Sept. 16, 1924. 1,508,839

O. DREYER

SAFETY FUSE

Filed Feb. 4, 1922

Fig. 1

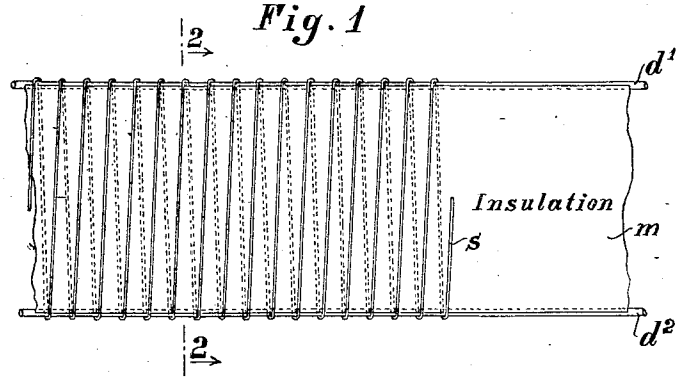


Fig. 2

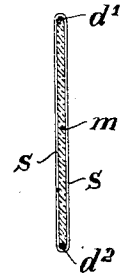


Fig. 3

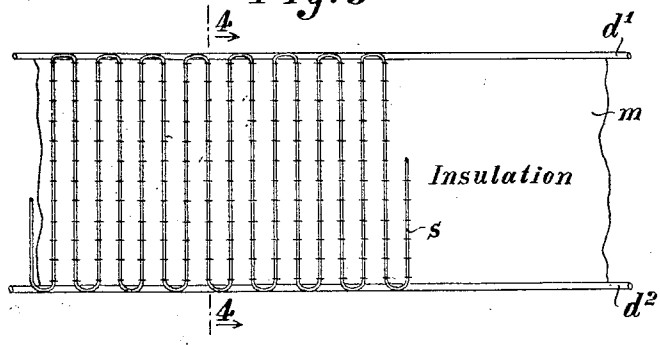


Fig. 4

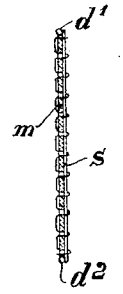


Fig. 5

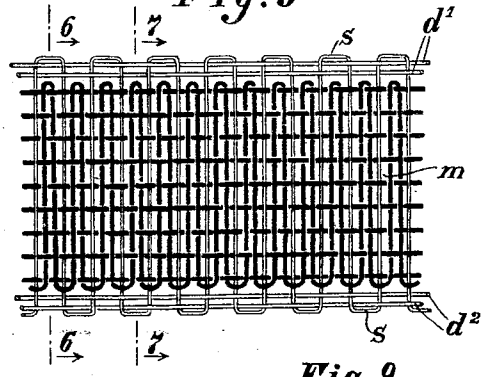


Fig. 6

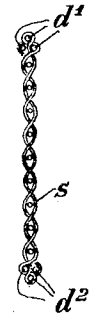


Fig. 7

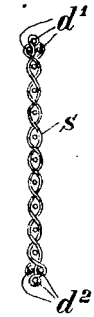


Fig. 8

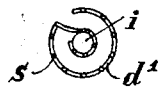
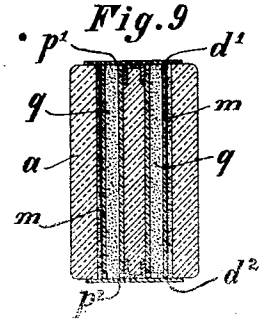


Fig. 9



Inventor:
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by Kenealy

Patented Sept. 16, 1924. 1,508,839

UNITED STATES PATENT OFFICE.

OTTO DREYER, OF ESSEN-RUHR, GERMANY.

SAFETY FUSE.

Application filed February 4, 1922. Serial No. 534,242.

To all whom it may concern:

Be it known that I, OTTO DREYER, a citizen of Germany, residing at Essen-Ruhr, Germany, have invented certain new and useful Improvements in Safety Fuses, of which the following is a specification.

My invention refers to safety fuses and its particular object is to provide a fuse which can be manufactured at lower costs than those hitherto in use.

As is well known to those skilled in the art, an overloaded electric circuit can be cut out in the most reliable manner by aid of a safety fuse whose fusible piece contains as little metal for evaporation in a single chamber as possible. This is the reason why fuses for low currents are more reliable in working than those for higher currents. In the latter case it has already been proposed to subdivide the fusible piece and to arrange the divisional pieces or wires either singly or severally, in separate channels of the fuse body or cartridge. In this manner the stationary state of the arc is diminished or avoided altogether inasmuch as no sufficient quantities of metal vapor can form in the single channels during the fusing operation. In connection with such fuses it has proved to be preferable to employ a fusible piece in the form of a very thin wire in multiple connection, certain minimum distances being observed between the single portions of the wire. Unfortunately this system could not be generally adopted for the reason that fuses of this type could not be manufactured at sufficiently low prices.

It is an object of my invention to provide means for manufacturing safety fuses of the type aforesaid at a comparatively low price and under commercial conditions.

To attain this object, the carrier for the fuse wire consists, according to the present invention, of a strip or tape of insulating material on the longitudinal edges of which a conductive wire is arranged. On or in this strip or tape a wire of silver (German silver), copper or some other suitable metal is arranged in such a manner as to extend across the strip or tape between the two edge wires in a zigzag or in a helical line, being conductively connected with the edge wires at all points of intersection. The single transversely extending portions of the continuous wire, being separated and insulated from each other, form so many subdivisions of the fuse-conductor, the edge wires forming the end contacts. The strip or tape carrying the fuse wire is cut into single pieces, the length of which depends upon the intensity of the current for which the safety fuse is intended. The intensity of current, this safety fuse is capable of carrying without melting, is proportionate to the number of divisional transverse wire portions on the cut-off piece of strip.

In the drawings affixed to this specification and forming a part thereof several embodiments of my invention are illustrated diagrammatically by way of example. In the drawings—

Figure 1 is a plan view of a piece of the improved safety fuse, the fuse wire being wound around the strip or tape.

Figure 2 is a transverse section on line 2—2 in Figure 1.

Figure 3 is a plan view of a modification in which the fuse wire extends in zigzag across one side of the strip and is attached thereto by sewing.

Figure 4 is a cross section on the line 4—4 in Figure 3.

Figure 5 is a plan view of a third modification in which the fuse wire is interwoven with a strip or tape insulating material.

Figures 6 and 7 are cross sections on the lines 6—6 and 7—7, respectively, in Figure 5.

Figure 8 is an edge view of a spirally coiled piece of safety fuse ready for insertion into a cartridge.

Figure 9 is an axial section through a cartridge having the safety fuse inserted therein.

Referring first to Figures 1 and 2, the carrier consists of a strip or tape of insulating material, such as asbestos, or of a strip of paste-board impregnated with an insulating liquid. Wires d^1 d^2 of copper or some other good metal conductor, about 1 to $\frac{1}{2}$ mm. thick, are arranged on the edges of the strip or tape and are affixed thereto by a wire s and having a thickness of about 0.07–0.1 mm. which is wound around the strip or tape m in such a manner that it extends in spiral windings from the wire d^1 to the wire d^2, and back contacting with both wires at each crossing point. In order to obtain a good contact between the wires s and d^1, d^2, conductive connection is ensured at every crossing point by soldering

the wires together. The wire s is thus subdivided into a great number of semi-windings separated from and insulated with respect to one another by the insulating strip m, the whole forming a safety fuse, the end contacts of which are located at the edges of the strip m.

This strip or tape is cut into pieces of suitable length, according to the strength of current for which the safety fuse is intended, each piece carrying a plurality of semi-windings of the wire s, which are connected in parallel, and the number of which corresponds to the current carrying capacity desired. The cut-off pieces are wound around a core i (Figure 8) so as to form a spiral. The core i consists of insulating material, and the core with the spirally wound piece of strip is inserted in the cartridge body a (Figure 9) which also consists of insulating material. The hollow space remaining in the cartridge body a is filled with a granular or pulverulent insulating material, such as arenaceous quartz. The cartridge is then closed by contact plates p^1 p^2 which are soldered to the edge wires d^1 d^2 of the coiled safety fuse strip. The cartridge may be impregnated, as usual, in vacuo with an insulating liquid.

In the modification illustrated in Figures 3 and 4 the carrier for the fuse wire again consists of a strip or tape m of asbestos or impregnated paste-board or the like, at the edges of which conducting wires d^1 d^2 are arranged. The wire s is wound to and fro on one side of the strip m, the subdivisions being suitably spaced, as shown, and the wire being secured to the strip by being sewn onto it. Each subdivision of the fuse wire s is conductively connected with the edge wires d^1 d^2, thus forming a subdivision of the fuse conductor. This strip is then cut into pieces of the length required in each case which are coiled, and housed in cartridges in the same manner as has been described with respect to Figures 8 and 9.

In the modification shown in Figures 5–7 the strip m consists of a fabric of threads of asbestos or some other insulating material. The edges of this tape are formed by wires d^1 and d^2 which form additional warp threads, while the continuous fuse wire s is interwoven with this tape to form an additional continuous weft thread, the single divisions of which are separated from and insulated with respect to each other by the weft threads of the asbestos fabric. The bent ends of the subdivisions of the wire s where this latter changes its direction, and the rim or edge wires d^1 and d^2 are interlaced, as shown in Figure 5, whereby all the wires are conductively connected with each other.

The step of working the fuse wire into an insulating tape in the form of wefts presents the advantage over the step of working it into the ground weave in the form of warps that the fuse can thus be adapted with great accuracy to the requirements of each individual case by cutting off a suitable piece of the finished strip or band.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. A safety fuse comprising a strip- or band-shaped carrier of insulating material, a conductor on each longitudinal edge of said carrier and a continuous wire extending in a plurality of zigzag windings across said carrier between said conductors and in multiple conductive contact with each conductor.

2. A safety fuse comprising a flexible strip- or band-shaped carrier of insulating material, a conductor on each longitudinal edge of said carrier and a continuous wire extending in a plurality of zigzag windings across said carrier between said conductors and in multiple conductive contact with each conductor.

3. A safety fuse comprising a woven band of insulating material, a plurality of conductive warp threads extending along the longitudinal edges of said band and a continuous weft wire interwoven with and extending in a plurality of zigzag windings across said band between the insulating weft threads thereof and in conductive contact with said conductive warp threads.

4. A safety fuse comprising a strip- or band-shaped carrier of insulating material, a conductor on each longitudinal edge of said carrier and a continuous wire of easily fusible metal extending in a plurality of zigzag windings across said carrier between said conductors, each winding being conductively connected with said conductors.

In testimony whereof I affix my signature.

OTTO DREYER.