

UNITED STATES PATENT OFFICE

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BLASTING CAP

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8 Claims. (Cl. 52-4)

This invention relates to an improvement in blasting caps, and has for its object production of a blasting cap which may be readily and cheaply loaded and positively detonated, and which will be of high efficiency in detonating a blasting charge, as evidenced by the fact that the caps embodying this invention give excellent plate tests; i. e. a large hole in the plate and a good sunburst.

This invention may be applied to either electric blasting caps, or to ordinary blasting caps fired with a fuse.

Heretofore, electric blasting caps have been provided with a compressed charge of mercury fulminate and a loose charge of mercury fulminate in which is embedded the bridgewire, or have been of the so-called base charge type; i. e. have been provided with a base charge, not adapted to be fired by the heat of the bridgewire, comprising, for example, picric acid, trinitrotoluene, tetryl, nitrostarch, ground smokeless powder, etc., and a top charge or priming charge detonated directly from the heat of the bridgewire embedded therein, and which when detonated communicates detonation to the base charge. Such top charge may comprise, for example, mercury fulminate, lead azide, lead trinitro-resorcinate, etc.

The materials used heretofore for the base charge have not proved entirely satisfactory for one reason or another, as for example, because they are difficult to prepare in a form which will flow readily, which is a very important factor in cap loading, or because they are dusty, or, as in the case of picric acid, they have a tendency to attack the metal of the cap shell in the presence of small amounts of moisture, or because they are of unsatisfactory chemical stability.

In accordance with this invention, it has been found that a highly satisfactory and efficient blasting cap, of either the electric or fuse type, can be produced by the use of i-inositol nitrate, preferably hexanitrate, as the explosive charge.

In the case of the electric blasting cap a charge of inositol hexanitrate alone may be used, or as a base charge underneath a suitable top charge.

In the case of a common cap to be fired with a fuse inositol hexanitrate as a base charge beneath a top charge comprising the usual initiating or detonating agents, such as mercury fulminate, lead azide, lead trinitroresorcinate, etc. will be used, or alternatively, a top charge comprising a mixture which burns without detonating, and evolves on burning a considerable amount of heat may be used, since I have found that a charge of inositol hexanitrate can be caused to

detonate efficiently by heat alone, in contrast to the commonly used base charges, which do not detonate by heat alone, but which require superposition of, or admixture with, an initial detonating composition.

In the case of an electric blasting cap where inositol hexanitrate is used as a base charge the top charge may comprise the usual initiating or detonating agents, such as mercury fulminate, lead azide, lead trinitroresorcinate, etc. Where inositol hexanitrate is used alone the hot flash from the match head, in which is embedded the bridgewire (see Initialexplosivstoffe, Escales und Stettbacher, 1917, page 467, which describes match heads) will be sufficient to cause detonation of the charge of inositol hexanitrate without the interposition of a top or initiating charge. By the term match head, I include other shapes and forms, e. g., a straight bridgewire enclosed by non-detonating flash compositions.

As illustrative of a satisfactory blasting cap in accordance with this invention, for example, any usual or desired form of blasting cap casing may be charged with a base charge comprising 0.16 g. of inositol hexanitrate, the base charge being pressed under a pressure of about 7840 pounds per square inch, over which, for example, is placed a priming charge of 0.30 g. of a 90/10 mercury fulminate-potassium chlorate mixture, and over which, in turn, is placed a capsule and an igniting wafer comprising 0.10 g. of a 70/30 fulminate-chlorate mixture, pressed at 5600 pounds per square inch. These caps will be sealed and provided for firing by a fuse or electrically, in accordance with usual practice.

As illustrative of a satisfactory electric cap in accordance with this invention, any usual form of blasting cap casing may be charged with a single charge comprising .50 g. of inositol hexanitrate, pressed under a pressure of about 7840 pounds per square inch. In the plug seal of the cap is placed the usual match head igniter, or equivalent thereof, and the whole sealed with pitch. On passing a heating current through the bridgewire embedded in the match head, the match head is ignited, and gives a violent flash, which flash, I have found, is sufficient to bring to detonation the charge of inositol hexanitrate located in the vicinity thereof.

As illustrative of a satisfactory common or fuse type blasting cap in accordance with this invention, any usual form of blasting cap may be charged with a base charge comprising .50 g. of inositol hexanitrate, the base charge being pressed under a pressure of about 7840 pounds per square

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inch, over which is placed an igniting (but not detonating) charge of 0.30 g. of a match composition comprising barium nitrate, magnesium powder and lead hypophosphite, over which is pressed a perforated capsule. When a fuse is placed in the open end of the cap, ignited, and the spark flashed through the opening in the capsule, the compressed match composition will flash and burn without exploding and will cause the charge of inositol hexanitrate thereunder to detonate.

If desired, in the case of use of inositol hexanitrate with priming (detonating) top charges, the inositol hexanitrate and detonating charge may be mixed intimately. Thus, for example, inositol hexanitrate may be mixed with mercury fulminate or diazo-dinitrophenol, or the like, and then pressed into the cap shell.

The caps made in accordance with this invention will be found to be of superior strength and of special advantage in detonating dynamites. In association with a priming charge of negative oxygen balance, inositol hexanitrate is of particular advantage because it possesses a positive oxygen balance, thus eliminating the necessity, as, for example, with mercury fulminate, for the use of an oxidizing agent, as, for example, potassium chlorate, or the like.

It will now be understood that this invention contemplates, from the broad standpoint, a blasting cap having a base charge, or a single charge of inositol hexanitrate. And it will be understood that the cap otherwise may be of any type or form desired. It will be understood that more specifically the cap may include any primary initiating or non-detonating flash charge, or a detonating charge for initiating or detonating the inositol hexanitrate, and any other ingredients which may be desired. It will be further understood that if a detonating primary charge be used it may in whole or in part be mixed with the inositol hexanitrate or superimposed thereon, all without departing from this invention, and it will be under-

stood further that I do not limit myself to any specified amount of inositol hexanitrate, initiating charge or other ingredients, or to the use of any particular pressure for pressing the charge so long as excessive pressures which will cause dead pressing or bulging of the cap shell are avoided.

This application is a continuation in part of application filed by me, Serial No. 565,705, filed September 28, 1931.

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

1. A blasting cap for initiating commercial explosives including a casing and a charge of i-inositol nitrate in said casing.

2. A blasting cap for initiating commercial explosives including a casing and a charge of inositol hexanitrate in said casing.

3. A blasting cap for initiating commercial explosives including a casing and a charge of i-inositol nitrate and an initiator for the inositol nitrate in said casing.

4. A blasting cap for initiating commercial explosives including a casing and a charge of inositol hexanitrate and an initiator for the inositol nitrate in said casing.

5. A blasting cap for initiating commercial explosives including a casing and a charge of i-inositol nitrate and a detonating initiator for the inositol nitrate in said casing.

6. A blasting cap for initiating commercial explosives including a casing and a charge of i-inositol nitrate and a flash initiator for the inositol nitrate in said casing.

7. A blasting cap including a casing, a charge of i-inositol nitrate and a priming charge therein, the priming charge being superimposed on the inositol nitrate.

8. A blasting cap including a casing, a charge of inositol nitrate and a priming charge therein, the i-inositol nitrate and priming charge being intimately admixed.

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