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ELECTRICAL OUTLET CONNECTORS

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This invention relates to an electrical circuit breaker, that is, to a device, adapted to be used in connection with electrical outlets, connection plugs, or other devices for connecting electrical appliances, to provide improved means for breaking the circuit in the event of an overload of current flow, and having means for resetting the device to operative condition after the fault causing such an overload has been corrected.

Heretofore various overload circuit breaking devices have been suggested some of which were designed to be interposed between the outlet receptacle and the connection plug of an electrical household appliance to be connected thereto, and in other instances the same have been incorporated in the connection plug itself for breaking the circuit.

Some of the aforesaid devices were fuse controlled which, however, were objectionable on account of the necessity of maintaining a supply of fuses on hand, and others which were operated by a thermally flexed bimetallic device which, when current of greater amperage than was required in the appliance was passed therethrough, would be flexed by the resultant heat and release spring tensioned parts to open the circuit.

The devices of the latter type were usually provided with means for resetting the same after the fault causing the overload had been corrected.

However, in the use of devices of the character aforesaid, no account was taken of the fact that, in most house wiring systems one side of the circuit is usually neutral and grounded, and the other side of the circuit is "hot" or live, and in many instances the fault would occur on the live side of the circuit, the connection plug would be so connected that the circuit would be broken by the device only on the neutral or grounded side, and if the appliance should be so connected, a potential source of danger would exist by reason of the failure to open the circuit on the live side.

With the foregoing in view, the principal object of the present invention is to provide circuit breaker means incorporated in electrical appliance connection devices which will open the circuit on both sides whenever an excess or overload of current may flow on either side.

A further object of the invention is to provide in a device of the character aforesaid, improved means for indicating whenever the device has been operated to open the circuit, and for resetting the same.

A further object of the present invention is to provide a device of the character aforesaid, which may be used by persons who are devoid of any electrical knowledge or skill.

The nature and characteristic features of the invention will be more readily understood from the following description, taken in connection with the accompanying drawing forming part hereof, in which:

Figure 1 is a plan view of an electrical outlet connector having circuit breaker means therein embodying the main features of the present invention, the same being shown with its cover plate removed;

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Fig. 2 is a vertical section thereof, taken on the line 2—2 of Fig. 1, with the parts shown in the operative or closed circuit positions;

Fig. 3 is a view similar to Fig. 2, but with the parts shown in the released or open circuit positions;

Fig. 4 is a transverse section taken approximately on the line 4—4 of Fig. 1; and

Fig. 5 is a similar view taken approximately on the line 5—5 of Fig. 1.

It should, of course, be understood that the description and drawing herein are merely illustrative, and various modifications and changes may be made in the structure and arrangement disclosed without departing from the spirit of the invention.

Referring to the drawing, in the particular embodiment of the invention therein shown, 10 is the housing, of a box like form, which may be made in any practical manner, preferably by molding the same, of insulating material.

The housing is provided with a cover plate 11, secured to the marginal edges of the side walls of the housing by screws or other suitable fastening devices. Internally extending from the base wall 12 of the housing 10 there are interiorly disposed projections 13, preferably integral therewith, or which may be secured thereto in any desired manner. One of these projections 13 is provided on each side and each has the lower end of a connection prong 14 fastened thereto, each of said prongs being provided with a bent portion 15 secured by a screw 16 to said internal projection.

From the base portion of each connection prong there extends forwardly a bimetallic member 20 which is adapted, when current of more than a predetermined amperage is passed therethrough, to be flexed by reason of the increased temperature caused by the current overload.

Each of the thermally flexed members 20 has its forward end extending under and normally engaging one of the arms 21 of a T-shaped lever, the tail 22 of which is secured to a resilient bracket 23, of angular form, one arm being secured by a screw 24 to said tail 22, and the other arm being secured by a screw 25 to one of the walls of the housing 10.

The resilient bracket 23 is normally tensioned to cause the arms 22 at the forward portion of the T-shaped lever to be depressed downwardly and normally overcoming the tension of the bimetallic members 20 hereinbefore referred to.

Intermediate the ends of the tail portion 22 of the T-shaped lever there is provided a notch 26 which is normally engaged by a projecting lip portion 27 of a flexible bracket member 28, one arm of which is secured to the base wall 12 of the housing 10 by a screw 29, and the other arm of which is secured by a screw 30 to a member 31 which is pivoted by means of a pin 32 extending therethrough, and having its ends secured in a projecting portion 33 of the base wall 12.

The pivoted member 31 is centrally slotted as at 34 for the passage therethrough of the tail portion 22 of the T-shaped member hereinbefore referred to.

On the upper portion of the pivoted member 31 there is secured, on each side thereof, a metallic arm 35. One end of each of said metallic arms 35 is bent over and secured by a screw 36 to a portion of the pivoted member 31. Said screw 36 also serves as a means for connecting a cable 37 to carry the current from the end of the bimetallic member to the metallic arm 35, this arrangement being provided on each side of the device.

Each of the metallic arms 35 carries a contact member 38 at its forward end, which is adapted, when the device is in the operative condition, to engage a contact member 40 carried on the upper end of a spring

contact plate 41 which extends through a slot 42 in a member 43 interiorly secured to the base wall 12 of the housing 10, there being one of such slots on each side for the reception of the prongs of the connection plug member mounted on the ends of the wires which extend to the appliance to be connected through the device.

The pivoted member 31 also has connected to the upper part thereof, a resetting rod 45, one end of which extends through one of the ends walls of the housing normally projecting a short distance outwardly on the exterior thereof. The other or inner end of the resetting rod 45 is attached to the pivoted member 31 by a screw 46.

The attachment by means of the screw 46 between the inner end of the resetting rod 45 and the pivoted member 31 is a more or less loose one to permit the co-action between these parts notwithstanding the pivotal movement of the member 31 within the housing whenever the circuit is broken.

It will be noted, however, that when the circuit is broken by the release of the pivoted member 31, the outer end of the resetting rod 45 will be caused to project outwardly, on the outside of the housing, to an appreciably greater extent, thereby to provide a visual indication whenever the circuit is broken.

The operation of the device as above described will now be easily understood.

In the event of a flow of current for any reason, on either side of the circuit, in excess of the normal amount for which the thermally flexed members are calibrated, one or the other, as the case may be, of said members will become overheated, causing the same to flex sufficiently to raise the T-shaped lever against the tension of the resilient bracket 23 which supports the same.

When the T-shaped lever is raised a sufficient distance to free the lip portion 27 of the resilient bracket 28 from the notch 26 in the tail portion 22 of the T-shaped lever, the pivoted member 31 will thus be released and, by reason of the tension of its resilient supporting bracket member 28, the same will be swung about the pivotal axis provided by the pin 32, whereupon the contact members 38 carried on both sides of the pivoted member will be raised from their engagement with the contact members 40, carried on the upper ends of the spring contact plates 41.

In this manner the circuit will be broken on both sides and this condition will be indicated by the greater extension of the protruding end of the resetting pin 45, the inner end of which is connected to the upper part of the pivoted member 31.

When it is desired to reset the device, it is only necessary to push the resetting pin inwardly causing the pivoted member 31 to move forward until the lip 27 of its resilient bracket 28 is again permitted to engage the notch 26 on the under side of the tail portion 22 of the T-shaped lever.

It will be noted that there is thus provided a simple, efficient, and relatively inexpensive device, which is adapted to be plugged into the ordinary outlet of an electric circuit, and into which may be plugged the plug connector of an electrical appliance, which device will serve effectively to open the circuit on both sides in the event of an overload on either side thereof.

I claim:

1. An overload circuit breaker of the character described comprising a housing, connection prongs extending outwardly from said housing and having parts extending into and secured within said housing, a pair of thermally flexed members electrically connected respectively to internal portions of said prongs, a pair of members internally mounted for movement in said housing, one of said members being adapted to be shifted by the ends of the thermally flexed members, and the other member having a pair of arms each carrying a contact member at the end thereof, said members being normally held in

operative position by a notch and lip engagement therebetween, said parts being disengaged by the passage of abnormal current through either of the thermally flexed members, means electrically connecting the thermally flexed members to the aforesaid contact members, another pair of contact members adapted to be normally engaged by the contact members carried by the aforesaid arms, plates positioned in slots into which the prongs of the connection plug of an electrical appliance are adapted to be inserted to complete the circuit, said last mentioned contact members being carried by said plates, and means for indicating the opening and closing of the circuit and for resetting the parts to operative positions.

2. An overload circuit breaker of the character described comprising a housing, connection prongs extending outwardly from said housing and having parts extending into and secured within said housing, a pair of thermally flexed members electrically connected respectively to internal portions of said prongs, a pair of members internally mounted for movement in said housing, one of said members being adapted to be shifted by the ends of the thermally flexed members, and the other member having a pair of arms each carrying a contact member at the end thereof, said members being normally held in operative position by a notch and lip engagement therebetween, said parts being disengaged by the passage of abnormal current through either of the thermally flexed members, means electrically connecting thermally flexed members to the aforesaid contact members, another pair of contact members adapted to be normally engaged by the contact members carried by the aforesaid arms, and plates positioned in slots into which the prongs of the connection plug of an electrical appliance are adapted to be inserted to complete the circuit, said last contact members being carried by said plates.

3. An overload circuit breaker of the character described comprising a housing, connection prongs extending outwardly from said housing and having parts extending into and secured within said housing, a pair of thermally flexed members electrically connected respectively to internal portions of said prongs, a member internally mounted for movement in said housing having portions engaged and adapted to be shifted by the ends of the thermally flexed members, another movable member having a pair of arms each carrying a contact member at the end thereof normally held in operative position by the movable member which is adapted to be shifted by the thermally flexed members to release said last mentioned movable member, flexible cables electrically connecting the ends of the thermally flexed members to the arms carrying the aforesaid contact members, a pair of contact members adapted to be normally engaged by the contact members carried by the aforesaid arms, and plates positioned in slots into which the prongs of the connection plug of an electrical appliance are adapted to be inserted to complete the circuit, said last mentioned contact members being carried by said plates.

4. An overload circuit breaker of the character described comprising a housing, connection prongs extending outwardly from said housing and having parts extending into and secured within said housing, a pair of thermally flexed members electrically connected respectively to internal portions of said prongs, a member internally mounted for movement in said housing having portions engaged and adapted to be shifted by the ends of the thermally flexed members, another movable member having a pair of arms each carrying a contact member at the end thereof normally held in operative position by the movable member which is adapted to be shifted by the thermally flexed members to release said last mentioned movable member, flexible cables electrically connecting the ends of the thermally flexed members to the arms carrying the aforesaid contact members, a pair of contact members adapted

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to be normally engaged by the contact members carried by the aforesaid arms, plates positioned in slots into which the prongs of the connection plug of an electrical appliance are adapted to be inserted to complete the circuit, said last mentioned contact member being carried by said plates, and means for indicating the opening and closing of the circuit and for resetting the same.

5. An overload circuit breaker of the character described comprising a housing, connection prongs extending outwardly from said housing and having parts extending into and secured within said housing, a pair of thermally flexed members electrically connected respectively to internal portions of said prongs, a member internally mounted for movement in said housing having portions engaged and adapted to be shifted by the ends of the thermally flexed members, another movable member having a pair of arms each carrying a contact member at the end thereof normally held in operative position by the movable member which is adapted to be shifted by the thermally flexed members to release said last mentioned movable member, flexible cables electrically connecting the ends of the thermally flexed members to the arms carrying the aforesaid contact members, a pair of contact members adapted to be normally engaged by the contact members carried by the aforesaid arms, spring plates positioned in slots into which the prongs of the connection plug of an electrical appliance are adapted to be inserted to complete the circuit, said last mentioned contact members being carried by said plates, and an externally extending member connected to one of the movable members for indicating the opening and closing of the circuit and for resetting the same.

6. An overload circuit breaker of the character described for use in an electrical circuit having two sides and comprising a housing, connection members for each side in said housing, a pair of separately operable thermally flexed members electrically connected to said connection members, members internally mounted for movement in said housing, one of said members having portions engaged and adapted to be shifted by said thermally flexed members, and the other of said members having a pair of arms each carrying a contact member at the end thereof normally held in operative position by the movable member which is adapted to be shifted by the thermally flexed members to release said last mentioned movable member, said movable members being normally held in operative positions by engagement therebetween, a pair of contact members adapted to be normally engaged by the contact members carried by the aforesaid arms, and means for connecting said last mentioned contact members in the respective sides of the circuit, the arrangement being such that both sides of the circuit will be opened upon passage of excess current through either one of the thermally flexed members.

7. An overload circuit breaker of the character described for use in an electrical circuit having two sides and comprising a housing, connection members for each side in said housing, a pair of separately operable thermally flexed members electrically connected to said connection members on the respective sides of the circuit, a member internally mounted for movement in said housing having portions engaged and adapted to be shifted by said thermally flexed members, another movable member having a pair of arms each carrying a contact member at the end thereof normally held in operative position by the movable member which is adapted to be shifted by the thermally flexed members to release said last mentioned movable member, a pair of contact members adapted to be normally engaged

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by the contact members carried by the aforesaid arms, and means for connecting said last mentioned contact members in the respective sides of the circuit, the arrangement being such that both sides of the circuit will be opened upon passage of excess current through either one of the thermally flexed members.

8. An overload circuit breaker of the character described for use in an electrical circuit having two sides and comprising a housing, connection members for each side in said housing, a pair of separately operable thermally flexed members electrically connected to said connection members on the respective sides of the circuit, a member internally mounted for movement in said housing having portions engaged and adapted to be shifted by said thermally flexed members, another movable member having a pair of arms each carrying a contact member at the end thereof normally held in operative position by the movable member which is adapted to be shifted by the thermally flexed members to release said last mentioned movable member, a pair of contact members adapted to be normally engaged by the contact members carried by the aforesaid arms, means for connecting said last mentioned contact members in the respective sides of the circuit, the arrangement being such that both sides of the circuit will be opened upon passage of excess current through either one of the thermally flexed members, and means for indicating the opening and closing of the circuit and for manually resetting the same.

9. An overload circuit breaker of the character described for use in an electrical circuit having two sides and comprising a housing, connection members for each side in said housing, a pair of separately operable thermally flexed members electrically connected to said connection members on the respective sides of the circuit, a member internally mounted for movement in said housing having portions engaged and adapted to be shifted by said thermally flexed members, another movable member having a pair of arms each carrying a contact member at the end thereof normally held in operative position by the movable member which is adapted to be shifted by the thermally flexed members to release said last mentioned movable member, a pair of contact members adapted to be normally engaged by the contact members carried by the aforesaid arms, means for connecting said last mentioned contact members in the respective sides of the circuit, the arrangement being such that both sides of the circuit will be opened upon passage of excess current through either one of the thermally flexed members, and an externally extending member connected to one of the movable members for indicating the opening and closing of the circuit and for manually resetting the same.

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