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ELECTRICAL DETONATOR FOR EXPLOSIVES

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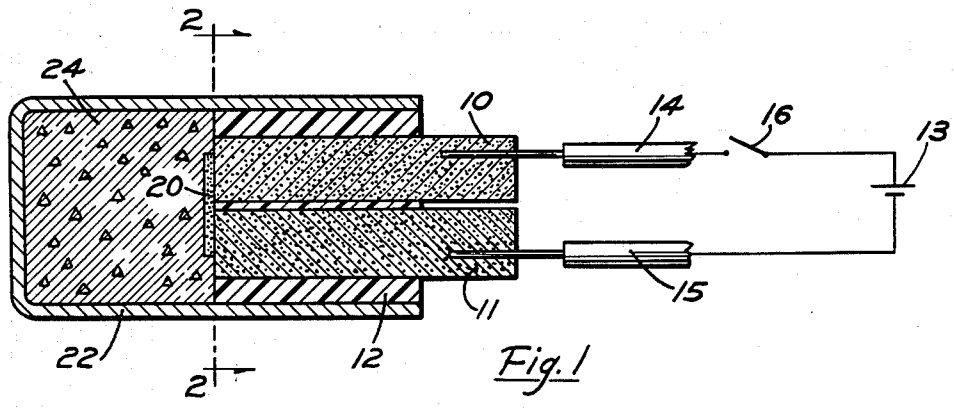


Fig. 1

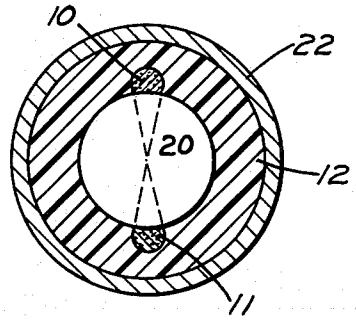


Fig. 2

INVENTOR.
NORMAN A. MacLEOD
BY O. G. Snyder
A R McCurdy
ATTORNEY

United States Patent Office

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ELECTRICAL DETONATOR FOR EXPLOSIVES

Norman A. MacLeod, Altadena, Calif.

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2 Claims. (Cl. 102—28)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to an electric detonator for explosives, and more particularly to a gap assembly for use in detonators of the type wherein an electrical current bridging a gap initiates an explosion in adjacent explosive material.

The invention contemplates an improved gap assembly wherein a film of graphite bridges the gap in the circuit and is designed to conduct low voltage currents of small magnitude without being heated sufficiently to activate the adjacent heat-sensitive fulminate such as lead azide, but upon application of a current of pre-determined higher voltage will break down, producing a spark discharge which will initiate the explosion. With such an arrangement, the static electricity and stray currents in the line are continuously dissipated, and only upon application of the voltage for which the device is designed is the detonator activated.

It is an object of the invention to provide an improved detonator which will not be set off by stray currents but will respond positively to a current of the required voltage.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following description.

Fig. 1 is a view in longitudinal cross-section of a detonator embodying the invention; and

Fig. 2 is a transverse section taken on line 2—2 of Fig. 1.

The detonator shown by way of example in the drawings comprises a pair of conductors **10**, **11** of graphite or the like, extending in spaced parallel relation to each other, and embedded in a cylindrical matrix **12** of insulating material such as a plastic. The adjacent surfaces of the conductors are of knife-edge form, to facilitate the passage of current therebetween when a predetermined voltage is applied. Current is supplied to the conductors from a source **13** through insulated wires **14**, **15** having their stripped ends embedded in the rear ends of the conductors, and controlled at a distance by means of a switch **16**.

Upon the forward end surface of the composite cylinder **10–11–12** is spread a thin film **20** of graphite, preferably in the form of a disk which is concentric with the matrix **12** and overlies the opposed edges of conductors **10**, **11**. The thickness of film **20** is exaggerated in the drawing for clarity, but should be of such thickness that it will conduct small stray currents of low voltage without breaking down, but when subjected to a predetermined higher voltage will break down, producing a spark discharge. The film may be sprayed or otherwise applied to the cylinder.

The gap mechanism just described may be protected by a cap **22** of metal, as known in the art. The cap is filled with lead azide or other fulminate **24**.

Upon the occurrence of small voltage differences between the conductors **10**, **11**, current will pass through film **20** to discharge the conductors, but because of the large area of film **20**, will not produce sufficient heat to activate the fulminate. However, when a predetermined voltage drop is caused by closing switch **16**, the much greater current, concentrated at the opposed edges of the conductors in accordance with known laws of electrostatics, will raise the temperature of the film **20** to such a point that the film will break down in this area and a spark discharge, adequate to initiate the explosion, will be produced.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In an electrical detonator, a pair of graphite conductors having spaced opposed portions of knife-edge form, means for supplying current of predetermined voltage to said conductors, a film of graphite of relatively large area bridging said portions, a charge of fulminate adjacent said film, and a protective shell enclosing said charge and said film.

2. In an electrical detonator, an elongated insulating matrix having a plane surface, a pair of conductors embedded in said matrix with their adjacent ends coplanar with said surface and having spaced opposed acute-angle edges, and a film of graphite on said surface connecting said ends, said film being of such conductivity that it will conduct stray currents but will break down when a predetermined voltage is applied across the conductors.

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