Aug. 15, 1944. W. O. SCHULTZ 2,355,824

FUSE TERMINAL

Filed May 3, 1943

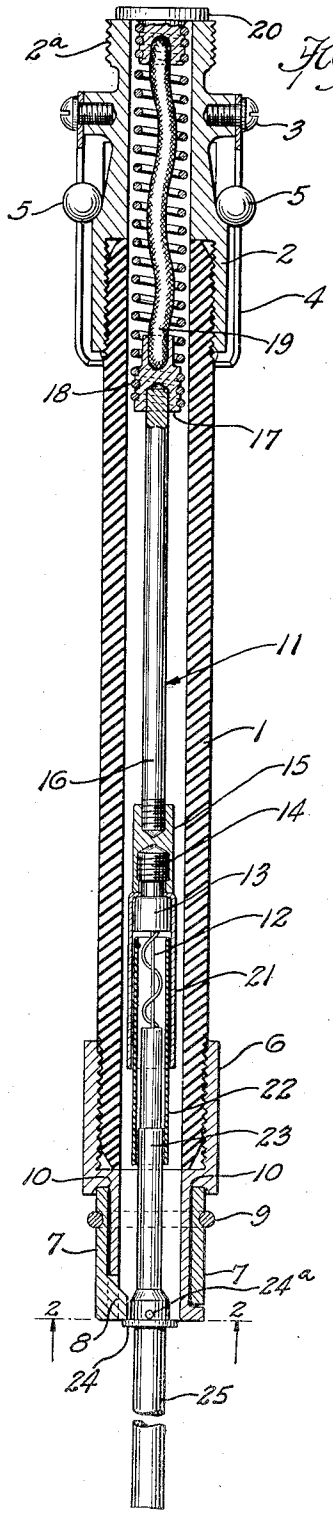



Fig. 1

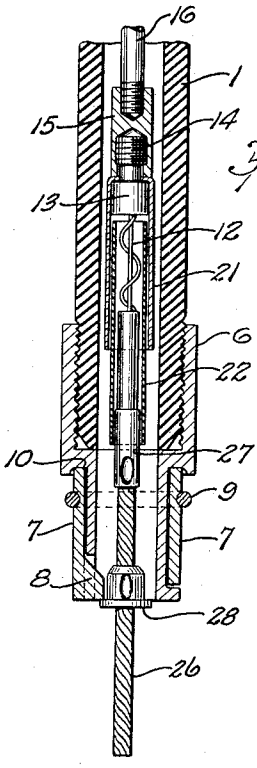



Fig. 4

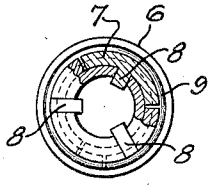



Fig. 2

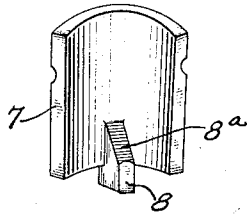



Fig. 3

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## FUSE TERMINAL

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8 Claims. (Cl. 200—117)

This invention relates to power fuses and has to do with improvements in fuse-links and cartridge terminal constructions aimed at facilitating the installation of fuse-links where, for any reason, it is not convenient to follow the conventional practice of securing a flexible leader to a binding post or the like on the external peripheral surface of the cartridge. My invention has particular application to bayonet type fuses, but its utility is not confined to that limited field.

In a bayonet type fuse the fuse cartridge is insertable and withdrawable to and from the housing by lengthwise movement, for which reason it is not convenient to have any irregular protruding part such as a binding post on the external peripheral surface of the cartridge—it being apparent that such protruding parts would tend to conflict with the interior housing contacts, making the housing construction more complicated and costly as well as more bulky, besides interfering somewhat with smooth insertion and withdrawal of the cartridge from the housing.

My primary object is to provide a fuse-link and terminal construction which does not entail a terminal anchorage of the external peripheral variety referred to above and which for that reason, among others, is well adapted for use in bayonet type fuses.

Another object is to provide a fuse-link and cartridge terminal construction which greatly simplifies the job of replacing fuse-links and at the same time ensures good electrical contact at both fuse-link terminals.

A further object is to devise a fuse-link, especially appliable to non-dropout fuses, which will afford a visible index of its condition. That is to say, which will show, on sight, whether or not the fuse has blown.

Still another object is to devise fuse constructions of the character above indicated which can be manufactured economically.

Referring to the drawing:

Fig. 1 is a longitudinal sectional view of a fuse cartridge and fuse-link assembly designed for use as a part of a bayonet type fuse;

Fig. 2 is a view taken at 2—2 of Fig. 1—a portion being shown in cross-section;

Fig. 3 is a perspective view, on an enlarged scale, of one of the three latch members constituting parts of the lower cartridge terminal construction; and

Fig. 4 is substantially a reproduction of the lower end of Fig. 1 except that it shows a modification of the fuse-link.

The structure of Fig. 1 comprises an elongate tube 1 composed either of horn fiber or of "Bakelite" lined with horn fiber and having the capacity to evolve within its bore arc-extinguishing gas or vapor, when subjected to the temperature of an arc. The upper end of tube 1 is threaded externally to receive a metal ferrule 2 which, in turn, is threaded at 2a to accommodate a cap, not shown, which serves to grip the upper terminal of the fuse link. Secured to the exterior of ferrule 2 by means of screws 3 is a depending sleeve 4 slotted lengthwise to form a number of contact springs spaced circumferentially around ferrule 2 and operative to engage the upper stationary contact of the fuse housing which is here omitted. The steel balls 5, of which several are provided, are held in place by means of sleeve 4 and their function is to prevent the fuse cartridge being expelled from the housing when a fuse-link blows. However, the present invention is not concerned with that phase of the device, and for that reason no further description will be given with reference thereto.

The lower end of tube 1 is likewise externally threaded to receive the lower conductive ferrule 6 which is designed to engage the lower fixed contacts within the housing of the fuse structure—which contacts are not shown.

The lower end of ferrule 6 is externally grooved circumferentially to receive three metal latch members 7, one of which is shown in perspective in Fig. 3. Each of said latch members is of arcuate configuration and they conjointly encircle the externally grooved portion of ferrule 6. Each latch member has an internally projecting lug or detent 8 having an inclined upper surface 8a. Ferrule 6 is slotted lengthwise at its lower end in three places to clear lugs 8. The three latch members are held in contact with ferrule 6 by means of an annular spring 9 by which they are encircled, and each latch member is designed to rotate pivotally about its upper internal edge which is identified by reference numeral 10. In the aggregate, the three latch members, together with spring 9, compose what I term a "spring-ratchet-latch."

The fuse-link, which is identified as a whole by reference numeral 11, includes a fusible section 12 comprising a fuse wire and a strain wire in parallel. These are firmly attached at their upper ends to a stud 13 which is threaded at 14 and thereby detachably connected to a coupler 15 which is internally threaded to engage the lower end of a conductive rod 16. The latter is secured at its upper end to an adapter 17 which

is externally threaded to engage the lower end of a helical retracting spring 18. Also connected to adapter 17 is the lower end of a flexible conductor 19. The upper end of spring 18, and, likewise, the upper end of flexible conductor 19 are secured to a button head terminal 20 of the usual form.

A tubular metal sleeve 21 is inwardly flanged at its upper end to engage a shoulder on stud 13, by means of which it is clamped against the lower end of coupler 15. Sleeve 21 encircles the fusible section 12 and telescopically embraces a fiber tube 22 which is secured at its lower end to a metal stem 23. The lower ends of the fuse and strain wires are firmly secured to this stem.

Forming a part of stem 23 is an externally flanged contact member 24 which is designed to engage the lugs 8 and thus effect an electrical connection between the lower end of the fuse-link and the ferrule 6 via latch members 7.

It will be apparent that normally there is a conductive path from contact springs 4 to ferrule 6 by way of the fuse-link.

Contact member 24 is of such external diameter that it will pass through the bore of tube 1 when the lower end of the fuse link is inserted in the upper end of the cartridge and pushed through. However, the normal radial spacing between each lug 8 and the axial center is such that contact member 24 cannot pass therebetween except by spreading the latch members apart, and this it does by engaging the angular surfaces 8a which operate as cam surfaces to effect radial outward movement of the latch members. As soon as contact member 24 has completed its passage through the latch, members 7 are retracted by spring 9 to their normal position, as shown in Fig. 1, wherein they function as stops to prevent a return movement of the contact member.

As shown in Fig. 1, spring 18 is under tension. When said spring is not tensioned, the length of the fuse link is not sufficient to permit contact member 24 to pass through the latch; but an extension 25 of insulating material is of such length that it will pass through the latch to the exterior thereof while the retracting spring is still not tensioned. Said extension is secured to stem 23 by means of a pin 24a and provides a convenient handle by means of which the installer can secure a hold on the lower end of the fuse-link, whereby he is enabled to pull the lower fuse-link terminal into latched position against the tension of spring 18. When contact member 24 is thus pulled through the latch and thereupon released, it assumes the position in which it is shown in Fig. 1 and is then fully installed.

The modification shown in Fig. 4 differs from that of Fig. 1 in that the lower terminal of the fuse-link includes a flexible conductive leader 26 in place of the long rigid stem 23 and extension 25. In the modified structure, leader 26 is secured at its upper end to a short rigid rod 27, corresponding to the upper end of stem 23; and the contact member 28, attached to leader 26, corresponds to contact member 24 of Fig. 1. The modified form is suitable for use where it is not desired to have any part projecting below contact member 28—the excess length of conductive leader being cut off by the installer after the fuse-link is installed.

In either case, the mode of operation of the fuse-link when a blowout occurs is not different from that of prior spring-tensioned links and requires no description.

What is claimed is:

1. In combination, a fuse cartridge having a bore extending lengthwise therethrough, a terminal attached to and carried by one end of said cartridge, said terminal including spring latch means comprising a plurality of latch members disposed around and jointly defining an opening co-axial with said bore, spring means yieldably retaining said latch members each in a retracted position wherein they delimit said opening to a predetermined minimum width, said latch members being movable radially of said opening for distending said opening, and a fuse-link mounted in said cartridge and extending through said bore and said opening, one terminal of said fuse-link including a contact member which is small enough to pass through said bore, but too large to pass through said opening when the latter is constricted to said predetermined minimum width, said contact member being operative upon moving outwardly from said bore to force said latch members radially outwardly to distend said opening, whereby said contact member is enabled to move through said opening in one direction, said latch members being operative, conjointly, to latch said contact member against movement through said opening in the opposite direction.

2. In combination, a fuse cartridge having a bore extending lengthwise therethrough, a terminal attached to and carried by one end of said cartridge, said terminal including spring latch means comprising a plurality of latch members disposed around a common axis coincident with that of said bore, each of said latch members having a lug projecting radially toward said common axis and jointly defining an opening co-axial with said bore, spring means for yieldably retaining said latch members each in a retracted position wherein they delimit said opening to a predetermined minimum width, said latch members being movable radially of said opening for distending said opening, each of said lugs having an inclined cam surface, and a fuse-link mounted in said cartridge and extending through said bore and said opening, said fuse-link being anchored at the two ends of said cartridge, one terminal of said fuse-link including a contact member which is small enough to pass through said bore but too large to pass through said opening when the latter is constricted to said predetermined minimum width by said spring means, said contact member being operative upon moving outwardly from said bore to engage said inclined cam surfaces and thereby force said latch members to move radially outwardly from said axis to distend said opening, whereby said contact member is enabled to move through said opening in one direction, said latch members being retractable by said spring means to constrict said opening and thereby to latch said contact member against movement through said opening in the opposite direction.

3. In combination, a fuse cartridge having a bore extending lengthwise therethrough, a ferrule forming one end of said cartridge, a spring-pressed latch member carried by said ferrule and situated adjacent one end of said bore, a fuse-link mounted in said bore and having its terminals anchored at the respective ends of said cartridge, said fuse-link including a fusible section and a biasing spring for tensioning said

fusible section, one terminal of said fuse-link including a contact member which is small enough to pass through said bore, but too large to pass said latch member when emerging from said bore except by deflecting said latch member out of its normal position, said latch member having an inclined surface engageable by said contact member for effecting deflection thereof out of the path of said contact member when said contact member is emerging from said bore, said latch member being effective to prevent re-entry of said contact member into said bore by movement in reverse direction, said contact member and latch member being operative, jointly, to anchor that terminal of the fuse-link of which said contact member forms a part and to provide electrical connection between said ferrule and fuse-link.

4. In combination, a fuse-link comprising a pair of spaced terminals, a fusible section and a biasing spring in series between said terminals, one of said terminals being elongate and having a contact member of enlarged diameter, a fuse tube of dielectric material housing said fuse-link within its bore, ferrules attached individually to the respective ends of said tube and bored coaxially with the bore of said tube, and a plurality of spring-pressed latch members carried by one of said ferrules and disposed concentrically about the axial center thereof, each of said latch members having a lug which projects radially toward said axial center and having an inclined surface engageable by said contact member and actuable thereby to effect radial movement of said latch members away from said axial center only when said contact member is emerging from said tube, said latch members being operative, conjointly, to bar re-entry of said contact member into said tube by reverse movement.

5. In combination, a fuse-link comprising a pair of spaced terminals, a fusible section and a biasing spring in series between said terminals, an elongate extension of dielectric material carried by one of said terminals, a contact member of enlarged diameter carried by the last-mentioned terminal adjacent said extension, a fuse-tube of dielectric material housing said fuse-link within its bore, ferrules attached individually to the respective ends of said tube and bored coaxially with the bore of said tube, and a latch comprising a plurality of spring-pressed latch members carried by one of said ferrules and disposed concentrically about the axial center thereof, each of said latch members having a lug which projects radially toward said axial center and having an inclined surface engageable by said contact member and actuable thereby to effect radial movement of said latch members away from said axial center only when said contact member is emerging from said tube, said latch members being operative, conjointly, to bar re-entry of said contact member into said tube by reverse movement.

6. In combination, a fuse cartridge having a bore extending lengthwise from end to end, said cartridge including an elongate tube of dielectric material, and a pair of conductive ferrules attached individually to the respective ends of said tube, one of said ferrules having an external circumferential groove, a latch comprising a plurality of arcuate latch members seated in said groove and jointly encircling the longitudinal axis of said cartridge, each of said latch members having a lug which extends radially toward said axis through a slot in the last-mentioned ferrule, there being a slot for each lug, an annular spring encircling said latch members and securing the same to their supporting ferrule, said spring normally holding said latch members each in a retracted position, each of said lugs having an inclined cam surface normally within the path of the hereinafter specified contact member, each of said latch members being fulcrumed at a point remote from its respective lug and rotatable about its fulcrum co-incidentally with radial movements of said lugs, and a fuse-link comprising spaced terminals, a fusible section and a biasing spring in series interconnecting asid terminals, one of said terminals having a flange-like contact member adapted to be latchingly engaged by said latch members for anchoring one end of said fuse-link, said contact member being operative to engage said inclined cam surfaces and thereby to move said latch members outwardly to permit said contact member to pass said lugs when said contact member is emerging from said bore, said latch members being retractable by said annular spring, when said contact member has passed through said latch, and operative, when so retracted to bar re-entry of said contact member by reverse movement.

7. In combination, a fuse cartridge having a bore extending therethrough, a fuse link mounted in said cartridge, a terminal attached to and carried by one end of said cartridge, said terminal including a latching mechanism for latching a terminal of said fuse link and holding said fuse link under tension, said latching mechanism comprising a plurality of latching members disposed circumferentially about an axis coincident with the axis of said bore and a spring member yieldingly retaining said latching members in latching position, said latching mechanism being operative to permit the passing therethrough of said fuse link terminal in one direction, and operative thereafter to arrest said fuse link and terminal against movement in the opposite direction.

8. In combination, a fuse cartridge having a bore extending therethrough, a fuse link mounted in said cartridge, a terminal attached to and carried by one end of said cartridge, anchoring means for retaining said fuse link under tension, said anchoring means comprising a plurality of latching members disposed about said cartridge terminal and cooperative therewith to anchor said fuse link, a spring member yieldingly retaining said latching members in latching position, said latching members being co-operative with said cartridge terminal to permit the passing of a terminal of said fuse link in one direction, and co-operative, thereafter, to arrest said fuse link and terminal against movement in the opposite direction.

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