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EXPLOSIVE

Joseph A. Wyler, Allentown, Pa., assignor to Trojan Powder Company, a corporation of New York

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My invention relates to improvements in explosives, and more particularly relates to an improved explosive possessing highly desirable characteristics with reference to both explosives energy and ability to withstand unfavorable conditions of moisture and temperature. One of the objects of my invention is to provide an explosive that contains no nitroglycerin, and that is non-freezing even at very low temperatures. Another object of my invention is to provide gelatinous or semi-gelatinous explosives containing no nitroglycerin, capable of withstanding unfavorable atmospheric conditions, and particularly conditions of low temperatures, without losing explosives efficiency and without freezing.

I have discovered that when tetranitromethane is admixed with mononitroxylene, these two non-explosive materials mutually dissolve to give a clear liquid which possesses very valuable properties as an explosive, alone or particularly when admixed with other materials, as herein described. Unlike such earlier mixtures of tetranitromethane with carbocyclic nitro bodies as have been described in the literature, the mixture of tetranitromethane and mononitroxylene does not separate into its components, and does not solidify even at very low temperatures. I have, for example, kept mixtures of tetranitromethane and mononitroxylene for many hours at a temperature of -30° C. without any evidence of the two components separating or freezing.

By admixing the ammonium, alkali, or alkali earth nitrates or other oxidizing salts with an admixture of tetranitromethane and mononitroxylene, I obtained explosive compositions that have many desirable properties as commercial explosives. To these mixtures I may of course add any of the usual constituents of commercial explosives, including combustible materials such as wood pulp, corn meal and like cereal products, or I may employ metallic constituents such as powdered aluminum or magnesium, or ferrosilicon, silicon carbide, and the like, and I may add anti-acid constituents such as zinc oxide, magnesium carbonate, calcium carbonate, sodium bicarbonate, and the like, and I may add stabilizing constituents such as diphenylamine, urea, and substituted ureas and urethanes, and I may also add consistency-controlling and waterproofing ingredients such as oil, paraffin, and the like. My invention rests in my discovery that tetranitromethane admixes in all proportions with mononitroxylene to form a liquid mixture which does not separate under the influence of low temperatures and which does not freeze under the influence of extremely low temperatures, and which may be employed, as a substitute for nitroglycerin, in a wide variety of explosive formulas, and which may be admixed with sodium nitrate, ammonium nitrate, and the

other customary constituents of commercial explosives, to form a great variety of explosive compositions which retained the valuable properties of the original mixture of withstanding low temperatures without freezing, separation, or the loss of explosives energy or reduction of sensitiveness.

Although I prefer to employ a mixture of substantially pure tetranitromethane and substantially pure mononitroxylene, I find that the presence of small amounts of dinitroxylene and trinitroxylene in the admixture does not materially alter the characteristics of the explosive, although large quantities of either dinitroxylene or trinitroxylene give mixtures which tend to separate at low temperatures, the higher nitro bodies crystallizing out from the mixture.

I have also discovered that a mixture of tetranitromethane and mononitroxylene has the ability to dissolve organic nitrates such as nitrocellulose, nitrostarch, and the nitrosugars, to form highly viscous products which, when admixed with ammonium nitrate, sodium nitrate, and the like, give explosives of gelatinous or semi-gelatinous nature. This is a very important aspect of my invention, since explosives of gelatinous or semi-gelatinous nature have many fields of usefulness, and up to the present time all explosives of gelatinous or semi-gelatinous nature have contained nitroglycerin as one of their essential components. By my invention I am able to prepare gelatinous and semi-gelatinous explosives entirely free from nitroglycerin, and which possess all of the desirable characteristics of nitroglycerin explosives without possessing their undesirable characteristics. My new gelatinous and semi-gelatinous explosives, for example, are all free from the characteristic of producing nitroglycerin headache when handled, and are entirely non-freezing, not only over the range over which nitroglycerin explosives are non-freezing, but even at temperatures at which nitroglycerin explosives of equal liquid explosive content become congealed and frozen.

As examples of specific embodiments of my invention, I will now describe typical explosives which are suitable for commercial use as equivalents of customary dynamite and similar nitroglycerin explosives.

	1	2	3	4
Tetranitromethane.....	5.33	5.00	12.00	9.00
Mononitroxylene.....	4.00	2.00	4.00	6.00
Ammonium nitrate.....	69.35	25.00	40.00	40.00
Sodium nitrate.....	13.16	25.50	20.00	20.00
Nitrostarch.....		37.00	19.00	14.00
Nitrocellulose.....				6.00
Trinitrotoluene.....	7.71		3.00	3.00
Aluminum.....		3.00	1.80	1.80
Zinc oxide.....	0.45	0.50	0.20	0.20
Corn meal.....		2.00		

In the manufacture of explosives in accordance with my present invention I prefer to first admix the tetranitromethane and the mononitroxylene, to form my liquid explosive constituent. When
5 gelatinous or semi-gelatinous explosive is desired, I next add nitrostarch or nitrocellulose to the liquid explosive base, until desired viscosity or "body" is obtained. The mixture of tetranitromethane and mononitroxylene, or of tetranitromethane, mononitroxylene and nitrostarch or
10 nitrocellulose is next incorporated with the other constituents of the explosive by the methods commonly used in explosives manufacture, the mixing operation, and the cartridge forming operation, being identical in all respects with the
15 corresponding operations as used in the manufacture of dynamite and semi-gelatin dynamite.

It will be evident that many changes may be
20 made within the limits of the present disclosure,

without departing from the essential principles of my invention as herein described, and accordingly no limits should be placed upon my invention except such as are given in the appended claims.

I claim:

1. An explosive comprising tetranitromethane and mononitroxylene.
2. An explosive comprising tetranitromethane, mononitroxylene, and the nitric acid ester of a carbohydrate.
3. An explosive comprising tetranitromethane, mononitroxylene, and an inorganic nitrate.
4. An explosive comprising tetranitromethane, mononitroxylene, the nitric acid ester of a carbohydrate, and an inorganic nitrate.
5. An explosive comprising tetranitromethane, mononitroxylene, nitrostarch, sodium nitrate, and ammonium nitrate.

JOSEPH A. WYLER.

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