

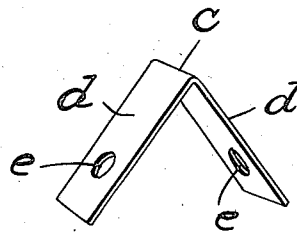
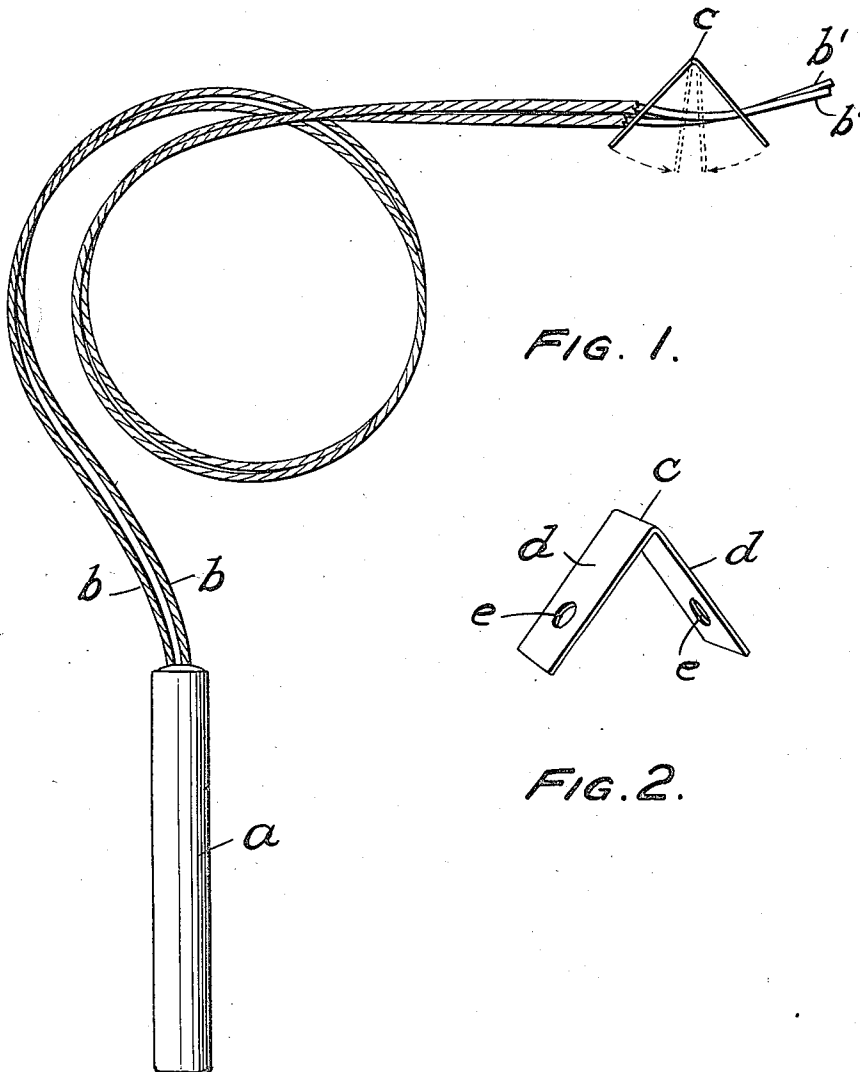
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C. H. LICKLE

1,856,103

BLASTING CAP

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WITNESS:

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BLASTING CAP

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My invention relates to improvement in blasting caps and more particularly to the provision of means whereby accidental firing of a cap through contact of the lead wires with a source of current will be positively avoided.

It is well known that blasting caps comprise a container or casing in which an explosive charge, as for example, fulminate of mercury, is contained. Extending into the casing is a pair of lead wires, the ends of which within the casing are connected by means of a bridge wire embedded in the explosive charge or in a more readily fire initiating charge. The lead wires in their extension from the cap, and ordinarily they extend some four or five feet, are mainly insulated, but their end portions are left bare of insulation in order that they may be connected into a firing circuit.

It has been well recognized that the uninsulated end portions of the lead wires afford an opportunity for accidental discharge of the cap, since in carrying caps to their point of use, for example, in a mine, the lead wires are frequently trailed and are likely to become connected with a live circuit, as a trolley wire, or the like, or to receive a stray current by contact, for example, with a rail.

Heretofore various means have been provided for avoiding accidental discharge of caps through inadvertent contact of the bare ends of the lead wires with a circuit or source of stray current. It has, for example, been suggested to twist the bare ends of the lead wires together for a distance in order to short-circuit them and various devices have been provided for connecting the bare ends of the lead wires or securing them in contact with one another with a view to effecting a short-circuit.

The various means heretofore suggested for the avoidance of inadvertent firing of caps have not proven satisfactory for various reasons. Where the bare ends of the lead wires are twisted together for a distance, it is necessary in order for the twist to be reasonably effective that it be extended to the insulated portions of the wire and desirably even beyond. The twisted ends are disad-

vantageous, since before the cap can be used the ends must be untwisted and the untwisted ends being deformed and kinked are in an undesirable condition for making an efficient connection with a firing circuit.

The various devices for connecting the lead wires or for holding the lead wires in contact with one another have been found unsatisfactory, since in all cases they are extremely difficult to remove, the ends of the wires usually being deformed in their removal and they do not afford any greater degree of protection, if as great, as that afforded by the twisting of the bare wires.

Now in accordance with my invention, I provide means whereby inadvertent firing of blasting caps is prevented, which means may be readily applied and, at the same time, when the cap is to be used, may be removed readily and without appreciable distortion of the uninsulated end portions of the lead wires.

In accordance with my invention I provide means whereby the uninsulated end portions of the lead wires may be short-circuited, the means or shunt being of such a character as to be readily applied to the wires and to be positioned to maintain itself thereon and, at the same time, to be readily positioned for removal without appreciable distortion of the wires. Preferably, the means or shunt will be of such a character as to on application automatically position itself to grip and retain itself in engagement with the wires. The means or shunt in accordance with my invention may be made of any desired conducting material and may be resilient or non-resilient, as may be desired. Thus, the means or shunt may be made of brass, steel, etc. The means or shunt will desirably comprise a relatively narrow strip of conducting material bent into angular form and provided adjacent its ends with apertures adapted to align when the arms are drawn together. In use the two arms of the means or shunt will be brought together and the ends of the lead wires passed through the apertures in the means or shunt, one arm of which will desirably bear against the ends of the insulation at the juncture of the insulated and uninsulated portions of the wires. If the means

or shunt be of resilient material, it will be maintained in position and in contact with the end portions of the lead wires by its own resiliency, which will cause the arms to separate and throw the apertures out of alignment when released. On the other hand, if the means or shunt be non-resilient material and properly positioned, the two arms will be spread to throw the apertures out of alignment and cause the shunt to grip the wires to maintain itself thereon.

It will be appreciated that an advantage of my short-circuiting device is that the harder the attempt to pull it from the lead wires the tighter it grips said lead wires, unless it is intentionally released by bringing the two ends of the clip together. This advantage of automatic increase of gripping power is in no way evident in previous devices, and comprises one of their defects.

Having now indicated, in a general way, the nature and purpose of my invention, I will proceed to a detailed description of a preferred embodiment thereof with reference to the accompanying drawings in which:

Figure 1 is a view of a blasting cap with lead wires embodying my invention.

Figure 2 is a perspective view of means or shunt embodying my invention.

In the drawings *a* indicates a blasting cap of any usual or desired construction, extending from which are a pair of lead wires *b*, *b* insulated throughout the major portion of their length and having uninsulated end portions *b'*, *b'* to enable connection of the cap into a firing circuit. The cap *a* may, for example, comprise a casing within which is positioned a detonating charge or detonating charges upon which an initiating charge is superimposed, the detonating charge or initiating charge being adapted to be fired electrically through the medium of the usual bridge wire connected across the lead wires and embedded in the detonating charge or initiating charge within the casing.

c indicates a short-circuiting means or shunt in accordance with my invention. The shunt *c*, as shown, is formed of a relatively narrow strip of conducting material bent into angular form to provide the two arms *d*, *d*, adjacent the ends of which are formed the apertures *e*, *e*.

As shown in Figure 1, the shunt is applied to the uninsulated end portions *b'*, *b'* of the lead wires by drawing the arms *d*, *d* together, bringing the apertures *e*, *e* into alignment and passing the end portions of the lead wires through the apertures *e*, *e*. The position of the arms on application to the end portions of the lead wires is shown by dotted lines in Figure 1. When the shunt is in position the arms *d*, *d* are separated, in the case of non-resilient material, or separate due to the resilience of the material, causing the apertures *e*, *e* to go out of alignment and consequently causing the lead wires to be tightly gripped by the

shunt at their points of passage through the apertures.

Where the shunt is formed of resilient or springy material, for its application the arms will be placed in tension when brought together and when the shunt is desirably positioned will be permitted to spring apart and engage the lead wires. On the other hand, where the shunt is made of non-resilient material the arms will be positively spread apart when the shunt is desirably positioned.

As will be obvious, the shunt may be readily removed from the lead wires by merely bringing the arms *d*, *d* together and slipping the shunt off the free ends of the wires, which may be readily accomplished since when the arms are together the apertures *e*, *e* will be in alignment and no resistance to the withdrawal of the wires through the apertures will be offered. Further, as will be obvious, the shunt in retaining itself upon the wires through spread of the arms and consequent non-alignment of the apertures *e*, *e* will not cause any material distortion of the wires and hence when the shunt is removed the wires will be in perfect condition for connection into a firing circuit.

It will be noted that when the arms of the shunt are separated causing the lead wires to be gripped at their points of passage through the apertures *e*, *e*, the shunt will not only be firmly secured to the lead wires, but since the shunt engages uninsulated portions of the wires their short-circuiting through the shunt and also through contact with one another will be assured.

It will be noted that desirably when the shunt is in final position, that is with the arms *d*, *d* separated, the arm adjacent to the insulated portions of the wires will engage the uninsulated portion adjacent to the termination of the insulation.

What I claim and desire to protect by Letters Patent is:

1. In combination with an electric blasting cap provided with lead wires having uninsulated end portions, a conductive shunt member bent upon itself and having apertures adjacent its free ends through which the end portions of the lead wires pass, the shunt member being maintained on the lead wires through non-registration of the said apertures.

2. In combination with an electric blasting cap provided with lead wires having uninsulated end portions, a conductive shunt member formed of resilient material and bent upon itself and having apertures adjacent its free ends through which the end portions of the lead wires pass, the said member being maintained on the lead wires by its resiliency.

3. In combination with an electric blasting cap provided with lead wires having uninsulated end portions, a conductive shunt member formed by bending upon itself a strip

having apertures adjacent its free ends, the
uninsulated end portions of the lead wires
extending through said apertures and the
member being retained on the lead wires by
5 separation of its free ends.

4. In combination with an electric blasting
cap provided with lead wires having unin-
sulated end portions, a conductive shunt
member formed by a resilient strip having
10 apertures adjacent its ends and bent upon it-
self, the uninsulated end portions of the lead
wires extending through said apertures and
the member being retained on the lead wires
through separation of the free ends thereof
15 under the influence of its resiliency.

In testimony of which invention, I have
hereunto set my hand, at Wilmington, Dela-
ware, on this 23rd day of December, 1930.

CHARLES H. LICKLE.

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