May 22, 1934. J. KIELCZEWSKI 1,959,479

FIRING DEVICE

Filed July 2, 1931

Fig. 3.

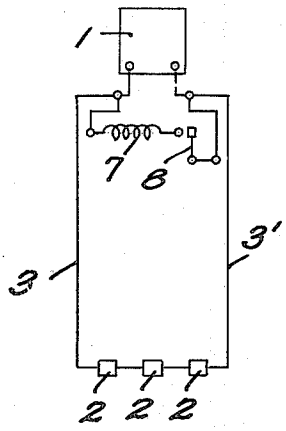


Fig. 1

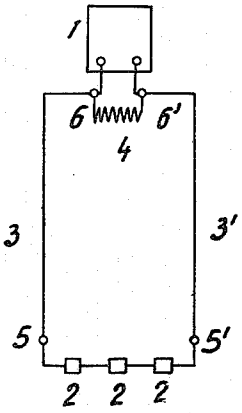


Fig. 6.

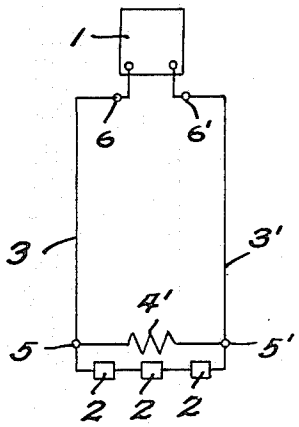


Fig. 2

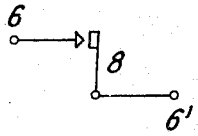


Fig. 4

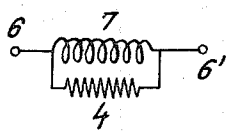
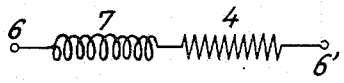


Fig. 5



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UNITED STATES PATENT OFFICE

1,959,479

FIRING DEVICE

Jerzy Kielczewski, Stary-Bierun, Poland, assignor to Lignoza Spólka Akcyjna, Katowice, Poland

Application July 2, 1931, Serial No. 548,470
In Germany July 23, 1930

1 Claim. (Cl. 102—10)

It is known that creeping currents in mines only have a limited voltage so that fuses which do not react to th's voltage are quite safe from creeping currents. For firing such fuses with igniting machines, however, a comparatively high voltage is required which is undesirable for other reasons, or if the permissible voltage is not to be exceeded it is only possible to fire with one igniting machine a very limited number of fuses, often not as many as are required.

The invention consists in this that a device arranged in parallel with the igniting circuit interrupts the auxiliary circuit when a current passes, so that an increased voltage then occurs at the terminals of the fuse. It is thus possible with this arrangement to fire simultaneously a larger number of fuses than is otherwise possible, or if an igniting machine is otherwise too weak for a single fuse it is possible for this to be ignited according to the invention.

The safety device may consist either of a resistance wire or a circuit breaker, or a circuit breaker with an inductance coil, or an inductance coil with a resistance in series, or an inductance coil with a resistance in parallel.

If, according to a further form of the invention, the resistance wire is arranged near the fuse, it has, at the same time, the action of the short circuiting wire in operation by hand.

The accompanying drawing illustrates various forms of the arrangement, in which,

Fig. 1 is a diagrammatic view of one form of the invention,

Fig. 2 is a fragmentary view of a modification thereof,

Fig. 3 is a diagrammatic view of a third form of the invention, and,

Figs. 4, 5 and 6 are fragmentary diagrams of further modifications of the invention.

As shown in Fig. 1, from the terminals of the igniting machine 1 two conductors 3, 3′ go to the fuse or fuses 2, several of which connected in series are shown in the drawing. At the terminals 6, 6′ a resistance wire 4 is arranged in parallel, which is of such a size that immediately before the ignition it is destroyed by burning out, melting, or in a similar manner. On account of this burning out, the voltage of the ignition circuit is so increased that the fuses are ignited. The voltage at which the resistance wire melts is considerably lower than that required for firing the fuses.

Instead of the resistance wire 4 other devices producing the same effect may be applied to the terminals 6, 6′. Thus Fig. 2 shows the circuit breaker 8, which is applied to the terminals 6, 6′. This may be a circuit breaker which is operated electromagnetically or otherwise.

According to Fig. 3 an inductance coil 7 may be placed in series with this circuit breaker 8, the coil, as well as the circuit breaker 8, being applied to the terminals 6, 6′. The desired effect is increased by the presence of this inductance coil.

Fig. 4 shows an inductance coil 7, which is in parallel with the resistance wire 4 and

Fig. 5 shows an inductance coil 7 in series with a resistance 4 attached to the terminals 6, 6′.

If the resistance wire is not attached to the terminals 6, 6′ but is placed near to the fuse as is shown by way of example in Fig. 6, the resistance 4′ being attached to the terminals 5, 5′, also performs the function of the short circuit wire. It is known that for security against stray currents conductors are placed in parallel with and near to the fuses, which give protection from stray currents during the time of preparation and are removed by hand immediately before firing. This removal by hand is not required in this case and is obtained automatically by the resistance wire 4′ being melted when a certain voltage is reached.

In the foregoing the safety device according to the invention has been described as being in parallel with the ignition circuit, but there are cases in which the device may be arranged in series with the fuses; this is possible, for example, when the circuit breakers or inductance coils in parallel with the resistance wire are used.

In mines containing fire damp in which there is danger from the burning of the resistance wire or the breaking of the circuit on account of the formation of sparks, the device may either be enclosed with non-combustible material, as is advantageous, for instance with the metal wire, or it can be enclosed so as to exclude fire damp which is most advantageous with circuit breakers.

What I claim is:

A circuit for ignition machines comprising a fuse circuit and an auxiliary circuit parallel thereto, and a device in said auxiliary circuit adapted to interrupt the latter when a current passes causing an increased voltage at the fuse terminals, said device including a circuit breaker with an inductance coil.

JERZY KIELCZEWSKI.