Dec. 29, 1925. 1,567,545

N. SCHMITT ET AL

ELECTRIC MINE FUSE

Filed June 23, 1924

Fig.1 Fig.2 Fig.3 Fig.4 Fig.5

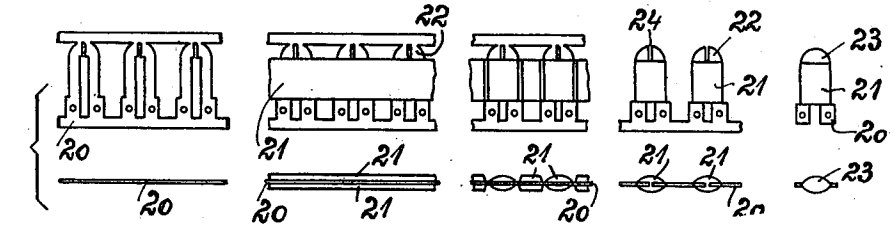


Fig.6 Fig.7 Fig.8 Fig.9 Fig.10

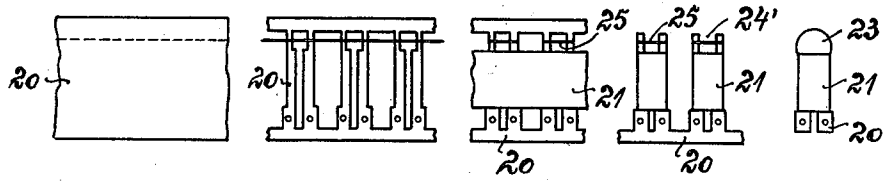


Fig.11 Fig.12 Fig.13 Fig.14

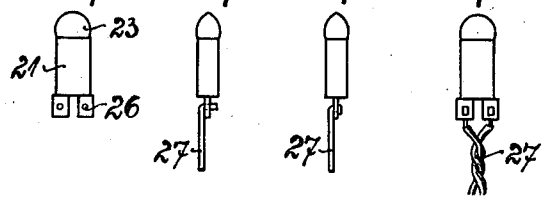
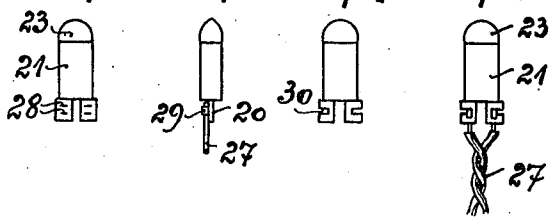


Fig.15 Fig.16 Fig.17 Fig.18



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UNITED STATES PATENT OFFICE.

NIKOLAUS SCHMITT, OF NIEDERLOSSNITZ, NEAR DRESDEN, AND OTTO SCHMITT, OF KUPPERSTEG, NEAR COLOGNE, GERMANY.

ELECTRIC MINE FUSE.

Application filed June 23, 1924. Serial No. 721,940½.

To all whom it may concern:

Be it known that we, NIKOLAUS SCHMITT, a citizen of Germany, residing at Niederlossnitz, near Dresden, State of Saxony, Germany, and OTTO SCHMITT, a citizen of Germany, residing at Kuppersteg, near Cologne, State of Prussia, Germany, have invented certain new and useful Improvements in Electric Mine Fuses; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electric mine fuses.

Hitherto, it has been customary to manufacture high tension fuses by applying the priming material direct to the ends of the wires and low tension fuses by soldering incandescent wires to the ends of the wires of the fuse. There is further well-known a method according to which the fuse heads are separately produced by coating a thin metal layer on both sides with compressed pulp of definite thickness whereupon the heads are stamped out in the form of a comb. In this form they are coated with the priming material and thereafter separated. The last-said method has considerable advantages over the earlier process particularly in as much as uniform resistances are obtained and considerable saving in time is ensured by the more rapid production of the fuses. On the other hand, however, finished fuse heads manufactured in accordance with this method have serious drawbacks which are mainly due to the hygroscopic nature of the insulating material used. When keeping a quantity of those finished fuse heads in stock as is mostly desirable the insulating material is liable to expand by the absorption of moisture or to contract under opposite circumstances. As a result thereof there is always in such fuses a variation in the resistances which not only causes waste in manufacture but also leads to misfiring of the finished fuse particularly in moist places. A further disadvantage of these fuse heads is due to the small thickness of the galvanized metal layer which may be easily damaged and thereby likewise lead to misfiring or cause waste in manufacture. Besides, the separated fuse heads are connected to the ends of the fuse wires by soldering. This soldering requires not only great skill but if the connections are not perfect the acid soldering medium causes misfiring and waste in manufacture.

With the electric fuse heads according to the present invention the said disadvantages are entirely avoided as will be readily understood from the following description taken in connection with the accompanying drawing.

In the drawing:

Figs. 1–5 show, in elevation and plan, the successive stages of manufacturing a high tension fuse according to the invention,

Figs. 6–10 are similar views of the several stages of manufacturing a low tension fuse,

Figs. 11–14 are different views of a finished fuse head illustrating the fixing thereto of the fuse wires,

Figs. 15, 16 and 17, 18, respectively, show two further modes of fixing the fuse wires to the ends of the fuse poles.

Referring now to the drawing, the high tension fuses shown in Figs. 1–5 will be described first. From a suitable metal sheet is stamped a strip 20 as shown in Fig. 1, such strip is then coated with strips 21 of a material becoming plastic under the influence of heat such as celluloid, cellon or like material which previously has been coated with a solvent of these materials. Now the strip shown in Fig. 2 is subjected to compression in a heated mould with the result that the celluloid and metal strips combine to form a rigid body as shown in Fig. 3.

After removal of the material between the heads 22 the form shown in Fig. 4 is produced, this form being ready to be dipped into the priming material. Fig. 5 shows the head separated and coated with priming material 23 and ready for connection to the conducting wires. These fuse heads are of great strength and reliability and are not affected by moisture so that they may be left in moist rooms and are particularly suitable for moist explosives and for despatch to tropical countries.

If cross wire fuses have to be produced a variation is necessary as shown in Figs. 6–10. A strip 20 of copper or brass sheet is first provided with a groove or channel. Then the strip is tinned either wholly or

only on the part where the groove or channel is provided, thereupon it is stamped out as shown in Fig. 7.

In lieu of the gap 24 in Fig. 4 a rectangular opening 24' is provided, the size of which corresponds to the length of the incandescent wires 25 to be used.

The wire 25 to be made incandescent is now laid in the groove and the sheet strip 20 heated at the side so that the tin in the groove melts and units with the wire moistened with the soldering medium, whereupon a reliable connection of the wire with the poles is obtained without the necessity of using a soldering iron.

By means of this groove there is not only ensured a light reliable connection but at the same time the possibility of the wire being soldered at an angle which would make its length and consequently its resistance different is avoided. Connection may also be produced by electrical welding but in this case the sheet metal strip is not tinned. For the rest, the treatment of this kind of fuses is the same as described with regard to Figs. 1–5.

This way of manufacturing low tension fuses has considerable advantages over the methods used hitherto, particularly inasmuch as, by making the wires of exactly the same length, variations in the resistances are avoided. In the earlier methods this is not possible and the finished fuses had to be sorted out according to the resistances, this being a tedious and inconvenient operation. The soldering of the wires 25 is simplified and may be carried out rapidly, particularly because the soldering of the wires 25 is effected on an endless strip.

Electric mine fuses in which the fuse heads are separately prepared have hitherto been connected exclusively by soldering with the fuse wires. With this soldering, it often happens that the soldered parts subsequently come apart leading to waste and misfiring.

In addition, residues of the acid soldering medium cause oxidation particularly when the soldering fluid is absorbed by the compressed pulp of the fuse heads and thus exerts a disadvantageous action on the current leads and priming material.

On account of these disadvantages it has already been proposed to effect a connection of the heads with the fuse wires by electric welding, but it has not been possible to carry out this method on account of various difficulties arising in actual practice.

Now the invention provides for a mode of fastening the fuse wires by which the disadvantages of soldering are avoided and a durable electrical connection is maintained. In Fig. 11 is shown a fuse head parts of which projecting from the celluloid block are formed with holes 26. Into these holes are introduced the ends of the fuse wires 27 bent at right angles Fig. 12.

While the fuse wire is held by clamping jaws, the wire end passed through is subjected by means of a suitable device to a pressure by which the wires are riveted to the poles of the fuse head as shown in Figs. 13 and 14.

This form of connection is superior to any other in rigidity and reliability and prevents waste and misfiring as they would occur with fuse heads to which the wires are fastened by soldering.

Other advantages of the described connection consist in that the use of soldering tin is dispensed with and that the connection can be readily made by inexperienced operators which is not possible in soldering and welding and the work is thus more rapidly done and less expensive.

A variation of the connection described is indicated in Figs. 15 and 16. The two pole parts of the fuse head are each provided with two slots 28, Fig. 15. The sheet metal between them is pressed through as shown in Fig. 16 and a loop 29 is formed into which the ends of the fuse wires may be inserted and in which they may be clamped.

Another modification is shown in Figs. 17 and 18. Here the two pole parts are provided with lateral recesses 30 in which hook-shaped ends of the fuse fires 27 are hung and clamped.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. A fuse head for electric mine fuses the poles of which are stamped out of sheet metal and partly embedded under pressure in a material becoming plastic under the influence of heat.

2. A fuse head for electric mine fuses the poles of which are stamped out of sheet metal and partly embedded in a material becoming plastic under the influence of heat, by compression of the material in a heated mold.

3. A fuse head for electric mine fuses having spaced poles stamped out of sheet metal and partly embedded in a material becoming plastic under the influence of heat so as to leave free both ends of each pole, the one ends being coated with the priming material and the other ends having attached to them the fuse wires.

4. The method of forming fuse heads, consisting in partially stamping out the fuse poles from sheet metal so as to leave them connected, and pressing a sheet of insulating material across the poles in a heated mold to soften the material whereby the poles will become embedded in the material, and then disconnecting the metallic connection between the poles.

5. A fuse head for electric mine fuses having spaced poles stamped out of sheet metal and partly embedded in a material becoming plastic under the influence of heat so as to leave free both ends of each pole, the one ends being coated with the priming material and the other ends having openings for inserting therein the ends of the fuse wires which are mechanically fastened to these pole ends.

6. A fuse head for electric mine fuses having spaced poles stamped out of sheet metal and partly embedded in a material becoming plastic under the influence of heat so as to leave free both ends of each pole, the one ends being coated with the priming material and the other ends having fixed to them by riveting the ends of the fuse wires.

7. A fuse head for electric low tension mine fuses having spaced poles stamped out of sheet metal and partly embedded in a material becoming plastic under the influence of heat, both the upper and lower ends of the poles projecting out of the said material, the space between the upper pole ends being of a size corresponding to the length of the incandescent wire to be mounted between them, priming material applied to the upper pole ends and fuse wires fastened to the lower pole ends.

8. A fuse head for electric low tension mine fuses having spaced poles stamped out of sheet metal and partly embedded in a material becoming plastic under the influence of heat, both the upper and lower ends of the poles projecting out of the said material, the lower ends having mechanically fastened to them the fuse wires, the upper ends being provided with a groove, an incandescent wire laid in the groove and connected to the ends by heating, and priming material being applied to the upper ends.

9. A fuse head having spaced poles stamped out of sheet metal and partly embedded in a plastic material so as to leave its opposite ends exposed, the lower ends being perforated for fuse-wire attachment and the upper ends being grooved during the stamping out operation, and an incandescent wire secured in the grooves of said upper ends.

10. A fuse head having spaced poles stamped out of sheet metal and partly embedded in a plastic material so as to leave its opposite ends exposed, the upper ends being transversely grooved, and a straight length of incandescent wire secured in the transverse grooves of the upper ends.

11. A fuse head for electric low tension mine fuses having spaced poles stamped out of sheet metal and partly embedded in a material becoming plastic under the influence of heat, both the upper and lower ends of the poles projecting out of said material, the lower ends having mechanically fastened to them the fuse wires, the upper ends being provided with a groove, and an incandescent wire laid in the groove and connected to the ends by heating.

In testimony whereof we have signed our names to this specification.

NIKOLAUS SCHMITT.
OTTO SCHMITT.