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FUSE OR CIRCUIT BREAKER

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Fig.2

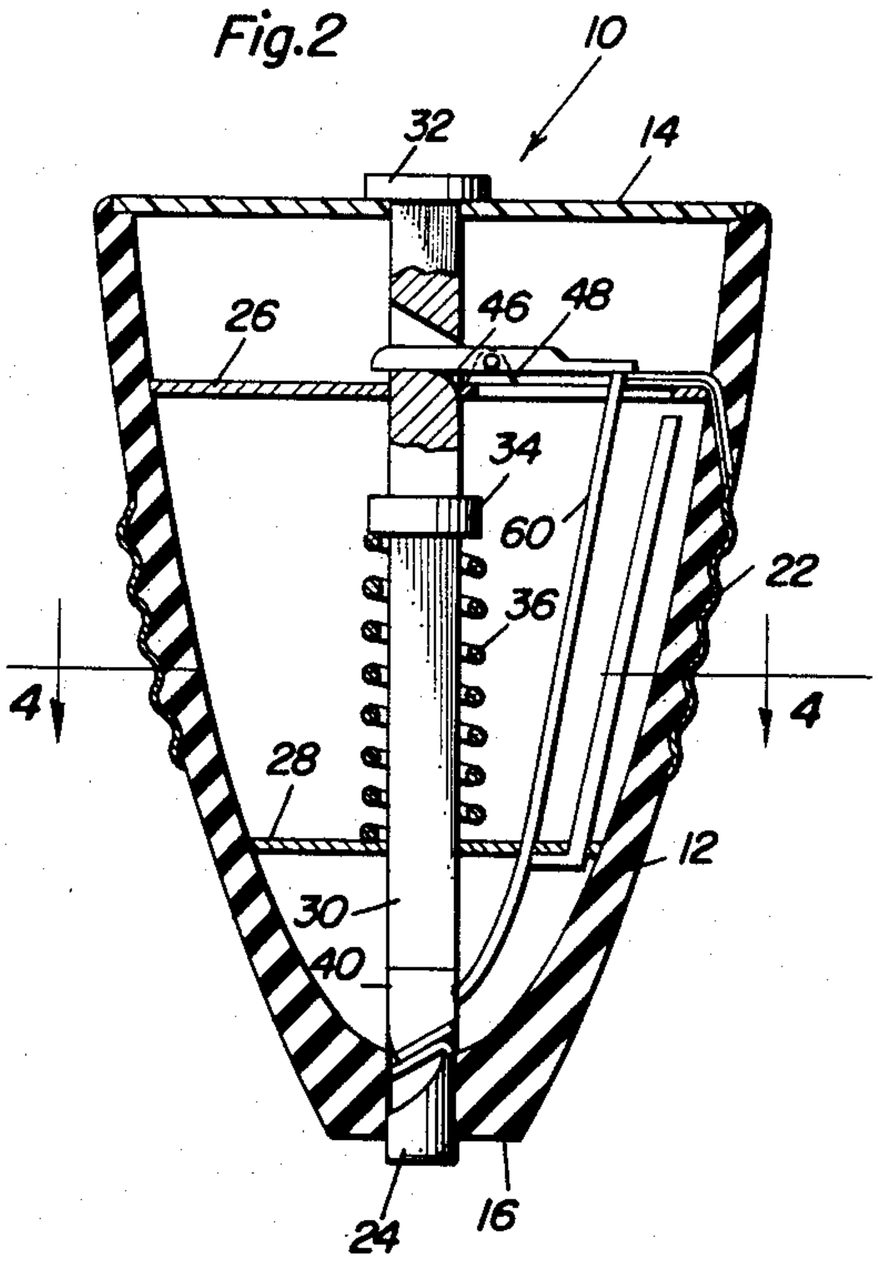


Fig.3

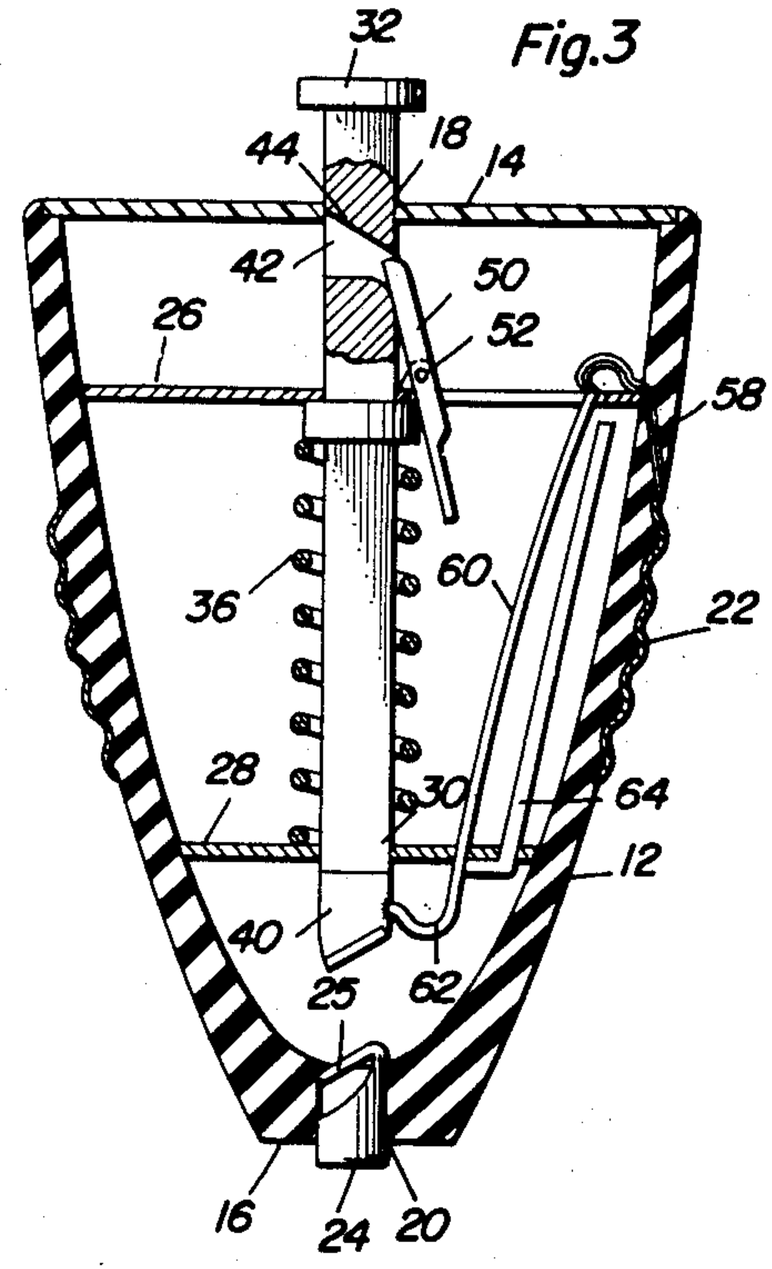


Fig.4

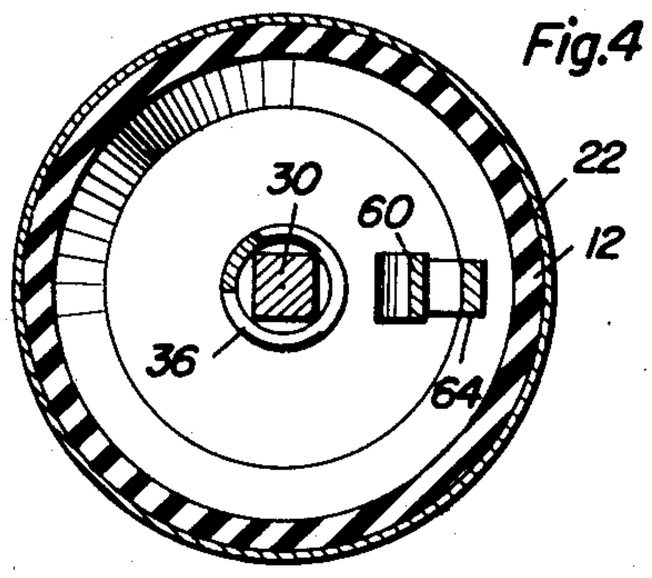
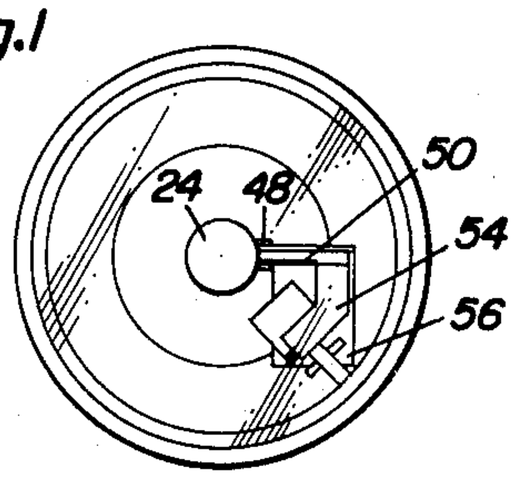


Fig.1



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FUSE OR CIRCUIT BREAKER

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This invention relates generally to electrical safety devices and more particularly to an overload circuit breaker which may be utilized in place of the conventional household fuse.

All modern wiring systems are protected by a fuse or circuit breaker which automatically opens the circuit in the event of an overload current so as to prevent excessive heating and ultimate fire in the wires. Formerly, most homes were equipped with conventional type fuses which screwed into a fuse outlet and were thereby placed in series with one side of the power line. Recently, the trend has been to utilize circuit breakers which simply open the circuit and may be reset rather than the disposable type fuses which must be replaced upon blowing. The development of a circuit breaker which could be utilized in the older type fuse outlets would prove desirable in that it would obviate the necessity of disposing of and replacing blown fuses. Therefore, it is the principal object of this inveniton to provide a novel and improved overload circuit breaker which may be utilized in conventional fuse outlets.

It is a further object of this invention to provide a novel and improved overload circuit breaker which may be easily manually reset.

It is a still further object of this invention to provide a novel and improved overload circuit breaker which is relatively simple, reliable and inexpensive.

In accordance with the above stated objects, below is described in particular the construction and operation of a novel and improved overload circuit breaker which initially includes an insulative housing of a size small enough to be placed in the conventional fuse outlet. The housing has affixed therearound, a threaded metallic portion which is intended to contact one side of a line and a fixed contact which is intended to contact the second side of a line. Electrical bridging means are provided within the housing for selectively bridging the metallic threads and the contact to connect to each other the two sides of the line. These bridging means include a flexible wire which is soldered to the metallic threads and to a bimetallic spring. The bimetallic spring in turn is electrically connected to a contact carried terminally by a shaft which is movable between two extreme positions within the housing. In one of these positions the shaft contact is not electrically connected to the contact on the housing leading to the second side of the line while in the other position electrical connection is made. The shaft is normally spring urged so that it rests in the extreme position where electrical connection between the two sides of the line is not made. However, a manual movement on the shaft may overcome the spring urging so that the two sides of the line are connected. Retaining means are carried within the housing to retain the shaft in the second extreme position after the manual movement. The retaining means include a pivotally connected arm which cooperates with a slot through the shaft retaining the shaft in the second extreme position. The pivotally connected arm is in turn controlled by the bimetallic spring which forms part of the electrical bridge noted above. Under normal conditions, the pivotal arm will be held by the bimetallic spring in a position so as to retain the shaft in the second extreme position connecting the two sides of a power line. In the event of an overload current, the bimetallic spring will heat and bend, releasing the pivotally connected arm and allowing the spring urged shaft to return to the first extreme position thereby opening the bridge between the two sides of the power line. Of course, the circuit breaker may be easily reset by manually returning the shaft to the second extreme position and if the cause of the overload current no longer exists, the two sides of the power line will then again be bridged.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation shown and described, and accordingly, reference is had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is an elevational view showing the circuit breaker from the bottom;

Figure 2 is a sectional view taken through the center of the circuit breaker with the circuit breaker shown in the second extreme position with the two sides of the line electrically bridged;

Figure 3 shows a view similar to that of Figure 2 with the circuit breaker in the first extreme position with the line open; and

Figure 4 is a sectional view taken substantially along the plane 4—4 of Figure 2.

With continuing reference to the drawings, the numeral **10** generally represents the overload circuit breaker comprising this invention having an insulative housing **12** having a top portion **14** and a bottom portion **16**. Each of the top and bottom portions **14** and **16** has an aperture as at **18** and **20** therein. The apertures **18** and **20** are aligned. A threaded metallic collar **22** is affixed circumferentially about the insulative housing **12** while a contact **24** is carried within the aperture **20** through the bottom **16** of housing **12**. Partitions **26** and **28** are fixed in the housing **12** between the top and bottom surfaces **14** and **16** and parallel thereto. The partitions **26** and **28** have apertures therein which are aligned with the aligned apertures **18** and **20** for passing shaft **30**.

The shaft **30** has a first flange **32** and a second flange **34** which respectively fall outside of the top surface **14** and partition **26** to allow for slidable movement of the shaft **30** in apertures in the respective surfaces. A circumferential spring **36** surrounds the shaft **30** and abuts the flange **34** and the lower partition **28**. It should be apparent, therefore, that the spring **36** normally urges the flange **34** and shaft upwardly as indicated in Figure 3.

The shaft has terminally affixed thereto a terminal contact **40** located proximate the contact **24** in the aperture **20** in the housing **12**. It is to be noted that the contacting edges on the respective contacts **40** and **24** are aligned and finished so as to provide a clean and efficient contact. The contact **24** has an extended portion **25** thereon which makes initial connection with the terminal contact **40** and is adapted to bend slightly and be resilient for compensating for slight variation in pressure and distances of the moving parts when the overload circuit breaker is reset.

A slot **42** in the shaft **30** has an angular upper surface **44** and beveled lower surface as at **46**. The partition **26** supports a pair of upstanding ears **48** which has pivotally affixed therebetween a centrally supported arm **50**. The arm **50** extends into the slot **42** and as the shaft **30** moves longitudinally within the aligned apertures the arm **50** pivots about axis **52** through ears **48**. The arm

50 has a perpendicular extension 54 which extends over an aperture 56 in partition 26.

A flexible wire 58 is electrically connected to the threaded portion 22 and passes through the housing 12 to a bimetallic spring 60 which is terminally supported in partition 28. A short length of flexible wire 62 electrically connects the bimetallic spring 60 to terminal contact 40. Positioned adjacent the bimetallic spring 60 is a length of cooling metal 64 which acts to modify the temperature of bimetallic spring 60. The bimetallic spring 60 extends upwards through the aperture 56 in partition 26 and is adapted to fall under the angular extension 54 on arm 50.

In the operation and utilization of this circuit breaker, the device 10 may be screwed into the conventional fuse outlet with the threaded portion 22 cooperating with the outlet threads and electrically connected thereto. The electrical contact 24 will automatically fall into place and electrically connect itself with one side of a power line. In the situation of Figure 3, an open circuit will then therefore exist between the metallic threads 22 and the contact 24. Upon manual depression of shaft 30, the flange 32 may be pushed toward the top surface 14 against the spring urging of spring 36. As this is done, the arm 50 will pivot about point 52 and the extension 54 will pass over the end of bimetallic spring 60 after forcing the bimetallic spring back and thereafter be held in a horizontal position as indicated in Figure 2. The portion of the arm 50 in slot 42 will then bear down on the bottom surface of the slot and prevent the spring 36 from forcing flange 34 and shaft 30 upward. Good electrical contact will then be established between the terminal contact 40 and the contact 24 and a circuit will be completed from the threads 22 to the contact 24 through the flexible wire 62, the bimetallic spring 60, and the flexible wire 58. With this circuit complete, line current may flow from metallic threads 22 to contact 24. In the event of an overload current, the bimetallic spring 60 will tend to heat up and bend away from the extension 54 of arm 50. Since the wire 58 is flexible, it will not hinder the bending of the bimetallic spring 60. As the bimetallic spring 60 passes from under the extension 54, the concentric springs 36 pressing against the flange 34 will force the shaft 30 upwards since the arm 50 is now free to pivot about axis 52 supported between ears 48. Of course, electrical connection between contact 40 and contact 24 will then be broken and the power line will be open. To again establish a close circuit, a manual depression on the flange 32 will force the shaft 30 downwardly as the arm 50 is pivoted about axis 52. If the bimetallic spring 60 has cooled sufficiently, the extension 54 of arm 50 will force the spring 60 back until it passes thereover after which the arm 50 will be maintained in horizontal position, as indicated in Figure 2, to retain the shaft 30 and contact 40 electrically connected to the contact 40. If the cause of the overload or fault has not been removed, the overload current will persist and the bimetallic spring 60 will once again release the pivotally supported arm 50 to allow the spring 36 to disconnect the contacts 40 and 24.

The cooling metal 64 has been included proximate the bimetallic spring 60 to somewhat cool the spring 60 so as to shorten the interval of time necessary before resetting. It is to be noted that the shaft 30 and aligned apertures are square for preventing any relative rotative movement between the shaft and apertures.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An overload circuit breaker comprising a housing having an insulative housing wall, a pair of spaced transverse partitions supported in said housing, electrically conductive threads forming a first contact supported on the outer surface of said housing wall, a second contact extending through said housing wall into said housing, an insulative shaft slidably received through said partitions extending outwardly of said housing and aligned with said second contact, a terminal contact carried by said shaft engageable with said second contact, a bimetallic spring supported by a lower of said pair of partitions, a slot in an upper of said pair of partitions, said bimetallic spring having a free end extending through said slot, electrically conductive means connecting said bimetallic strip between said first contact and said terminal contact, a flange on said shaft between said spaced partitions, a coil spring concentrically disposed about said shaft engaged with said lower portion and said flange for urging said shaft upwardly and retainer means for retaining said shaft in a lowered position with the second contact connected to said terminal contact, said retainer means including an arm pivotally and centrally supported on said upper partition adjacent said upper partition slot, said free end of said bimetallic spring normally engaged with one end of said arm to prevent pivotal movement of said arm, a slot in said shaft receiving a second end of said arm therein whereby said shaft is prevented from being moved by said coil spring due to the pivotal immobility of said arm.

2. An overload circuit breaker comprising a housing having an insulative housing wall, a pair of spaced transverse partitions supported in said housing, a first contact supported on said housing, a second contact extending through said housing wall into said housing, an insulative shaft slidably received through said partitions extending outwardly of said housing and aligned with said second contact, a terminal contact carried by said shaft engageable with said second contact, a bimetallic spring supported by a lower of said pair of partitions, a slot in an upper of said pair of partitions, said bimetallic spring having a free end extending through said slot, electrically conductive means connecting said bimetallic strip between said first contact and said terminal contact, a flange on said shaft between said spaced partitions, a coil spring concentrically disposed about said shaft engaged with said lower portion and said flange for urging said shaft upwardly and retainer means for retaining said shaft in a lowered position with the second contact connected to said terminal contact, said retainer means including an arm pivotally and centrally supported on said upper partition adjacent said upper partition slot, said free end of said bimetallic spring normally engaged with one end of said arm to prevent pivotal movement of said arm, a slot in said shaft receiving a second end of said arm therein whereby said shaft is prevented from being moved by said coil spring due to the pivotal immobility of said arm.

3. The combination of claim 2 wherein a metallic cooling element is supported proximate the bimetallic spring.

4. The combination of claim 3 wherein said first contact comprises conductive threads formed on the outer surface of said housing wall.

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