

(No Model.)

P. WARD & E. M. GREGORY.
FUSE AND DETONATOR.

No. 459,321.

Patented Sept. 8, 1891.

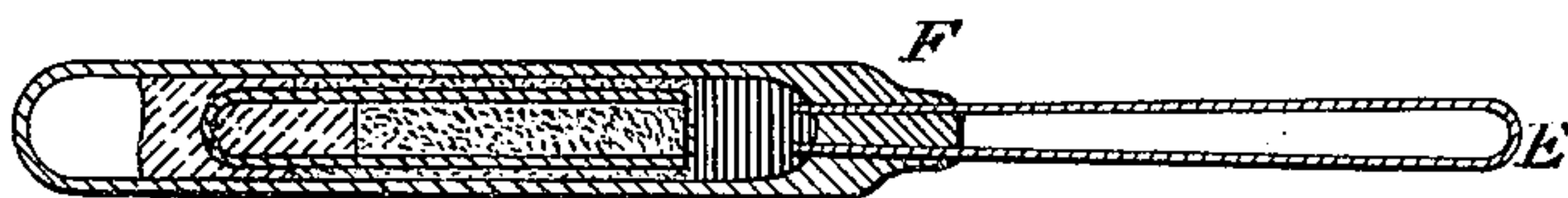


FIG. 1



FIG. 2.



FIG. 3.



FIG. 4.

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PAUL WARD AND EDWARD MAMMATT GREGORY, OF LONDON, ENGLAND.

FUSE AND DETONATOR.

SPECIFICATION forming part of Letters Patent No. 459,321, dated September 8, 1891.

Application filed May 13, 1890. Serial No. 351,695. (No model.)

To all whom it may concern:

Be it known that we, PAUL WARD and EDWARD MAMMATT GREGORY, residing at London, England, have invented an Improvement in Fuses and Detonators and in the Method of and Appliances for Manufacturing the Same, of which the following is a specification.

This invention relates to an improved fuse and detonator, and has for its object to provide a fuse which by its accuracy of construction shall be uniformly sensitive to a small current of electricity for ignition, cheap in construction, and more completely protected against the destructive influence of moisture, heat, climatic, and other influences.

To carry out our invention we employ a bent or closed "armature" of wire E, by which ignition is effected electrically, composed of either insulated or uninsulated wire of any suitable conducting metal, such as copper or iron, and termed a "safety-armature," because formed in a loop which is ineffective to produce ignition until the said loop has been broken or cut and each side of the loop has been separated from metallic contact with the other.

From the method of construction herein-after described it will be seen that we form the insulator, the wires, and the receptacle for holding the priming composition all combined with accuracy within special gages or tools, so that an absolutely uniform arrangement of the wire terminals is insured both in the amount of surface exposed and in the distance of their separation from one another, whereby the article is much simplified and cheapened, and all the fuses may be ignited with certainty and with extreme sensitiveness by a definite small current of electricity.

In order that our invention may be better understood, we now proceed to describe the same in relation to the drawings, hereunto annexed, reference being had to the letters marked thereon.

Like letters refer to like parts in the various figures.

Figure 1 is a longitudinal section of the fuse and detonator with both ends of the glass receptacles closed by fusing. Fig. 2 shows sectional elevation of the fuse and detonator hermetically closed at open end by packing. Fig. 3 shows the same with tube hermetically

closed by fusing. Figs. 4 shows internal detonating-tube removed from the fuse.

To carry our invention into effect, we employ glass tubing cut into lengths of suitable dimensions, and we fuse the free ends of a wire loop (safety-armature E) into one end of such bit of tube, so that the free ends of the wire loop shall project a certain definite length and width apart into the interior of said tube, as shown at Figs. 1, 2, and 3.

We close the open end of the glass tube by inserting therein a sufficient quantity of Chat-terton's composition, sealing-wax, india-rubber, varnish, fusible alloy, or other suitable substance, as shown at G, Fig. 2, and then, if deemed expedient, dipping the whole into Portland, Roman, or other hard cement and varnish.

For making a combined fuse and detonator such as shown at Figs. 1, 2, and 3 we take one of the combined tubes or cavities and wires above described and charge the same with the priming above referred to, and into this charged tube or cavity we insert another tube of glass or ebonite H, Fig. 4, or other like or suitable material, of smaller diameter than the fuse-case, and which is open at one end, and which contains a detonating material. This second-mentioned tube we insert into the charged tube open end downward, as per Fig. 1, so that on the fuse being fired by a current of electricity its fire is directly communicated to the detonator. We also use any suitable detonating composition for charging the said inner tube in lieu of gun-cotton; but when using a detonating composition we employ the following method of manufacturing the detonating-pellets, so that they are never manipulated in a dangerous state in bulk. We mix the necessary ingredients for forming the detonating composition under alcohol or other fluid. This mixture is then sucked into the "filler" or "charger" above referred to, and around the nozzle of the filler or charger is placed a closed paper or other tube. Into the tube thus formed we express from the filler or charger a suitable quantity of detonating composition. This charged paper or porous tube is then removed from the nozzle and allowed to dry spontaneously, and onto the top of the detonating composition contained

in the said paper or porous tube we place a small quantity of just-melted paraffine or other wax. These detonating-pellets are then inserted wax end first into the second glass or other tube H, Fig. 4; which is in turn inserted into the fuse F, Fig. 1, in the manner described with reference to the tube when charged with gun-cotton; or the pellets enveloped in the paper or other tube may, if preferred, be inserted into the fuse without being placed in the said second glass or other tube, as in Fig. 3. Any suitable non-inflammable substance—such as asbestos, slagwool, white-peat powder, or other similar heat non-conducting and non-inflammable material—is then inserted into the outer tube on the top of the inner tube containing the detonating-pellets or into the top of the pellets themselves, as the case may be, and the outer tube of the combined fuse and detonator is then closed by fusion, as in Fig. 3, or by the insertion therein of any of the compositions in the manner before described with reference to the fuse, as at G, Fig. 2.

The object of inserting the paraffine-wax on the top of the detonating material, as above described, is to render the detonating composition harmless by the melting of the paraffine, should by any means the heat while sealing the outer tube, as above described, become too great, or in the case of a conflagration arising in the place where the detonators are stored.

We form the hair-pin-shaped loops (safety-armature) by winding a quantity of wire on a metal plate of double-V section, which, when fully covered, is placed flat and the wire severed on opposite sides.

It will be found that the fuse and combined

fuse and detonator constructed as hereinbefore described are absolutely impervious to the destructive action of hot damp air, climatic and electric influences; but, if desired, they may be further coated with india-rubber or any convenient mechanically-protective medium.

The above-described case of glass fused on the iron or other wire can be employed in the construction of what are known as "low-tension" or "platinum" wire fuses for the purpose of preventing damage by moisture in submarine use.

Having fully described our invention, what we desire to secure by Letters Patent is—

1. In an electric fuse or combined electric fuse and detonator, a glass receptacle fused over the two ends of the igniting wire or wires and fused at the other end after charging to form a hermetically-closed impervious receptacle for the priming or priming and detonating charge, substantially as described.

2. In an electric fuse or combined electric fuse and detonator, a glass receptacle fused over the two ends of the igniting wire or wires and closed at the other end after charging by Chatterton's composition, sealing-wax, india-rubber, varnish, or fusible alloy to form a hermetically-closed and impervious receptacle for the included charge, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

PAUL WARD.

EDWARD MAMMATT GREGORY.

Witnesses:

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