

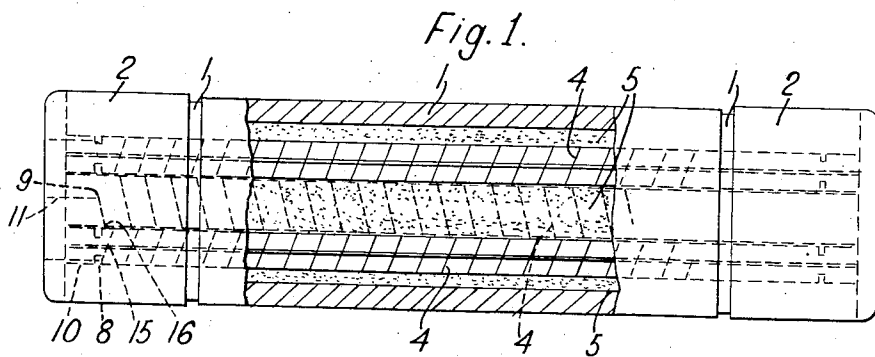
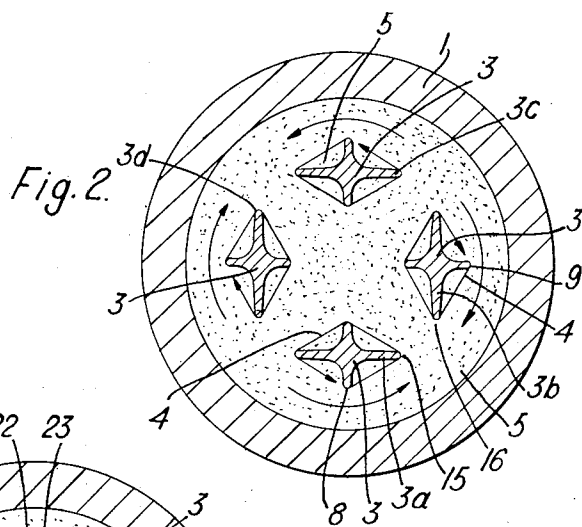
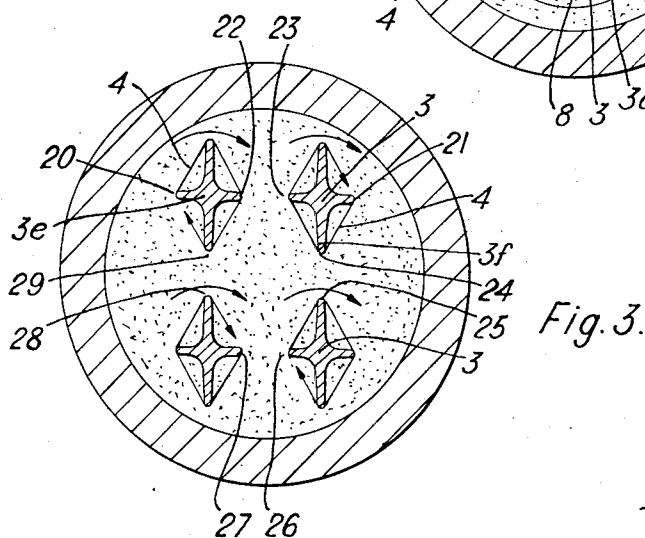
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ELECTRIC FUSES

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ELECTRIC FUSES

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8 Claims. (Cl. 200—120)

An electric fuse is known which is provided within its hollow insulating body with a single elongated star-section insulating core, for example of ceramic, having a fusible element, or a number of such elements electrically in parallel, wound helically around the core with a constant pitch and embedded in arc-quenching powder, such as quartz powder. The rupturing capacity and continuous current rating of such a fuse has been increased, without a corresponding increase in the size of the fuse, by providing not just one core but a number disposed within the body and extending generally parallel to one another. Each core has one or more of the fusible elements wound helically around it and all the elements are connected electrically in parallel with one another and have a common constant pitch. The cores have of course to be spaced from one another by a distance sufficient to prevent short-circuiting from an element on one core to an element on an adjacent core, and this serves to limit the number of cores of reasonable size which can be provided in the body of the fuse and thus serves to limit the total increase in rupturing capacity and continuous current rating which is possible by employing more than one core. It will be appreciated that the gaps between adjacent cores must be considerable, for a modern high rupturing capacity may well have a potential drop along its length of up to about 1,000 volts per inch when arcing has commenced. Such gaps between cores are in effect waste space within the fuse, for the arc-quenching powder which fills them performs no real function.

According to the present invention, the elements are arranged so that adjacent portions of elements on adjacent cores are at substantially the same electrical potential when a voltage is applied across the fuse. A switch in accordance with the invention is such that, during periods of element melting and arcing which take place on development of a fault in the associated electrical circuit, the potentials at any two adjacent portions of the elements on adjacent cores are substantially the same, thereby reducing, as compared with similar prior arrangements, the risk of shorting between adjacent elements. As a result, the cores may be brought closer together than hitherto, and more cores may be employed in a given space with consequent increase in rupturing capacity and continuous current rating. Alternatively the same rupturing capacity and continuous current rating may be obtained from a fuse of smaller size.

In one arrangement according to the invention, the or each element on each core is arranged to be a mirror image of the element, or the corresponding element, of the or each adjacent core. With this arrangement, the elements on adjacent cores are, of course, wound in opposite directions. Because of this, the inductance is less than in a similar fuse in which all the elements are wound in the same direction.

Two fuses in accordance with the invention will now

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be described with reference to the accompanying drawings in which:

Figure 1 is a side elevation of the first fuse, partly in section and showing the top, bottom and right hand side elements of Figure 2;

Figure 2 is a cross-section of this first fuse; and Figure 3 is a cross-section of the second fuse.

The first fuse has a ceramic tubular body 1 of annular cross-section over the ends of which are fitted caps 2 which constitute the terminals of the fuse. Housed within the body 1 are four identical elongated, parallel ceramic cores 3 which, as can be seen from Figure 2 are of star-section. Around each core 3 is helically wound, with a constant pitch, a single fusible element 4 which is embedded in arc-quenching quartz powder 5 which fills the interior of the body 1. All the elements 4 are connected inside the body 1 to the caps 2 so that the elements are all connected electrically in parallel with one another.

As can be seen in Figure 1, all the elements 4 are wound with a common pitch and each element is arranged to be a mirror image of the element of each adjacent core. Thus, adjacent elements are wound in opposite directions. The element on the bottom core 3a is wound in an anticlockwise direction looked at from the left of Figure 1, the helical winding starting at the bottom 8 of the core 3a. On the other hand, the element 4 wound around the adjacent core 3b is wound in a clockwise direction looked at from the left of Figure 1 and the helical winding starts at the front 9 of the core 3b. The portions of the elements at the points 8, 9 are connected directly through leads 10, 11 to the inside of the left hand cap 2 and these two portions are therefore at virtually the same electrical potential as this cap. The adjacent portions of the elements on the two cores 3a, 3b, are indicated as 15, 16, these portions 15, 16 being a quarter of a turn away from the points 8, 9 and being therefore at substantially the same electrical potential when a voltage is applied across the fuse. The same applies all the way along the two cores 3a, 3b so that these cores may be arranged closer to one another than in previous constructions having laterally aligned elements wound in the same direction. It will be appreciated that the same applies to the elements on the other two cores 3c and 3d.

The second fuse differs from the first in that the cores 3 are arranged the same way round and in that all the elements are wound in the same direction. However, adjacent cores are turned about their axes through 180° with respect to one another. Thus the elements 4 on the adjacent cores 3e, 3f start their helical winding at points 20, 21 which are laterally aligned but which are remote from one another. The portions of the elements at the points 20, 21 are, of course, of the same electrical potential since they are connected directly to one of the caps 2. The adjacent portions 22, 23 of these elements are both disposed half a turn from the points 20, 21 and are thus at the same electrical potential as one another when a voltage is applied across the fuse. In the same way, the adjacent portions 24, 25 are at substantially the same potential when a voltage is applied across the fuse, and the same applies to the adjacent portions 26, 27 and 28, 29.

I claim:

1. An electric fuse comprising an insulating body containing arc-quenching material, a plurality of elongated substantially parallel star-section insulating cores mounted in said body, a plurality of fusible elements wound helically about said cores with a common pitch and embedded in said material, and means connecting said

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elements electrically in parallel wherein in each pair of adjacent elements, each pair of points of minimum divides the respective elements into first and second lengths, the ratios between the resistances of the first and second lengths for the two elements being substantially the same.

2. The electric fuse as defined in claim 1 wherein said arc-quenching material is a powder.

3. The electric fuse as defined in claim 1 wherein the common pitch of the fusible elements wound helically about said cores is constant.

4. An electric fuse comprising an insulating body containing arc-quenching material, a plurality of elongated substantially parallel star-section insulating cores mounted in said body, a plurality of fusible elements wound helically about said cores with a common pitch and embedded in said material, and means connecting said elements electrically in parallel, each element being a mirror image of an element on an adjacent core.

5. A fuse as defined in claim 1, said cores and ele-

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ments being identical with one another, and each core being turned about its axis with respect to an adjacent core, to render the said ratios substantially the same.

6. A fuse as defined in claim 1, said insulating body comprising a tube of annular cross-section, and the said cores being arranged symmetrically about and parallel to the axis of said body.

7. A fuse as defined in claim 1 and comprising terminal caps fitting over the ends of said insulating body and being electrically connected to said elements.

8. A fuse as defined in claim 1 wherein all of said cores are mounted in a single opening in the body.

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