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BLASTING CAP

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11 Claims. (Cl. 52—5)

This invention relates to blasting caps, and more specifically to blasting caps containing an explosive charge of hexanitrodiphenylethylenedinitramine.

Heretofore, blasting caps have been prepared by the use of a metal casing containing unit explosives charge of an initiating explosive, e. g. fulminate-potassium chlorate, diazodinitrophenol-potassium chlorate, lead azide, lead azide-lead trinitroresorcinate, and the like, or by the use of a cheaper, non-initiating base charge of trinitrotoluene, picric acid, tetryl, or the like, upon which is superimposed an initiating charge of fulminate-potassium chlorate, diazodinitrophenol-potassium chlorate, azide-lead trinitroresorcinate, and the like. The latter type of blasting cap is known as one containing a base charge and is the type of blasting cap to which this invention relates.

The use, as a base charge in blasting caps, of trinitrotoluene, picric acid, or tetryl is attended with difficulty, in that such substances are not free-running when in a finely divided state, and will not run freely through small holes in the loading plates of the machines used in the manufacture of blasting caps. It has been necessary to further treat such substances, for example by recrystallization, by tumbling in a barrel, by spraying the crystals with an aqueous solution of gum arabic, etc., without, however, wholly avoiding the stated disadvantages of these substances.

I have found that the stated disadvantages can be avoided by the use in blasting caps as a base charge in a suitable casing of the substance hexanitrodiphenylethylenedinitramine, which may be readily prepared, for example, by the nitration of 2,4,2',4'-tetranitrodiphenylethylenediamine or of 2,4,6,2',4',6'-hexanitrodiphenylethylenediamine, or of diphenylethylenediamine.

I prefer the process of preparation which comprises the reaction of ethylenediamine and dinitrochlorobenzene, to form 2,4,2',4'-tetranitrodiphenylethylenediamine, which is then nitrated with strong nitric acid to form hexanitrodiphenylethylenedinitramine, washed, and dried, because this process appears to produce a more stable product. The product so prepared is suitable directly for use in the loading machines of cap plants, without any further treatment, e. g. recrystallization or graining, because it is in a free-flowing form, with smooth, uniform crystals.

A further advantage of the use of hexanitrodiphenylethylenedinitramine as a base charge in blasting caps containing a diazodinitrophenol priming charge is that a 10% less weight of expensive initiating or top charge is required, than with the use of tetryl for a like purpose.

I may use, as the base charge in my improved blasting caps either hexanitrodiphenylethylenedinitramine alone, or admixed with about 25% by weight of potassium chlorate, in order to decrease the negative oxygen balance of the charge.

As a specific example of a blasting cap made in accordance with this invention, I may load into an ordinary copper or gilding metal cap shell a base charge of 0.20 gram of hexanitrodiphenylethylenedinitramine and press the same under about 4,000 pounds per square inch pressure, then insert on top of this base charge a priming charge of about 0.30 gram of a mixture of about 75 parts by weight of diazodinitrophenol and about 25 parts by weight of potassium chlorate and on top of the latter, a perforated inverted, ⅜" copper capsule, pressing capsule and priming charge under a pressure of about 2,240 pounds per square inch, and on top of the capsule place an ignition charge of about 0.05 gram of a mixture of about 75 parts by weight of diazodinitrophenol and about 25 parts by weight of potassium chlorate and press the same at about 4,000 pounds per square inch.

As a specific example of an electric blasting cap made in accordance with this invention, I may load into an ordinary electric blasting cap shell about 0.20 gram of hexanitrodiphenylethylenedinitramine and press the same under a pressure of about 4,000 pounds per square inch, then insert on top thereof about 0.40 gram of a mixture of about 75 parts by weight of diazonitrophenol and about 25 parts by weight of potassium chlorate, without pressing the same. I then insert the usual bridgewire-plug assembly and connecting wires and seal the same into position.

I may also prepare electric delay blasting caps, by inserting between the explosive charge and the bridgewire assembly of the above example a fuse, which acts to delay ignition of the explosive charge. In such an electric delay blasting cap there will be placed around the bridgewire a suitable flash composition adapted to ignite the fuse, and the fuse composition may be one that will burn with evolution of gases, in which case a vent for escape of such gases will be provided, or the fuse composition may be one that will burn without evolution of any substantial amount of gas, in which case no vent will be provided and the cap will be completely sealed.

As a further specific example of an electric blasting cap in accordance with this invention I

may load into a usual electric blasting cap shell about 0.20 gram of a mixture of about 2 parts by weight of hexanitrodiphenylethylenedinitramine and about 2 parts by weight of diazodinitrophenol and about 1 part by weight of potassium chlorate and press the charge under a pressure of about 3,000 pounds per square inch, then insert a loose priming charge of about 0.40 gram of the same mixture, and complete the assembly as hereinbefore described.

I contemplate as within the scope of this invention, the use of other priming compounds in place of the diazodinitrophenol described, for example mercury fulminate, lead azide, etc.

What I claim is:

1. A blasting cap for detonating explosives including a casing and a charge of hexanitrodiphenylethylenedinitramine.

2. A blasting cap for detonating explosives including a casing, a charge of hexanitrodiphenylethylenedinitramine and an initiating charge for the hexanitrodiphenylethylenedinitramine in said casing.

3. A blasting cap for detonating explosives including a casing, a charge of hexanitrodiphenylethylenedinitramine and a priming charge therein, said priming charge being superimposed on the hexanitrodiphenylethylenedinitramine.

4. A blasting cap for detonating explosives including a casing open at one end, a charge of hexanitrodiphenylethylenedinitramine and an initiating charge for the hexanitrodiphenylethylenedinitramine in said casing.

5. An electric blasting cap for detonating explosives, including a casing, a charge of hexanitrodiphenylethylenedinitramine and an initiating charge for the hexanitrodiphenylethylenedinitramine.

6. An electric blasting cap for detonating explosives including a casing, and a charge of hexanitrodiphenylethylenedinitramine.

7. A delay electric blasting cap for detonating explosives including a casing and a charge of hexanitrodiphenylethylenedinitramine.

8. A blasting cap for detonating explosives including a casing and a charge comprising about 75% of hexanitrodiphenylethylenedinitramine and about 25% of potassium chlorate.

9. A blasting cap for detonating explosives including a casing, a base charge of 0.20 g. of hexanitrodiphenylethylenedinitramine, a superimposed priming charge of about 0.30 g. of a mixture of about 75% diazodinitrophenol and about 25% potassium chlorate, a perforated capsule confining said priming charge, and adjacent said capsule an ignition charge of about 0.05 g. of a mixture of about 75% diazodinitrophenol and about 25% potassium chlorate.

10. An electric blasting cap for detonating explosives including a casing, a base charge of about 0.20 g. of hexanitrodiphenylethylenedinitramine and a superimposed priming charge of about 0.40 g. of a mixture of about 75% diazodinitrophenol and about 25% potassium chlorate.

11. A delay electric blasting cap for detonating explosives including a casing, a base charge comprising hexanitrodiphenylethylenedinitramine and a priming charge of a mixture of diazodinitrophenol and potassium chlorate.

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