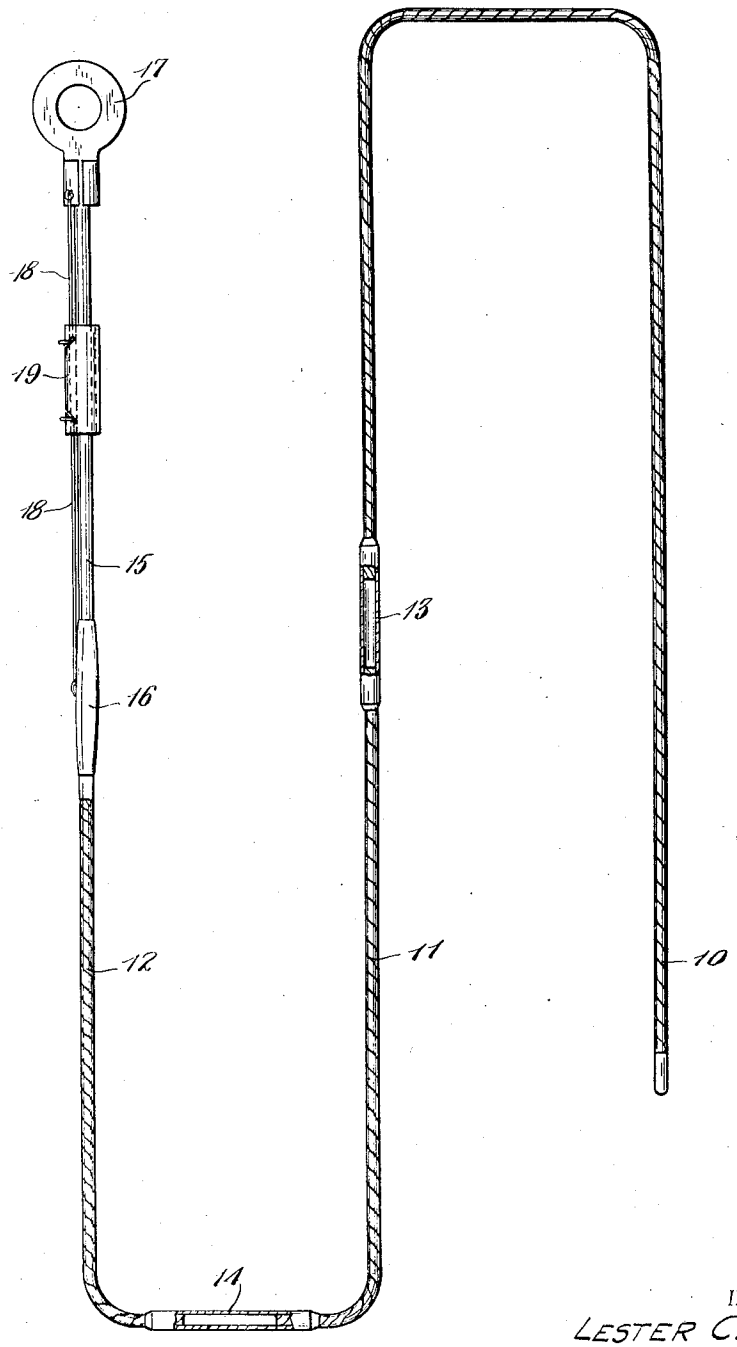
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FUSE LINK

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FUSE LINK

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This invention relates to fuses, and more particularly to a fuse link for use in the explosion or expulsion type of fuse, such as that disclosed in my prior Patent 1,605,543, dated November 2, 1926.

Practical experience with the type of fuse link shown in my aforesaid prior patent has shown that the use of a relatively long infusible conductor with a relatively short fusible section at one end thereof is objectionable, under some conditions, because of the liability of the long infusible conductor, when expelled, to fall where it will bridge between a conductor and ground or short-circuit a pair of conductors. Another objectionable feature of a long infusible conductor is that attendants are liable to be injured by it when it is expelled from the fuse tube.

It is one of the objects of the present invention to provide a fuse link that is especially adapted for the type of fuse mentioned above and will be expelled from the fuse tube in relatively short sections or broken up so that there will be less liability of injury to attendants as well as less liability to short-circuit or ground other conductors. A further advantage is that, because the fuse link is expelled in relatively short sections, it is possible to locate the fuse closer to other apparatus and thus reduce the cost of installation.

In the accompanying drawing I have illustrated a fuse link embodying my invention. This fuse link comprises a plurality of conductor sections 10, 11 and 12 which are preferably made of copper cable so as to be flexible and have the requisite current-carrying capacity with a minimum size and weight. The sections 10 and 11 are joined together by a fusible section or joint 13 which is preferably of tubular form so as to permit the ends of the sections 10 and 11 to be inserted therein and soldered thereto. In a similar manner the conductor sections 11 and 12 are connected together by a fusible section or joint 14. To the end of the section 12 there is connected a section 15 of fusible wire which is accurately calibrated to be fused by a current of predetermined amperage in a predetermined time. The connection between the sections 12 and 15 may be by means of a sleeve 16 of good conducting material into which the ends of the sections 12 and 15 are inserted and then soldered. A connecting terminal 17 is soldered to the end of the fusible section 15 and, from the drawing, it will be seen that all of the sections referred to are connected together in series so as to form a continuous wire that is adapted for use in the tube of a fuse such as that disclosed in my prior Patent 1,605,543. In making up the fuse link, as described, the conductor sections 11 and 12 are of such length that when the wire is assembled in the fuse all of the fusible sections, such as the sleeves 13 and 14 and the section 15, will be within the tube of the fuse, and it will be understood that while I have illustrated a fuse link comprising the three conductor sections 10, 11 and 12, a larger number of these conductor sections may be used, if desired, by making them shorter and correspondingly increasing the number of the fusible sleeves 13 and 14.

In making a fuse link for use in the type of fuse illustrated in my prior Patent 1,605,543, it is desirable to have the calibrated fusible section, such as the section 15, located at the end of the wire so that it will be positioned at the closed end of the fuse tube. This fusible section 15 is so calibrated as to be fused by a current of the amperage representing the rated capacity of the fuse, and the fusible sections 13 and 14 are so calibrated that for any given current they will fuse after the fusible section 15. This may be insured by so proportioning the sleeves 13 and 14 that they will require a somewhat larger current to fuse them than that required by the fusible section 15, or the metal of which the sleeves 13 and 14 are made may require, for any given current, a somewhat longer time to fuse than the fusible section 15. In any case, however, the sections 13, 14 and 15 should be so calibrated that the section 15 will always fuse in advance of the sections 13 and 14.

In certain types of fuses in which my improved fuse link is adapted to be used as, for example, that disclosed in my copending application Serial No. 237,842, filed October 31, 1938, it is under a constant tension. Fuses are sometimes subjected to momentary overloads which would tend to soften and thus weaken the tensile strength of the fusible section 15. If such overloads are not dangerous to the circuit or apparatus that is protected by the fuse it is desirable that the fusible section 15 should not be broken by the tension on the fuse link, when it is so momentarily softened and weakened. In order to avoid breaking the fusible section 15 under such circumstances I provide a reenforcement which consists of a relatively fine wire 18 of material of high tensile strength, such as stainless steel. One end of this wire is soldered or otherwise secured to the sleeve 16, and the other end to the terminal 17 so that it bridges the space occupied by the fusible section 15 and, when the

latter is weakened, the wire 18 will prevent a separation. At the same time the wire 18 should be of such gauge that when the section 15 fuses the heat generated will also fuse the wire 18. For fuses of relatively large capacity the wire 18 may be in one continuous piece from the sleeve 16 to the terminal 17 but, for the lighter capacity fuses where the current capacity of the wire 18 would be substantial in relation to the rated capacity of the fusible section 15, it is desirable to make the wire 18 in two sections with an insulator 19, of fiber or other suitable material, forming a connection therebetween.

When the fuse link is used in a fuse of the type disclosed in my prior Patent 1,605,543, a current, in excess of the calibrated capacity of the fusible section 15, will fuse the latter first and then the fusible sections 13 and 14, and the gases generated will expel the sections of the link from the tube and also destroy the arcs that are formed. On account of the conductor sections 11 and 12 not being of sufficient length to span the distance between adjacent conductors or between any conductor and a ground, there will be no liability for these sections to form a short-circuit and, because the sections are of relatively small mass, they are not liable to seriously injure any apparatus or an attendant, when expelled from the fuse tube.

When the fuse link is used with the form of fuse disclosed in my copending application Serial No. 237,842, filed October 31, 1938, it would be normally under tension, so that a momentary overload which would tend to weaken the fusible section 15 without actually fusing it, might result in a rupturing of the fusible section by the tension force to which the link is subjected and the reenforcing wire 18 would then come into play and prevent the rupturing of the fusible section 15 so that the circuit would not, under such circumstances, be interrupted by the momentary overload. However, if the overload is sufficient to fuse the fusible section 15, then the arc that is thereby formed would also fuse the wire 18 and permit the fuse to function in the usual way. In cases where the overload might fuse the section 15 but be insufficient either in intensity or duration to fuse the fusible sections 13 and 14, the heat of the gases generated in the fusion of the section 15 would cause the fusion of the sections 13 and 14 and thus permit the link to be expelled from the fuse tube in short sections.

While I have illustrated and described what I now consider to be the preferred embodiment of my invention, it will be understood that various changes may be made in the details of construction without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A fuse comprising a plurality of flexible conductor sections fusible at a relatively high temperature and joined together in series by a tubular fusible section that is fusible at a relatively low temperature, and a fusible end section joined to the end of one of said conductor sections and calibrated to be fused by a current of predetermined amperage in a shorter time than the first mentioned fusible section.

2. A fuse comprising at least three flexible conductor sections fusible at a relatively high temperature and joined together in series by tubular fusible sections that are fusible at a relatively low temperature, and a fusible end section joined to the end of one of said conductor sections and calibrated to be fused by a current of predetermined amperage in advance of the fusing of the first mentioned fusible sections.

3. A fuse comprising at least three flexible conductor sections fusible at a relatively high temperature and joined together in series by tubular fusible sections that are fusible at a relatively low temperature, a fusible end section joined to the end of one of said conductor sections and calibrated to be fused by a current of predetermined amperage in advance of the fusing of the first mentioned fusible sections, a connecting terminal on said end section, and a tension member connecting said terminal with the last mentioned conductor section and reenforcing said fusible end section, said tension member comprising two conductors that are fusible by a current of lower amperage than said predetermined amperage and mechanically connected together by an insulating member.

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