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ELECTRIC TIME FUSE

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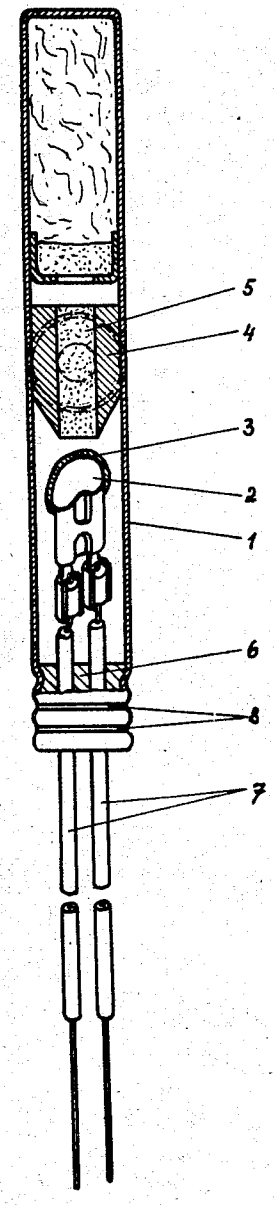

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ELECTRIC TIME FUSE

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4 Claims. (Cl. 102—10)

This invention relates to an electric time fuse and has for its object to enhance the reliability of timing and ignition of such fuses under all possible working conditions. To attain this object it has been found in practice to be essential to adopt a combination of measures which contribute jointly to the achievement of the aim in view, and of which no one can be omitted without impairing the efficacy of the others. The invention relates more particularly to electric time fuses of the type comprising a charge of a retarding composition for the purpose of effecting the timing.

One of the above-mentioned measures is the provision of a match head which, while being capable of easy electric ignition, generates, at the last stage of the combustion an intense heat without much gas generation and will ensure ignition of the retarding charge even if the latter should be difficult to ignite. In this respect the invention consists in coating the core of the match head with a layer of metal powder mixed with an oxygen carrier.

Reliable ignition of the retarding charge is further ensured according to the invention by enclosing said charge in a cylinder presenting to the match head a tapered end whereon the heat is concentrated.

A further measure essential for the attainment of the object of the invention is the use of a retarding charge which will burn at a slow regular rate and which can be stored without degeneration, and in this respect the invention consists in forming the charge from iron powder the particles of which are coated with a neutral, readily adhering substance such as chalk or the like, and mixed in coated condition with an oxygen carrier.

The attainment of the object of the invention is further conditional on the provision of an hermetic closure for the different charges so that the internal gas pressure will remain high and without fluctuations, in order that the combustion of the retarding charge may proceed with the desired speed and regularity. In this respect the invention consists in closing the fuse cartridge with a plug of lead or other compressible material and sealing said plug to the cartridge case and to the leading-in wires by pressing circumferential and substantially continuous grooves into the case and the plug. Experience has shown that any leakage of gas from the fuse, and consequent reduction of the internal pressure, during the combustion of the delaying charge, affects the rate at which the latter burns and consequently upsets the timing of the fuse.

The invention is illustrated in the accompanying drawing which represents a vertical section of an electric time fuse according to the invention.

The fuse comprises a cartridge case 1 containing a match head 2 and a retarding charge 5. The match head is carried by electric leading-in wires 7 which enter the cartridge through a closing plug 6 and which supply current for igniting the match head.

According to the invention the match head comprises a core of easily ignitable material which immediately surrounds the fuse wire, and an outer coating 3 capable of generating an intense heat. The coating consists of a metal powder of iron, aluminium, zinc, antimony, zirconium, or the like mixed with an oxygen carrier in the form of a chlorate or nitrate, for instance potassium chlorate or barium nitrate. A mixture in about equal proportions of metal and oxygen carrier has been shown to give the best results. Several metals can be used together.

In order to concentrate the heat generated by the match head on the forward end of the retarding charge 5, the thick wall of the surrounding cylinder 4 is tapered at the end which faces the match head, as shown in the drawing. By this arrangement the extreme end of the charge will be surrounded by a ring of insulating air, and heat which would otherwise be dissipated through the cylinder 4 and through the cartridge case, will be available for ensuring a reliable ignition of the retarding charge.

For the retarding charge a mixture of iron powder and an oxygen carrier, for instance potassium permanganate, is employed. Since the potassium permanganate has a strongly oxidizing influence on the iron which would be detrimental to prolonged storage and since it also causes the iron to burn too rapidly with considerable heat generation, it is necessary to add a neutral substance which will check oxidation and retard the combustion. For this purpose the iron powder is mixed with a phlegmatizing substance, for instance chalk, capable of enclosing and adhering to the iron particles. The iron powder is mixed with the chalk before the oxygen carrier is added. Treated in this manner the iron will be protected from over-rapid oxidation, and the charge will burn slowly and uniformly, very little heating of the cartridge will take place, and premature ignition of the explosive charge will be prevented. A suitable mixture is obtained from 15 parts by weight of iron powder, 3 parts

finely ground chalk, and 30 parts potassium permanganate.

Since the speed of the combustion is dependent on the gas pressure in the cartridge, it is essential to maintain the pressure free from fluctuations owing to leakage through the cartridge case. For this purpose the closing plug 6, which is made of lead or other compressible material, is hermetically sealed to the cartridge case by pressing circumferential and substantially continuous grooves 8 into cartridge case and plug. This compression of the plug is made so that a simultaneous hermetic sealing of the plug to the leading-in wires 7, will be effected.

I claim:

1. An electric time fuse comprising in combination a fuse case open at one end and closed at the other end, lead-in wires, a plug of yielding material longitudinally traversed by the said lead-in wires and adapted to form a closure of the open end of the said case without any leakage, an electrically fired match head attached to the said wires and coated exteriorly with a mixture of metal powder and an oxygen carrier, a charge of a retarding composition composed of iron particles coated with a neutral phlegmatizing substance and mixed with an oxygen carrier, a shell containing the said retarding composition closely fitting within the said fuse case and having its end nearest to the said match head taperedly reduced in thickness of wall, and a priming charge located between the outer end of the said shell and the closed end of the fuse case, substantially as and for the purpose specified.

2. An electric time fuse as claimed in claim 1 in which a portion of the said case adjacent the open end thereof and the said plug are provided with at least one circumferential and substantially continuous indented groove, for the purpose of effecting the said pressure-tight closure of the case.

3. In an electric time fuse as claimed in claim 1 the said retarding composition consisting of iron particles coated with chalk and mixed with potassium permanganate.

4. In an electric time fuse as claimed in claim 1 the said retarding composition consisting of iron particles coated with chalk and mixed with potassium permanganate, these ingredients being used in the proportions of 15:3:30 respectively.

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