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INCENDIARY COMPOSITIONS

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This invention relates to deflagrating compositions, and particularly to such compositions as are ignitible by percussion and, upon ignition, burn with a self-sustaining flame of intense heat adapted to ignite contiguous inflammable substances. Typical of such compositions are powder igniting ammunition primers and the charges of incendiary projectiles. Closely related thereto, but functioning in a somewhat different manner, are the flight marking compositions used in "tracer" projectiles.

The composition of the present invention is especially adapted but not limited to incendiary charges and ammunition priming compositions.

Incendiary projectiles comprise a metal jacket containing in the nose portion thereof a charge of a percussion or impact sensitive material, the remainder of the jacket being filled by a metal core, which may or may not comprise a central aperture communicating with the nose cavity and partly or wholly filled with the incendiary composition. Such a projectile is described in the patent to De Wilde and Kaufmann, No. 2,217,645, October 8, 1940. The incendiary composition consists essentially of an oxidizing ingredient and a fuel ingredient which react with a strongly exothermic reaction. A common mixture comprises substantially equal amounts of an oxidizing salt, for example, barium nitrate, and a finely divided, readily oxidizable, strongly exothermic material, such as a powdered metal or metal alloy. A very desirable fuel is an alloy of substantially equal proportions of aluminum and magnesium but mixtures of a plurality of oxidizers and/or fuels are frequently used. As an aid to charging, small amounts of insoluble metallic soaps are sometimes added both to tracer and incendiary compositions, but such soaps are detrimental to both ignitibility and storage stability.

In loading incendiary projectiles, the composition must be handled and loaded in a dry state, measured charges thereof being secured from a suitable reservoir of the material and transferred to a funnel, through which each charge passes into the projectile jacket, the metal core being thereafter inserted over the incendiary charge. In the event that the core comprises an aperture, the core may be inserted in the jacket first, and when this is done the incendiary composition is preferably but not necessarily divided into a plurality of increments which are successively introduced through the core aperture. It will be apparent that, in order to secure adequate and uniform charges, the composition must be dry and

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free flowing, also that during loading it is very much exposed to the surrounding atmosphere. In a dry atmosphere, the loading of incendiary charges in this manner is measurably successful, but in an atmosphere of high humidity the mixture particles develop sufficient cohesion to interfere materially with free-flowing, causing bridging in funnels and other passages. Since the charging operation is mechanically performed, insufficient charges or the absence of any charge at all is not readily detected and defective cartridges result.

The present invention comprises the discovery of an ingredient which may be added to deflagrating compositions with several beneficial results. The prime object has been to improve the free-flowing properties of such compositions to facilitate charging and eliminate or reduce sensitiveness to atmospheric humidity, but other benefits have also been secured.

It has been found that the addition of a small percentage of tricalcium-phosphate ($Ca_3(PO_4)_2$), a very fine dry powder, substantially eliminates the sensitiveness of such compositions to atmospheric humidity, and enables their regular and dependable machine loading in varying weather, without air conditioning. This end is achieved without detriment to performance, in fact actual improvement in storage stability and in certainty of ignition has been noted.

The effect may be explained as follows:

A certain amount of condensation takes place at the surface of the metallic fuel, in accordance with the well known tendency of metals to condense moisture from a humid atmosphere. Such moistening of the surface tends to cause the particles of the fuel to adhere to each other and to the particles of the oxidizer. The finely pulverent, dry and non-hygroscopic tricalcium phosphate coats the surface of the metal particles to an extent sufficient to prevent detrimental condensation thereon, and the resulting undesirable particle adhesion. In the same manner, the surface coating of the metal particles may prevent too intimate a contact between fuel and oxidizer, and a resulting slow reaction and deterioration on storage.

The use of the invention enables the continued quantity production of incendiary cartridges under atmospheric conditions which would otherwise stop production. The amount of tricalcium phosphate required is small, a preferred quantity being about .5% although the desired results are secured by amounts as small as .12% or as large as 2% of the entire composition.

Similar beneficial effects are secured by the addition of tricalcium phosphate to priming compositions, particularly those which tend to be hygroscopic, such for example as compositions containing an admixture of potassium chlorate and antimony sulphide. Free flowing under such extreme conditions as 90% relative humidity at 120° F. has been secured by the addition of .1% to .5% of tricalcium phosphate, a preferred amount being .25%, without detriment to sensitivity.

What is claimed is:

1. A deflagrating composition comprising an oxidizing ingredient, a fuel ingredient, and tricalcium phosphate.

2. A deflagrating composition comprising substantially equal proportions of barium nitrate and an alloy of magnesium and aluminum, and .12% to 2% of tricalcium phosphate.

3. An incendiary composition for projectiles, comprising an oxidizing ingredient, a fuel ingredient, and tricalcium phosphate.

4. An incendiary composition for projectiles, comprising barium nitrate, a metallic alloy fuel, and .12% to 2% of tricalcium phosphate.

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REFERENCES CITED

The following references are of record in the file of this patent:

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