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# UNITED STATES PATENT OFFICE

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## PLASTIC EXPLOSIVE MIXTURE OF HIGH SHATTERING POWER

No Drawing. Application filed June 16, 1930, Serial No. 461,652, and in Switzerland February 27, 1930.

In the course of further researches concerning the explosive mixture, which forms the object of the application No. 363,999, filed May 17, 1929 it has become evident that it may be desirable for military as well as for industrial purposes to deprive the said mixture (which consists of crystalline pentaerythrite tetranitrate and liquid aliphatic nitric acid esters of polyvalent alcohols, such as nitroglycerine, dinitroglycol, or a mixture of both) of its oily character partly or wholly by adding collodion-cotton in a quantity corresponding to 0.5 to 8 of the liquid nitrate constituents. The collodion-cotton is preferably first completely saturated with the liquid nitric acid esters and this mixture in a cold or heated state and partly or totally gelatinized is then mixed with the powdery pentaerythrite tetranitrate and kneaded. This composition is known as "penthrinite". Its sensitiveness against shocks can be reduced below that of the shock-proof and shot-resisting picric acid by adding to the liquid nitric acid esters, prior to gelatinizing, a phlegmatizing agent soluble in the latter, such as camphor, and a stabilizing agent such as for instance "Centralite" or urethane. "Centralite" is dimethyl-diphenyl-urea. At the same time the explosive mass becomes more plastic and tough and acquires such a stability that it can be stored indefinitely, although possessing a superior explosive power than the charges of projectiles hitherto generally utilized. Such a gelatinized "penthrinite" differs from the known explosive gelatine (nitrogelatine) and all the other special explosive gelatines (nitrogelatines), in that it does not age, i. e. it retains unaltered its extraordinary detonation velocity during any length of storage.

According to the required purposes the filling of projectiles, aero-shells, hand-grenades, mines etc. may be done before or after swelling takes place. If, for instance, the pressing or casting of the mixture is done in a cold condition, then the gelatination takes place slowly and will become complete, according to the temperature of the day and the proportion of nitroglycol within from a few hours to some weeks. The advantage obtained by the addition of collodion-cotton consists chiefly in the fixation of the liquid constituents which renders possible the employment of "penthrinites" containing a large proportion of nitroglycerine and being, therefore, particularly efficient.

The following is an example of an explosive mixture according to the present invention.

*Example.*—95 to 5% of a not easily congealable liquid mixture consisting of 75% nitroglycerine and 25% nitroglycol in which 0 to 6% camphor with or without 0.1 to 3.0% "Centralite" or urethane has been previously dissolved and in which thereupon, in a cold condition or after heating, 8 to 0.1% collodion-cotton has been incorporated, is mixed with 5 to 95% pentaerythrite tetranitrate.

What I claim is:—

1. A plastic explosive mixture detonating with maximum velocity, suitable for military purposes, consisting of a mixture of 5 to 95 parts by weight of pentaerythrite-tetranitrate with 95 to 5 parts by weight of a liquid nitric acid ester of polyvalent aliphatic alcohols, and 8 to 0.1% collodion-cotton.

2. A process of manufacturing a plastic, explosive composition which consists in mixing 5 to 95 parts of pentaerythrite-tetranitrate with 95 to 5 parts all by weight of a liquid nitric acid ester of polyvalent aliphatic alcohols, to which 8 to 0.1% of collodion-cotton has previously been added.

3. A process as described in claim 2 in which camphor as phlegmatizing agent up to 6% is added prior to the gelatination with collodion-cotton.

4. A process as described in claim 2 in which camphor as phlegmatizing agent up to 6% is added prior to the gelatination with collodion-cotton, in which prior to gelatination and phlegmatizing a stabilizing medium is dissolved in the liquid ester-component at the ratio of 0.1 to 3%.

In testimony whereof I have signed my name to this specification.

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