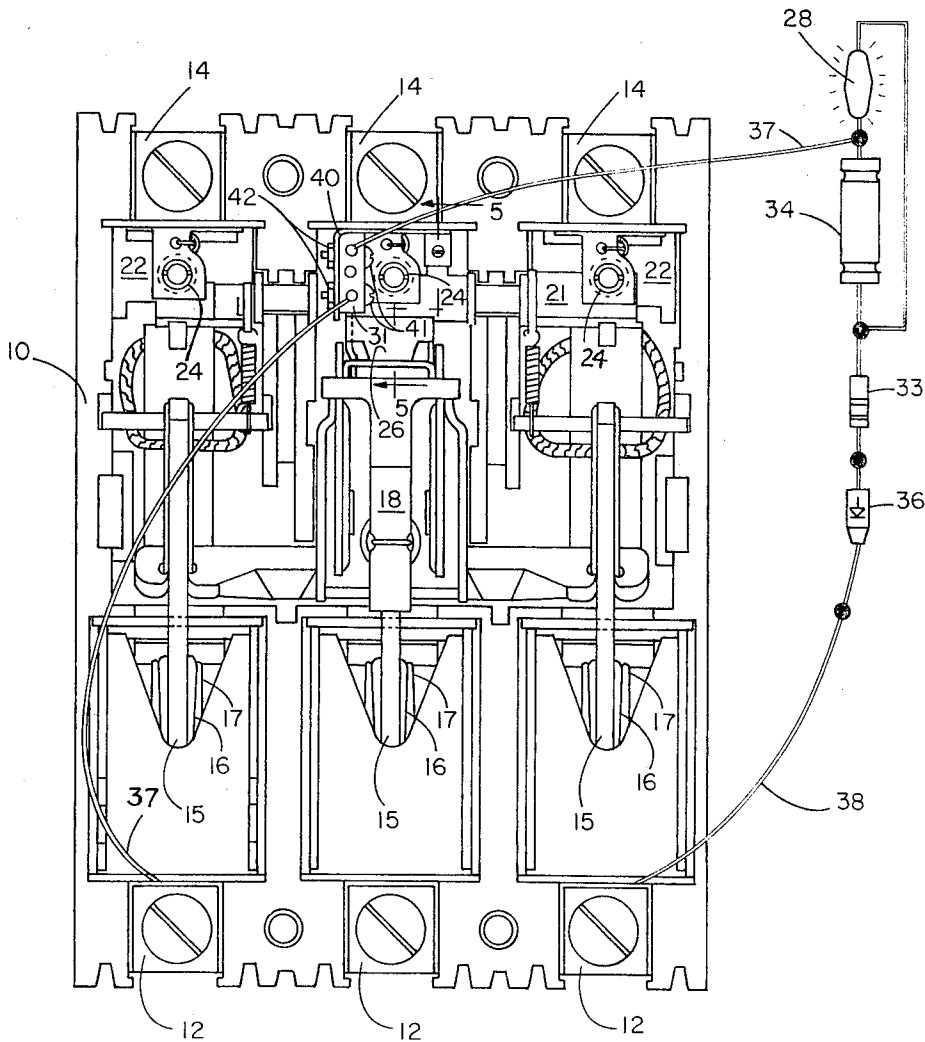


FIG. 3

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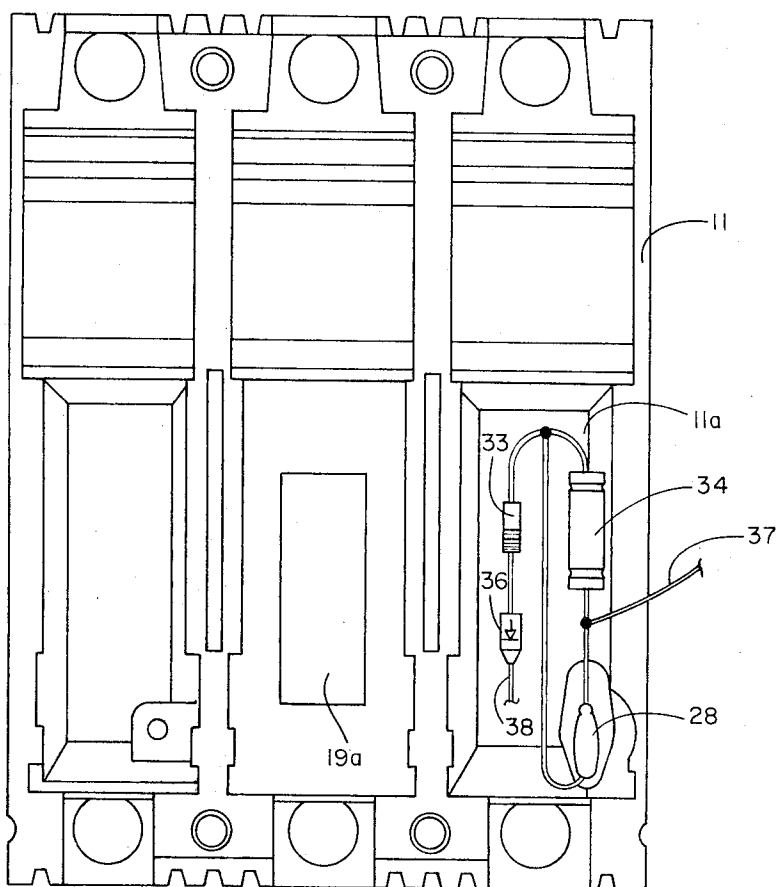


FIG. 4

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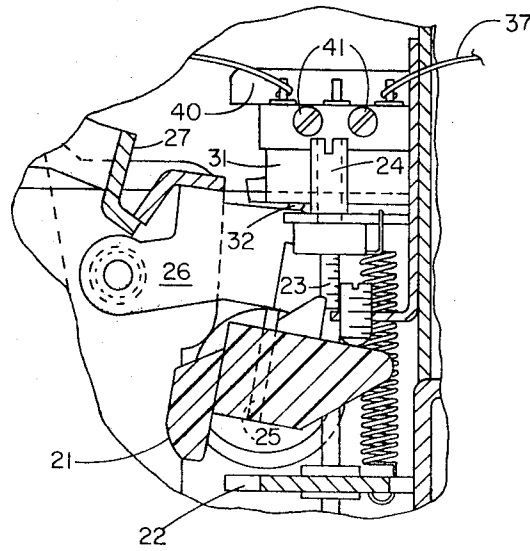


FIG. 5

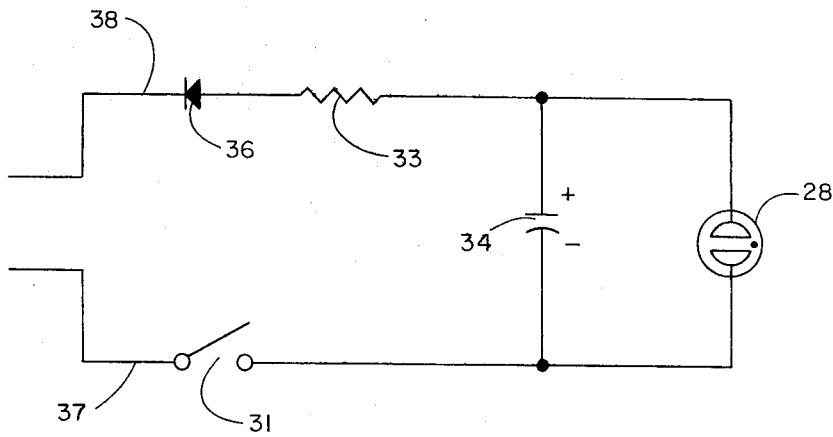


FIG. 6

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ELECTRICAL CIRCUIT BREAKER WITH ILLUMINATED TRIP INDICATOR

FIELD OF THE INVENTION

This invention relates to a molded circuit breaker provided with means to indicate the tripped or untripped condition thereof and more particularly to a molded case circuit breaker including a lamp which flashes whenever the circuit breaker is in its tripped condition.

DESCRIPTION OF THE PRIOR ART

Molded case circuit breakers have been provided with a member movable to a position wherein it is visible through a window in a cover of the circuit breaker to indicate that the circuit breaker is tripped. It has also been proposed that such circuit breakers be equipped with a pilot light connected across a pair of contacts of the circuit breaker thereby to indicate whether the contacts are open or closed. This latter form of indication is not satisfactory because it does not distinguish between the tripped condition of the circuit breaker and an off condition that has been selected manually, and because the lamp circuit provides an undesired path for current to continue to flow through the circuit breaker to a load.

SUMMARY OF THE INVENTION

There is need for an illuminated indicating means that will show whether a molded case circuit breaker is tripped or untripped independently of the on or off position of the contacts, and which permits the circuit breaker to isolate the load completely. Preferably, the lamp should flash on and off in order to attract attention.

In accordance with this invention, a movable member of the operating mechanism of a molded-case circuit breaker, upon movement to a tripped position, effects closure of the contacts of a small snap switch thereby to complete a circuit from the line side of the circuit breaker through a flashing circuit to a neon lamp positioned behind a window in the circuit breaker case. More specifically, the window in the circuit breaker cover is positioned in a front wall of a recess formed on the inner side of the cover. Directly behind the window within the recess is the neon lamp which is arranged to be fed through a diode and a resistor from the line side of the circuit breaker. A capacitor is connected in parallel with the lamp in a charging circuit including the diode and the resistor, and the capacitor, the resistor, and the diode are all confined within the recess adjacent the lamp. A circuit from these circuit components to the line side of the circuit breaker passes through a small, normally-closed snap switch so mounted in the circuit breaker that its operating button is depressed by a releasably latchable intermediate latch member to hold the snap switch open only when the circuit breaker is in its latched or untripped condition. Closure of the snap switch upon release of its operating button by the releasably latchable member completes the charging circuit for the capacitor which, upon reaching the break down voltage of the lamp, discharges to cause ignition of the lamp. The capacitor immediately starts to recharge. Thus, the lamp flashes intermittently as long as the circuit breaker is tripped.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of a molded case circuit breaker including an indicating lamp in accordance with this invention;

FIG. 2 is a fragmentary sectional view taken along the line 2—2 of FIG. 1, some parts of the circuit breaker being omitted;

FIG. 3 is a view of the circuit breaker of FIG. 1 with a cover and certain other parts removed and showing the wiring and certain components of a lamp flashing circuit out of their normal position within a recess in the cover;

FIG. 4 is a view of the cover of the circuit breaker of FIG. 1 from the inner side thereof showing the components of the lamp flashing circuit, except a switch, in normal position;

FIG. 5 is a fragmentary sectional view taken along the line 5—5 of FIG. 3; and

FIG. 6 is an elementary wiring diagram of the flashing circuit used in this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawings, the circuit breaker illustrated is similar to that described in U. S. Pat. No. 3,341,791 issued in the name of James H. Leonard on Sept. 12, 1967, and comprises a molded case including a base 10 and a cover 11, line terminals 12, load terminals 14, movable contact arms 15, movable contacts 16, stationary contacts 17, and an operating mechanism 18. The operating mechanism 18 includes a handle 19 that protrudes through an opening 19a in the cover 11. Operation of the handle 19 causes selective opening and closing of the contacts 16 and 17. The circuit breaker also includes current responsive tripping mechanism including a pivotally mounted common trip bar 21 (FIGS. 3 and 5), armature members 22, armature rods 23 connected respectively to the armatures, trip bar actuating members 24 adjustably threaded respectively on the armature rods, a latch plate 25 mounted on the trip bar 21, a pivotally mounted releasably latchable intermediate latch member 26, and a pivotally mounted releasably latchable trip lever 27. Upon the flow of a fault current in a circuit through the circuit breaker, a magnetizable core member (not shown) magnetically associated with that circuit attracts a respective one of the armature members 22 to pivot the trip bar 21 clockwise, as viewed in FIG. 5, by means of the respective actuating member 24. The latch plate 25 is thereby moved out of latching relationship with the intermediate latch member 26, which in turn is moved out of latching relationship with the trip lever 27 to trip the circuit breaker. Reference may be had to the aforementioned patent for a more detailed description of the operating mechanism 18, the current responsive tripping mechanism, and other details of the circuit breaker.

In accordance with this invention, means are provided to cause a neon lamp 28 to flash intermittently when the circuit breaker is in tripped condition. The lamp 28 is adhesively secured in a recess 11a formed in the inner side of the cover 11 so as to be visible through a transparent window 30 closing an opening in a front wall of the recess 11a. The supply circuit for the lamp

28 includes a normally closed snap switch 31 having a depressible operating button 32, a resistor 33, a capacitor 34, and a diode 36 connected as shown in FIGS. 3 and 6. The power for illuminating the lamp is obtained through leads 37 and 38 connected to respective ones of the line terminals 12. The switch 31 is secured to a bracket 40 in the circuit breaker by a pair of screws 41 having nuts 42 threaded respectively thereon. The operating button 32 is depressed by the intermediate latch member 26 in the latched position thereof.

With reference to FIGS. 3 and 6, the diode 36, the resistor 33, and the capacitor 34 are connected in series with each other in a charging circuit through the snap switch 31 across a pair of the line terminals 12. The lamp 28 is connected directly in parallel with the capacitor 34. Upon tripping of the circuit breaker, the intermediate latch member 26 rotates clockwise, as viewed in FIG. 5, to an unlatched position, thereby releasing the operating button 32 of the snap switch 31. The snap switch 31 thereupon closes to complete the circuit through the capacitor 34. The capacitor 34 accumulates a charge during a time interval determined by its capacity, the voltage at the terminals 12 and the resistance of the resistor 33. When the charge on the capacitor 34 reaches the break down voltage of the lamp 28, the capacitor discharges through the lamp 28 causing the lamp 28 to become illuminated. Upon discharge of the capacitor 34, the lamp 28 is extinguished and the capacitor 34 starts to recharge through the same circuit that provided its initial charge. This operation is repeated so long as the intermediate latch member 26 is in its unlatched position. Flashing of the lamp 28 thus indicates that the circuit breaker has tripped because of an abnormal current condition.

I claim:

1. A three-pole electric circuit breaker comprising a molded case having three compartments, a common

trip bar pivotally mounted in the case and extending through a center one of the compartments into each of two outer ones of the compartments, three pairs of separable contacts disposed respectively in the compartments, a releasably latchable trip lever pivotally mounted in the center compartment and releasable from a latched position to effect separation of the three pairs of contacts, an intermediate latch member pivotally mounted in the center compartment and latchable by the common trip bar, the trip lever being latchable by the intermediate latch member, and a switch in the center compartment having a depressible operating button held in a depressed position by the intermediate latch member, when the trip lever is latched by the intermediate latch member and the intermediate latch member is latched by the common trip bar, to hold the switch in an open-contact condition, and released by the intermediate latch member to allow the switch to assume a closed-contact condition when the intermediate latch member is released by the common trip bar and the trip lever is released by the intermediate latch member.

2. An electric circuit breaker as claimed in claim 1 wherein the case has a window therein, and including an electric lamp in the case visible through the window, a pair of line terminals mounted on the case, and flashing means effecting repetitive on-and-off flashing of the lamp only when the circuit breaker is in a tripped condition, the flashing means including a diode, a resistor, and a capacitor in a series circuit with the switch across the line terminals, the lamp being connected in parallel with the capacitor.

3. An electric circuit breaker as claimed in claim 2 wherein the case includes a cover having an interior recess, and the diode, resistor, capacitor, and lamp are mounted in the recess.

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