May 24, 1932. F. C. LA MAR 1,860,313

FUSE

Filed Feb. 19, 1930

FIG. 1

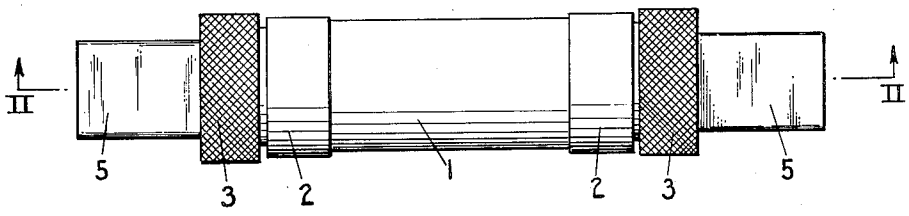


FIG. 2

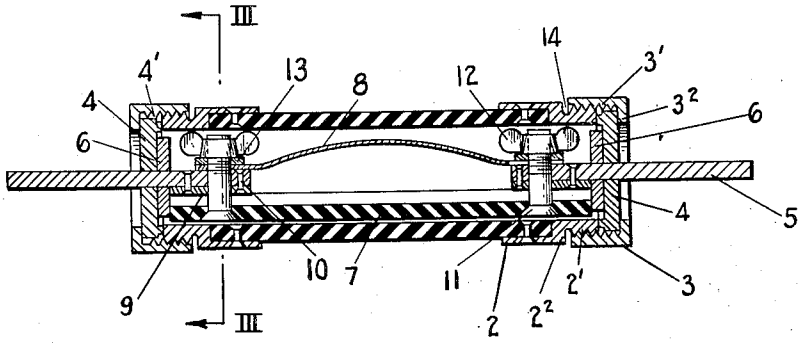


FIG. 3

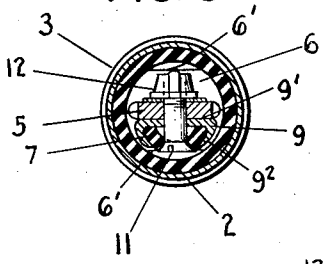


FIG. 4

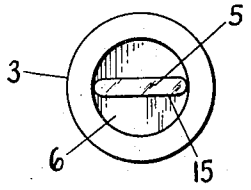
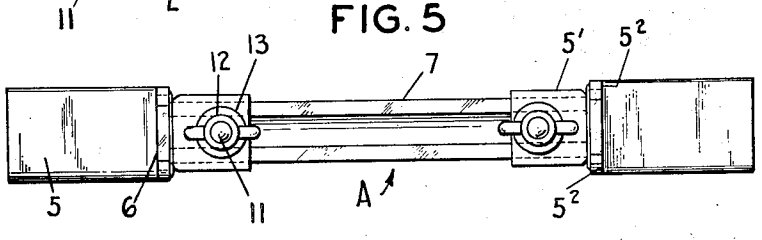


FIG. 5



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UNITED STATES PATENT OFFICE

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FUSE

Application filed February 19, 1930. Serial No. 429,473.

This invention relates to electrical devices, especially to electrical devices for interrupting an electrical circuit upon an abnormal flow of current therein and more particularly to such a device including an easily fusible link commonly known as a fuse.

Heretofore fuses of the renewable cartridge type have been made in many forms. These forms have apparently been devised in an attempt to produce a renewable fuse of the cartridge type which consisted of a minimum of parts, inexpensive to assemble, and which was so constructed that to remove the fusible element from the cartridge in order to replace it with a new fusible element would require the fewest manipulations and the fewest and most commonly used tools.

A principal object of applicant's invention is the provision of a renewable fuse of the cartridge type which is so constructed that a minimum of parts must be disassembled in order to replace the fusible element and which preferably does not require the use of any tools whatsoever.

A further object of the invention is the provision of a device of the type described which includes knife blades held in alignment by an insulating bridge.

A further object of the invention is the provision of a device of the type described, including an insulating bridge for maintaining knife blades in alignment and means for securing the ends of the bridge to the knife blades, of such a form that the bridge may be removed and replaced by a new bridge by the use of the fewest possible commonly used tools.

Other objects and advantages will appear as the description of the particular physical embodiment selected to illustrate the invention progresses and the novel features of the invention will be particularly pointed out in the appended claims.

In describing the invention in detail and the particular physical embodiment selected to illustrate the invention reference will be had to the accompanying drawings and the several views thereon in which like characters of reference designate corresponding parts throughout, and in which:

Figure 1 is a side elevational view of a complete renewable cartridge fuse of the knife blade type embodying the invention; Fig. 2 is a longitudinal cross-sectional view on the plane indicated by the line II—II of Fig. 1, viewed in the direction of the arrows at the ends of the line; Fig. 3 is a transverse cross-sectional view on the plane indicated by the line III—III of Fig. 2, viewed in the direction of the arrows at the ends of the line; Fig 4 is an end elevational view of the device as shown by Fig. 1; Fig. 5 is a top plan view of a unitary knife blade assembly as used in the device.

In general the device comprises an insulating shell or tube 1 having at each end identically formed ferrules as 2, identically formed end caps as 3, identically formed closure washers as 4, and a knife blade assembly designated as a whole by A, including oppositely disposed identically formed separated knife blades 5 protruding from each end of the shell 1.

Each of the knife blades has a shoulder as 6 thereon. This shoulder may be integral or may be placed on the knife blade terminal 5 and secured rigidly thereon in any desired manner. It is preferred to make the shoulder 6 from a separate piece and in the form of a disc except that it is preferred to flatten opposite sides as shown at 6′, Fig. 3. It is also preferred to have a slot in the disc and of such size that it will pass over the tang 5′ of the knife blade but will abut the shoulders as 5^2 of the knife blade.

Abutting the shoulder 6 on the blade 5 is the closure washer 4 which is formed on its inner side with projections at intervals, as 4′.

The cap 3 is formed with an internal thread 3′ and a flange 3^2. The internal thread 3′ contacts with an external thread 2′ upon the ferrule 2 and the flange 3^2 is of such size that the blade 5 may pass therethrough but the flange will bear against the closure washer 4.

The dimensions of the parts are such that the shoulder 6 may pass through the shell 1 and ferrules 2 from end to end; the washer 4 has its projections 4′ bearing against the end wall of the ferrule 2 providing a slight

gas space therebetween; the cap 3 when screwed into place, as shown in Fig. 2, holds the closure washer 4 firmly against the shoulder 6 and the projections 4′ thereof firmly against the end of the ferrule 2 but the inner end of the cap comes just short of meeting the shoulder 2^2 of the ferrule.

In order to maintain the knife blades 5 in spaced relation longitudinally and in alignment, the insulating bridge 7 is used. This bridge may be made of many different materials but it is preferred to use horn fibre. The cross-section of the bridge may be of various forms but it has been found that an arcuate form is preferable. This form of cross-section is shown in Fig. 3. It provides the maximum of material adjacent the shell and the maximum separation from the fusible link 8. In order to attach the bridge to the tangs 5′ of the blades with a minimum of parts and a maximum of efficiency in maintaining spacing and alignment, applicant has provided the end sockets 9. These end sockets have a flat portion 9′ bearing against the flat side of the tank and are preferably riveted thereto by rivets as 10. Each socket has bent up edges 9^2 which conform to the outer portion of the arcuate bridge member 7. The arcuate bridge member 7 is positioned by being slipped longitudinally into the sockets 9 until it abuts against the shoulders as 6. The knife blades are thereby spaced and aligned.

In order to hold the bridge in position and to also hold the renewable fuse link 8 in position, a flat headed screw 11 is passed through a counter sunk orifice in the bridge and threaded into an orifice in the tang 5′ and extending up beyond the tank 5′ provides a threaded rod like member about which the ends of the fusible link 8 are passed and which bear wing nuts 12 for clamping the washers 13 firmly against the ends of the fusible link 8 to hold them in place.

If a fusible link as 8 fuses then in order to replace it with a new fusible link it is necessary to remove only one of the end caps 3. When an end cap as 3 is removed, the unitary fuse link device A may be then withdrawn from the shell 1. After being withdrawn from the shell 1 it is merely necessary to loosen the two wing nuts 12, remove the remnants of the old fuse link, substitute a new fuse link 8, then tighten the wing nuts, replace the assembly within the shell 1, rotating it until blade 5 matches with the slot 15 in the washer 6, place the washer 6 which has been removed upon the other knife blade and then screw the cap which has been removed into place.

If for any reason the bridge 7 needs to be renewed it may easily be done by first removing the assembly A from the shell, then unscrewing the screws 11 from their threaded engagement with the blades 5, whereupon they may be entirely withdrawn, a new insulating bridge 7 put into place, and the screws replaced.

When a fusible link is fused in service the gases formed within the shell pass around the end of the ferrules 2 between the washer 4 and the ferrule into the threads 3′ and 2′, around the threads, finally issuing at the space 14 between the end of the cap 3 and the shoulder 2^2 of the ferrule.

From the above description it will be seen that a new fusible link may be inserted in the device without the use of any tools whatsoever, although of course, applicant does not mean to exclude the use of ordinary nuts in place of the wing nuts 12, in which case, a wrench or pliers of some sort would be probably required. The only other part of the interior of the fuse which may possibly need renewing being the insulating bridge 7, provision has been made so that it may be readily renewed by the use of no tools other than perhaps a screw driver, and a pair of pliers if an ordinary nut is used in place of the wing nut 12.

Although I have particularly described one particular physical embodiment of my invention and explained the principle and construction thereof, nevertheless, I desire to have it understood that the form selected is merely illustrative but does not exhaust the possible physical embodiments of the idea of means underlying my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a renewable cartridge fuse, in combination: a hollow insulating body; a metallic ferrule attached on one end of the body and provided with an external thread; a flanged cap provided with an internal thread for cooperation with the external thread of the ferrule; a slotted washer formed with projections resting on the end of the ferrule clamped between the flange of the cap and the ferrule; a knife blade protruding through the slot in the washer, formed with a shoulder against which the washer bears and a threaded orifice for the reception of a screw threaded member; a socket attached to the knife blade; an elongated insulating bridge member having an end inserted in the socket; a headed screw threaded member passing through the bridge member, the socket, screw threaded into the knife blade and projecting therethrough, a nut for cooperation with the projecting portion of the screw threaded member for attaching one end of a fuse link to the knife blade and means cooperating with the other end of the bridge member for forming another knife blade spaced from the first mentioned knife blade closing the other end of the hollow member and providing for the attachment of the other end of the fusible link.

2. In a knife blade assembly for a renewable cartridge fuse, in combination: two op-

positely disposed separated knife blades; socket members; one attached to each knife blade; an insulating bridge having an end inserted in each socket; two headed screw threaded members; one passing through each end of the bridge and a socket threaded into a knife blade and projecting therebeyond; nuts, one on each screw threaded member for clamping an end of a fusible link to a knife blade.

3. In a knife blade assembly for a renewable cartridge fuse, in combination; two oppositely disposed separated knife blades; socket members; one attached to each knife blade; an insulating bridge having an end inserted in each socket; two headed screw threaded members; one passing through each end of the bridge and a socket threaded into a knife blade and projecting therebeyond; nuts, one on each screw threaded member for clamping an end of a fusible link to a knife blade, shoulder members, one rigid on each knife blade; slotted washers, one on each knife blade and formed with inward projections; internally threaded flanged caps one cooperating with each washer; externally threaded ferrules, one cooperating with each cap, and a hollow enclosing body joining the ferrules.

4. As a means for spacing the knife blades of a renewable cartridge fuse, the combination with two spaced oppositely disposed threaded orificed knife blades of socket members one attached to each blade, an insulating bridge piece having opposite ends engaging the socket members and headed screw threaded members, one passing through each end of the bridge piece, through a socket screw threaded into a knife blade orifice and projecting therefrom and having a nut thereon for securing a fusible link to the knife blade.

5. As a unitary assembly for the knife blades of a renewable fuse, the combination of: two separated knife blades; an insulating bridge member extending between and overlapping the end of each knife blade; a socket for each knife blade formed with a flat face resting against a flat face of the knife blade and upturned edges partially embracing the end of the bridge member; means fastening the sockets to the blades and headed screwed members, one passing through each end of the bridge, through each socket and threaded into a blade and extending therebeyond and provided with a nut to fasten one end of a link to the blade.

FRANK C. LA MAR.