Aug. 4, 1959 H. SIMMONDS 2,898,425

CARTRIDGE FUSE LINKS

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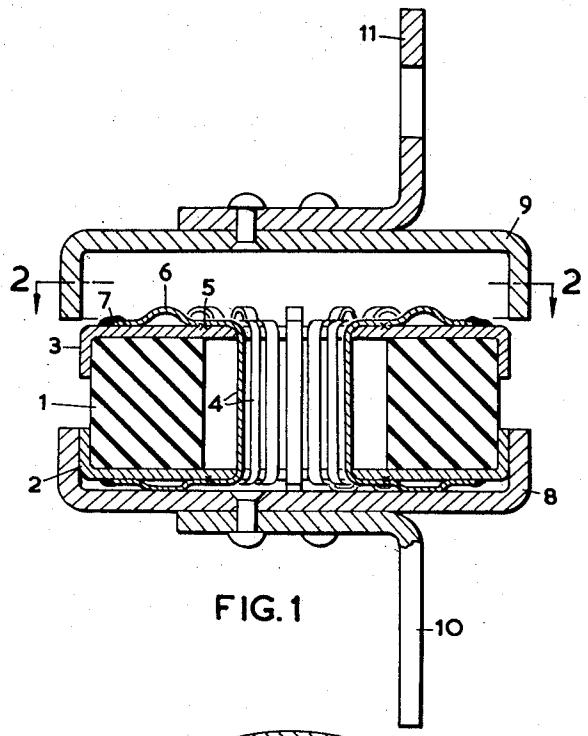


FIG. 1

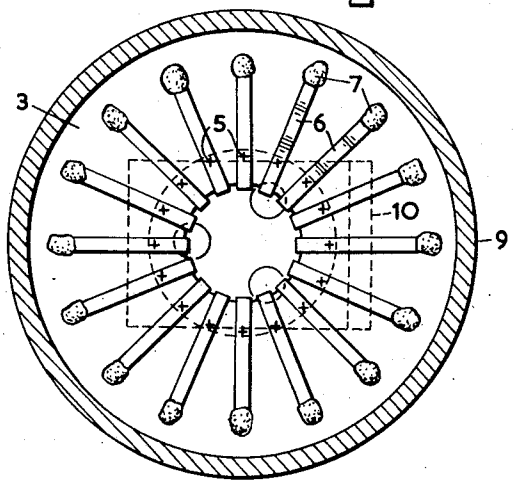


FIG. 2

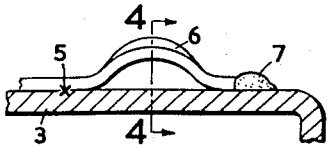


FIG. 3

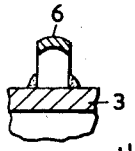


FIG. 4

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CARTRIDGE FUSE LINKS

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5 Claims. (Cl. 200—131)

This invention relates to cartridge fuse links of the kind in which a fuse element extends through a hollow insulating body and is secured to inner end caps, electrical connection being made to outer end caps.

According to the invention, a cartridge fuse link comprises a hollow insulating body, inner end caps secured to said body, a fuse element of sheet material extending between the inner end caps through the body, each end of the element being bent over and secured in two radially spaced positions to the outer surface of an inner end cap and formed between these positions with a bight projecting above the general level of the bent-over portion, and an outer end cap forming an electrical terminal for said fuse element and secured to the inner end cap with its inner surface deforming the bight so as to make intimate thermal and electrical contact therewith.

Preferably the element is secured at that one of the two positions which is nearer to the fusible portion of the element by a welding operation, and at the other position by soldering. The use of solder is usually preferred in fuse gear manufacture to welding, but if placed too near a portion of a fuse element which can attain a high temperature, there is a possibility, in some conditions of use, that the solder might diffuse into the material of the element to an extent such as to materially alter its melting point. In the present construction the use of a weld at the fixing position nearer the fusible portion followed by a portion in direct conducting relation with the outer cap and beyond that a soldered connection, adequately prevents such a possibility provided the outer cap is kept sufficiently cool in use, while preserving the advantages of the use of a soldered connection.

A fuse link according to the invention may have a single element in the form of a strip of metal or it may have a tubular element with appropriate holes around its medial portion to provide a plurality of parallel connected fusing regions. Alternatively it may be provided with a number of separate strip elements connected in parallel and these may each, if desired, be shaped in the neighborhood of the fusing region so as to produce a particular fuse characteristic.

A fuse link of this last mentioned form is illustrated in the accompanying drawing from which, in conjunction with the following description, the above and other features of the invention will be apparent.

In the drawing, Fig. 1 is a sectional elevation of a cartridge fuse link partly assembled, Fig. 2 is a section on line 2—2 of Fig. 1, and Fig. 3 is an enlarged view of a broken-away portion of the inner end cap showing a modified arrangement, and Fig. 4 is a section on line 4—4 of Fig. 3.

A fuse body 1 of ceramic material is in the form of a hollow cylinder, cup-shaped inner end caps 2, 3 are pressed on to the ends of the body 1 the flanges of the inner end caps being an interference fit with the outer surface of the body 1. Each of the end caps 2, 3 has a central hole the edges of which are chamfered and the diameter of which is less than the internal diameter of the body

1. Fuse elements 4 in the form of thin strips of silver are arranged so as to extend through the bore of the body 1 spaced away from the inner wall thereof by being supported from the holes in the end caps 2, 3. The ends of the elements 4 are bent over so as to lie radially on the surface of the end caps 2, 3 as shown in Fig. 2. At points near the edge of the central hole in the end caps 2, 3 the elements 4 are spot welded to the surface of these end caps, as shown at 5. The end of each element is then bent into a bight 6 which extends away from the surfaces of the end caps 2, 3. The outer ends of the elements are then soldered to the end caps 2, 3 near the periphery thereof, as shown at 7. The extent to which the bight 6 of each element extends away from the surface of the corresponding end cap is so arranged as to be greater than the height of solder at 7. If desired, excess solder can be removed at this stage by a grinding or finishing operation. Outer end caps 8 and 9 are then pressed on to the inner end caps 2 and 3 respectively. These outer end caps 8 and 9 are arranged to be an interference fit over the inner end caps 2 and 3 and are forced on to such an extent as to ensure that each bight formed in the ends of the fuse elements is compressed during this operation. In Fig. 1 the end cap 8 is shown in its final position with the bights 6 fully compressed, while the end cap 9 is shown in a partly assembled position before it has actually contacted the bights 6.

In practice the end cap 8 in the position shown in the drawing, is assembled first and the interior of the body 1 is then filled with arc quenching material such as powdered silica which thus completely surrounds each of the fuse elements 4. It may be convenient to make the welded and soldered connections between the elements 4 and the inner end cap 3 only after the end cap 8 has been fully pressed home. The welded and soldered connections 5 and 7 are then made between the elements 4 and the end cap 3. The outer end cap 9 is then forced on to the inner end cap 3 so as to compress the bight 6 at that end. The outer end caps 8 and 9 have riveted to them connecting lugs 10 and 11 respectively.

The bights 6 in the ends of the fuse elements 4 may be formed after the welded connections 5 have been made or they may be pre-formed when the elements 4 are in their straight condition. Figs. 3 and 4 show a modified form of bight in which, as will be seen clearly from Fig. 4, the material of the element is deformed in two directions so as to present a somewhat domelike appearance. By this means the bights are rendered more rigid than if they were merely deformed in one plane and the pressure exerted by a collapsed bight on the inner surface of the outer end caps may thus be increased.

The construction results in a particularly good thermal and electrical contact between individual fuse elements and the large mass of metal of the outer end caps at a point nearer to the fusing region than the soldered connection of the fuse elements.

What I claim as my invention and desire to secure by Letters Patent is:

1. A cartridge fuse link comprising a hollow insulating body, inner end caps secured to said body, a fuse element of sheet material extending between the inner end caps through the body, each end of the element being bent over and secured in two radially spaced positions to the outer surface of an inner end cap and formed between these positions with a bight projecting above the general level of the bent-over portion, and an outer end cap forming an electrical terminal for said fuse element and secured to the inner end cap with its inner surface deforming the bight so as to make intimate thermal and electrical contact therewith.

2. A cartridge fuse link according to claim 1, wherein

the material of the fuse element in the region of the bight is curved in two directions to increase its stiffness.

3. A cartridge fuse link comprising a hollow insulating body, inner end caps secured to said body, a fuse element of sheet material extending between the inner end caps through the body, each end of the element being bent over and secured in two radially spaced positions to the outer surface of an inner end cap and formed between these positions with a bight projecting above the general level of the bent-over portion, the element being secured at that one of said two positions that is nearer to the fusible portion by a welding operation, and an outer end cap secured to the inner end cap with its inner surface deforming the bight so as to make intimate thermal and electrical contact therewith.

4. A cartridge fuse link according to claim 3, wherein

the element is secured at the other of said two positions by solder.

5. A cartridge fuse link according to claim 3, wherein the material of the fuse element in the region of the bight is curved in two directions to increase its stiffness.

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