Aug. 8, 1939. D. E. CARNEY 2,168,791

RENEWABLE ELECTRIC FUSE

Filed March 22, 1938

Fig. 1.

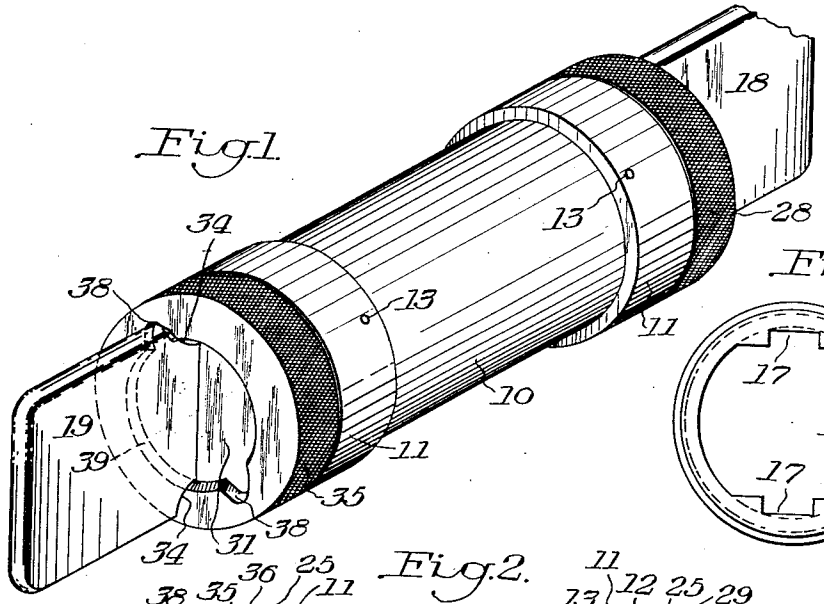


Fig. 3.

Fig. 2.

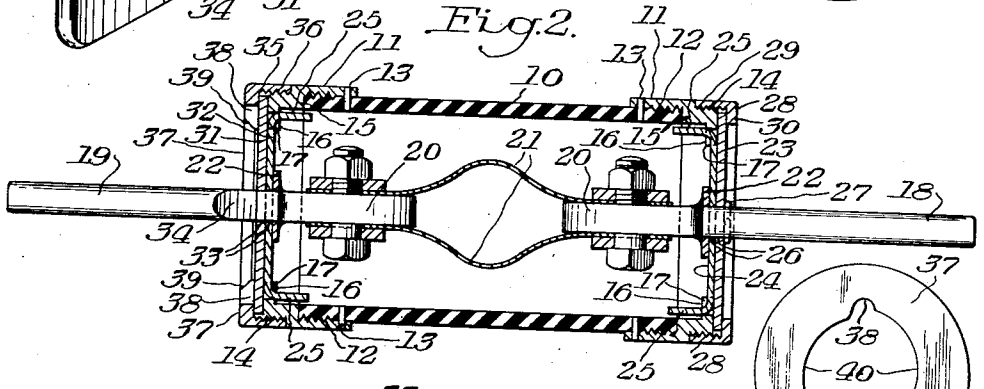


Fig. 6.

Fig. 5.

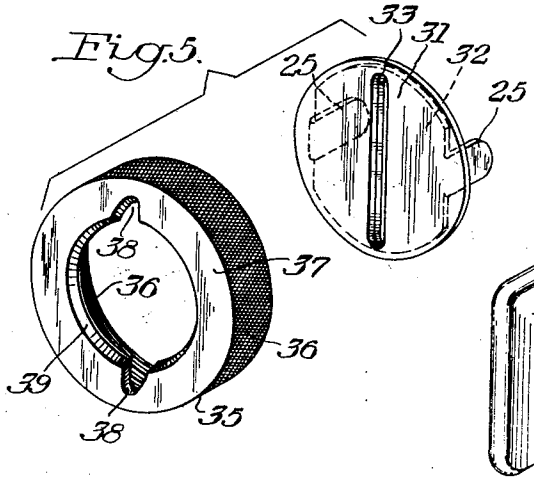
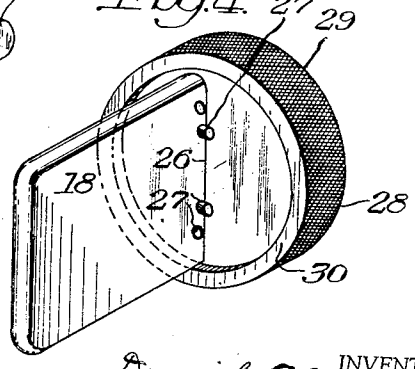


Fig. 4.



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RENEWABLE ELECTRIC FUSE

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Application March 22, 1938, Serial No. 197,384

4 Claims. (Cl. 200—131)

This invention relates to renewable electric fuses of what is generally known as the "knife blade" type, and more particularly is an improvement upon the general character of fuse disclosed in United States Letters Patent No. 2,077,823, issued on April 20, 1937.

The metal parts of such fuses, with the exception of the fusible link, are composed of copper and brass which are expensive, and thus one of the objects which I have in view is the reduction of the number of parts and the quantity of metal required.

Again these metal parts require machining which adds to the expense of manufacturing the fuses, and thus by means of my invention I am enabled to materially reduce the manufacturing costs in the case of articles which are sold in a highly competitive market.

Again, renewable fuses are generally used by unskilled persons, and therefore their repair should be easily accomplished without the use of special tools. In the case of my improved fuse anyone may readily and quickly disassemble the fuse, remove the fused link and replace it with a new fuse.

Other objects and advantages will appear from the following description.

In the accompanying drawing, wherein I have illustrated a practical embodiment of the principles of my invention,

Fig. 1 is a perspective view showing the assembled fuse;

Fig. 2 is a longitudinal section of the same;

Fig. 3 is an end view showing one of the ferrules;

Fig. 4 is a perspective showing the closure plate, the screw cap and the terminal blade of one end of the fuse, the right end in Figs. 1 and 2;

Fig. 5 is an exploded perspective showing the screw cap, the closure plate and the guide plate used for the other end of the fuse;

Fig. 6 is an end elevation of a modified form of screw cap for the last mentioned end of the fuse.

Referring to the drawing, 10 represents the tubular shell made of insulating material, such as fibre, and provided at each end with metal ferrules 11 having an internally threaded skirt 12 which is screwed down over the end of the shell 10 and is preferably permanently attached thereto as by the pins 13. The outer ends of the ferrules are reduced in external diameter and screw threaded as at 14 to receive the screw caps which are hereinafter described.

The ferrules 11 are provided with internal annular shoulders 15 which abut against the ends of the shell 10 and have the same internal diameter as the shell. At its outer end each of the ferrules 11 is provided with a pair of diametrically opposed segmental internal flanges 16, provided with centrally located notches 17 which extend in depth to the interior wall of the ferrule.

18 and 19 represent the two terminal blades which are of proper shape to fit into the clips of a switchboard or other mounting.

The shanks 20 or inner ends of said terminals are of reduced widths and are provided with holes for attaching thereto the ends of the fusible link or links 21.

22 represents the flash-bars which are centrally slotted to be slipped down over the ends of the shanks 20 and rest against the shoulders formed at the union of the shanks and the wider blades. The flash-bars are permanently fixed to the terminals as by soldering.

The flash-bars are of relatively narrow width, slightly greater than the thickness of the blades and extend beyond the edges of the blades a slight distance. However the flash-bars are of suitable length to be passed through the shell 10.

23 represents a circular closure plate for one end of the fuse, the right end in Fig. 2, which in practice is usually termed the upper end of the fuse. The plate 23 is of the proper diameter to seat against the end of the ferrule 11 and to close the same. Permanently attached to the inner face of the plate 23 is the lock plate 24 which is provided with two opposed angular fingers 25 which engage the notches 17 of the ferrule 11 and prevent rotative movement of the closure plate relative to the shell.

The lock plate 24 is of the proper dimensions and contour to fit into the end of the ferrule so that the closure plate 23 will engage the outer end of the latter. The plates 23 and 24 may be riveted together.

The closure plate and the lock plate attached to the former are provided with registering diametrically disposed slots 26 which enable the plates to be slipped down over the blade 18 to rest against the flash-bar 22. The plates 23 and 24 are held assembled with the terminal by any suitable means. However to assure the permanent assembly of the parts, after the plates have been slipped down over the terminal and rest against the flash-bar, I hold the elements permanently in assembled relation by punching with a sharp tool the metal of the blade from either side to form a plurality of studs 27 which engage the outer face of the closure plate 23 at either

side of the terminal blade to prevent movement of the plate longitudinally of the blade while permitting a limited swaying or rocking movement of the terminal relative to the shell 10 to compensate for misalignment or irregularities in the supporting clips, without strain on the fuse structure or the clips.

28 represents a screw cap having a threaded skirt 29 which screws down over the threaded portion 14 of the ferrule 11, and which is provided with an inwardly extending annular flange 30 which bears against and clamps the closure plate 23 tightly against the end of the ferrule 11 when the screw cap is screwed up on the ferrule. The internal diameter of the flange 30 is sufficient to allow clearance for the terminal blade.

It is to be noted that the end assembly includes but three elements permanently attached together, the terminal blade, the closure plate and the lock plate, all of these parts functioning as one element while the screw cap is the second element.

Referring now to the other end of the fuse, 31 and 32 represent a closure plate and lock plate similar to the plates 23 and 24 respectively, the plates 31 and 32 being permanently connected together, as by rivets, but not being secured to the terminal. The plates 31 and 32 are provided with registering slots 33 which permit the assembled plates to be slipped down over the blade and rest against the flash-bar 22.

At either side the edges of the terminal blade 19 are provided with aligned substantially triangular notches 34 whose inner walls are substantially normal to the axis of the terminal while their outer walls are inclined inwardly. When the parts are assembled the inner or base walls of the notches are disposed somewhat inwardly of the outer surface of the closure plate 31. The lock plate 32 is provided with fingers 25 which engage the notches 17 in the adjacent ferrule 11.

35 represents the screw cap for this end of the fuse, having an internally threaded skirt 36 which screws up on the threaded portion 14 of the ferrule 11. The cap 35 is provided at its outer end with an internal or overhanging annular flange 37 defining a central opening which at two diametrically opposite points is enlarged by the radially disposed recesses 38 cut in the flange 37 to provide sufficient clearance for the insertion of the terminal blade 19 through the cap.

The opening proper in the screw cap is of such diameter that the inner perimetral edge of the flange 37, when the cap is turned so that the recesses 38 are out of registry with the edges of the terminal blade, will engage the notches 34 and thus prevent a movement of the terminal blade longitudinally of the fuse. The said perimetral edge is preferably beveled outwardly, as shown at 39, to form a wedging surface complementary to the inclined walls of the notches 34 and thus enable the terminal to be wedged in its fixed position.

In Fig. 6 I show a modified form of the screw cap wherein the inner perimetral wall of the flange 37 is formed to provide two eccentric surfaces 40 which, as the cap is turned wedge against the apices or inner end of the notches 34 and thus wedge the terminal blade against movement.

To assemble the fuse, the closure plate 31 and lock plate 32 are first applied to the end of the ferrule 11 at one end of the shell, the fingers 25 engaging the notches 17, and the screw cap applied to the threaded portion 14 of the ferrule and screwed up until almost tight but with its recesses 38 registering with the slots 33 in the closure and lock plates. The connected terminal blades and fusible link are then put into position, the terminal blade 19 being pushed through the shell and the slots 33 in the plates 31 and 32 until the flash bar 22 bears against the inner face of the lock plate 32. This brings the plates 23 and 24 into position against the outer end of the other ferrule 12 with the fingers 25 of the lock plate 24 engaging the notches 17. The screw cap 28 is then applied and screwed home on the threaded portion of the last mentioned ferrule 11. The screw cap 35 is then tightened on the ferrule at the other end of the shell, turning the recesses 38 out of registration with the notches 34, and thus locking the terminals fixedly in position. As both ends of the shell with the ferrules applied are the same, it is not necessary to select either end of the shell for the introduction of the terminals in assembling.

To disassemble the fuse, as for the replacement of the fusible link, the screw cap 35 is slightly unscrewed to bring the recesses 38 into registry with the edges of the terminal blade 19, the screw cap 28 is then unscrewed and removed, and the terminals and fusible link are then withdrawn by grasping the terminal 18 and drawing the elements out through the shell.

To test the fuse to determine whether the fusible link has been fused or "blown", it is only necessary to loosen the screw cap 28 and pull outwardly on the terminal blade 18. If the fuse is blown the terminal will move outwardly away from the shell; otherwise it will resist movement.

It is apparent that my improved renewable fuse presents a number of substantial advantages.

Thus it comprises a reduced number of elements, thus materially decreasing its cost of manufacture and a material saving in relatively costly material.

It is arranged for easy assembly and disassembly, thus requiring but little time for repairs and no special skill or tools.

It may be tested to determine whether or not the fuse is blown, without disassemblage or removal of any parts.

I claim:

1. In an end construction for a renewable fuse, the combination with a tubular shell of insulating material and a metal ferrule fixed on the end of the shell, said ferrule having diametrically opposed notches, of a terminal blade provided with a transversely disposed flash-bar fixed thereon, a slotted closure plate slipped down over the outer end of the terminal blade against the flash-bar, said plate having fingers to engage said notches to prevent relative rotative movement between the closure plate and the shell, said plate being arranged to rest upon the outer end of the ferrule, means protruding from the opposite sides of the terminal blade to hold the closure plate assembled with the terminal blade and the flash-bar, and a screw cap arranged to be applied to the end of the ferrule after the terminal and closure plate have been positioned in place and having a threaded skirt to be screwed onto the ferrule and an overhanging flange to bear against the outer face of the closure plate.

2. In an end construction for a renewable fuse, the combination with a tubular shell of insulating material and a metal ferrule fixed on the end of the shell, said ferrule having diametrically op-

posed interior segmental flanges provided with notches, of a terminal blade provided with a transversely disposed flash-bar fixed thereon, a slotted closure plate slipped down over the outer end of the terminal blade and provided with fingers to engage said notches to prevent relative rotative movement between the plate and the shell, said plate being arranged to rest upon the outer end of the ferrule, means protruding from the opposite sides of the terminal blade to hold the closure plate assembled with the terminal blade and flash-bar, and a screw cap arranged to be applied to the end of the ferrule after the terminal and closure plate have been positioned in place and having a threaded skirt to be screwed onto the ferrule and an overhanging flange to bear against the outer face of the closure plate.

3. In an end construction for a renewable fuse, the combination with a tubular shell of insulating material and a metal ferrule fixed on the end of the shell, said ferrule having diametrically opposed notches, of a terminal blade provided with a transversely disposed flash-bar fixed thereon, said blade being provided with notches in its edges adjacent the flash-bar, a slotted closure plate arranged to be slipped down over the end of the blade against the flash-bar and to close the end of the ferrule, and a screw cap having a threaded skirt to be screwed onto the ferrule and an integral overhanging flange of proper diameter to clasp the neck of the terminal blade between the notches and said flange being provided with diametrically opposed recesses to provide clearance for the terminal blade when the screw cap is turned into proper position, said flange engaging said notches and clamping the closure plate against the ferrule when the screw cap is screwed home on the ferrule.

4. In an end construction for a renewable fuse, the combination with a tubular shell of insulating material and a metal ferrule fixed on the end of the shell, said ferrule having opposed segmental interior flanges provided with notches, of a terminal blade provided with a transversely disposed flash-bar fixed thereon, said blade being provided with notches in its edges adjacent the flash-bar, a slotted closure plate arranged to be slipped down over the end of the blade against the flash-bar and to close the end of the ferrule, and a screw cap having a threaded skirt to be screwed onto the ferrule and an integral overhanging flange of proper diameter to clasp the neck of the terminal blade between the notches and said flange being provided with diametrically opposed recesses to provide clearance for the terminal blade when the screw cap is turned into proper position, said flange engaging said notches and clamping the closure plate against the ferrule when the screw cap is screwed home on the ferrule.

DANIEL E. CARNEY.