Dec. 8, 1931. R. K. BREWSTER 1,835,753

BLASTING CAP

Filed Nov. 15, 1930

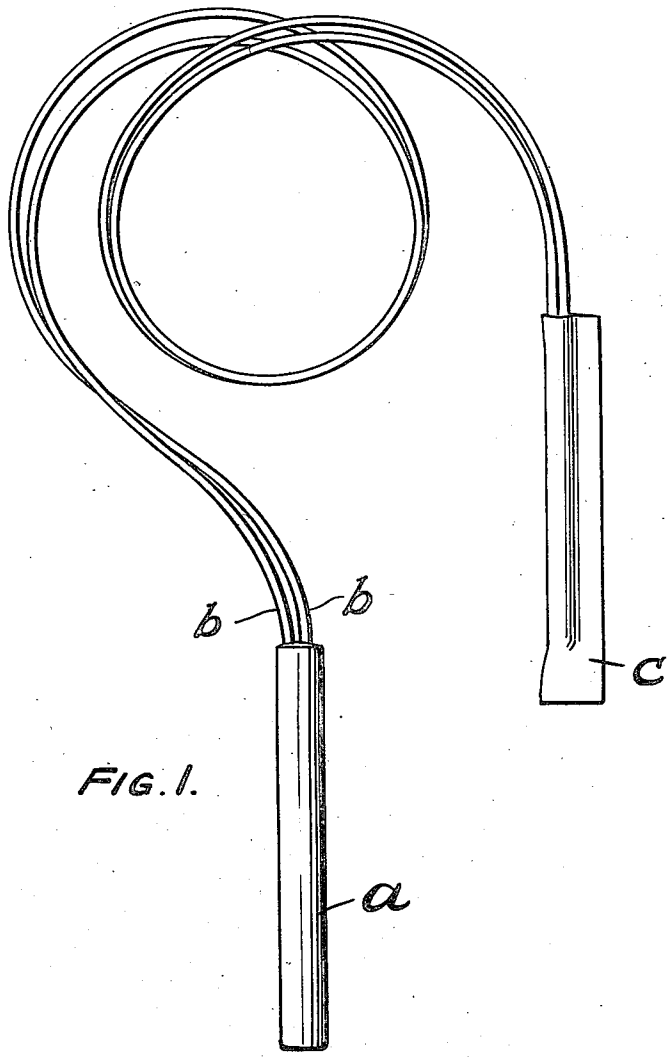

FIG. 1.

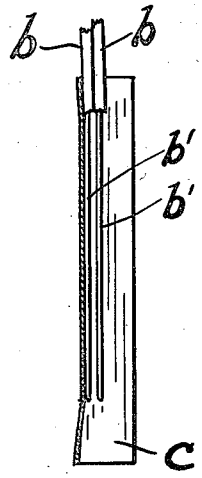

FIG. 2.

WITNESS:

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UNITED STATES PATENT OFFICE

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BLASTING CAP

Application filed November 15, 1930. Serial No. 495,818.

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 fired 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 disadvantageous, 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. Further the twisting of the ends does not insure against accidental firing of the cap, since frequently the bridge wires contact with the metal casing and a circuit such as will fire the cap may be made where the twisted ends of the lead wires contact with a source of high voltage current, for example, a trolley wire and, at the same time, the metal casing is grounded as by contact, for example, with a rail.

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.

In all cases the means heretofore used for the protection of the caps have been open to the objection that aside from the fact that they result in distortion of the ends of the wires, as in the case of twisting, or in their removal, as in the case of connectors, no protection is afforded against corrosion of the uninsulated ends of the wires and when caps are put into use, unless they are substantially new, it is often necessary to clean off the ends of the wires in order to insure efficient connection to the firing circuit.

Now, in accordance with my invention, I provide means whereby inadvertent firing of blasting caps is wholly prevented, whereby the uninsulated ends of the lead wires are protected from corrosive influences and, at the same time, whereby the uninsulated ends of the lead wires may be prepared for connection into a firing circuit without effort and as is more important without any distortion or kinking of the ends of wires.

In accordance with my invention, I provide a protector formed of any desired insulating material, which desirably is flexible, all as will hereinafter appear more in detail, and adapted to extend over the uninsulated

end portions of the lead wires. The protector desirably extends for a distance over the insulation and for a distance beyond the free ends of the wires.

In accordance with my invention I provide a covering for the non-insulated end portions of the lead wires, which will not only efficiently cover the non-insulated portions, the covering being so designed as to prevent any possible inadvertent contact of the non-insulated portions of the lead wires with a source of current and, at the same time, being so designed as to protect the non-insulated portions from corrosion and so as to be readily removable without distortion of the end portions when it is desired to connect the cap into a firing circuit.

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

Figure 1 is a side view of a blasting cap embodying my invention.

Figure 2 is a view, partly in section, of the end portions of the lead wires of the cap shown in Figure 1, showing an embodiment of my invention in detail.

In the drawings *a* indicates a container or casing, which may be of any usual type and formed of metal. Within the casing is positioned the usual explosive charge and in association therewith, if desired, an initiating charge.

Embedded in the explosive charge, or in the initiating charge, is the usual bridge wire connected to the ends of the lead wires *b*, *b*, which as usual extend into the casing. The lead wires are insulated as usual, except for the free end portions *b'*, which are uninsulated in order that they may be connected into a firing circuit. *c* indicates a protector or covering for the uninsulated end portions *b'*, *b'* of the wires. The covering *c* may be made of any suitable non-conducting and waterproof material or material rendered non-conductive and which desirably is flexible, as, for example, suitably impregnated or coated fabric, rubber, etc., etc. The covering will desirably be of a rectangular shape and of a length greater than the extent of the non-insulated portions of the lead wires so that when it is in place, it will extend over the insulated portions of the wires for a distance beyond the points of termination of the insulation and will also extend a distance beyond the ends of the wires.

In the application of the protector or covering, it is folded upon itself over the end portions of the lead wires. One end of the protector embraces the insulated portions of the wires and the other end extends beyond the free ends of the wires. The overlapping portions of the covering are then cemented or adhered together and to the wires, including the non-insulated portions and the insulated portions embraced. The adherence of the covering to the lead wires and to itself may be effected by the use of any ordinary glue or cement.

When the protector or covering is adhered in place, it will be noted that the non-insulated end portions of the lead wires are fully and completely protected not only throughout their length, but also beyond their free ends and beyond the points of termination of the insulated portions, the non-insulated portions being not only protected from the possibility of contact with a source of current, but also protected from corrosive influences. The protector or covering is effectively retained in place due to its adherence to itself and to the wires and, at the same time, as is obvious, may very readily be stripped off or removed therefrom without the slightest distortion of the end portions of the wires and when removed will leave the wires clean for connection into a firing circuit.

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

1. In combination with a blasting cap, adapted for electrical firing and provided with lead wires having uninsulated end portions, a non-conducting protector folded upon itself to embrace the uninsulated end portions of the lead wires from end to end and adhered to itself.

2. In combination with a blasting cap, adapted for electrical firing and provided with insulated lead wires having uninsulated end portions, a non-conducting protector folded upon itself to embrace the uninsulated end portions of the lead wires and adhered to itself, said protector extending beyond the free ends of said wires and beyond the points of termination of the insulation thereon.

3. In combination with a blasting cap, adapted for electrical firing and provided with lead wires having uninsulated end portions, a rectangular non-conducting protector folded lengthwise upon itself to embrace the uninsulated end portions of the lead wires and adhered to itself and to said wires, said protector extending beyond the free ends of said wires and beyond the points of termination of the insulation thereon.

4. In combination with a blasting cap adapted for electrical firing and provided with lead wires having uninsulated end portions, a protector comprising a rectangular piece of flexible, non-conducting material folded upon itself to embrace the wires and adhered to itself along adjacent free edges and along its end edges adjacent the free ends of the lead wires.

In testimony of which invention, I have hereunto set my hand, at Kingston, N. Y., on this tenth day of November, 1930.

ROUSE K. BREWSTER.