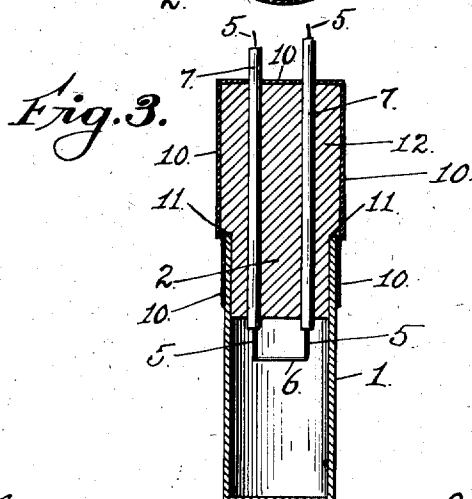
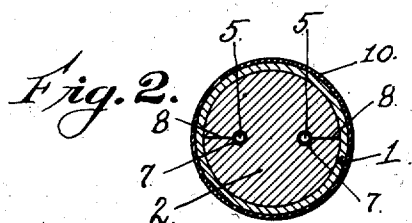
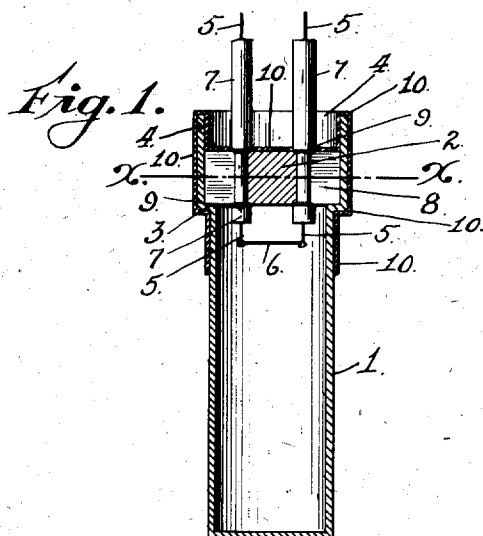


R. H. RENNIE & C. C. JESSEN.
ELECTRIC DETONATOR AND EXPLODER.
APPLICATION FILED MAY 19, 1910.

991,373.

Patented May 2, 1911.



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UNITED STATES PATENT OFFICE.

RONALD H. RENNIE AND CHARLES C. JESSEN, OF OAKLAND, CALIFORNIA.

ELECTRIC DETONATOR AND EXPLODER.

991,373.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, RONALD H. RENNIE and CHARLES C. JESSEN, citizens of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Electric Detonators and Exploders, of which the following is a specification.

10 Our invention relates to that class of devices used either as detonators or exploders, in which inflammable or explosive materials are carried within a container, and are adapted to be ignited by an electric current.

15 The object of our invention, in general terms, is to provide a device of this class with a cap or plug-closure of a stable and permanent character, hermetically sealing the container and making it moisture proof, 20 permitting the ignition of the contents under liquid, and the immersion of the device for an unlimited time without material deterioration.

25 To this end our invention consists in the novel construction of the container, its cap or plug-closure and the sealing thereof and the electrodes which we shall now fully describe and claim.

Referring to the accompanying drawings—Figure 1 is a longitudinal section of our device on an enlarged scale, and the parts somewhat exaggerated, for the sake of illustration. Fig. 2 is a cross section on the line $x-x$ of Fig. 1. Fig. 3 is an enlarged sectional view of the device showing a modified form of the initial seating of the closure-plug in the container.

1 is a metallic container having an open top. In this container is placed whatever inflammable or explosive material may be required for its particular use as an exploder, or as a detonator, and the general shape of the body of the container will be such as will fit it for said uses.

45 2 is a plug which fits and closes the open top of the container. This plug may make with the container any suitable form of frictionally tight and shouldered initial seat or joint, but in its practical development we prefer, for a reason presently to be stated, the joint here illustrated, in which the plug seats down to a shoulder 3 in the container, with the rim 4 of said container projecting beyond the plug. Furthermore 55 this plug, in its best construction, is of metal,

and the electric wires 5, (of which there may be one or more, according to whether a jump spark, with the container as one electrode is used; or a platinum bridge 6, as here shown, is employed as the igniter) pass 60 through said metallic plug in suitable insulating covers 7.

The object in using a metallic plug for the closure is two-fold. First, it renders possible a liquid-proof and tight joint with 65 the insulated electric wires; and, second, it provides for making a liquid proof and hermetically sealed joint between itself and the container, both joints being of a most permanent character. The first of these objects flows from the fact that by reason of 70 the metallic character of the plug, it may be either cast or molded upon and about the insulated wires, thereby, in cooling, tightly compressing said wires; or it may be directly compressed thereon, as we have here illustrated; in which the plug is shown as 75 provided with holes for the wires, said holes being slitted at 8 to the outside, and thereafter forced tightly closed, by pressure, about the insulated wires. Such pressure as this has the further beneficial effect of sufficiently shouldering the wire insulation; as shown at 9, just above and below the plug, to tightly hold the wires and close 85 their passages through the plug.

The second object is attained by the use of a metallic plug, by the further development of our invention, in the shape of a metallic coating 10 of electro-plating deposit. 90 This coating is applied after the container is filled and the plug, with its wires, seated well in place. It covers the upper portion part of the container as far down as may be desired, and laps over the projecting rim 4 95 of the container, and down its inner surface and over the entire upper surface of the plug and around the entrances thereto of the insulated wires, thus forming a complete liquid tight and permanent envelop 100 for the fitted parts, and holding the plug in place.

As we have before stated the form of seat which the plug finds initially in the container may be of any suitable character. 105 Thus in Fig. 3 we show a form in which the plug seats against the top rim of the container by a shoulder at 11, and the head 12 of the plug projects beyond the rim. In this case, the electro-plating deposit 10 covers 110

the joint and envelops the whole projecting head of said plug, with a similar effect to that heretofore described.

We may also state that in so far as the electro-plating deposit and its function are concerned, it would not be essential that the plug be wholly of metal, for the plating might be accomplished by having the outer or exposed surface of the plug only, of such a nature, that the metallic coating may be deposited by electrolysis.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is—

1. A device of the described class, comprising an open-top container to carry an inflammable or explosive material; a plug closing the open top of the container; an electrical conductor passing through the plug and carrying an igniter within the container; and a metallic deposit covering and hermetically sealing the joint between the container and plug.
2. A device of the described class, comprising an open-top container to carry an inflammable or explosive material; a plug closing the open top of the container; an electrical conductor passing through the plug and carrying an igniter within the container; and a metallic deposit covering and hermetically sealing the joint between the container and plug, and sealing also the entrance of the electrical conductor to said plug.
3. A device of the described class comprising an open-top metallic container to carry the inflammable or explosive material; a metallic plug closing the open top of the container; an insulated electrical conductor passing through said plug and carrying an

igniter within the container; and a metallic deposit of electro-plating enveloping the exterior of the container and exposed surface of the plug, to hermetically seal and form a liquid proof closure for said container.

4. A device of the described class comprising an open-top metallic container to carry the inflammable or explosive material, said container having an internal shoulder below said top; a metallic plug seated within the open top of the container against the shoulder therein, the rim of the container extending beyond the plug; an insulated electrical conductor passing through said plug, and carrying an igniter within the container; and a metallic deposit of electro-plating enveloping the exterior of the container and exposed surface of the plug, to hermetically seal and form a liquid proof closure for said container.

5. A device of the described class, comprising an open-top container to carry an inflammable or explosive material; an electrical conductor passing into the container and carrying an igniter therein; insulation about said conductor; a metallic plug tightly compressed about said insulation and seated in the open top of the container to close it; and a metallic electroplating deposit on the container and exposed surface of the plug to hermetically seal the joint.

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

RONALD H. RENNIE.
CHARLES C. JESSEN.

Witnesses:

WM. F. BOOTH,
D. B. RICHARDS.