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BLASTING CAP

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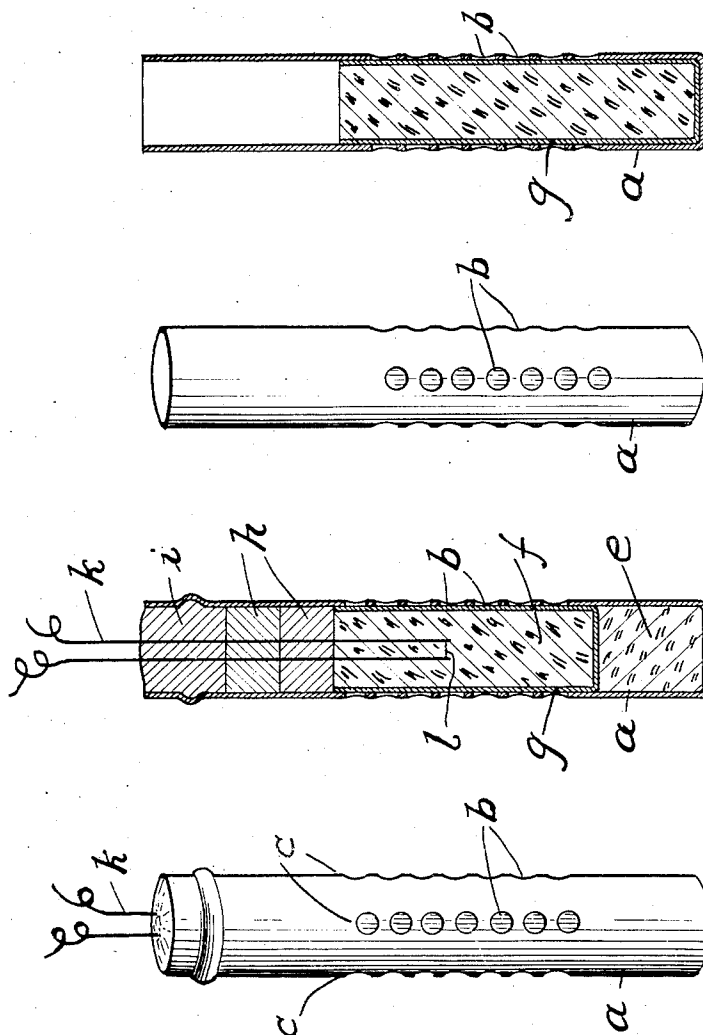


FIG. 4.

FIG. 3.

FIG. 2.

FIG. 1.

WITNESS:

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BLASTING CAP

Application filed May 12, 1932. Serial No. 610,758.

This invention relates to an improvement in blasting caps such as are used in firing commercial explosives. The improved blasting cap in accordance with this invention may be of any type, such as a plain cap adapted for firing with a fuse, an electric cap, a delay cap, etc., etc.

As is well known, where a blasting cap fails to fire, it will be present in blasted down material and due to its high power will be a distinct menace in the subsequent use of the material. More particularly, an unfired cap presents a very distinct menace where present in coal and is likely, if not certain, to cause substantial damage, if not personal injury when the coal is used.

Now it is the object of this invention to provide a blasting cap so constructed that if it should fail to fire, for example, in connection with the mining of coal, its explosive charge will be destroyed or rendered innocuous in treatment of the coal prior to shipment to the consumer.

Generally speaking the cap in accordance with this invention, which may be of any type, will be provided with a casing adapted to contain any usual charge, as, for example, an explosive or detonating charge, with or without an igniter charge, and the casing will be provided with an opening or openings normally closed by means of a closure of any suitable water soluble material.

In operation if the cap should fail to fire and remain unfired in, for example, coal, it will be destroyed or rendered harmless in the subsequent treatment of the coal for market, as by washing, flotation, jigging, etc., since the water used will dissolve the water soluble closure for the aperture in the casing and the water gaining access to the explosive charge within the casing will wash it out through the opening or openings to be carried away from the coal, or at least so distributed as to render it harmless.

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

Figure 1 is a perspective view of an elec-

tric blasting cap embodying this invention.

Figure 2 is a sectional view of the blasting cap shown in Figure 1.

Figure 3 is a perspective view of a blasting cap for fuse firing.

Figure 4 is a sectional view of the cap shown in Figure 3.

In the several figures *a* indicates any usual blasting cap casing or shell as, for example, the usual copper casing, though as will be appreciated the casing may be made of any desired suitable material and of any desired suitable shape and size without departing from this invention.

The casing *a* is essentially provided with one or more openings in its body, as for example, openings *b*, desirably arranged vertically as shown, and there being desirably provided a series of vertical rows *c*, of openings *b* as shown. If desired, vertical slots may be substituted for the vertical rows of openings. As will be appreciated, the number, size, shape and arrangement of openings *b* is unimportant to the essence of this invention, it being contemplated that a single opening may be used and that where a plurality of openings are used they may be of various shapes, sizes, number and arrangement. Likewise, the opening or openings may be variously located in the casing.

Referring now more particularly to Figures 1 and 2, in which an electric blasting cap is illustrated, the cap casing *a* provided with vertical rows of openings *b*, will contain at its bottom a base charge *e*, which may comprise any suitable composition or mixture, as, for example, tetranitroaniline, picric acid, tetryl, etc. The base charge will be adjacent to but below the lowest of the openings *b*. Above the base charge the casing contains a top charge *f*, carried loosely within a capsule *g* formed of water soluble material as, for example, gelatin, etc., etc. The top charge may be composed of any well known composition or mixture, as, for example, fulminate-chlorate, diazodinitrophenol, lead azide, etc. The capsule *g*, which is open at its top, fits tightly within the casing and acts as a closure for the openings *b*.

The casing is closed with the usual closing plugs *h* and is sealed with any usual sealing material *i*, retained by widening of the shell as at *j*. Electric lead wires *k* extend
5 into the igniter charge *f* and their ends within the charge are connected by a fusible bridge wire *l*, as usual in electric caps.

As will be appreciated, both the base charge and the top charge may be contained
10 in a capsule, as *g*, which may extend to the bottom of the casing, or the capsule extending to the bottom of the casing may contain a single homogeneous detonating charge.

Referring now more particularly to Figures 3 and 4 in which a cap adapted to be fired by means of a fuse is shown, the casing, which is open at the top for the reception of a fuse, contains a detonating charge of any suitable composition contained within a capsule *g* of water soluble material and which fits in the lower portion of the casing and acts as a closure for the openings *b*.
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In operation, as will now be obvious, if a cap embodying the invention remains unfired, for example, in coal, when the coal is washed the capsule closing the apertures *b* will be dissolved sufficiently to open the openings or slots and the charge will be washed out of the casing and away, all by
20 the wash water which on dissolution of the capsule will have access to the inside of the casing and will wash out the charge therein through the openings, which, as will be noted, are opposite or adjacent to the explosive charge or charges.
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As will be understood, in order to render any cap safe, it is only necessary to wash out the charge which is sensitive to heat. Hence, the top charge, which must be heat sensitive, where used, or the base charge, if heat sensitive, or both, or a homogeneous single charge, will be loosely loaded, or where tightly compressed will be admixed with a water soluble material, as, for example, potassium chlorate, sodium chlorate, or the like, in order to insure its removal by water on dissolution of the water soluble closure for the opening or openings in the casing. Where the base charge is used with a top
30 charge the former will not have sufficient heat sensitivity to present any hazard if it remains in, for example, coal and such charge may be tightly compressed and may remain in the casing without damage so long as the top charge is removed.
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As will be appreciated, various modifications in the structures described above for illustrative purposes may be made without departing from this invention. Thus various modifications may be made in connection with the embodiment of this invention to various types of caps and, for example, the openings as illustrated may be displaced by various forms and arrangements of openings in the body of the casing or by an

opening in the bottom thereof and the opening or openings may be closed by a patch or patches of water soluble material or by a sleeve in place of the capsule as described.

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

1. A blasting cap including in combination a casing provided with an opening, an explosive charge within the casing and a water soluble closure for said opening.
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2. A blasting cap including in combination a metallic casing provided with an opening, an explosive charge within the casing adjacent said opening and a water soluble closure for said opening.
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3. A blasting cap including in combination a casing provided with an opening therein, a water soluble capsule within the casing and affording a closure for said opening and an explosive charge within the casing.
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4. A blasting cap including in combination a casing provided with an opening therein, a water soluble capsule within the casing and affording a closure for said opening and an explosive charge within the capsule.
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5. A blasting cap including in combination a casing provided with a series of openings in the side of the casing, a water soluble closure for said openings and an explosive charge within the casing.
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6. A blasting cap including in combination a casing provided with a series of openings arranged vertically in the side of said casing, a water soluble capsule within said casing and affording a closure for said openings and an explosive charge within said casing.
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7. A blasting cap including in combination a casing provided with a series of openings in vertical alignment, a water soluble capsule within the casing and affording a closure for said opening and an explosive charge within the casing.
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8. A blasting cap including in combination a casing provided with a series of vertically extending slots, a water soluble capsule within the casing and affording a closure for said opening and an explosive charge within the casing.
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In testimony of which invention, I have hereunto set my hand, at Wilmington, Delaware, on this 26th day of April, 1932.
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JEAN PICCARD.
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