

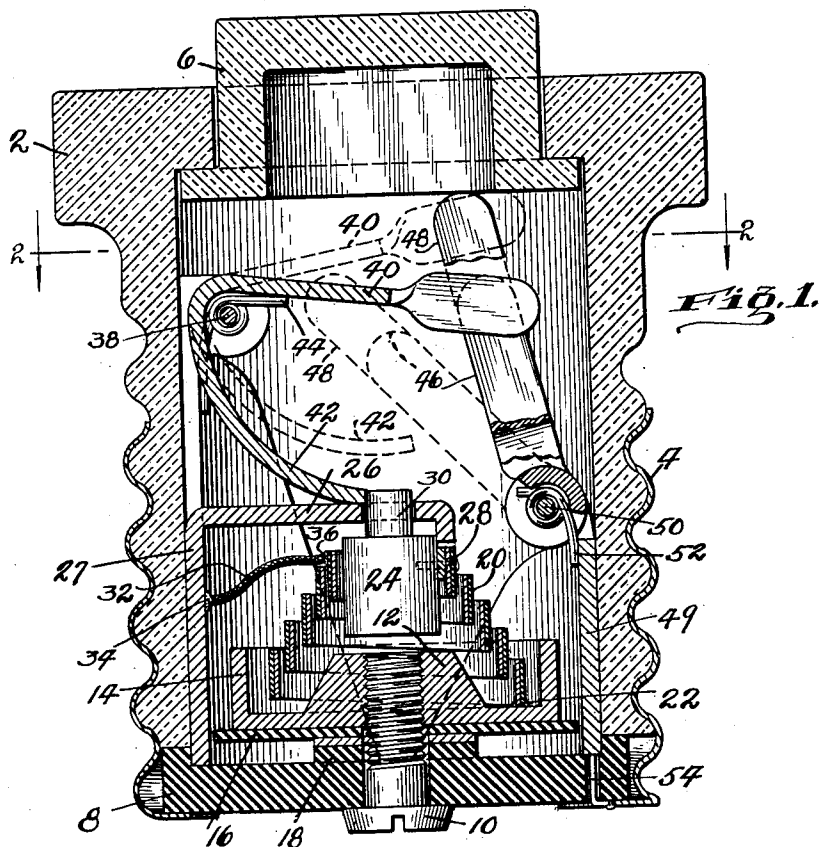
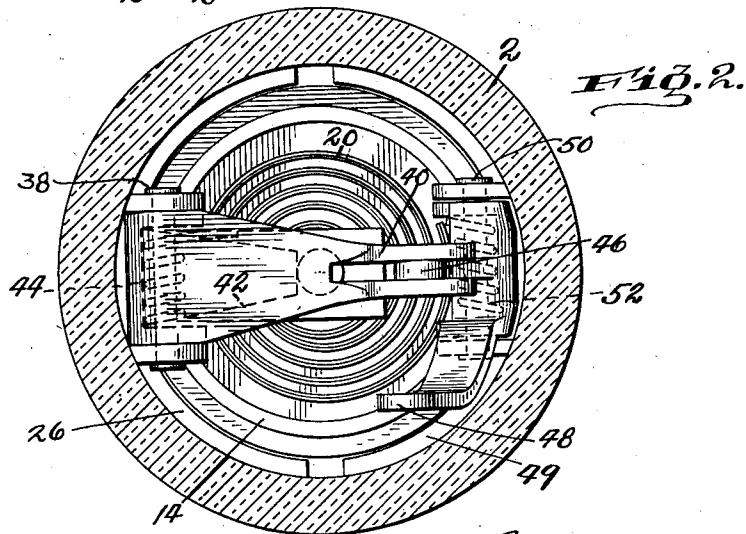
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CIRCUIT CONTROL DEVICE

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CIRCUIT CONTROL DEVICE

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5 Claims. (Cl. 200—88)

This invention is directed to circuit control devices, and without attempting to exhaust the possibilities and advantages and novel features of the device of this invention and without attempting to mention them in the order of their importance, I wish to direct attention to the following:

My device is so designed and constructed as to adapt the same to any standard fuse receptacle of the screw type to take the place of the usual screw type fuse plug.

My circuit control device is trip free. In other words, it cannot be held in closed position when the current exceeds the rated value of the device, so it becomes impossible to hold the circuit on an overloaded motor or under short circuit conditions.

The device will trip instantaneously on dead short circuit on one-half to one cycle on 220 volts A. C.

My improved device will remain closed on any predetermined current and/or time setting, whereupon it will automatically open, and cannot be held in closed position by holding down the reset button.

My device is preferably of the indicating type, its open position being indicated by a suitable target visible through the reset push button.

Furthermore, my improved device embodies a construction which makes it possible to obtain both overload and short circuit tripping conditions with a single device, and can be manufactured for many different ratings by very simple and inexpensive structural changes.

The circuit element of my device may be embodied in other mechanisms as an actuating medium such as appliance cords, operating units for oil circuit breakers, or overload relays in other devices.

In the accompanying drawing wherein I have illustrated one embodiment of my invention:

Fig. 1 shows my improved circuit breaker in sectional elevation; and

Fig. 2 is a section taken substantially on the line 2—2 of Fig. 1.

Referring to the drawing in detail: 2 designates a holder, such as moulded rubber, or glass, or other suitable material within which the working parts of my device are mounted.

The exterior of this holder is provided with a standard rolled brass, or other suitable metal, fuse plug thread section 4 which fits any standard fuse plug receptacle.

The top of the holder 2 is provided with a push button 6 for closing the breaker. This but-

ton is preferably of transparent material, such as glass, so that the position of the parts within the breaker may be observed.

At the bottom of the holder 2 I provide a closure member 8 of suitable insulating material such as Bakelite, for instance, which supports the entire operating mechanism of the breaker.

Passing through the insulating closure and supporting member 8, into the interior of the holder 2, is an assembly screw 10. This screw 10 passes into the conical center 12 of a steel cup or holder 14 centrally disposed within the holder 2. Fiber washers 16 and 18 or washers of other suitable insulating material are interposed between the steel cup 14 and the closure and supporting member 8.

Disposed within the metal cup 14 is a bi-metallic or special alloy thermo-magnetic element 20. This thermo-magnetic element 20 is helically wound in the form of a frusto-cone, the lower end or base of the frusto-cone being anchored to and in electrical contact with the supporting metal cup 14 as shown at 22.

The thermo-magnetic element 20 is so wound that upon heating it will rotate and pull downwardly toward the cup 14.

Extending into the top of the frusto-cone provided by the thermo-magnetic element 20 and attached thereto, as shown at 28, is an iron plunger 24. This plunger 24 passes through and is guided by the free end of an arm 26. This arm is an integral part of a bronze or brass supporting shell 27 which extends upwardly within the holder 2 along the wall thereof, from the closure member 8, the arm being bent inwardly of the holder and then downwardly, so that its end lies adjacent the top of the thermo-magnetic element 20.

32 designates a flexible copper connection, one end of which is anchored to and in electrical contact with the shell 27, as shown at 34, and the other end of which is anchored to and in electrical contact with the thermo-magnetic element 20, as shown at 36.

Pivotaly mounted on a pivot 38 which is adjacent the top and side of the holder 2 is a current carrying bell crank lever, the arm 40 of which is bifurcated, as seen in Fig. 2, and constitutes a contact arm, while the arm 42 of the bell crank lever not only carries current but functions as a latch, the free end of this arm 42 engaging a latch pin 30 which is an extension of the plunger 24 and projects through and is guided by the arm 26. The bell crank lever is spring

loaded by spring 44 which tends to move the bell crank lever from the full line position of Fig. 1 to the dotted line position of the same figure.

At the side of the holder 2 opposite the arms 40 and 42 are integral arms 46 and 48 supported by a brass or bronze supporting shell 49. The arm 46 is a contact arm engaging, under normal conditions, the bifurcated current-carrying arm 40, as seen in Fig. 2, while the arm 48 is a trip-free lever arm. These arms are pivoted on pivot 50, equipped with a spring 52, adapted, under certain conditions, to hold the two arms in the full line position of Fig. 1.

54 designates a copper shunt connection between the metal shell 4 and the contact arm 46.

The full line position of Fig. 1 shows my device in operative position. The contact arm 40 is latched in position, the latching arm 42 engaging the latch pin 30. The push button 6 is in its retracted position so that the contact arm 46 and trip-free arm 48 are held in the full line position of Fig. 1 by the spring 52, with the end of the contact arm 46 engaging the bifurcated arm 40.

It will be evident that with the parts in this position a circuit may be traced from assembly screw 10, steel cup 14, thermo-magnetic element 20, plunger 24 and integral latch pin 30, arms 42, 40 and 46, supporting shell 49, connection 54 and shell 4. Another circuit may be traced: Assembly screw 10, steel cup 14, thermo-magnetic element 20, connection 32, shell 27, arms 26, 42, 40, 46, shell 49, connection 54 and shell 4.

On a thermal overload it will be quite evident that the thermo-magnetic element 20 will turn and contract to pull the plunger 24 and integral latch pin 30 to a position with respect to the arm 26 so that when the top of the latch pin becomes flush with the arm 26 the contact latch arm 42 is released to allow the parts to assume the dotted line position of Fig. 1, to open the circuit. On magnetic operation the coil 20 becomes magnetized, magnetizing the cup 14 to create a magnetic field between the cup 14 and plunger 24 to retract the plunger 24 and latch 30, thus releasing the arm 42 to the dotted line position of Fig. 1.

As pointed out at the beginning of this description it is impossible to hold the breaker in closed position by the button 6 as long as abnormal conditions exist. Let us assume that the breaker has tripped but that the abnormal conditions have not been taken care of. The button 6 is depressed in an endeavor to reset. It will be apparent that in depressing the button the same will engage both the trip-free arm 48 and the contact arm 40 and when the arm 40 has been moved downwardly sufficiently to engage the arm 26 the trip-free arm 48 and the contact arm 46 will have been moved to the dotted line position of Fig. 1. In such position the contact arm 46 is some distance below the bifurcation in the contact arm 40 so that no circuit is closed. Upon release of the button 6 the arms 48 and 46 will be swung to the full line position of Figure 1, but inasmuch as the instant the circuit through the device is closed again, assuming that normal conditions have not been restored, the latch pin 30 will be retracted to release the arm 42 to open the circuit again. In other words, it is necessary, in resetting, to de-

press and then to release the button 6, and if the latch pin is not in position to latch the arm 42 to latch the arm when the button is depressed, and to hold the arm in circuit closing latched position when the button is released and to permit the arm 46 to move to circuit closing position, no circuit can be maintained through the device.

In addition to all of the foregoing, it is to be noted that this device is operative on abnormal thermal conditions other than those produced by an overload. For example, my device might be installed in a socket attached to a copper buss which may be overheated sufficiently as to constitute a fire hazard. The thermo-magnetic element 20 would then act thermally to open the circuit through the device even though the electrical load is within the limits of the rating and capacity of the device. Again, the device may be installed within a cabinet, for example, and the circuits might become overheated due to lack of carrying capacity, although there is no excess current flowing, the heat generated would effect operation of the device.

It is to be understood that the device as illustrated represents merely one embodiment of my invention and that changes in details of construction and arrangement of parts may be made within the purview of my invention.

What I claim is:

1. In combination a quick-break switch, a plunger for latching the same in closed position, and a coil for said plunger comprising a thermo-magnetically operated coil for actuating said plunger by the thermostatic action or the magnetic action of said coil to unlatch said switch.

2. In combination a quick-break switch, an armature for latching the switch in closed position, and a thermo-magnetically operated coil for retracting said armature to unlatch said switch, said coil surrounding said armature and being anchored at one end and secured to said armature at its other end.

3. In combination a quick-break switch, an armature for latching the switch in closed position, and a bi-metal thermo-magnetically operated coil for retracting said armature to unlatch said switch, said coil surrounding said armature and being anchored at one end and secured to said armature at its other end, and in series with said switch.

4. A circuit breaker comprising in combination a quick-break switch, a plunger, a latch member carried by the plunger, a bi-metal element wound in a conical helix about said plunger, one end of said helix being attached to said plunger, the other end being anchored, said bi-metal element being in series with said switch and operable under predetermined overload conditions to move said plunger to release said latch member thereby to release said switch.

5. A circuit breaker comprising in combination a quick-break switch, a plunger, a latch member carried by the plunger, a bi-metal coil about said plunger and connected in series with said switch, said coil being operated under predetermined conditions to release said latch member, and a spring for moving said switch to open position upon said release of the latch member.

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