April 19, 1932. H. R. COOK 1,854,450

CARTRIDGE FUSE

Filed Oct. 4, 1930

Fig. 1.

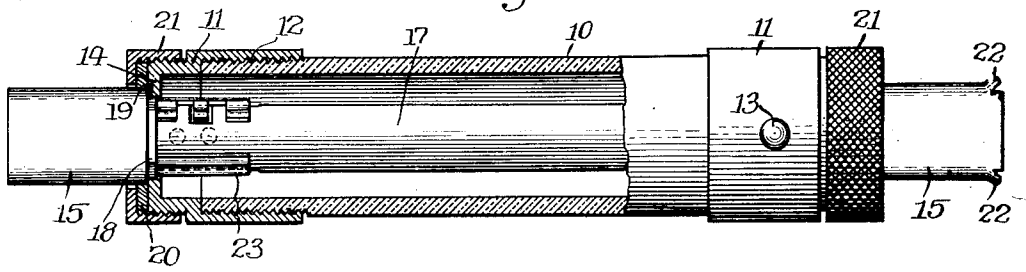


Fig. 2.

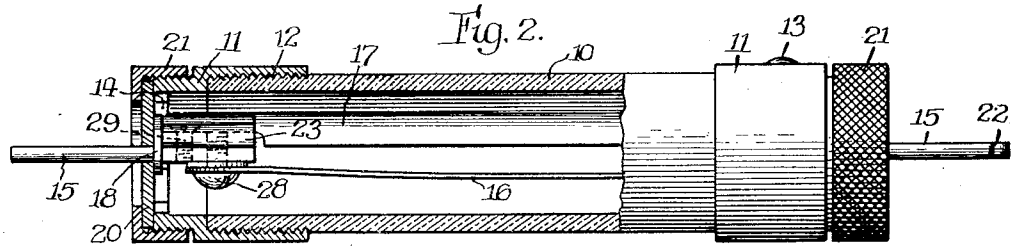


Fig. 3.

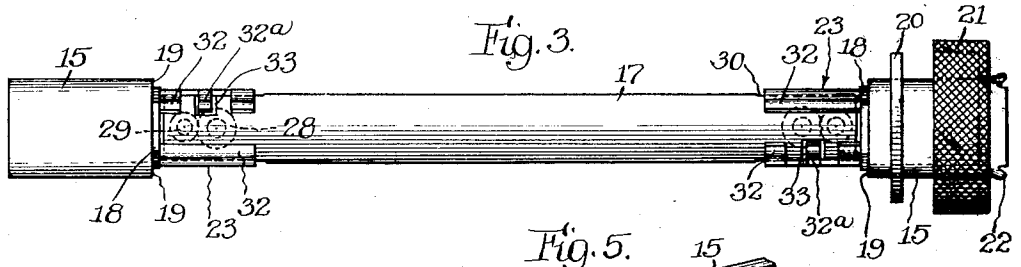


Fig. 4.

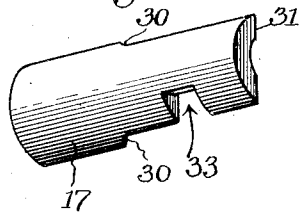
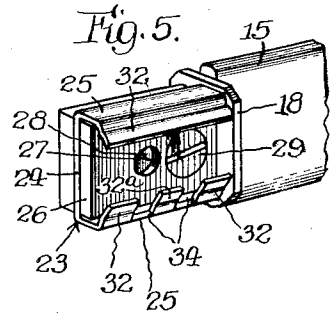


Fig. 5.



Inventor:
Herbert Ray Cook,
By Glascock Downing & Seboldt
Attys.

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UNITED STATES PATENT OFFICE

HERBERT RAY COOK, OF CHICAGO, ILLINOIS, ASSIGNOR TO JEFFERSON ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

CARTRIDGE FUSE

Application filed October 4, 1930. Serial No. 486,317.

The invention relates to renewable cartridge fuses and more particularly to those of the knife blade type.

An object of the invention is to provide an improved cartridge fuse of the renewable type in which the major elements that are removable from the casing are incorporated in a terminal blade unit which is so constructed as to compensate for a relative variation in length of the parts of the fuse caused by expansion or contraction thereof.

More specifically stated, it is an object of the invention to provide an improved terminal blade unit for a cartridge fuse which embodies a pair of terminal blades secured in alinement to an insulating section by means which maintains such alinement and yet is capable of permitting limited longitudinal movement between the parts to facilitate assembly of the fuse and to compensate for a variation of length of the terminal blade unit relative to the casing wherein it is mounted.

Further objects and advantages will become apparent as the description proceeds.

In the drawings:

Figure 1 is a lonigtudinal view partly in section of one form of the invention.

Fig. 2 is a similar view taken in a plane at right angles to that of Fig. 1.

Fig. 3 is a plan view of the terminal blade unit.

Fig. 4 is a fragmental perspective view of one end of the insulating member.

Fig. 5 is a fragmental perspective view of the end of a terminal blade to which the insulating member is secured.

Figs. 4 and 5 taken together illustrate the manner of assembling the insulating member and the terminal blades.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

In describing the particular embodiment of the present invention illustrated herein, reference is had to the patent to McDonald and Cook, No. 1,702,353, issued February 19, 1929, covering a cartridge fuse, of which the present invention is an improvement.

Referring to the drawings, 10 designates a cylindrical tube of fibre or other insulating material, to the opposite ends of which two metallic heads or bushings 11 are secured in any suitable manner, such for example as by means of the screw threads 12, rivets 13 or both. At their outer ends, these heads have end walls or webs 14 arranged to form alined non-circular apertures therein.

The terminal blade unit which carries the fusible element may be of various forms such as that illustrated in Fig. 3. This unit comprises a pair of knife-blade terminals 15, one or more fusible elements 16 connecting the terminals, and a bridge section 17 in the form of an elongated bar of suitable insulating material, such as fibre, for securing the blades together in spaced relation. Each of the knife-blade terminals 15 has a plate 18 affixed thereto in any suitable manner to extend transversely of the blade intermediate the ends thereof, which blade is arranged to engage certain of the sides of the aperture defined by the web 14 on the head 11 to hold the blade against rotation relative to the head.

The knife-blades 15 are provided with shoulders 19 formed on the opposite edges thereof adjacent the plates 18 and the inner portions of the blades are narrower than the outer or terminal portion. The shoulders 19 are adapted to abut the outer sides of the webs 14 of the heads 11 to prevent any movement of the blade in the casing when positioned axially thereof as shown in the left hand end of Fig. 1. When the blades are in this position, the plates 18 are located in the planes of, or are flush with, the webs 14 and are non-rotatably disposed within the apertures therein.

A metal washer 20 of substantially the same diameter as that of the head 11 fits slidably on the end of each knife-blade and an end cap 21 having screw-threaded engagement with the head 11 is employed to secure

the parts in assembled relation. Where desired, the washer 20 and the end cap 21 on one of the terminal blades may be permanently retained thereon by means of one or more projecting or up-set portions 22 on the blade.

The insulating member 17 extends between and is secured to the terminal blades 15 so that the terminal blades are joined as a unit and may be removed from or inserted into the casing through one end thereof. The insulating member also serves to hold the terminal blades in alinement and prevents tipping or other movement of the terminal blades relative to the casing.

In the operation of fuses of this character, the parts are subjected to a change of temperature which covers a considerable range. Such changes of temperature have a direct effect on the parts of the unit to produce a considerable variation of the dimensions thereof. Moreover, since the insulating member is generally formed of fibre or similar material, it is directly affected by moisture which may result in a similar variation of dimensions. This may also be true of the casing 10. In any event, a longitudinal variation of the parts is undesirable for many reasons, as for example it may cause the insulating bar 17 to buckle or bow into contact with the fusible element 16; or it may prevent the shoulders 19 from being firmly seated against the webs 14, or the plates 18 from being positioned within the apertures in the webs 14 and flush therewith, with the result that the end caps 21 and the disks 20 do not secure the terminal blades properly to the casing. On the other hand, the dimensions may so vary that the terminal blade unit becomes of less length than the casing, in which case it would not be possible to assemble the parts.

These disadvantages are overcome in the present invention by providing a novel means for securing the insulating member 17 to the terminal blades 15, which means compensates for any variation of dimensions of the terminal blade unit relative to the casing. Inasmuch as the securing and compensating means when used on both ends of the terminal bar are herein shown as being substantially identical, it will only be necessary to describe one of said means. It should be understood, however, that only one of the securing and compensating connections need be used, in which event the other end of the insulating member is secured to the knife-blade terminal in any suitable manner.

Referring to Figs. 4 and 5, in which a preferred form of connection is shown, a U-shaped clip 23 has a base portion 24 of substantially the same size as the inner and narrower end of the knife-blade terminal 15. The clip is rigidly secured to this end of the terminal and preferably the manner of securing is such that the clip may be readily detached therefrom. To this end, the side arms 25 of the clip 23 embrace or straddle a metallic block 26 having therein a screw-threaded aperture 27. Registering apertures in the base of the clip and the knife-blade terminal permit a fastening device, such as a screw 28 (Fig. 2), to be engaged with the aperture 27. The screw 28 also serves as a means for securing the fusible element 16 to the knife-blade terminal. For additional security, a second screw 29 passes through registering apertures in the metallic block 26 and the clip base 24 into screw-threaded engagement with the knife-blade terminal 15.

In the present device the insulating member 17 is semi-cylindrical in form and portions of the side edges thereof are cut-away as at 30 (Fig. 4) to provide a substantially flat surface 31 arranged to abut the back of the metallic block 26. The side arms 25 of the clip are bent inwardly to form flanges 32 for engaging the outer surface of the end of the insulating member. The arrangement of parts is such that the end of the insulating member fits snugly in the channel provided by the metallic block 26 and the flanges 32 to prevent relative movement in any other than an endwise direction. Such endwise movement is resisted to some extent by the frictional engagement of the flanges 32 with the insulating member.

In order to prevent withdrawal of the insulating member from its receiving channel and also to limit the extent of relative movement therebetween, the insulating member is cut-away on one side thereof to provide a transversely opening recess 33. The flange 32 which engages the side of the insulating member having the recess 33 therein is cut-away at appropriate points, as at 34, to provide a short tongue 32^a arranged to be struck into the recess 33 in the insulating member. The width of the tongue 32^a is less than the width of the recess 33, thereby permitting a limited endwise movement of the insulating bar relative to the knife-blade terminal.

It will be seen from the foregoing that the construction provides a terminal blade unit which is a rigid assembly with the exception of the compensating movement and that this movement is confined within limits. Consequently, when the terminal blade unit is mounted in the casing, relative variation, due to any cause, between the terminal blade unit and the casing is compensated for by the limited movement of the insulating member relative to the terminals. Moreover, should any variation occur while the terminal blade unit is separate from the casing, the construction allows a limited adjustment to be made in order properly to assemble the terminal blade unit with the casing.

I claim as my invention:

1. A terminal blade unit for cartridge fuses comprising, in combination, two blades; a

fusible element joining said blades; and an insulating bridge section securing said blades in spaced relation; said bridge section comprising an insulating member; metallic blocks arranged to be interposed between the ends of said member and said blades; U-shaped clips positioned with the base portions thereof between said blocks and said blades and with the side portions extending beyond said blocks away from said blades; and fastening devices extending through apertures in said fusible element, terminal blades, and clips into screw-threaded engagement with said metallic blocks; said clips having the sides thereof bent toward each other to form flanges adapted to embrace the ends of said insulating member; said insulating member having transverse recesses near the ends thereof for receiving portions of the flanges of said clips to limit relative movement of said insulating member and said terminal blades.

2. A terminal blade unit for cartridge fuses comprising, in combination, two blades; a fusible element joining said blades; and means for maintaining said blades in spaced relation comprising an insulating member having transverse recesses near the ends thereof; channel-shaped clips arranged to receive the ends of said member; said clips having portions arranged to be struck into said recesses to limit relative movement between the clips and said member; and means for securing the clips to the blade.

3. A terminal blade unit for cartridge fuses comprising, in combination, two blades, a fusible element joining said blades, and means for maintaining said blades in spaced relation comprising an insulating member having a transverse recess near one end thereof, a channel-shaped clip arranged to receive the recessed end of said member, said clip having a portion arranged to be struck into said recess to limit relative movement between said clip and said member, means for securing said clip to said blade, and means for securing the other end of said insulating member to the other blade.

4. A renewable cartridge fuse having, in combination, a casing, a terminal blade for each end of the casing, means for securing said blades rigidly to said casing, and means for connecting said blades to form a terminal blade unit comprising an insulating member, connecting members secured to said terminal blades and fashioned to receive an end of the insulating member, and interengaging means on at least one of said connecting members and said insulating member fashioned to permit of a limited relative movement therebetween.

5. A renewable cartridge fuse having, in combination, a casing, a terminal blade for each end of the casing, means for securing said blades to said casing, and means for connecting said blades to form a terminal blade unit comprising an insulating member, and means for connecting said member to said terminal blades including interengaging means adapted to permit of limited movement therebetween to compensate for the variation of length of the casing or of the insulating member due to the expansion or contraction of one or the other.

6. A renewable cartridge fuse having, in combination, a casing, a terminal blade for each end of the casing, means for securing said blades to said casing, and means for connecting said blades to form a terminal blade unit comprising an insulating member, and means for connecting said member to at least one of said terminal blades including compensating means fashioned to allow for the variation due to expansion or contraction of the insulating member or casing when the said fuse elements are assembled.

7. In a terminal blade unit for cartridge fuses, the combination of two blades, an insulating member for securing said blades in spaced relation, and a compensating connection interposed between one of said blades and said insulating member and arranged to allow for the variation of length of the insulating member due to expansion or contraction thereof when said blades are immovably assembled in a fuse.

8. A cartridge fuse comprising, in combination, a casing, a pair of terminals mounted on said casing, an insulating member extending between said terminals, and devices for connecting said member to both of said terminals, at least one of said devices being constructed to permit of relative movement between the member and the terminal to compensate for a relative variation of dimensions occasioned by expansion or contraction of the parts.

9. A cartridge fuse comprising, in combination, a casing formed at least in part of a material subject to variations of dimensions under the influence of heat or moisture, a pair of terminals on said casing, a member joined to said terminals, said member being formed of a material variable in dimensions under the influence of heat or moisture, and means for connecting said member to said terminals fashioned to permit of a relative movement between said member and at least one of said terminals to compensate for a variation of dimensions of said member or said casing or both.

10. A renewable cartridge fuse comprising, in combination, a pair of knife blade terminals, a rigid insulating bar for connecting said terminals together in alinement and for spacing them apart, one end of the bar being suitably connected to one terminal, and means connecting the other end of said bar to the other terminal and constructed to prevent relative twisting movement between said bar and terminal but to permit limited

sliding movement therebetween in a direction longitudinal thereof.

11. A cartridge fuse comprising, in combination, a pair of knife blade terminals, a rigid insulating bar having one end suitably connected to one terminal and having its other end overlapping the other terminal, and means secured to the latter terminal and embracing said overlapping end of the bar, said means preventing relative twisting movement of the terminal and bar but permitting relative longitudinal movement therebetween.

12. A fuse comprising a pair of terminals, means including an insulating member extending between said terminals and connecting them together in permanent alinement, and means permitting limited longitudinal movement of one terminal relative to the other terminal to compensate for dimensional variations in the fuse.

In testimony whereof I have hereunto affixed my signature.

HERBERT RAY COOK.