July 18, 1939. G. N. LEMMON 2,166,782

CIRCUIT INTERRUPTER

Filed Aug. 31, 1936

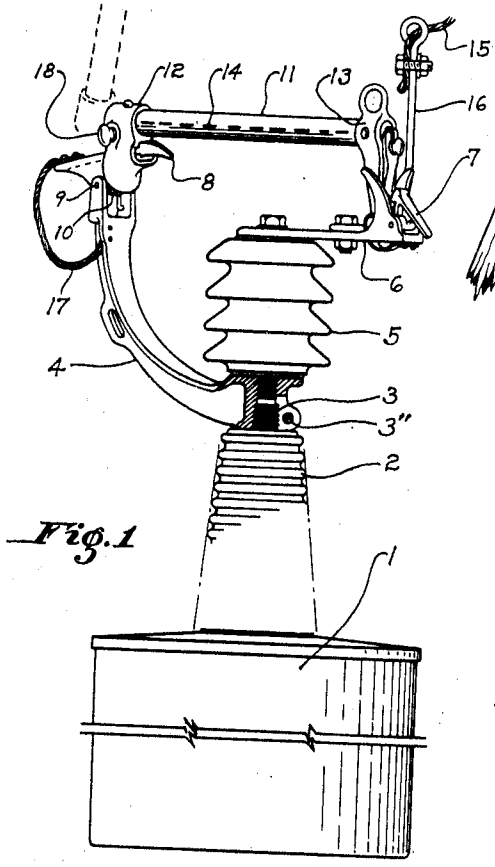


Fig. 1

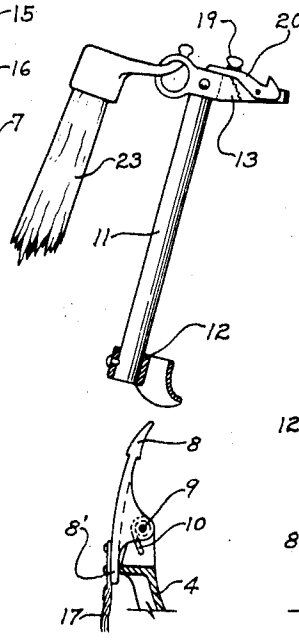


Fig. 2

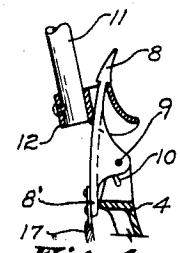


Fig. 4

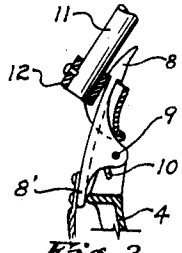


Fig. 3

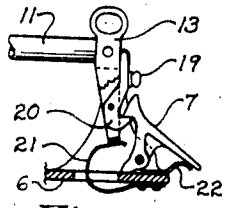


Fig. 6

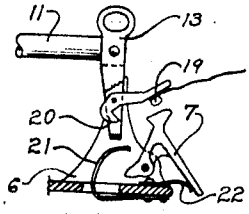


Fig. 7

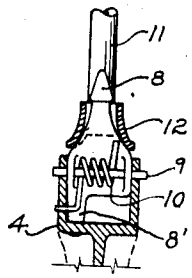


Fig. 5

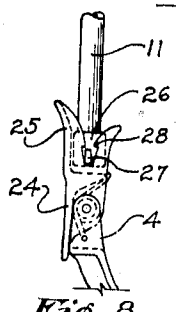


Fig. 8

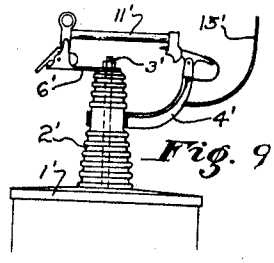


Fig. 9

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CIRCUIT INTERRUPTER

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Application August 31, 1936, Serial No. 98,629

15 Claims. (Cl. 200—114)

This invention relates to electrical circuit interrupters of the sort known as expulsion tube fuses.

One purpose is to provide a device in which the tube is automatically removed from closed-circuit position whenever the fuse-link has ruptured. Another purpose is to provide means for readily removing and replacing the tube and its fuse-link. Another purpose is to provide means for mounting such protective equipment directly on a transformer bushing, or similar location, with a minimum or strain upon such support. Another purpose is to provide an article of manufacture which accomplishes the desired results and which can be produced at low cost. Other purposes will be evident from the following specification and claims.

Referring to the drawing, Fig. 1 shows my device as mounted on a transformer; Fig. 2 is a partial view showing the hinge and the tube when the tube is being removed or replaced; Figs. 3, 4, and 5 are details of the hinge in partial section; Figs. 6 and 7 are similar details at the latch end of the tube; Fig. 8 is a modified form of hinge; and Fig. 9 shows in small scale a modification of the supporting insulators and other parts.

The transformer 1 has a porcelain bushing 2, and a terminal stud 3 upon which is mounted the circuit interrupter base 4. The bolt 3'' clamps base 4 to stud 3. The base 4 supports the insulator 5 to which is secured the arm 6, with its pivoted latch 7. The base 4 also supports the hinge member 8 by means of the pivot 9.

A spring 10 biases hinge member 8 counter-clockwise. The tube 11 has a hinge terminal 12 which engages with the hinge member 8, and a latch terminal 13 which carries a pivoted hook member 20 which is engageable with the latch 7. A fuse-link 14 normally closes the circuit between hinge terminal 12 and latch terminal 13. The incoming line 15 connects with the rod 16, and the circuit extends through the members 6, 13, 14, 12, 8 and 4 to the transformer terminal 3. A flexible shunt 17 makes positive connection between hinge member 8 and base 4.

One end of the fuse-link 14 is attached by the screw 18 to the terminal 12, and the other end of 14 is held by screw 19 to the hook 20. A curved spring 21 is supported by the arm 6 and presses upwardly against the terminal 13 to insure good contacts. The terminal 13 has a ring for engagement by a switch-hook 23 as shown in Fig. 2.

On the hinge member 8 are two projections as shown particularly in Figs. 2, 3, 4 and 5, which are engageable with the upper edges of the flared opening which extends through terminal 12. A spring 22 biases the latch 7 counter-clockwise, and a suitable stop prevents overtravel.

Operation is as follows. To place the tube and its fuse-link in service, a switch-hook 23, or other suitable means, is used to lower the terminal 12 over the point of the hinge member 8 as shown in Fig. 2. The wide flare on 12 makes it easy to be so placed, and the parts are coordinated so that they readily become closely engaged with one another as shown in Fig. 5. The terminal 13 is next moved forward and downward, which causes the back, or upper, ridge on hinge 8 to engage with the edge of 12, as shown in Fig. 3. Further motion of the tube towards closed position imposes more stress on the spring 10, which retains the parts thus locked together until they return to their former positions. When the latch terminal 13 reaches closed position, shown in Fig. 6, it has engaged with the spring-contact 21 and the latch 7 engages with the hook 20, thereby holding the tube in closed circuit position, with a slight tension on the fuse-link 14. Flared upward projections on 6 serve as guides for 13.

When the fuse-link 14 ruptures, as by overload, the hook 20 is free to rotate away from latch 7 to the position in which it is shown in Fig. 7. Then the spring 10 moves member 8 and so swings the tube 11 to the open position indicated by dotted lines in Fig. 1. The member 8 is prevented from over-travelling by the stop 8', but the momentum of tube 11 carries it backward until the parts 8 and 12 are as shown in Fig. 4, when the lower, or forward ridge on 8 has engaged with the corresponding edge of the opening through hinge terminal 12. When it is desired to remove the tube from the device, the ring on 13 is lifted upwards, and a slight shaking of the switch-hook disengages hinge terminal 12 from both ridges on 8, so the upward removal of the tube may be completed. If it is desired to open the circuit without rupture of the fuse-link, a switch-hook or other suitable means is used to tap downwards on the extended part of the latch 7, thereby releasing it from the hook 20. The spring 10 thereupon swings the tube up to the opening position. Fig. 7 shows the latch 7 in the above position.

Fig. 8 shows a modified form of hinge in which the hinge member 24 has two slots between the portions 25 and 28, into which the terminal 26 fits. A flat projection 27 on each side of the terminal 26 engages with the said slots, and when the tube is pulled towards closed circuit position

the projecting point 28 engages with 27 thereby locking together 24 and 26.

Locating the tube directly above the transformer terminal, reduces the strain imposed upon stud 3, and having the tube horizontal when the fuse ruptures prevents the gases from being expelled downward where they might cause trouble. Also it is possible to rotate the entire protective device about the axis of the transformer terminal, thereby bringing the fuse tube into any desired angular position without moving the transformer.

Many modifications of mounting, hinge, latch, and other details can readily be made by one skilled in the art without departing from the purpose and spirit of this invention. Obviously any overload responsive means for interrupting the circuit within the expulsion tube, which is the equivalent for the fuse described above, may be substituted for the fuse and is within the scope of this invention.

As a modification, the hinge and latch ends of the device may be transposed so that the latch is mounted on the base arm 4 while the hinge is mounted on top of the insulator 5. It is also possible to provide a longer porcelain bushing for the transformer as shown in Fig. 9. In this case the arm 4' is secured to the bushing 2' by a band around the outside of the porcelain 2', and the terminal conductor 3' is connected directly to the member 6'. The incoming line 15' is attached to the arm 4', and the tube 11' carries the fuse, similar to the arrangement shown in Fig. 1.

These and similar modifications do not depart from the purpose and spirit of this invention.

I claim:

1. In combination, in a circuit interrupter, an insulating bushing with a conductor therethrough, two conductive members borne by the said bushing and insulated from one another and spaced from one another by a gap, a tubular insulating container above the said bushing and spanning the said gap, and a fusible conductor within the said container and completing the circuit between the said two conductive members.

2. In combination, in a circuit interrupter, an insulating bushing with a conductor therethrough, two conductive members borne by the said bushing, an insulating tubular container held transversely above the said bushing by the said conductive members, and a fusible conductor within the said container.

3. In a circuit interrupter, an insulating bushing with a conductor terminal at its upper end, a second insulator supported upon the said terminal, a second conducting member supported upon the said second insulator, an arm extending outwardly and upwardly from the first said terminal and a fuse completing the circuit between said second conducting member and the said arm.

4. In a circuit interrupter, an insulating bushing with a conductor terminal at its upper end, an arm secured to a mid-position on the bushing and extending outwardly to a second conducting terminal, together with a fuse member completing the circuit between the two said terminals.

5. In an apparatus of the class described, an electrical device having a casing, an insulating bushing carried by said casing and forming a unitary portion of said casing, a fuse structure outside of said bushing for protecting said electrical device, and means detachably and removably locking said fuse structure to said bushing to bodily support said fuse structure from said bushing, whereby said fuse structure may be bodily removed from said bushing.

6. In an apparatus of the class described, an electrical device having a casing, an insulating bushing carried by said casing and forming a unitary portion of said casing, said bushing rigidly carrying a conducting member, a fuse structure outside of said bushing for protecting said electrical device, and conducting means forming a portion of said fuse structure detachably and removably interlocked with said conducting member, whereby said fuse structure is carried by said bushing and is bodily removable therefrom.

7. In an apparatus of the class described, an electrical device having a casing, an insulating bushing carried by said casing and forming a unitary portion of said casing, a stud rigidly carried by said bushing, a fuse structure outside of said bushing for protecting said electrical device, a socket member carried by said fuse structure for receiving said stud, and means detachably locking said socket member to said stud, whereby said fuse structure is supported from said bushing and is bodily removable therefrom.

8. In an apparatus of the class described, an electrical device having a casing, an insulating bushing carried by said casing and forming a unitary portion of said casing, a stud rigidly carried by said bushing, a fuse structure outside of said bushing for protecting said electrical device, a socket member carried by said fuse structure for receiving said stud, and means detachably locking said socket member to said stud, whereby said flue structure is supported from said bushing and is bodily removable therefrom, said stud and said socket member forming a portion of an electrical circuit to said electrical device.

9. In an apparatus of the class described, an electrical device having a metal casing, an insulating bushing carried by said casing, a drop-out fuse structure supported from said bushing and including a pivotally mounted fuse tube movable from operative to inoperative position, mechanism normally holding said fuse tube in operative position and releasing said tube when said mechanism operates, and a fuse link restraining said mechanism from releasing operation.

10. Apparatus as set forth in claim 5, in which the fuse structure comprises a drop-out expulsion tube, means to hold the tube in operative position, and a conductor within the tube operable on overload to break the circuit within the tube and permit the tube to move from its closed-circuit position.

11. Apparatus as set forth in claim 6, in which the fuse structure comprises a drop-out expulsion tube, means to hold the tube in operative position, and a conductor within the tube operable on overload to break the circuit within the tube and permit the tube to move from its closed-circuit position.

12. Apparatus as set forth in claim 7, in which the fuse structure comprises a drop-out expulsion tube, means to hold the tube in operative position, and a conductor within the tube adapted operable on overload to break the circuit within the tube and permit the tube to move from its closed-circuit position.

13. In a circuit interrupter, an insulating bushing with a conductor terminal at its upper end, a second insulator supported upon said terminal, a

second conducting member supported on said second insulator, an arm extending outwardly and upwardly from the first said terminal, a drop-out expulsion tube, means to hold the tube in operative position, and a conductor within the tube completing the circuit between said second conducting member and said arm and operable on overload to break the circuit within the tube and permit the tube to move from its operative position.

14. In a circuit interrupter, an insulating bushing with a conductor terminal at its upper end, an arm secured to the mid portion of the bushing and extending outwardly to a second bushing terminal, a drop-out expulsion tube, means to hold the tube in operative position and a conductor within the tube completing the circuit between said two terminals and operable on overload to break the circuit within the tube and permit the tube to move from its operative position.

15. In an apparatus of the class described, an electrical device having a metal casing, an insulating bushing carried by said casing, an expulsion tube circuit interrupting structure supported from said bushing and including a pivotally mounted tube movable from operative to inoperative position, mechanism normally holding said tube in operative position and releasing said tube when said mechanism operates, and a conducting link operable to open the circuit in the tube and normally restraining said mechanism from releasing operation.

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