Jan. 11, 1927. 1,614,210

N. SCHMITT

METHOD OF MANUFACTURING WATERTIGHT ELECTRIC FUSES

Filed July 26, 1926

Fig.1

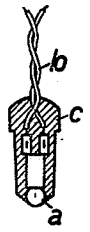


Fig.2



Fig.5



Fig.4

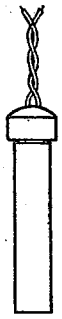


Fig.3

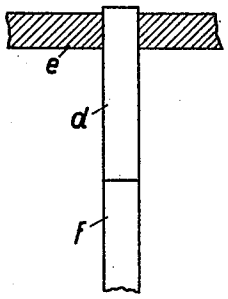


Fig.6



N. Schmitt
Inventor

By: Marks & Clerk
Attys

Patented Jan. 11, 1927.

1,614,210

UNITED STATES PATENT OFFICE.

NICOLAUS SCHMITT, OF NIEDERLOSSNITZ, GERMANY.

METHOD OF MANUFACTURING WATERTIGHT ELECTRIC FUSES.

Application filed July 26, 1926, Serial No. 125,079, and in Germany January 13, 1925.

In blasting operations it frequently occurs that they have to be carried out in wet rock or completely under water. Hence it is necessary that the electric fuses used shall be made perfectly watertight, so that they shall not become useless through the action of the water. The methods adopted hitherto with this object in view consist mainly in this, that the caps of the fuses are embedded either directly in the detonator or in a casing, into which the detonator is then cemented. As, however, all cementing materials, more particularly the sulphur usually used for this purpose, contract when they solidify and the water would penetrate through the cracks due to shrinkage into the priming composition of the cap and the detonator, it was found necessary to protect the fuses subsequently against the penetration of water by covering them with pieces of rubber tubing, wrapping them with insulating band and immersing them in molten paraffin and the like.

It has also been proposed to form a plug fitting into the detonator cap, through which the wires are inserted and at the ends of which the priming composition is attached. In a construction of this kind the wires are bound to become loose when handled, thus rendering the packing ineffective.

It has also been proposed to cement the fuse into a cast casing which is divided by a partition into two separate spaces, one of which receives the incandescent wire and priming composition and the other the detonator. The carrying out of this idea is rendered difficult by the complicated form of the casing, the manufacture of which is fairly expensive. But even in this construction water is not prevented from penetrating to the primary composition, which fails to act when wet.

By pressing delay compositions into the fuse casing the fuse is rendered watertight on the side facing the detonator. On the other side, however, is the cement for fixing the fuse wires into this casing as in fuses of the usual kind which does not form a tight closure as already explained above.

The present invention has for its object to render both the detonator and the primary composition tight against the penetration of moisture without any casing in the simplest manner by the following method.

In the accompanying drawing:

Figures 1 and 2 are longitudinal sectional and side views respectively of the fuse.

Figure 3 is an elevation of the fuse fitted with a detonator.

Figures 4, 5 and 6 are elevations of modifications of the invention.

The fuse head of electric mine fuses are embedded in some suitable material, as shown in section in Fig. 1, and in elevation in Fig. 2, *a* being the fuse head, *b* the leading-in wires and *c* the embedding material. The embedding material may consist of resin, wax, paraffin, asphalt and the like or of mixtures of these materials or of other suitable materials, which, however, must have the requisite strength and toughness and be easily fused.

When a fuse embedded in material of this kind is to be fitted with the detonator *d* (Fig. 3), the latter is inserted in the hole in the metal plate *e* which has been heated by steam or hot water, so as to rest on the support *f*. The fuse head (Fig. 2) is then inserted in the detonator. The embedded material on the fuse head has a conical shape and the external dimensions are such that the lower end will fit tightly in the detonator. Through the detonator being heated the surface of the embedded material will be melted, so that it can be forced easily down into the detonator till the shoulder *a* rests against the latter. This will bring about such an intimate and permanent connection between the fuse head and the detonator that water cannot possibly penetrate. The finished fuse is immediately pushed out of the hot plate by raising the plunger *f* and is ready for transport and use. Fig. 4 shows the complete fuse which may be left for weeks under water without being detrimentally affected.

For fuses which are to be transported without detonators a modified form shall now be described. In Fig. 5 a fuse is shown embedded in the manner described, which has a tapered extension *h* at its lower end. If a fuse head of this kind be immersed in melted embedding material up to the shoulder, a portion of the material will ad-

here to it, giving it the shape shown at *h* in Fig. 6. By this method the fuse head described is not only protected against damage, but also against being affected by water, to such an extent that the fuse head may lie in water for weeks without being detrimentally affected, even without the detonator. In addition to this the present method renders the use of paper and brass casing superfluous, as detonators may be placed on the fuse heads at the place where they are to be used, when they will form a firm connection, owing to the conical shape of the head.

What I claim is:

1. A method of manufacturing watertight electric fuses, consisting in providing the fuse head with a conical covering of an easily fused material, externally heating a detonator and inserting the said fuse head therein, whereby the two are connected together securely and in a watertight manner, as set forth.

2. A method of manufacturing watertight electric fuses, consisting in providing the fuse head with a tapered extension, immersing the said fuse head in molten easily fused material, externally heating a detonator and inserting the said fuse head therein, whereby the two are connected together securely and in a watertight manner, as set forth.

In testimony whereof I have signed my name to this specification.

NICOLAUS SCHMITT.