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ELECTRIC SAFETY FUSES

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Fig. 1.

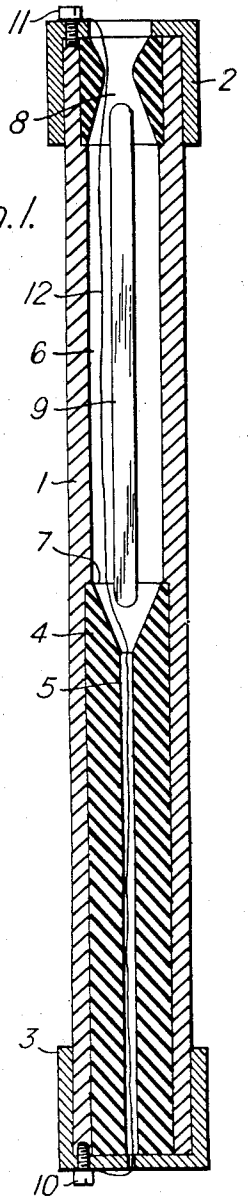
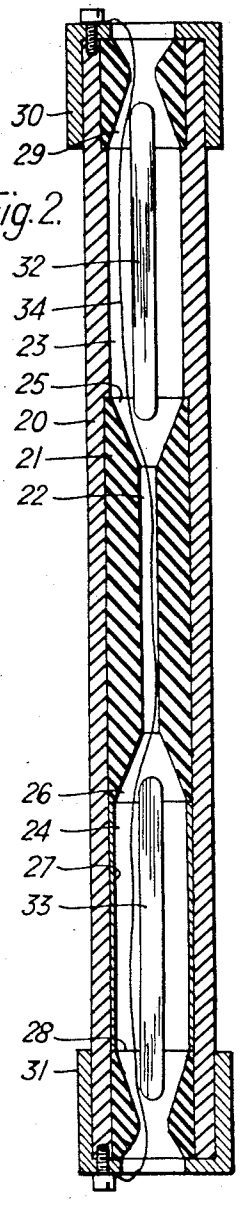


Fig. 2.



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ELECTRIC SAFETY FUSES

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3 Claims. (Cl. 200—120)

This invention relates to a safety fuse of very simple construction, wherein the extinguishing of the arc is effected by a flow of pressure extinguishing medium produced by the arc itself, and which can be used more especially for high and extremely high tensions.

In accordance with the invention this is achieved due to the fact that the extinguishing chamber is connected with a narrow channel and that a fixed contact arranged in the extinguishing chamber is disposed both before the outflow aperture of the channel and in the outflow aperture of the extinguishing chamber, and that the arcs burning at both ends of the contact are extinguished both by the outflowing pressure extinguishing medium from the channel and from an extinguishing chamber. When the fuse wire melts, firstly a pressure-producing arc burns for a very short time in the extinguishing chamber and in the channel, which is then bridged over by the contact situated in the extinguishing chamber, to this length, so that now only the arc in the channel and in the outflow aperture of the extinguishing chamber burns. Due to the pressure extinguishing medium flowing out of the channel into the extinguishing chamber, on the one hand the arc burning before the outflow aperture is exposed to a flow of pressure extinguishing medium and on the other hand the pressure extinguishing medium situated in the extinguishing chamber and only slightly warmed is driven to the outflow aperture of the extinguishing chamber, in order to blow upon the arc there burning, so that the extinguishing of the arc takes place. The outflow aperture of the extinguishing chamber is expediently made of an insulated material and thus the arc is compelled to seek a footing on a smooth surface. In order to control the issuing extinguishing medium the outflow aperture of the extinguishing chamber can be provided with a valve.

Two examples of embodiment of the invention are shown in the accompanying drawing, wherein Figure 1 represents a safety fuse with two extinguishing points and Figure 2 represents a safety fuse with four extinguishing points.

In Figure 1 the safety fuse tube **1** is closed off by two caps **2**, **3** provided with apertures. An insert **4** consisting of insulated material is inserted into the lower part of the safety fuse. The insert **4** is provided with a channel **5**, which is in open communication with the free remaining space of the safety fuse. This space constitutes the extinguishing chamber **6**.

The insert **4** or the narrow channel **5** runs conically towards the extinguishing chamber **6**, and forms for this side the closure **7** of the extinguishing chamber **6**. On the other side the extinguishing chamber **6** is terminated by the outflow aperture **8**, which also consists of an insulating material.

Both the insert **4** and the outflow aperture **8** are placed in the safety fuse tube **1** of a greater diameter, and are held fast by the caps **2**, **3**.

In the extinguishing chamber **6** there is secured a contact **9**, which is disposed with its ends, which are formed as arc footing contacts, on the one hand before the outflow aperture **7** of the channel **4** and on the other hand in the outflow aperture **8** of the extinguishing chamber **6**. Due to this arrangement two open contact positions are formed, which serve for the extinguishing of the arc.

By means of the screws **10**, **11** the fuse wire **12** is secured to the caps **2**, **3**. The fuse wire is advantageously introduced into the safety fuse by the use of a steel wire.

The safety fuse of Figure 1 acts in the following way:

When the fusible wire **12** melts, an arc burns between the caps **2**, **3** in the channel **5** and in the extinguishing chamber **6**, and an increase of pressure is produced. Over the length of the contact **9** the part of the arc burning in the extinguishing chamber is bridged over by the contact **9** so that now only two arcs, separated from one another, burn. The one arc burns between the cap **2** and the upper end of the contact **9** in the outflow aperture **8**. The other arc burns between the lower end of the contact **9**, within the channel **5**, and the cap **3**.

While the arc burning in the outflow aperture **8** only acts as an extinguishing arc, the arc burning in the channel **5** serves on the one hand for the further additional increase of pressure and on the other hand this arc produces a flow of pressure extinguishing medium, to which the arc burning on the lower part of the contact **9** is exposed.

This pressure extinguishing medium flowing out of the channel **5** flows into the extinguishing chamber **6** and increases the already produced pressure extinguishing medium situated there, which then flows out through the outflow aperture **8** of the extinguishing chamber.

The pressure extinguishing medium issuing from the channel **5** thus not only acts upon the arc burning in the outflow aperture **7**, but also increases and drives the pressure extinguishing medium situated in the extinguishing chamber to the extinguishing point **9**, **11**. The two arcs are thus exposed, due to the production of pressure in the channel **5**, to a very effective flow of pressure extinguishing medium. It is here of special advantage that the upper arc burning in the outflow aperture **8** is blown upon by a pressure extinguishing medium which is hardly prewarmed.

Due to this double flow a reliable and easy extinguishing of the two arcs takes place, and the manner of operation is here just as effective and reliable for very small and very great currents.

As extinguishing medium it is possible to use air, gas in any form, or a liquid. The insert **4** and the outflow aperture **8** can be produced from an insulating material which gives off gases due to the action of the arc, which gases are favourable to the extinguishing of the arc.

In Figure 2 the insert **21** with the narrow channel **22** is situated in the middle of the safety fuse tube **20**. Due to this arrangement two extinguishing chambers **23**, **24** are formed. The outflow apertures **25**, **26** run conically into the extinguishing chambers **23**, **24** and close these off from the interior of the safety fuse tube **20**.

The insert **21** is inserted from beneath into the safety fuse tube **20**, and held by the spacing tube **27**.

The extinguishing chambers **23**, **24** are closed off by the outflow apertures **28**, **29** at the ends of the safety fuse tube **20**, which are held firmly together by the caps **30**, **31**.

In the extinguishing chambers **23**, **24** there are secured the contacts **32**, **33**, which are disposed before and in the outflow apertures **28**, **29** respectively, and with the caps **30**, **31** constitute to these sides the open contact positions. The fusible wire **34** is secured by means of the screws on the caps which are screwed, cemented or moulded on to the safety fuse tube **20**.

The safety fuse of Figure 2 acts in the following way:

When the fusible wire **34** melts, an arc burns between the caps **30**, **31** in the two extinguishing chambers and in the channel **22**, and an increase of pressure is produced.

The arcs burning in the two extinguishing chambers **23**,

24 are bridged over by the contacts 32, 33, and now only the partial arcs between the cap 30 and the contact 32, from the contact 32 through the channel 22 to the contact 33, and from the contact 33 to the cap 31 are burning.

The first, long length of the arc is thus now divided up into three arcs. The arcs burning with relatively short length between the caps 30, 31 and the contacts 32, 33 serve only for the extinguishing.

The long arc burning between the contacts 32, 33 in the channel 22 produces in the channel a further increase of pressure, whose flows of extinguishing medium blow upon the two arcs burning before the outflow apertures 25, 26, and impart further increase of pressure to the pressure extinguishing medium situated in the extinguishing chambers 23, 24, produced by the arc first burning, so that the still fresh pressure extinguishing medium is driven into the outflow apertures 28, 29 and effectively blows upon the arcs burning there.

Thus the four arcs are in a powerful flow of pressure extinguishing medium, and very easy extinguishing takes place.

The number of the open extinguishing positions can be multiplied in any desired manner, and thus the switching-off capacity of the safety fuse can be increased without regard for the voltage.

Here again any gas or a liquid can be used as extinguishing medium.

I claim:

1. An electrical safety fuse comprising a tube, two apertured end caps secured one to each end of said tube, at least one insulating insert pierced by a long narrow channel secured within said tube, at least one outflow-apertured member secured within said tube and spaced from said insert whereby at least one chamber is formed and bounded by said tube and said insert and said member, at least one conductor arranged in each of said chambers and extending substantially from end to end thereof, and a fuse wire extending between said end caps and extending through said channel and through said chamber adjacent to said conductor.

2. An electrical safety fuse comprising a tube, two apertured end caps secured one to each end of said tube, a long insulating insert secured within said tube and pierced by a long narrow channel, said channel communicating at one end with an aperture in one of said end caps and having a conical widening at the other end, a member with a convergent-divergent outflow aperture secured within said tube and spaced from said insert so that a chamber of substantial length is formed between and bounded by said tube and said insert and said member, a conductor within said chamber having one end within said conical widening and the other end within the convergent part of said convergent-divergent outflow aperture, and a fuse wire extending between said end caps through said channel and said chamber adjacent to said conductor.

3. An electrical safety fuse comprising a tube, two apertured end caps secured one to each end of said tube, at least one insulating insert pierced by a narrow channel with a conical widening at each end secured within said tube, two members each with a convergent-divergent outflow aperture secured within said tube, one of said members being at each end of said tube and said members and said insulating inserts being substantially spaced from one another to form a plurality of extinguishing chambers of substantial length within said tube, a plurality of conductors arranged one in each of said chambers, each of said conductors extending substantially from end to end of one of said chambers, and a fuse wire extending between said end caps through said channels and said chambers adjacent to said conductors.

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