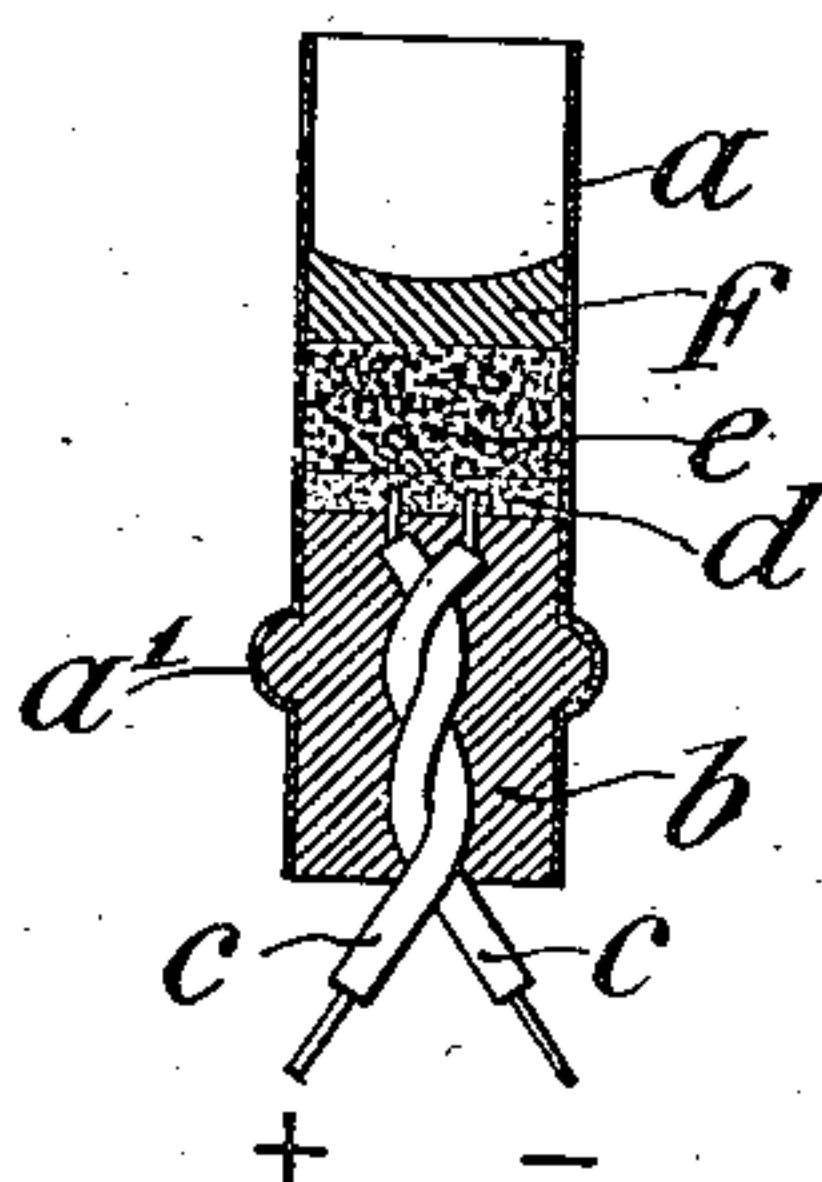


938,553.

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PRIMING CHARGE FOR MINES.
APPLICATION FILED JUNE 15, 1908.

Patented Nov. 2, 1909.



Witnesses
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UNITED STATES PATENT OFFICE.

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PRIMING CHARGE FOR MINES.

938,553.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed June 15, 1908. Serial No. 438,578.

To all whom it may concern:

Be it known that I, LOUIS CAHÜC, manufacturer, a citizen of the French Republic, residing at Ingolstädterstrasse, Neumarkt, Upper Palatinate, Germany, have invented new and useful Improvements in Priming Charges for Mines, of which the following is a specification.

The subject of my invention is an improved priming charge to be electrically fired in mines.

The essential feature of my invention is that firing is done with the aid of an intermediate priming-powder containing aluminum, placed between the conducting-wires. The aluminum is used in a finely divided state, for instance in the form of aluminum-dust, aluminum-wool, etc. If desired, the aluminum can be partly replaced by another metal in finely comminuted form, such as copper-, tin-, or magnesium-dust or the like, or an aluminum alloy in a state of fine division may be employed.

In the accompanying drawing a fuse provided with the new arrangement is represented in longitudinal section.

a is a socket formed of cardboard, metal or the like said socket being formed with a circular projection *a'*; *b* is an insulating material (sulfur, sealing-wax or the like) into which the electric wires *c* are to be embedded. Said material *b*, which is intended to afford the necessary insulation of the wires *c*, is maintained in place by the part *a'* of the socket *a*; *c* are the insulated wires which are twisted together, the upper extremities of said wires extending somewhat through the upper surface of the insulating material *b* and having their relatively adjacent portions bared of insulation and being surrounded by the comminuted aluminum which forms a layer *d* of small height in such manner that the incandescing mixture *d* lies between the bared portions of the wires; *e* is the igniting mass composed of black powder, gun-cotton (pyroxylin), fulminate of mercury or the like; *f* is an obturator consisting of wax, or the like. The upper part of the fuse above the obturator *f* receives the cartridge or the like.

The priming-charge of aluminum, or of a mixture of aluminum and other metals, can if necessary also be mingled with substances containing oxygen and (or) carbon, which in consequence of the elevation of the reaction-temperature contribute to the ignition

of the detonating-composition, or of the explosive direct.

I am aware that mines and the like have already been fired electrically in such a manner that the detonating-composition, or the explosive itself, has been ignited by means of an intermediate priming-powder, brought to combustion or explosion by means of the electric current. It is, however, novel to the art to employ for this purpose aluminum powder, aluminum mixed with other metals, or an aluminum alloy.

I am also aware that the ignition has been effected by means of a so-called incandescent "bridge" or wire. The employment of powdered aluminum, according to my invention, however, is much more advantageous. For metallic powders, as is well known, are bad conductors, so that the aluminum powder, offering a high electric resistance, is immediately heated and thus causes numerous small luminous arcs to form between the individual particles, whereby the ignition is much better transmitted than, for instance, is the case when an incandescent wire is employed. Similar effects are attained when the aluminum is partly replaced by another metal.

The employment of aluminum as an intermediate priming-powder has the further advantage that after firing the mine or the like, the cinder which has been formed by the influence of the heat developed by the electric current is also conducting. This is of importance, especially in the case of mines and the like connected in series, for should one or more mines have missed fire, a subsequent current generated by the induction apparatus can still be sent through the primers connected in series and so fire these unexploded mines.

The following further advantages of the use of aluminum are of importance. 1: By using comminuted aluminum as a primary igniter the temperature of ignition is relatively low, but the temperature of explosion is very much raised, so that the safety of ignition is increased accordingly. 2: Because aluminum, as very well known, is only oxidizable with great difficulty, the stability of the priming-powder is increased. 3: The action of the fuse even with weak currents is very perfect and very reliable, as, for instance, a magnetoelectric igniting machine working with a tension of 50-60 volt with 0.10 ampere is sufficient for igniting 20 fuses

in one operation. 4: In order to fill 100,000 fuses, only 1 kilogram of aluminum is necessary, so that the use of aluminum as a primary igniter or primary powder is very economical and cheap. As, moreover, a very small quantity of aluminum powder and the like is sufficient to make a good contact between the two electrodes or wire-ends, my new method also possesses the advantage of economy over prior intermediate priming-powders, whose composition is often of a complicated nature, and over incandescent wires, which are made of platinum and are thus very expensive.

15 If it is desired to add to the aluminum powder an oxygen-carrier, such as potassium-, or sodium-nitrate, or the like, this can be done up to about 50% of the quantity.

If the aluminum is to be used mingled with another metal, there may be added to it, for instance, one third of the latter in comminuted condition. By thus substituting another metal for a portion of the aluminum, the following advantages are attained. Firstly, if the metal added is cheaper than aluminum, the price of the final product, that is, the priming-powder, is lower. Secondly, by the addition of the other metal the possibility is presented of regulating the firing-temperature, or keeping it exactly within the most favorable limits, for, as is well known, the temperatures at which the various metals become incandescent under the influence of heat, that is under the action of the electric current, differ greatly from each other.

Naturally, instead of a single metal, a mixture of several such can be added to the aluminum.

40 The aluminum powder, or mixture containing comminuted aluminum and the like, or the aluminum alloy in comminuted form may with advantage be used as intermediate priming-powder in the manufacture of fuses

for mines, as it is sufficient to strew the powdered material between the wire-ends or electrodes of spark-fuses or incandescent-gap-fuses or the like.

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

1. In an electric fuse the combination of insulated conducting wires having relatively adjacent portions bared of insulation, an incandescing conductor comprising a mixture of finely divided aluminum, another metal in a state of fine division, an oxygen carrier and a carbon carrier, said mixture lying between the bared portions of the wires.

2. In an electric fuse the combination of insulated conducting wires having relatively adjacent portions bared of insulation, an incandescing conductor comprising a mixture of finely divided aluminum, another metal in a state of fine division, and an oxygen carrier, said mixture lying between the bared portions of the wires.

3. In an electric fuse the combination of insulated conducting wires having relatively adjacent portions bared of insulation, an incandescing conductor comprising a mixture of finely divided aluminum and another metal in a state of fine division, said mixture lying between the bared portions of the wires.

4. In an electric fuse the combination of insulated conducting wires having relatively adjacent portions bared of insulation, an incandescing conductor comprising aluminum in a state of fine division lying between the bared portions of the wires.

In witness whereof I have hereunto signed my name this 23rd day of May 1908, in the presence of two subscribing witnesses.

LOUIS CAHÜC.

Witnesses:

H. W. HARRIS,
OSCAR BOCK.