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ELECTRICAL THERMO-MOTIVE DEVICE

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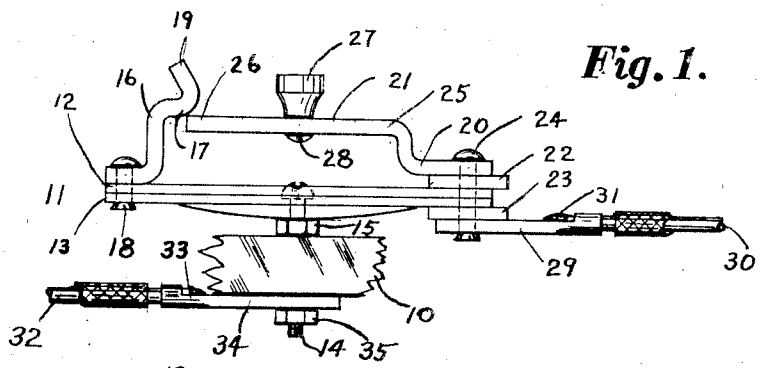
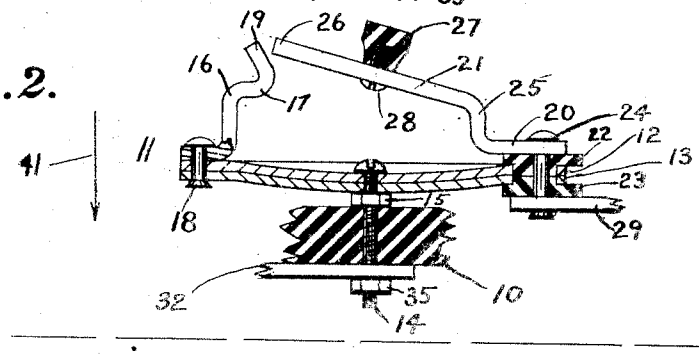


Fig. 1.

Fig. 2.



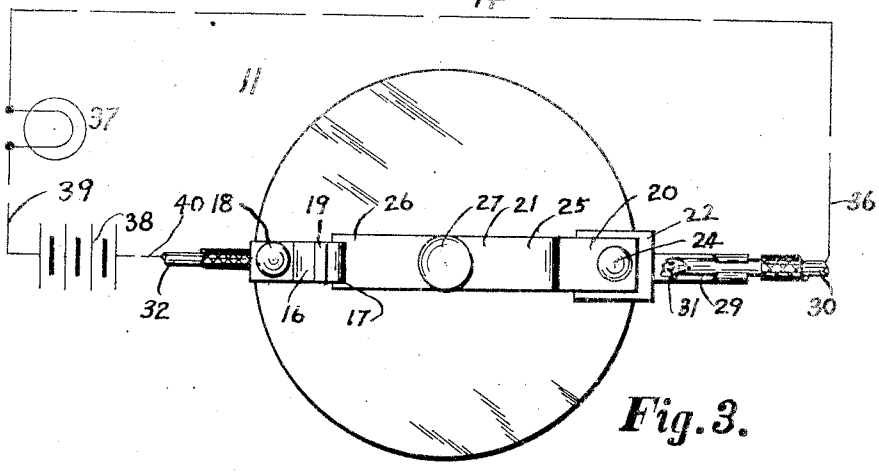


Fig. 3.

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ELECTRICAL THERMOMOTIVE DEVICE

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8 Claims. (Cl. 200—138)

The present invention relates to the electrical art and more particularly to electrical circuit breakers and has for an object to provide a breaker which may be manually or otherwise closed in accordance with the particular environment in conjunction with which the device is used and which is so constructed that it may be repeatedly used.

Another object of the invention is to provide a thermo-motive device for said purpose of economical manufacture which is of permanent, durable character.

A still further object of the invention is to provide a circuit breaker, the circuit opening action of which is comparatively very rapid.

Other and further objects and advantages of the invention will be obvious to those skilled in the art from the following detailed description thereof.

In the drawing:

Figure 1 is a side elevation of the new device mounted on a fragment of a block of insulation, certain movable electrodes employed being in a closed contacting position with respect to each other.

Figure 2 is a similar view certain portions of the new device being in section, said electrodes being in an open position.

Figure 3 is a top plan view of the invention and showing the latter included in a diagrammatically illustrated, energized electrical circuit together with an incandescent light bulb.

As heretofore practiced in the art, especially in dwelling houses meltable fuses have been commonly employed in electrical circuits for breaking the later at times when short circuits have occurred, said fuses requiring replacement often by people unfamiliar with the electrical art thereby causing delay, danger and injury to said persons, the latter also often inserting new fuses repeatedly in damaged or improper circuits without repair of the latter, thereby wasting said fuses unduly, and the present invention aims to obviate said undesirable features of the prior practice.

Referring now to the drawing for a more particular description 10 indicates a fragment of a block of insulating material which is preferably stationary such as when attached to the wall of a switch box within a dwelling house or when attached to the dashboard or other suitable portion of an automobile or the like having electrical instrumentalities for which protection against abnormal electrical currents is desired.

The new device includes a thermo-motive electrode generally indicated at 11 and which preferably consists of a bi-metallic disk of concavo-convex contour in cross section, the half portion 12 of which is formed of one selected metal and the other oppositely disposed half portion 13 thereof consisting of a different metal, said electrode portions 12 and 13 being suitably joined together in a manner whereby the disk is sufficiently thin to be flexible for later described purposes and sufficiently thick to resist a selected degree of heat applied to said disk.

The disk 11 as thus described is normally of an initial form-sustaining character and while a bi-metallic disk is preferred it will be understood that any electrode formed of one or two pieces of metal which will become suitably deformed for later described purposes, upon becoming heated sufficiently, may be employed in lieu of said preferred bi-metallic construction.

As best shown in Figure 2, preferably the medial portion of the disk is secured by means of a bolt or screw electrode 14 to said insulation 10, a nut or the like 15 preferably being disposed between said block and said disk.

An electrode 16 having an inwardly off-set detent portion or hook 17 is disposed in electrical contact with said disk and secured to the latter by means of a rivet 18 preferably adjacent the perimeter of said disk and it will be understood that said disk, for certain uses, may be elongated in lieu of the circular disk specifically illustrated.

The detent 17 is provided with an outwardly flared guide portion 19 for facilitating engagement of a later described arm under and with said hook.

An electrode 20 having an arm portion 21 is carried by the disk and electrically insulated from the latter by means of laminations of insulating material or washers 22 and 23, said member 20 being mechanically secured to the disk by means of a rivet or the like 24 which also secures said washers together.

The electrode 20 is preferably formed integral with the arm 21 and of resilient material such as spring bronze whereby resultant from said resiliency, especially adjacent the portion 25 of the electrode 20, the arm 21 is normally urged away from the disk 11 and at times when said arm is manually or otherwise moved towards said disk, said arm being disposed across the latter, the free end 26 of said disk may strike the inclined guide portion 19 of the electrode 16 whereby further movement of said free end towards the disk pushes the free end of the

electrode 16 away from the rivet 24 for permitting said free end of the arm to engage under the hook detent 17; whereupon said free end of the electrode 16 returns to a normal position, as shown in Figure 1, said electrodes 20 and 16 then being disposed in electrical contact with each other.

It will be understood that the above described device may be enclosed, if desired, in a housing or suitable container, in which case the latter is preferably provided with a glass or transparent mica window whereby an operator may visualize the position of the electrode portions 17 and 26 with respect to each other for noting whether or not they are in contact and at times when a housing is employed a knob of insulation or plunger is disposed through a wall of said housing whereby the operator may place his finger upon said plunger for causing said free end 26 to engage with the detent hook 17. As specifically shown in Figure 2, said knob of insulation 27 is carried by the arm 21 and secured to the latter by means of a screw 28 whereby the operator may readily depress the arm 21 by placing his finger or the like on said knob for said purpose and without said finger becoming electrified.

An electrode clip 29 is secured to the rivet 24 for facilitating an electrical connection between a wire 30, said clip and the metallic rivet 24, said wire preferably being soldered to the clip as at 31.

Similarly a wire 32, as shown in Figure 1, is soldered as at 33 to a second clip electrode 34, an end of the latter being mechanically and electrically attached to the screw electrode 14 by a suitable means such as the nut 35.

As thus described at times when the wires 30 and 32 are included in a closed electrical circuit the current will pass from a source of energy through the screw electrode 14 to the medial portion of the disk 11 and through the electrode 16, arm 21, rivet electrode 24 and clip 29 at times when the wire 32 is in electrical communication, as described, with the medial portion of the disk. It will be further noted that for certain types of use the wire 32 may be electrically connected to the disk adjacent the perimeter thereof although the disk becomes heated and more quickly responsive, as later described, at times when the wire 32 is electrically connected to the medial portions of said disk.

For certain uses the new device is comparatively minute with respect to the proportional size thereof specifically illustrated in the drawing, and it will be understood that the device is so constructed and assembled that the disk becomes deformed resultant from a current passing through the disk which is greater than a preselected normal degree resultant from said disk becoming heated as later described. Manufacture of specimens of the new device are made of a preselected capacity to be used in conjunction with and for a certain current. During manufacture the devices are marked "15 A", "30 A", "60 A" and the like for denoting that the devices so marked are of respectively 15, 30 and 60 ampere capacity. For automobile use or when the source of electrical energy is a conventional 6 volt battery, said specimens are correspondingly and approximately marked for purposes well known to those skilled in the electrical art.

The capacity of any specimen of the new device to open a circuit at times when the latter includes more amperage than desired is governed by the particular construction of a specimen, either by making the disk 11 thicker or thinner, by the degree of convexity of said disk or the lack of said convexity or by the degree of the urge provided by the spring portion 25 or by the length of the arm 21 with respect to the hook-detent 17.

Referring to Figure 3 the wire 30 is in communication with the wire 36 the latter also being in electrical communication with a utilitarian electrical instrumentality such as the incandescent light bulb generally and diagrammatically indicated at 37, said device 37 being in communication with a battery 38 or other suitable source of electrical energy through a wire 39, said battery being similarly connected to the wire 32 through a wire or similar conductor 40 and as thus described it will be understood that the new invention may be included in the described electrical circuit for protecting the electrical instrumentality 37 from damage at times when and if the current generated becomes too great for the capacity of the device 37 and greater than the disk 11 will carry without deformation.

In operation, assuming that the disk 11 is mounted to a stationary object, at times when electrical current flows through said disk, the latter becomes correspondingly heated, and assuming that the disk has been constructed to withstand a current of 15 amperes said circuit operates normally. At any time the amperage of said circuit becomes increased, by any means, above said selected normal degree, said disk instantly becomes correspondingly heated proportionally and to a greater degree than its capacity to withstand said heat without deformation, thereby causing the perimeter of the disk to be moved in the direction of the arrow 41 and towards the convexed medial portion of the disk, the latter thereby becoming flatter in side elevation contour and moving the hook detent 17 away from the free end 26 of the electrode 20; whereupon the inherent resiliency of the free portion of the electrode 20 causes the arm 21 to move away from the hook 17 for breaking the circuit.

At times when the circuit becomes broken it remains open even after the disk has become cooled said circuit not being reclosable until an operator is informed, resultant from said breaking, that said circuit requires repair or adjustment after which said circuit may be manually and readily closed. In cases where said operator is inexperienced, should he manually close the electrodes 17 and 26 together and thereby close said circuit without adjustment or repair of the latter, said circuit and new device immediately becomes reopened and prior to damage of the instrumentality 37.

From the foregoing description it is thought to be obvious that an electrical thermo-motive device constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and used, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish it to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as claimed.

I claim:

1. An electrical device comprising a block of

electrical insulating material, a bi-metallic disk of concavo-convex contour in cross section; said disk being normally of initial form sustaining character, a bolt electrode for attaching a medial portion of said disk to said block, a detent electrode secured to and in contact with said disk adjacent the perimeter of the latter, and a third electrode having a resilient arm portion carried by and electrically insulated from said disk, said detent and arm electrodes being spaced apart with respect to each other and adapted to be included in an electrical circuit, the free end of said arm being adapted to engage in said detent for normally closing said circuit, said disk being adapted to become deformed at times when an electrical current greater than a preselected degree is applied to said circuit for releasing said arm from said detent for opening said circuit, whereby said disk becomes cooled and assumes its said normal initial form for reuse.

2. An electrical device comprising a bi-metallic disk of concavo-convex contour in cross section, said disk being normally of initial form sustaining character, an electrode secured to and in contact with said disk adjacent the perimeter of the latter, said electrode being provided with a detent portion, and a second electrode having a resilient arm portion carried by and electrically insulated from said disk, said electrodes being spaced apart with respect to each other and adapted to be included in an electrical circuit, the free end of said arm being adapted to engage in said detent for normally closing said circuit, said disk being adapted to become deformed at times when an electrical current greater than a preselected degree is applied to said circuit for releasing said arm from said detent for opening said circuit, whereby said disk becomes cooled and assumes its said normal initial form for reuse.

3. In an electrical circuit, a bi-metallic member, two electrodes carried by said member, one of said electrodes being insulated from said member and provided with a resilient swingable arm portion, the other electrode being in contact with said member and provided with a detent portion engaged with the free end of said arm for normally closing said circuit through said electrodes, said member being adapted to become deformed at times when the electrical current carried by said circuit becomes greater than a preselected normal degree, said member and electrodes being so constructed and assembled that at times when said member becomes deformed that said free end moves away from said detent for breaking said circuit.

4. In an electrical circuit opener, a metallic disk, oppositely disposed electrodes carried by said disk adapted to be included in said circuit, one of said electrodes being in contact with said disk and the other electrode electrically insulated from said disk, means for causing said electrodes to normally engage each other for closing an electrical circuit through said electrodes, said disk and electrodes being so constructed and assembled with respect to each other that at times when said circuit is electrically energized in excess of a preselected degree said electrodes disengage for breaking said circuit.

5. A device for the purpose described comprising a bi-metallic disk, two spaced apart electrodes secured to said disk, one of said electrodes being electrically insulated from said disk and the other in electrical contact therewith, a metallic spring arm having an end secured to one of said electrodes, means for causing engagement between the free end of said arm and the other electrode, said disk being so constructed that it becomes deformed when sufficiently heated for permitting disengagement of said arm and said other electrode, said disk being adapted to assume an initial form upon becoming of substantially initial temperature.

6. An electrical thermo-motive device comprising a bi-metallic disk of concavo-convex contour in cross section, an electrode secured to and electrically insulated from said disk having a swingable arm portion disposed across said disk, a detent electrode in electrical contact with said disk adjacent the perimeter thereof, the free end of said arm being adapted to engage in said detent, and resilient means for moving said arm away from said detent responsive to a change in the normal cross sectional contour of said disk.

7. A device as described in claim 6 having a knob of electrical insulating material adapted to be pressed by an operator's finger for moving the free end of said arm into engagement with said detent.

8. An electrical device comprising a thermo-motive electrode, a second electrode having a swingable arm portion disposed across and electrically insulated from said thermo-motive electrode, a detent electrode in electrical contact with said thermo-motive electrode, the free end of said arm being adapted to engage in said detent, and resilient means for moving said arm away from said detent responsive to a change in the normal contour of said thermo-motive electrode.

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