July 7, 1942. J. A. COY 2,289,179

CIRCUIT BREAKER

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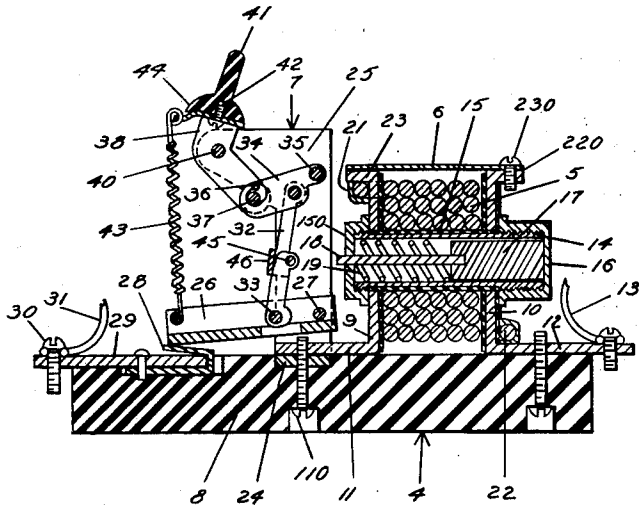


Fig 1

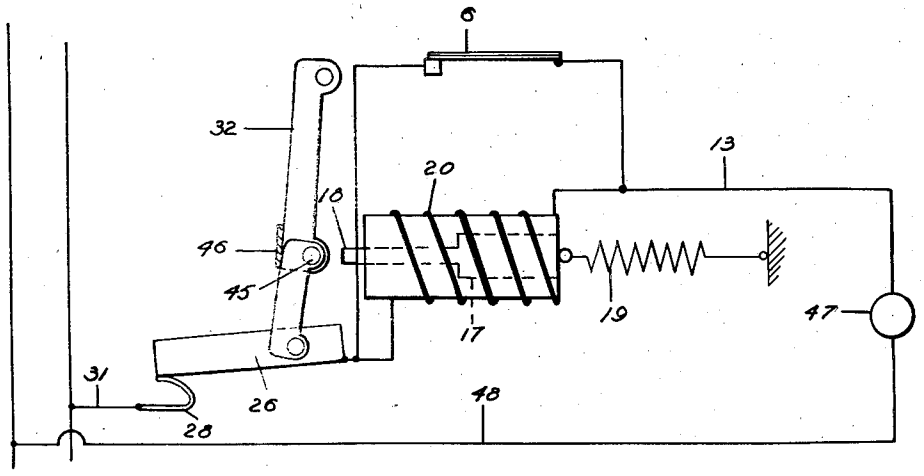


Fig 2

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CIRCUIT BREAKER

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2 Claims. (Cl. 200—89)

This invention relates to improvements in circuit breakers and is particularly directed to circuit interrupters for use in light capacity circuits such as in residential wiring or the like.

It is an object of this invention to provide an improved circuit breaker having certain structural elements which cooperate to provide a means for conducting one leg of the protected electrical circuit through said breaker.

Another object of the invention is to provide a breaker of simplified construction which results in a compact and relatively small device which may be made at a comparatively small cost.

Other objects will be apparent from the following specification and drawing, in which:

Fig. 1 is a longitudinal cross-sectional view through my circuit breaker.

Fig. 2 is a wiring diagram for the circuit employing my interrupter.

The embodiment of my invention comprises a circuit breaker 4 having a magnetic coil 5, a thermal responsive switch 6 and a circuit switch 7 mounted as a unit upon a non-conductive base 8. The means responsive to predetermined overload conditions in the protected circuit comprises the magnetic coil, commonly termed a solenoid, which has two vertically spaced metallic plates 9 and 10 mounted on the base 8 by means of integral horizontal portions 11 and 12 respectively. The portion 12 serves as a contact fastening plate for the load wire 13, the portion 11 being held in electrical contact with a lower horizontal portion of switch mechanism 7 by means of screw 110. The plates are provided with central apertures for receiving a hollow cylindrical core 14, a sleeve 15 made of insulating material encircling said core and insulating it from the plates. The ends of the core project from the plates and are provided with exterior threads for receiving caps 150 and 16 to complete the housing for an armature 17, a plunger 18 and a compression spring 19. Magnetic coil 5 is wound over the sleeve 15 and between the plates 9 and 10 and is insulated from said plates, the ends thereof being soldered to each of said plates as indicated at 21 and 22.

A thermal responsive switch 6 for conditioning the solenoid may be used in my breaker and may take the form of flange 220 of the plate 10 by means of screw 230. The free end of the element normally contacts flange 23 of the plate 9. The element is electrically conductive and flexes upwardly when subject to heat generated by electrical resistance set up therein in the well-known manner.

The outer end of the portion 11 is electrically connected to the lower connecting portion 24 of two spaced vertical members of the switch, one of which is indicated as 25. These members carry between them, by means of connecting pins, the operative mechanism of the switch which comprises a breaker arm 26 pivoted between the vertical members by means of pin 27. In normally closed position, the outer end of the breaker arm engages spring contact 28, said contact being electrically connected to plate 29 which carries a contact screw 30 for binding the end of line wire 31. The breaker arm is normally held in engagement with spring contact by means of a jointed link 32, pivoted to said arm intermediate its ends by pin 33. The upper end of the link is freely pinned to lever 34, the latter being rotatably mounted to the spaced vertical members by means of pin 35. The free end of the lever is provided with an elongated slot 36 which receives a pin 37 rigidly mounted on L-shaped lever 38, the latter lever being mounted to the vertical members by means of pin 40. A handle 41 is fastened to the upper portion of the lever by screw 42. A tension spring 43 is fastened to the outer end of the breaker arm and to an extension 44 of the lever 38, biasing said arm and lever to "open" position.

It will be noted that in normal "closed" breaker arm position, the jointed portion 45 of the link 32 is beyond dead center, the lever being held rigid by the lower portion thereof engaging an abutment 46 formed on the upper portion of the link whilst the pin 37 takes a position in the lowermost portion of the slot 36 which indicates a point beyond dead center with reference to the linkage elements 34 and 38 and the force exerted on the parts by tension spring 43. The switch is adapted to open the circuit when the breaker arm disengages from the spring contact 28. This is accomplished when the circuit has been subjected to an overload sufficient to build up a magnet field in the coil and draw the armature into alignment with it thus moving plunger 18 to contact the link 32 at jointed portion 45. This action results in the collapse of the link, permitting the breaker arm and lever 38 to be drawn toward each other to break the circuit. The switch is reset by rotating handle 41 in a clockwise movement which adjusts the jointed links 32 and returns the switch parts to a position indicated in Fig. 1.

As shown in the diagram (Fig. 2), like reference numerals refer to similar elements—and as indicated in the foregoing description, one side of the magnetic coil is connected to a suitable translating device 47 by means of wire 13, line 48 being led from said device to the service circuit. The other side of the coil is connected to the breaker arm 26, which in turn engages spring contact 28 communicating with the service line 31 to complete the circuit. It will therefore be noted that the electrical circuit through the breaker is plate foot portion 12, plate 10, solenoid coil 5, plate 9, plate foot portion 11; lower connecting portion 24 of the U-shaped switch supporting frame 25, breaker arm 26, stationary contact 28 and plate 29. The structural elements of the breaker therefore function as a means of conducting one leg of the protected circuit through said solenoid and thus provides a simplified and economically constructed circuit breaker.

What is claimed is:

1. An interrupter for an electric circuit comprising an electrically, non-conductive base; a breaker arm movable to open or close the circuit; switch mechanism connected to the arm for maintaining said arm in open or closed circuit positions; a U-shaped frame supporting the breaker arm and the switch mechanism between the vertical side members thereof, and having its lower, horizontal portion resting upon the base, said frame being in electrical engagement with the breaker arm and serving as a current conductor for the circuit; means responsive to overload conditions in the circuit positioned adjacent the switch mechanism and associated therewith to open the circuit and comprising a solenoid having two L-shaped, electrically conductive plates with their foot portions formed in divergent, horizontal relationship and resting upon the base; the plates having aligned apertures formed therein; a core extending through the apertures and supported by the plates; means for insulating the core from the plates; a coil wound on the core and having each terminus in electrical engagement with one of the plates; the end of one of the said foot portions being in contact with the lower horizontal portion of the U-shaped frame; means for locking said portions together and binding them to the base; and an electrical contact on the end of the other foot portion.

2. An interrupter for an electric circuit comprising an electrically, non-conductive base; a breaker arm movable to open or close the circuit; switch mechanism connected to the arm for maintaining said arm in open or closed circuit positions; a U-shaped frame supporting the breaker arm and the switch mechanism between the vertical side members thereof, and having its lower, horizontal portion resting upon the base, said frame being in electrical engagement with the breaker arm and serving as a current conductor for the circuit; means responsive to overload conditions in the circuit positioned adjacent the switch mechanism and associated therewith to open the circuit and comprising a solenoid having two L-shaped, electrically conductive plates with their foot portions formed in divergent, horizontal relationship and resting upon the base; the plates having aligned apertures formed therein; a core extending through the apertures and supported by the plates; an armature movable within the core; a plunger rod extending from the core, said core being mounted between the plates in a position to permit actuation of the switch mechanism by the rod; means for insulating the core from the plates; a coil wound on the core and having each terminus in electrical engagement with one of the plates; the end of one of the said foot portions being in contact with the lower horizontal portion of the U-shaped frame; means for locking said portions together and binding them to the base; and an electrical contact on the end of the other foot portion.

JOSEPH A. COY.