Sept. 7, 1926.

1,599,078

D. CORRIE

DETONATOR

Filed March 23, 1925

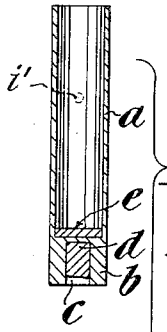


Fig. 1.

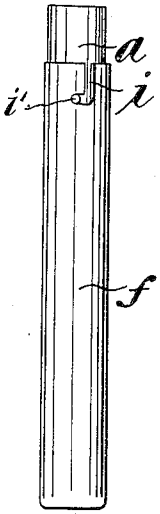


Fig. 2.

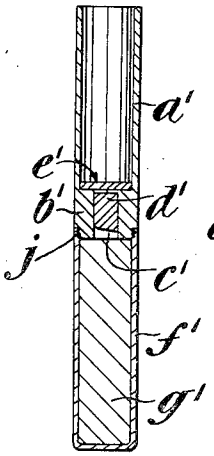


Fig. 3.

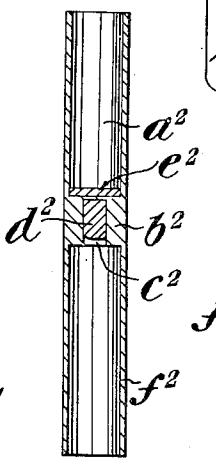


Fig. 5.

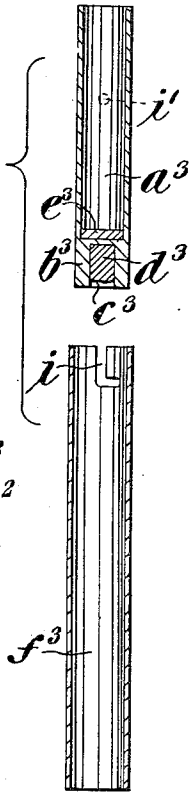


Fig. 6.

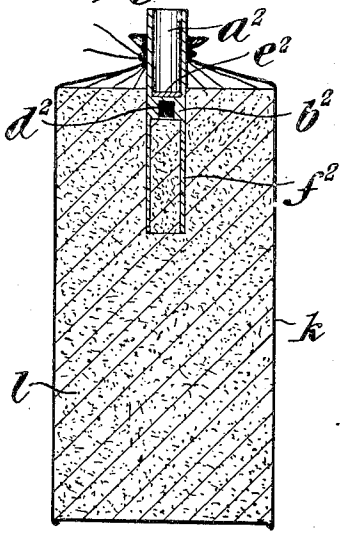


Fig. 4.

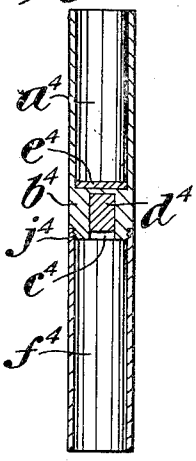


Fig. 7.

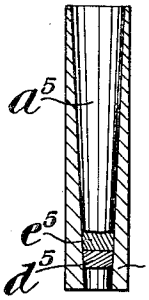


Fig. 8.

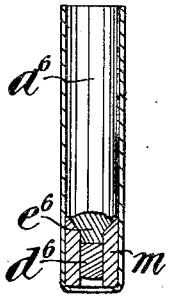


Fig. 9.

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# UNITED STATES PATENT OFFICE.

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## DETONATOR.

Application filed March 23, 1925, Serial No. 17,650, and in Great Britain February 7, 1925.

This invention has reference to improvements in and relating to blasting and mining cartridges and the like, and to detonators or blasting-fuses therefor.

The object of the present invention is to so construct the detonators or blasting-fuses that they are rendered harmless and safe for handling, and especially so with a view to conveyance by train, road or the like. For instance, the invention is primarily applicable to detonators wherein a detonator charge of a suitable composition, such, for instance, as tetranitromethylaniline, is pressed into a tube or the like, and associated with a priming composition, such as fulminate of mercury, or a percussion cap or amorce. In this case the detonator is, according to this invention, characterized in that the priming composition or equivalent is kept away from the detonator composition loaded in a separate member until the time of actual use. As in certain cases the blasting charge (e. g. dynamite, blasting gelatine or the like) into which the detonator is inserted may be exploded direct from the primer without the aid of a detonating composition such as tetryl (tetranitromethylaniline), the present invention embraces the attainment of the object by the employment of a detonator or blasting-fuse wherein the priming composition, such as fulminate of mercury, or percussion cap or amorce, is kept away from the blasting charge—which, in use, forms a part of the blasting-fuse—until the actual moment of use.

In attaining the object with this second form (omitting tetryl or the like), the lower end of the pencil-like tube usually containing the tetryl is formed as an open-ended empty tube which can be filled on the spot with blasting gelatine or the like either from the cartridge bag or by plunging the same into the charge therein. The said tube can be a separate member attachable to the primer tube, or can be integrally in one therewith, in any case there being provided a detonator or blasting-fuse in which the primer composition or equivalent is contained in a member entirely separate from the detonator or blasting composition until it is required to bring them together.

Broadly, therefore, the invention may be summarized as a detonator for blasting cartridges or the like, characterized in that it is constructed with components whereby the primer and detonating (or blasting) compositions respectively may be kept apart.

The advantage of being able to keep apart primer and detonator-proper by this employment of a pair of safely handled components will be apparent. For example, a box or container for detonators according to this invention could be constructed with two separate compartments, one a nest of, say, fifty recesses for the primer tubes, and the other having fifty recesses for the detonator-containing tubes, each collection of components being safely segregated. The lid of such a container could be so constructed that only one nest of recesses was accessible at the one time, thereby further assuring safety. Or, in the second species, the empty tubes to be filled on the spot with detonator or blasting composition could be packed with the primers.

From the foregoing, a general understanding of the invention will have been obtained, and in order that the said invention shall be more clearly understood reference is directed to the following description and accompanying sheet of drawings, wherein:—

Figure 1 shows, in sectional elevation, one form of a detonator, including a tetryl or equivalent charge, according to this invention with the components detached.

Figure 2 is an outside elevation of the form shown in Figure 1, with the components assembled ready for use; and,

Figure 3 is a sectional elevation of a modified form, also with the components assembled for use.

Figure 4 shows, in sectional elevation, a blasting cartridge to which is applied a detonator or blasting-fuse according to the invention, wherein tetryl or equivalent is omitted.

Figure 5 is a sectional elevation of a slightly different form of detonator.

Figure 6 shows another form of the detonator, comprising a pair of attachable components, tetryl being omitted.

Figure 7 shows, again in sectional eleva-

tion, a further form of detonator comprising a pair of attachable components, tetryl being omitted.

Figures 8 and 9 are modifications hereinafter referred to.

In the embodiment illustrated in Figs. 1 and 2 the primer tube *a* has a thickened base *b* axially recessed as shown at *c* with said recess opening outwardly and in which is inserted the priming composition *d*. A safety fuse *e* is located in the bottom of the primer tube *a*. A detonator is shown in the form of an elongated metal cylinder *f*, closed at one end, and adapted to contain the pressed-in detonator composition *g*, having a space or chamber *h* above the composition to receive the primer tube. The primer tube *a* and the detonator *f* have a pin and slot connection the detonator *f* having a bayonet slot *i* at its upper end on either side to receive laterally projecting pins *i'* carried by the tube *a*. The tube *a* is of smaller diameter than the tube *f* for telescopic engagement therewith and the frictional fit between these two tubes is sufficient for the purpose of assembly but a positive detachable bayonet joint lock may be supplied if found desirable.

In the form shown in Fig. 3 the primer tube $a^1$ is the same as the tube *a* in Figs. 1 and 2 except that its connection with the detonator tube $f^1$ is by means of an internal thread on said tube $f^1$ and an exteriorly threaded reduced end of the base $b^1$ the threaded end being marked *j*. The letters used in this form of the invention are the same as those in Figs. 1 and 2 except that the exponent "1" is employed.

In Figs. 1, 2 and 3 the detonator tubes are closed at their lower ends and open at their upper ends while in the form shown in Figs. 4 and 5 the detonator tubes $f^2$ are made integral with the priming tubes $a^2$ and are open at their lower ends. This tube $f^2$ thus remains empty until fitted into the cartridge *k* shown in Fig. 4 when it becomes filled or substantially filled with the blasting gelatine or similar composition shown at *l*. In this form of the invention the primer element $b^2$ $c^2$ and $d^2$ is located at the junction of tubes $a^2$ and $f^2$.

In Fig. 6 the structure is similar to that shown in Fig. 1 and 2 except that the detonator tube $f^3$ is open at its lower end instead of being closed and it may be either provided with a positive or detachable lock such as the bayonet joint shown or the frictional fit may be sufficient for the purpose of assembly. The numerals used in this form are the same as in the other figures except that the exponent "3" is employed.

The form shown in Fig. 7 is similar to that shown in Fig. 3 except that the detonator tube $f^4$ is open at its lower end instead of being closed otherwise the structure is the same as that shown in Fig. 3. In Fig. 7 the reference numerals employed are the same as in the other figures except that the exponent "4" is used in connection with them.

In the form shown in Fig. 8 the primer tube $a^5$ has its interior gradually tapered toward its lower end providing thickened walls $b^5$ at said lower end which operates in the same manner as the base *b*, $b^1$, $b^2$, $b^3$ and $b^4$ of the other figures the thin dividing web employed in the other forms being omitted in this form of the invention and the safety fuse $e^5$ is located directly over the primer or fulminate $d^5$.

In Fig. 9 the primer tube $a^6$ is provided at its lower open end with a sleeve *m* located on the interior of the tube and forms the chamber or seat for the fulminate $d^6$ which has located above it the safety fuse $e^6$.

By employing the thickened base *b* and the tubular member *f* which extends into the charge *k*, the initial explosive and igniting blast generated at *d* is directed longitudinally to the center of the charge *k*, the thickened base preventing lateral shattering of the fulminate primer thereby directing the primer explosion longitudinally.

I claim:—

1. A detonator or blasting fuse comprising a fulminate primer tube having a thickened base with an axial recess opening through the end of the tube and adapted to contain a fulminate priming composition, and a detonator tube adapted to be filled with a detonator composition, the primed end of the primer tube being connected with the detonator tube.

2. A detonator or blasting fuse including a fulminate primer tube having a thickened base with an axial recess opening through the end of the tube to contain a fulminate priming composition whereby the explosion is directed longitudinally relatively to said tube.

3. A detonator or blasting fuse comprising a fulminate primer tube having an open end and a thickened base closed end, said base having an axial recess opening through the surface of the base and adapted to contain a fulminate priming composition, a closed end detonator tube partially filled with detonator composition above the closed end and open at the other end, the primed end of the primer tube detachably fitting the space left in the open end of the detonator tube.

4. A blasting fuse comprising a tubular member in the base of which is located a fulminate priming composition or equivalent, and a tubular member with an open end and into which the blasting composition or the like can be readily filled on the spot, the base of said first mentioned tubu-

lar member being thickened to prevent lateral shattering of said member and having a recess formed therein to receive the fulminate primer.

5. In a detonator or blasting fuse, a fulminate primer tube having an open end and a thickened base closed end, said base having an axial recess opening in the reverse direction to the open end of the tube, a fulminate primer mounted in said recess, and a detonator or blasting tube adapted to be filled with a detonator composition, the primed end of the primer tube being connected with the detonator or blasting tube.

In testimony whereof I have affixed my signature hereto this 9th day of March 1925.

DAVID CORRIE.