

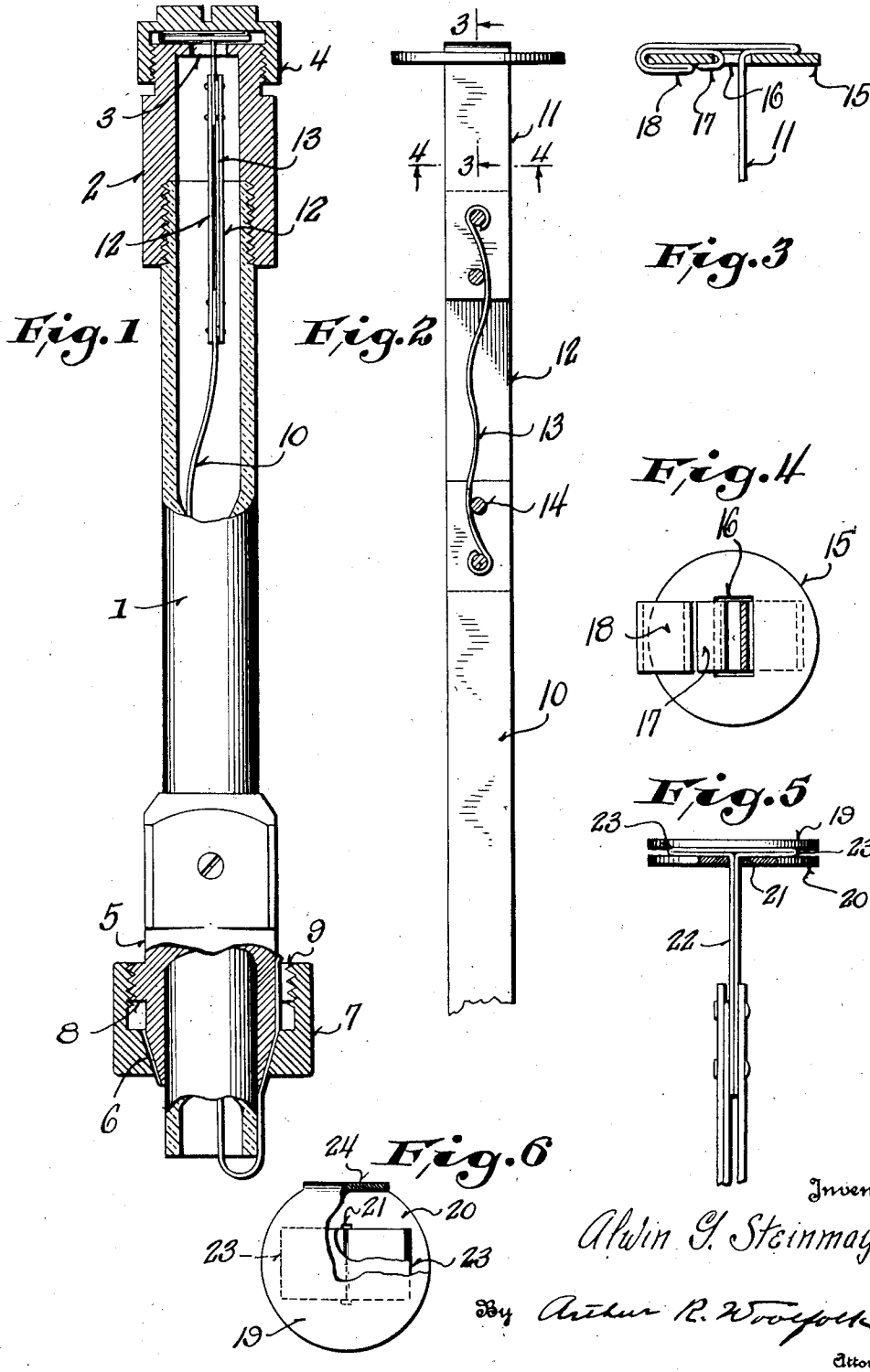
Feb. 14, 1933.

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1,897,342

FUSE LINK

Filed Dec. 26, 1929



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## FUSE LINK

Application filed December 26, 1929. Serial No. 416,325.

This invention relates to fuse links.

In fuse links as heretofore constructed, it has been found extremely difficult to make a low amperage fuse link which is mechanically strong and which also may be made of a uniform capacity.

When it is considered that in the high voltage circuits the fuse links have to be relatively long, it will be seen that the small diameter of low amperage fuses renders them particularly fragile.

Several attempts have been made to overcome this difficulty, among which may be mentioned the enclosing of the fuse link in insulating tubing, commonly known as "spaghetti" tubing. This type of fuse has been found to have a certain choking effect which very often causes the fuse to clear too rapidly, which results in the fusing of an insufficient length of the fuse link. The result of this is that a leakage occurs between the ends of the fuse link adjacent the fused portion, and this leakage very often produces spitting or other radio interference. In addition to this, there is a slow carbonization which takes place which frequently finally results in burning through the fuse cartridge.

In addition to the defects noted above, it has been the common practice to solder one end at least of the fuse link to a terminal clip or contact member. This process of soldering usually reduces the section of the fuse link immediately adjacent the clip and thus varies the capacity of the fuse and makes the capacity other than that for which the fuse is intended. In addition to this, certain chemical changes take place adjacent the soldered joint due to the soldering. The heat and the chemical nature of the solder frequently varies the chemical nature of the fuse link. Thus there is very frequently a change in capacity of the fuse from that at which it was intended to melt.

This invention is designed to overcome the defects noted above and objects of this invention are to provide a novel form of fuse link which may be made in any size desired, even in the very small or low amperage sizes, and which is reinforced at a portion of its length, where it is of reduced cross section to me-

chanically protect the fuse at its most delicate portion.

A further object is to provide a fuse link which, although reinforced at the portion of reduced cross section, permits the ready inspection of the reinforced part, so that it is easy to determine the condition of the fuse although the fuse is reinforced.

Further objects are to provide a fuse link which has a reduced portion held in a mechanically slack condition by insulating reinforcing means which relieves the reduced portion of any mechanical strain, which is so made that no choking is produced when the fuse blows, and which protects the cartridge from intense heat at the instant the fuse melts.

Further objects are to provide a fuse link which is equipped with a contact clip, which does not require soldering to the contact clip, but which, instead, is so made that an extensive contact area is assured by mechanical means without damage to the fuse link.

Further objects are to provide a fuse link which is so made that it will have a reduced portion precisely determining the value of the current at which the fuse will blow, and which is of sturdy construction throughout its entire length, although the fuse link may be of small capacity.

Further objects are to provide a fuse link in which the major portions may be made of one material and shape, and in which the reduced portion may be made of a different shape and of the same or of a different material from the major portion.

Further objects are to provide a fuse construction which will be free from radio interference after the fuse blows, and which is so made that the reduced portion will be completely destroyed under all conditions, and which, even if the major portion of the fuse link is not destroyed, will nevertheless provide a wide break or spacing between any remaining portion.

An embodiment of the invention is shown in the accompanying drawing, in which:

Figure 1 is an elevation of the fuse cartridge with parts in section showing the fuse link in place.

Figure 2 is a fragmentary view of the fuse link removed from the cartridge and drawn to an enlarged scale with a part of the reinforcing means sectioned off.

5 Figure 3 is a sectional view on the line 3—3 of the Figure 2.

Figure 4 is a sectional view on the line 4—4 of Figure 2.

Figure 5 is a side elevation of a modified 10 form of construction particularly directed to the terminal clip or contact clip, such view being partly in section.

Figure 6 is a plane view, partly broken 15 away, of the structure shown in Figure 5. Referring to the drawing, it will be seen that the fuse structure comprises an elongated body portion or fuse cartridge 1 of insulating material. This cartridge carries an upper metal contact member 2 provided 20 with a transversely extending upper portion or wall having an aperture 3 therethrough. The upper end of the contact member 2 is threaded and receives the threaded clamping cap 4. The lower portion of the cartridge 25 is provided with a lower contact member 5 having a tapered portion 6 against which the fuse link may be clamped by means of the clamping nut 7. Preferably the threaded portion or shoulder 8 of the lower contact 30 member is provided with a slot 9 through which the end of the fuse link may extend as indicated in Figure 1.

It is to be distinctly understood that the expressions upper and lower are used merely 35 for simplicity of description and to avoid needless repetition, as obviously the fuse could be used in other positions from that shown without departing from the spirit of this invention. Therefore these expressions 40 upper and lower are not to be interpreted as specifically limiting expressions.

The fuse link comprises two major portions, a lower portion 10 and an upper portion 11. The upper portion is preferably 45 materially shorter than the lower portion so as to correctly position the reduced part in the upper portion of the fuse cartridge as shown in Figure 1.

The two major portions 10 and 11 are each 50 formed of a flexible metal strip preferably of fusible material, and these sections or portions have their ends spaced apart as shown most clearly in Figure 2. A pair of fiber reinforcing strips 12 are used to mechanically 55 join the major portions of the fuse link and to hold opposed ends of these portions in spaced relation. A fusible element 13 is interposed between the spaced ends of the portions 10 and 11 and joins such portions. This 60 fusible element constitutes an intermediate portion in the fuse link of reduced cross section, and it may be made of the same or of different material from that of the portions 10 and 11. This portion 13, as will be seen 65 very readily from Figure 2, is held in a slack

condition by the insulating fiber strips 12, so that there is no chance for mechanical strain to be applied to the reduced portion 13 even if the fuse link is flexed at the fiber strips.

Preferably the fiber strips 12 are positioned 70 on opposite sides of the portion 13 and are secured in place by rivets 14 extending through the fiber strips and through the portions 10 and 11. These rivets also preferably have 75 the member 13 wrapped around them or in contact with them, as shown in Figure 2. However, when the rivets are drawn up in the process of riveting, they will firmly bind the portion 13 against the portions 10 and 11 and insure extensive and adequate contact 80 between such portions.

It is, of course, to be understood that it is within the province of this invention to use a single fiber strip if desired, unless otherwise 85 specifically claimed.

It will be noted from the construction thus far outlined that a flexible fuse link has been provided which is equipped with a reduced section mechanically protected. It is to be 90 noted, however, that this reduced section may be very readily inspected, as is apparent from Figure 1, for the fiber strips form in effect a housing for this reduced portion which is open at its longitudinal edges.

It is thus apparent that no testing of this 95 fuse link is required to ascertain whether or not it is continuous throughout, but that this condition may be readily ascertained by a simple inspection.

It has been found that when fuse links are 100 soldered to the terminal contact clips, frequently the section of the fuse link adjacent the clip is altered and, in addition, it is frequently found that the chemical nature of the fuse link has been changed adjacent the sol- 105 dered portion. This produces an uncertainty or variation in fuses which require soldering.

This invention overcomes the difficulty 110 noted above as no soldering is required in the joining of the fuse link to the terminal clip.

One form of the invention employs a metal 115 terminal clip 15 which is provided with a central aperture 16 through which the portion 11 of the fuse link is threaded. The upper projecting portion is then folded across the upper face of the contact clip 15 as shown 120 in Figures 3 and 4 and its end passed back through the opening 16 and clinched as indicated at 17. Also either one or both of the folded or looped ends may be clinched around an edge of the contact clip. For instance, 125 the portion 18 has been shown as clinched around the edge of the clip 15 in Figures 3 and 4.

A further and a preferred form of contact 130 clip is shown in Figures 5 and 6. The contact clip consists of an upper, disc like member 19 and a lower disc like member 20, the lower member being provided with a slot 21. 1

These disc like members are joined by an integral, normally folded lip 24, thereby permitting the members 19, 20 and 24 to be stamped out of one piece of metal. The upper fusible member 22 which corresponds to the member 11 may be either single or double. It is preferably doubled, as shown in Figure 5, and has two outwardly folded portions 23 clamped between the upper disc 19 and the lower disc 20 of the clip, the body of the member 22 extending downwardly through the slot 21. Obviously, it is an extremely easy matter to insert the upper member 22 through the slot 21 while the discs are either partially or wholly opened out. Thereafter the upper disc is folded down into the position shown in Figures 5 and 6.

It will be seen that in both forms of terminal clips or contact clips a very extensive contact is secured between the terminal or contact clip and the fuse link.

In addition to this, when the fuse link is positioned within the fuse cartridge with the terminal clip clamped between the clamping cap 4 and the upper contact member, it will be seen that the fuse link is tightly held, and an extensive electrical contact is secured.

It will be seen that a very simple and eminently practical fuse link has been provided by this invention which may be made in any desired capacity even for very low amperage and for high voltage. Further, it will be noted that the reduced portion is mechanically protected from all damage and also is held in a slack condition by the reinforcing insulating portion, so that it is free from the chance of damage or from mechanical strain.

It is to be noted also that the spacing of the major portions of the fuse link is such that a wide separation is obtained even when only the reduced portion 13 is melted as, for instance, when the fuse blows due to overload condition. Consequently, there is no chance of radio interference even under these most disadvantageous conditions. On the other hand, if the fuse should be suddenly and greatly overloaded as, for instance, under short circuit conditions, the entire fusible element, including the major portions and the reduced portions, would be destroyed, and, consequently, there would be no chance even under the condition of extreme load of the establishing of an arc in the fuse cartridge, as an extremely wide separation would then be obtained.

It will be seen that a very simple and relatively cheap and eminently reliable fuse link has been provided by this invention.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. A flexible fuse link adapted to be bodily threaded into a fuse cartridge comprising a composite fuse consisting of two spaced fusible strips forming the major portion of the fuse link, an intermediate fusible portion electrically joining said spaced portions and of lesser cross section than said spaced portions, and an insulating member joining said spaced fusible portions and holding said intermediate fusible portion in a slack condition.

2. A fuse link comprising a pair of elongated fusible members of flexible fusible metal, having their ends spaced apart, a non-fragile insulating member joining the spaced ends of said fusible members, and an intermediate fusible member held in a slack condition by said insulating member and mechanically clamped at each end to the corresponding end of said first mentioned fusible members.

3. A fuse link comprising a pair of elongated fusible members of flexible fusible metal having spaced ends, an intermediate fusible member electrically joining the spaced ends of said first mentioned fusible members, a pair of insulating strips enclosing between them said intermediate fusible member, said insulating strips leaving an open space along their longitudinal edges, and means mechanically clamping the ends of said insulating strips and the ends of said intermediate and first mentioned fusible members together.

4. A fuse link comprising an elongated fusible element of ribbon-like flexible conducting material, a contact clip having an upper plate and a lower plate joined by an intermediate offset portion, the lower plate having an elongated slot therethrough and said plates presenting flat opposed faces, said fusible element having one end threaded through said slot and folded flatly into the space between the two plates to form a T-head between the plates and having a face to face contact with the two plates, whereby an extensive face to face contact is provided between said T-head and both said plates.

In testimony whereof, the signature of the inventor is affixed hereto.

ALWIN G. STEINMAYER.