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MANUFACTURE OF FUZE HEADS FOR ELECTRICAL FIRING

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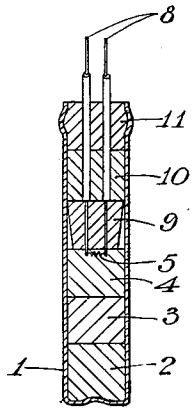


Fig. 1

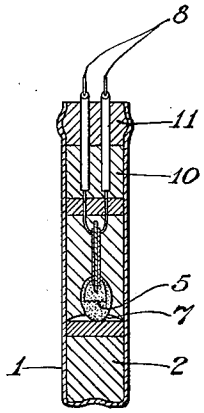


Fig. 2

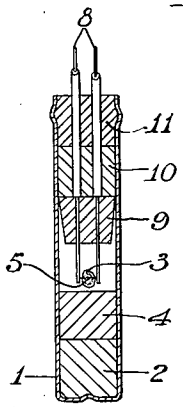


Fig. 3

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MANUFACTURE OF FUSE HEADS FOR ELECTRICAL FIRING

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5 Claims. (Cl. 102—10)

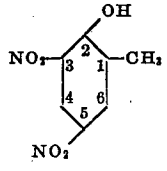
The present invention relates to blasting initiators and to ignition compositions for the same. It relates particularly to new and improved ignition compositions for electric blasting caps.

As is well known, several types of ignition means have been developed for electric blasting caps. In one type a bridge wire of relatively high resistance joins the pole ends of suitable electric conducting leads. The bridge wire is embedded in a loose ignition composition.

In another type of ignition means the bridge wire is provided with a coherent bead of a suitable ignition composition. A material commonly employed for the bead formation is copper acetylide, for example. This substance has the disadvantage that it does not store well under moist conditions. Other ignition materials known to the art have their own peculiar disadvantages when used either as a loose charge or in the form of a bead. Many materials which display satisfactory storage properties are dangerous to handle; with other materials it is often difficult to obtain successive batches having constant ignition characteristics, even when their preparation is carried through with reasonable precautions for ensuring uniformity in the product from batch to batch.

The chief object of the present invention is a new and improved ignition composition. A further object is a blasting initiator containing such a composition. Another object is an electric blasting cap provided with an ignition composition which is not unduly violent and is of improved stability and low sensitivity to shock or friction. Additional objects will be apparent from the following detailed description of our invention.

We have discovered that the foregoing objects may be accomplished and the disadvantages overcome by the use of ignition compositions comprising a basic lead salt of a dinitrocresol. We prefer to use the basic lead salts of 3:5-dinitro-2-hydroxy toluene namely a dinitro-hydroxy-toluene having the structural formula



preferably those containing 47% to 62% lead. These salts may be employed according to our invention either in compositions intended for use in loose ignition charges or as a constituent of bead compositions.

The lead salts of dinitro-ortho-cresol may be obtained in the form of a fine powder by precipitation from aqueous solutions of a soluble salt of the nitrocresol and a soluble salt of lead under appropriate conditions for the precipitation of a basic salt.

The basic lead salt may be used in ignition compositions either alone or mixed with a proportion of other ingredients, for example an oxidizing agent such as potassium chlorate. It is sometimes desirable to corn the material into granules of suitable size. This result may be readily accomplished by mixing with a solution of gum acacia or the like in known manner. Desirably the oxidizing agent may be introduced while the lead salt is suspended in the corning solution. The resulting composition will be found particularly desirable for use as a loose charge in electric blasting caps, as illustrated in greater detail in the following two examples.

Example 1

90 parts of the lead salt of the 3:5-dinitro-2-hydroxytoluene containing 58% of lead is corned with 10 parts of potassium chlorate with the aid of a solution of 1 to 2 parts of acacia gum in 60 parts of water, the mass, while still containing about 15 to 20% moisture being pressed through a 30-mesh sieve, the powdered material passing an 80-mesh sieve being rejected. Into a copper detonating tube is introduced a main charge consisting of 1 gram of a mixture of mercury fulminate and potassium chlorate in the proportions 80:20, pressed into the lower end of the tube and occupying about 15 mm. of its length. The corned mixture prepared according to this example is then run in until it occupies a length of from 4 to 6 mm., the quantity used being about 0.12 gram. The plug carrying the bridge wire is then inserted so that the bridge wire becomes embedded in the composition, and the assembly is completed by introducing the waterproofing and sealing compositions.

Example 2

100 parts of basic lead salt of 3:5-dinitro-2-hydroxy toluene of lead content 59% is corned with 60 parts of acacia gum solution of 2% strength by pressing the mass containing 20% moisture through a 16-mesh sieve and discarding the ma-

terial passing the 80-mesh sieve. The detonator consists of an aluminum shell containing a base charge of 0.25 gram of tetryl, a primary initiating charge consisting of 0.35 gram of a mixture of 70 parts of lead azide and 30 parts of lead styphnate, and a deflagrating charge of 0.12 gram of the corned mixture described in this example, in which latter the bridge wire is embedded.

The loose deflagrating charge according to our invention is particularly insensitive to friction and has a satisfactorily low firing current, while the detonators containing the same have excellent storage properties.

In addition to their use as a loose ignition charge, the salts according to our invention may be equally desirably employed in the bead type of ignition charge. The material may be employed either alone or, if desired, along with a proportion of an oxidizing agent to form readily ignitable composition. In preparing fuseheads of this type, the exposed bridge wire is usually dipped into a suspension of one of our readily ignitable compositions in a viscid solution of nitrocellulose, resinous material or the like in a volatile organic solvent, and the bead of the suspension is dried. More than one dip may be applied as desired, and in many cases it is usual to provide the exterior of the bead with a coating of a suspension of another composition, for instance one containing potassium chlorate and charcoal, in order to increase the intensity of the flash obtained from the initiator. It may be desirable to apply a coating of collodion to the bead.

Another type of bead employed in our invention comprises the bridge plug assembly upon the bridge wire of which a bead of our ignition composition is applied without the use of the support common to the fusehead or matchhead types of bead. The term "bead" as employed throughout this specification shall be understood to include both this bridge plug type of bead and the fusehead type of bead.

The use of the salts according to our invention for the formation of ignition beads is illustrated further by the following example.

Example 3

The bridge wire and the end of the metal foil strips attached to the pole piece on each side of the cardboard sheet of a fusehead assembly of the well known type are dipped in the normal fashion into a composition made by incorporating 1 part by weight of basic lead 3:5-dinitro-2-hydroxy toluene with 1 part by weight of a 2½% solution of industrial nitrocotton in commercial amyl acetate, and thinning to a suitable dipping consistency with more amyl acetate. The fuse head is finished with an external dip of a suspension of potassium chlorate-charcoal mixture and a final collodion dip. The bridge wire, when uncoated, fused when a current of 0.65 ampere was passed for not more than 0.05 second. The firing current of the fusehead was 0.41–0.44 ampere.

Fuseheads or bead ignition charges prepared in accordance with our invention exhibit an outstanding combination of advantages over fuseheads prepared from any one of the materials that have been used or proposed previously with respect to comparative insensitiveness to shock or friction, sensitiveness to thermo-ignition, intensity and non-explosive quality of flame, uniformity of ignition characteristics from successive batches of raw material, and storage stability. It is not claimed that fuseheads made from hitherto known materials may not possess in some degree certain of the above mentioned advantages, but fuseheads made according to the present invention will be found superior in at least one of these respects to any of those made according to the prior art. For instance, they possess better stability and lower sensitivity to shock or friction than acetylide fuseheads; and the ignition temperatures of the preferred salts are lower than that of lead picrate.

In order to further illustrate the manner in which the salts in accordance with our invention may be used in electric initiators, both as loose and bead ignition charges, reference is made to the accompanying drawing, which represents preferred embodiments thereof. It is understood, however, that this is done solely by way of illustration and is not to be regarded as a limitation upon the scope of our invention.

Referring generally to the drawing, Figure 1 is a longitudinal section of an initiator having a loose ignition charge. Figure 2 is a similar view of an initiator provided with a fusehead type of bead ignition charge. Figure 3 is a similar view of an initiator provided with the bridge plug type of bead ignition. Corresponding parts of the different figures are represented by similar characters referred to in the following description.

In the drawing, the numeral **1** represents a metal shell of any suitable material such as aluminium, copper, or the like. The numeral **2** represents a suitable base charge, which may comprise either a detonating explosive in the case of a blasting cap, or may be a deflagrating material when a squib is involved. In Figure 1, the priming charge **3** capable of initiating said base charge is superposed thereon. Above the charge **3** is the loose ignition composition in accordance with the present invention, surrounding the bridge wire **5**, below plug **9**.

In Figure 2, the bridge wire **5** and the ends of the metal foil strips **6**, attached to the pole pieces, are dipped into our ignition composition to form the bead **7** thereof. In both figures, the conducting wires **8** pass through the waterproofing composition **10**, and finally through the hard seal **11**.

Figure 3 illustrates the bridge plug head type of assembly wherein the bead **3** of our ignition composition is applied directly on the bridge wire **5** in the absence of the support common to the matchhead type.

In the foregoing detailed description of our invention, it should be understood that many variations can be made without departing from the spirit and scope thereof. We intend, therefore, to be limited only in accordance with the following patent claims.

We claim:

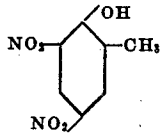
1. An electric blasting initiator containing an ignition composition comprising a basic lead salt of 3:5-dinitro-2-hydroxy toluene containing 47 to 62% of lead.

2. The electric blasting initiator according to claim 1, wherein the ignition composition is in the form of a bead on the bridge wire.

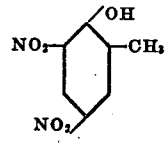
3. The electric blasting initiator according to claim 1, wherein the ignition composition is in the form of a loose charge.

4. An electric blasting initiator containing an ignition composition comprising a basic lead salt

of the dinitro-hydroxy-toluene having the structural formula:



5. A blasting initiator containing an ignition composition comprising a basic lead salt of the dinitrohydroxytoluene having the structural formula:



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