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W. T. CLARK

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RENEWABLE LINK CARTRIDGE FUSE

Filed Feb. 21, 1930

Fig. 1.

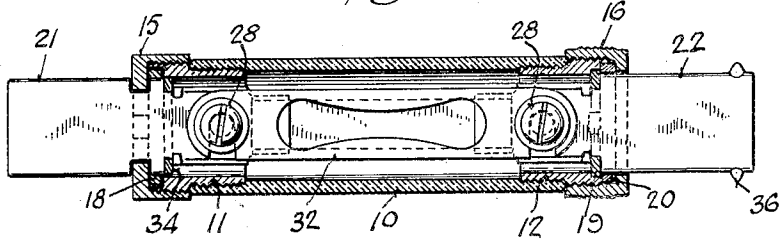


Fig. 2.

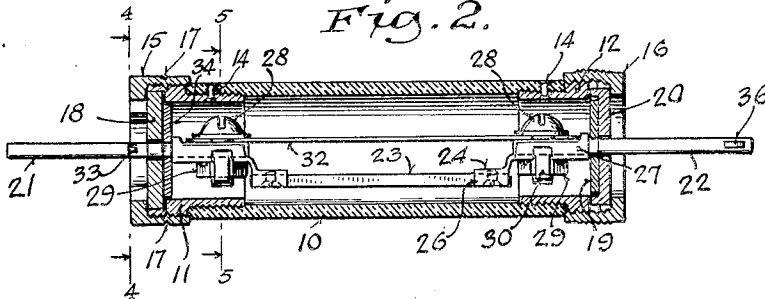


Fig. 3.

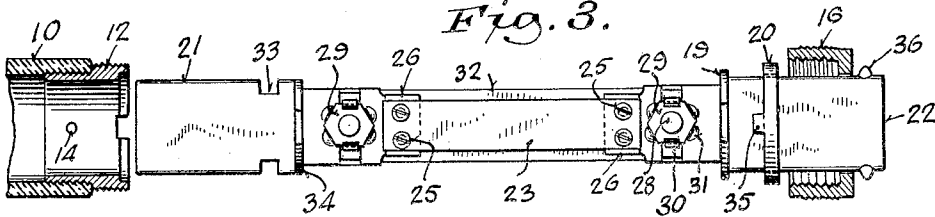


Fig. 4.

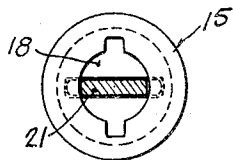


Fig. 5.

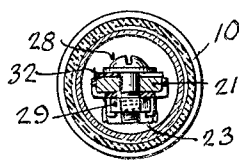


Fig. 6.

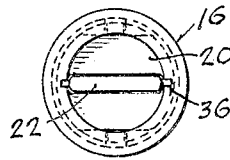
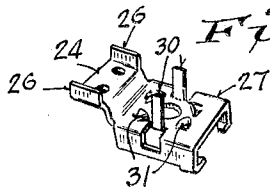


Fig. 7.



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RENEWABLE LINK CARTRIDGE FUSE

Application filed February 21, 1930. Serial No. 430,306.

My invention relates to renewable link fuses of the cartridge type, and includes certain novel details in the construction of the casing, as will hereinafter be described, and also certain novel features in the construction of a removable current conducting unit normally disposed in the said casing, such unit including two spaced and aligned knife blades or other terminals, and insulating bridging means employed to connect the terminals of the unit, and maintain them in a substantially fixed relation to each other, so as to resist torque in positioning the unit in the casing.

The spacing and alignment of the terminals is secured through the use of an insulating bridge piece and clamps of a specially designed form, two of the latter being employed to connect the ends of the bridge piece to the opposed ends of the terminals, whereby a structure sufficiently rigid for the purposes of the invention is produced.

The invention also includes means cooperating with the terminal at one end of the casing for maintaining the removable conducting unit in a fixed position longitudinally with relation to the casing when inserted therein, such fixed position being attained by a partial rotary motion of the unit.

The invention further includes means associated with the terminal at the other end of the casing for locking the unit in the position to which it has been rotated.

The foregoing and other novel features residing in my invention will now be particularly described and the novelty thereof pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a longitudinal central section of a casing of an improved cartridge fuse constructed in accordance with my invention, and showing in elevation the knife blades and a fusible link connected at its ends to the same.

Fig. 2 is a like sectional view of a casing taken in the horizontal plan of Fig. 1, but looking from the underside of the same, and showing in plan the same parts and the novel arrangement of the insulating bridge which connects the knife blades.

Fig. 3 is a view, looking from the rear of Fig. 1, of the connecting unit detached from its casing, a part of the latter being shown at the left, with the corresponding cap for the knife blade with which it is associated.

Fig. 4 is an end view in elevation of one of the caps of the casing, with a part of the knife blade in section, looking from the left of Fig. 2.

Fig. 5 is a transverse section on the line 5—5, Fig. 2, looking in the direction of the arrows.

Fig. 6 is an end view in elevation looking from the right in Figs. 1, 2 and 3; and

Fig. 7 is a perspective view of one of the clamps of special formation used for connecting the ends of the bridge piece to the opposing ends of the knife blades.

In the drawing the numeral 10 indicates a tubular casing of any usual construction, and of suitable non-conducting material, the ends of the casing being provided with metal bushings or thimbles 11 and 12, reduced in diameter at their inner ends, such reduced portions being threaded exteriorly for engagement with the interior of the ends of the casing 10. The outer ends of the bushings or thimbles, beyond the reduced portions, are provided with circumferential shoulders which abut the ends of the casing, when the bushings or thimbles are positioned in the casing. Permanent attachment between the bushings or thimbles 11 and 12 and the ends of the casing, is effected by means of rivets 14 passed radially through both parts. But means other than rivets may be used for the purpose. The enlarged outer ends of the bushings or thimbles 11

and 12 are threaded exteriorly for engagement by the threads of caps 15 and 16.

The cap 15 is maintained in a permanently fixed relation to the bushing or thimble 11 at one end of the casing. This permanent connection may be secured in any suitable manner, but I have found it expedient to slightly indent the flange of the cap at opposite points in its diameter, as at 17, and so interlock the engaged threads of the parts sufficiently to prevent the unscrewing of the cap, after the assembly is made.

The outer end of the bushing or thimble 11 is counterbored, so as to form a circular seat for a washer 18, formed as a disc, and of a thickness which is slightly less than the depth of the seat in which it is placed, so as to permit a free floating rotation of the said washer, in assembling the elements of the cartridge, or when withdrawing the unit to replace the fuse link. The cap 15 is provided centrally with a large perforation, the surrounding marginal portion of which is adapted, when the cap is screwed into place, to abut the outer end of the bushing or thimble 11, and extend over the washer 18, confining the latter to the circular seat in which it has been placed, but not exerting any pressure thereon which would interfere with the free floating rotation of the said washer.

The bushing or thimble 12 at the other end of the casing is similarly constructed, its outer enlarged end being threaded exteriorly for engagement by the interior threads of the cap 16, the latter having a knurled outer surface to facilitate the application and removal of the unit in assembling the parts or replacing the fusible link. The outer end of the bushing or thimble 12 is likewise counterbored to provide a circular seat for a baffle 19, which later will hereinafter be described, the thickness of the baffle being slightly less than the depth of the circular seat, so as to permit the free rotation of the same as before. A washer 20 is confined upon the end of the bushing or thimble by the cap 16, the latter having a large central perforation, the margin about which bears upon the said washer and clamps the same against the end of the bushing or thimble 12. Both the baffle 19 and washer 20 have other features of construction which will hereinafter be described.

The conducting element or unit of the cartridge fuse is composed of two knife blades 21 and 22, the inner ends of which within the casing are connected by an insulating bridge piece 23, the ends of the latter being attached to clamps of novel form. The clamps are also detachably secured to the opposed ends of the knife blades 21 and 22, within the casing.

Fig. 7 illustrates in perspective one of the special clamps used in connecting the knife

blades to the bridge piece. Their use maintains the knife blades in spaced relation and correct position at all times, for the renewal of the fuse link. The special clamp is preferably formed as a stamping of metal of low conductivity. At one end it is provided with a channeled portion 24 adapted to receive one end of the bridge piece 23, and to be secured thereby by any suitable means, such as screws 25, or otherwise. The up-standing side walls or flanges 26 of the channel member 24 are designed to engage the opposite edges of the bridge piece at the end thereof, and this arrangement, together with the use of a plurality of fastening elements 25, serves to make a stable connection between the knife blades and the bridge piece.

The channel portion 24 of the clamp is offset laterally from the main or body portion 27 thereof, the latter being somewhat of box form, open at its end, for the insertion therein of the end of the knife blade. The box 27 is formed so as to closely embrace three sides of the end of the knife blade, and may partially embrace the fourth side. The flat side of the box is provided with a perforation, and the end of the knife blade with a corresponding transverse registering perforation, which are aligned in the assembly. A bolt 28 is passed through such perforations to connect the parts. A nut 29 on the threaded end of the bolt, completes the clamping connection.

It is desirable that the nut 29 be permanently positioned upon the box 27, and I achieve this by striking out from the flat side of the box 27 two opposite prongs 30, which latter are adapted to be folded over the nut and secure the same in position. Embossments 31 formed in the same side of the box 27, are arranged about the perforation therein, to form a pocket in which the polygonal nut 29 may be seated, and its rotation prevented when the bolt is turned.

A fusible link 32 connects the opposed ends of the knife blades 21 and 22, and is secured thereon by the bolts 28 so as to make a good electrical contact. The construction of the said fusible link 32 is novel in its form, but no claim thereto is made herein, as it is set forth and claimed in my pending application filed February 21, 1930, Serial No. 430,309.

The bridge piece 23, due to the offsetting channels 24 of the special clamp, is supported in spaced parallel relation to the link, as shown in Fig. 2. The free edges of the stamping at the fourth side of the box 27, are bent over the corners at the corresponding side edges of the ends of the knife blades 21 and 22, and such free edges may be pressed so as to form slight interlocking depressions on the said corners of the knife blades, so as to unite the clamps firmly to the knife

blades, and prevent their accidental separation.

The knife blade 21 is reduced transversely of its width by means of opposite notches therein, so that the width of the reduced portion is approximately the diameter of the central perforation in the cap 15. The said central perforation is cut out at opposite points of its diameter, as shown in Fig. 4, so that the wide outer end of the blade may be passed through the elongation of the said central opening of the cap 15, and the said blade rotated to the position indicated in Fig. 4.

A baffle 34, formed as a circular disc having a transverse slot is passed over the narrowed inner end of the knife blade and fixed thereon in the position indicated in Figs. 1, 2 and 3, to form a stop for the knife blade 21 when the same has been passed into the casing and out through the slot in the washer 18 and the elongation of the circular opening in the cap 15, the purpose in the use of baffles being to prevent the passage of gaseous flame from the casing when the fusible link 32 is blown by a rush of current.

On the knife blade 22, the baffle 19 previously referred to, is arranged in the same relative position on the inner end of reduced width. The baffle 19 is also formed as a disc, and opposite portions in the periphery thereof are cut away to provide for the passage thereover of opposite projections 35 extending axially of the washer 20, which projections enter opposite transverse notches in the outer end of the bushing or thimble 12. Both the knurled cap 16 and the washer 20 are free for movement along the knife blade 22, and are confined thereon by the baffle 19 and extended angular projections 36 formed on the edges of the knife blade 22 near its outer end. By this construction, the cap 16 and the washer 20, associated with the knife blade 22, are always in a position for immediate assembly in relation to the casing.

The bridge 23, mounted in the channel of the special clamp, is readily detachable in the event that replacement thereof becomes necessary or desirable.

In assembling the parts constituting my improved fuse, the transverse slot in the washer 18 at one end of the casing is brought into register with the elongation of the central perforation in the fixed cap 15, and the knife blade 21, as the leading element of the conducting unit, is inserted at the opposite end of the casing and passed through the registering slots in the cap 15 and washer 18, the engagement of the baffle 34 with washer 18, acting to arrest the further movement of the unit inwardly of the casing. The unit is then given a quarter turn, so as to engage the notches 33 of the knife blade

21 with the overhanging margins of the perforation in the cap 15. In effecting such engagement, the washer 18 rotates freely, and hence the unit is restrained against longitudinal movement in a reverse direction.

In the insertion of the unit, the baffle 19 on the knife blade 22 enters the counterbore in the bushing or thimble 12 and always occupies a definite spaced relation to the washer 18. The quarter turn given the unit, as before described, brings the flat peripheral surfaces of the baffle 19, opposite the notches in the outer end of the bushing or thimble 12. The washer 20 is then positioned with its projections 35 in engagement with the said notches, and the knurled cap 16 is turned into position, to complete the assembly of the cartridge fuse. The conducting unit is thus positively locked against longitudinal movement, and the terminal 22 against any rotary movement, although the terminal 21 may have a slight flexibility in the latter respect, which permits it to readily adapt itself to any misalignment of the cut-out clips into which it may be installed.

The perforations in the washers 18 and 20 through which the knife blades 21 and 22 are passed, are elongated and of dimensions which will freely receive the said terminals. When assembled as described, the said washers act to support the conducting unit in a definite position with respect to the axis of the casing. The washer 18 and its associated baffle 34 at one end of the casing, and the baffle 19 at the other end of the casing, form journals for the conducting unit in the rotation of the latter to and from its operative position. The clearance between the bushings or thimbles at the ends of the casing, and the baffles and washers disposed therein, should provide for the venting of the gases equally at both ends of the casing.

If the fuse be blown, the cap 16 is unscrewed and moved outwardly on the knife blade 22, to permit the disengagement of the locking projections 35 of the washer 20, from the notches in the bushing or thimble 12. By giving a quarter turn to the unit, the locking engagement of the parts at the other end of the cartridge is broken, and the unit may be withdrawn. By loosening the bolts 28, the blown fusible link may be replaced by a new one, and current connection with the knife blades be established by tightening the bolts. A great advantage of the construction resides in the fact that but two parts are to be handled in replacing a blown fuse, namely the casing and the unit, the latter carrying in a single structure all of the elements which serve to locate and secure the unit in operative relation with respect to the casing, and complete the assemblage of the cartridge.

The arrangement of the terminals, the clamps and the bridge piece in definite and

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fixed order, so as to constitute an always ready structural unit, contributes very materially to the saving of time, which often is a factor of importance in replacing a blown fuse, on account of the reduction in the number of pieces heretofore required to be handled in the operations of replacing the fuse and reassembling the parts.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is:

1. In a renewable cartridge fuse, a tubular casing having attached bushings at its ends, with caps at the ends of the casing to close the same, the outer ends of the bushings being counterbored, a freely floating washer seated in the counterbore at one end of the casing and confined therein by the cap, a conducting unit including two knife blade terminals spaced from each other in alignment and a fuse link making contact between the same, a bridge piece for maintaining the spacing and alignment of the terminals, one terminal being passed through an opening in the said washer, and the unit being partially rotatable into locked engagement with the said cap, and means at the other end of the casing for locking the unit in fixed relation to the casing.

2. In a renewable cartridge fuse, a tubular casing provided with bushings at its ends, caps engaging the bushings to complete the closure, the outer end of the bushings being counterbored, a conducting unit including two knife blade terminals spaced from each other in alignment and a fuse link for making contact between the same, an insulating bridge between the terminals for maintaining such spacing and alignment, a floating washer seated in the counterbore at one end of the casing and confined therein by the cap, a baffle fixed to one terminal and adapted to abut the said washer, a second baffle attached to the other terminal and adapted to be seated in the corresponding counterbore, means on the first terminal for locking the unit against longitudinal movement, and means on the second terminal for locking the unit against rotary movement.

3. In a renewable cartridge fuse, a casing, a conducting unit including two terminals with an insulating bridge connected to the terminals for maintaining the same spaced apart and in longitudinal alignment, a fuse link electrically connecting the terminals, perforated freely rotatable end washers at the ends of the casing for supporting the unit in axial relation to the casing and forming journals for the rotation of the said unit, and means for locking the unit in position after rotation.

4. In a renewable cartridge fuse, a casing, a conducting unit including two terminals with an insulating bridge connected to the terminals for maintaining the same

spaced apart and in longitudinal alignment, a fuse link electrically connecting the terminals, perforated freely rotatable end washers at the ends of the casing for supporting the unit in axial relation to the casing and forming journals for the rotation of the said unit, and means for locking one of the end washers against rotation.

In testimony whereof, I have signed my name at Milwaukee, this 20th day of January, 1930.

WM. T. CLARK.

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