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IGNITION AND PRIMING COMPOUND

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This invention relates to that class of compounds adapted for use as an igniting, priming or heating means for explosives.

More particularly the compounds are designed for igniting blasting caps, for igniting thermite and for other purposes such as delays for shells, delay trains for delay electric blasting caps, etc.

An object of the invention is to provide an improved composition that will be stable and safe to handle under all conditions and may be made having varying degrees of sensitivity as required for different particular services.

Another object of the invention is to provide a composition of the above type that will be non-explosive and will not be affected by moisture or varying temperatures and will remain effective over long periods of time.

Another object of the invention is to provide a non-gas forming and non-spitting composition adapted to generate intense heat and adapted for the purpose of igniting and priming explosives.

As one of the particular purposes for which the composition has been developed is for a priming composition in a delay type electric blasting cap, the invention will hereinafter be particularly described for that purpose.

With the above and other objects in view my invention includes the features set forth in the following specification and illustrated by the specific examples included therein.

Briefly and in its preferred aspect, my invention may be composed of the following materials: first, a phosphide of a metal such as copper or zinc, or a mixture of the phosphide of each of these metals in different particular proportions for special purposes; and second, an oxidizing compound such as potassium bichromate, barium chromate, red lead, etc.

The quantity of metallic phosphide may be varied from about 15% to 40% and the oxidizer from 85% to 60%. The sensitivity and speed of the composition may be widely varied by varying the proportions of phosphides of the zinc and copper as well as other metallic phosphides, e. g., manganese phosphide, iron phosphide, nickel phosphide, cobalt phosphide, chromium phosphide, boron phosphide, etc. Also if mixtures of copper and zinc phosphide are used, greater sensitivity and speed may be obtained by larger ratios of zinc than copper phosphide. Particular services requiring highly sensitive compositions may be of boron phosphide. To decrease the sensitivity and speed the proportion of zinc phosphide is reduced and other suitable metallic phosphides used as well as the copper. Also there may be an inert material, such as iron oxide, magnesium oxide, silicates, silica, etc. added.

When a greater amount of heat is required, the composition may have added to the substances referred to above an amount of finely divided aluminum, magnesium, etc., which greatly increases the intensity of the heat generated by the combustion of the composition. A composition including aluminum with the phosphide and oxidizer may be used to best advantage to ignite difficultly ignitable materials such as thermite. The addition of this finely divided aluminum also has the effect of increasing the ease of ignition of the composition.

As an example of an igniting composition particularly adapted for delayed blasting caps, squibs, etc., the composition may include approximately 25% metallic phosphides and 75% potassium bichromate. The phosphides may be approximately 30% of zinc and about 70% copper to give the requisite sensitivity.

A composition primarily designed for igniting thermite and similar compounds may contain up to about 10% of metallic aluminum in powdered form, from 5% to 15% zinc phosphide, and about 75% to 85% of potassium bichromate, lead or manganese oxide, barium chromate or other insensitive oxidizing element. To increase the sensitivity to ignition and speed of burning there may be added red phosphorus.

In using the above described compositions wherein it is confined as in blasting caps to ignite the detonating substance such as mercury fulminate, it is not necessary to vent the casing for the cap as no appreciable amounts of gasses are generated and therefore no pressures are created within the casing that would require an absorbing element or might destroy the container or prevent complete burning of the composition. After burning the ashes remain in compact form within the casing or receptacle for the composition. During combustion, ignition of the composition takes place uniformly and without violence.

The composition is non-explosive and is entirely safe to handle; it also can be granulated into pellets of any size and safely stored over long periods of time without deterioration.

The choice of oxidizing means for the composition enables the rate of burning of the composition to be controlled. Chromates and dichromates as of potassium, barium, lead are less sensitive and result in a slow burning of the com-

positions in which they are employed with the phosphides. Oxides of lead such as Pb_3O_4 or PbO_2 or manganese dioxide are more sensitive and result in a faster rate of combustion of the composition.

I claim:

1. A priming composition for blasting caps and the like, comprising in combination, a metallic phosphide, and an oxidizer selected from the group consisting of an oxide and a chromate.

2. A priming composition for blasting caps and the like, comprising in combination a metallic phosphide, and a chromate oxidizing compound.

3. A priming composition for explosive charges comprising phosphide of zinc and a chromate oxidizing compound.

4. A priming composition for explosive charges comprising phosphides of zinc and copper and a chromate oxidizing compound.

5. A priming composition for igniting explosive charges comprising a mixture of from 15% to 40% of phosphides of copper and zinc and of 85% to 60% of potassium chromate.

6. A priming composition for explosive charges comprising one part of a mixture of copper and zinc phosphides, and three parts of potassium chromate, there being approximately 30% zinc phosphide and 70% copper phosphide in the phosphide mixture.

7. An igniting composition for thermite and the like, comprising up to 10% powdered metallic aluminum, 5% to 15% zinc phosphide, and 75% to 85% oxidizing compound comprising a chromate.

8. An igniting composition for thermite and the like, comprising up to 10% powdered metallic aluminum, 5% to 15% zinc phosphide, and 75% to 85% oxidizing compound comprising an oxide.

9. An igniting composition for thermite and the like, comprising a mixture of copper and zinc phosphides, metallic aluminum, and an oxidizing compound comprising a chromate.

10. An igniting composition for thermite and the like, comprising a mixture of copper and zinc phosphides, metallic aluminum, and an oxidizing compound comprising an oxide.

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