

UNITED STATES PATENT OFFICE

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BLASTING EXPLOSIVE

No Drawing.

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This invention relates to the production of a blasting explosive. In particular it relates to a blasting explosive containing erythritol tetranitrate.

As pointed out in my U. S. Patent 1,691,954, dated November 20, 1928, a stable explosive, erythritol tetranitrate, can be produced by using the process of nitration therein outlined. I have now found that the explosive thus produced can be made the basis of a new blasting powder having unique and valuable properties as hereinafter pointed out.

Ordinary dynamites having nitroglycerin as the basic ingredient are subject to several objections. They produce a headache among the operators when handled, both in the process of manufacture and when used in the field. Although most modern dynamites are presumably non-freezing there are instances where the temperature has been so low that these liquid explosive dynamites have frozen and have thus become sources of danger. Furthermore, liquid explosive dynamites are subject to leakage, making them both unpleasant and dangerous to handle.

The well known nitrostarch dynamites have overcome to a certain extent some of the above mentioned objections. They are non-freezing, non-headache producing, and are not subject to leakage. In accomplishing these results, however, they become very insensitive to detonation by influence. This low sensitiveness limits the field of use for these explosives.

I have discovered that when erythritol tetranitrate is used as the basis of a blasting explosive, a powder is produced which overcomes the objections pointed out above in liquid explosive dynamites, and at the same time is far superior to the nitrostarch powders in sensitiveness to detonation by influence. The dynamite thus produced is absolutely non-freezing. It does not produce a headache when handled. It is free from leakage. It overcomes the outstanding objection to present solid explosive dynamites, that of being too insensitive. Erythritol tetranitrate has a further advantage over nitrostarch in that it is obtainable as a pure crystalline compound of definite composition,

insuring accurate chemical control of the properties of the powder.

A particularly novel feature of my invention is that I have discovered erythritol tetranitrate to be an explosive that imparts unusual sensitiveness to solid explosive dynamites. In this respect I have found it to be far superior to such well known solid explosives as T. N. T., tetryl, and nitrostarch. When substituted in part or in whole for the basic high explosive of the usual types of dynamite it has the property of imparting excellent strength and sensitiveness. Erythritol tetranitrate is as powerful an explosive as nitroglycerin and is considerably more powerful than nitrostarch. In several respects it has been found particularly well suited for the production of a practical blasting explosive. I have found that it is a useful explosive even in liquid explosive dynamites though its most valuable use lies in the field of solid explosive dynamites.

As illustrative examples of compositions comprising erythritol tetranitrate which provide the highly desirable properties enumerated aforesaid, I may cite the following:

Example I

	Per cent
Erythritol tetranitrate	40
Sodium nitrate	46
Wood meal or other carbohydrates	13
Chalk	1

In the above composition I may vary the percentage of erythritol tetranitrate from 5 to 60% adjusting the oxidizing agents and combustibles to make a properly balanced powder, to obtain the desired strength for the particular work to be done.

Example II

	Per cent
Erythritol tetranitrate	15
Ammonium nitrate	75
Wood meal or other carbohydrates	9
Chalk	1

In the above composition I may with good results vary the erythritol tetranitrate from 5 to 25% adjusting the ammonium nitrate

and wood meal to keep the powder properly balanced.

Example III

	Per cent
5 Erythritol tetranitrate -----	18
Ammonium nitrate -----	21
Sodium nitrate -----	46
Wood meal or other carbohydrates -----	9
10 Sulfur -----	5
Chalk -----	1

In this composition the erythritol tetranitrate content may vary from 5 to 25% adjusting the combustibles and oxidizing agents accordingly. The sulfur may be used as indicated, or eliminated entirely. In the foregoing examples, I, II, and III, the erythritol tetranitrate may be partially substituted by nitrostarch. As nitrostarch is cheaper than erythritol tetranitrate this substitution effects an economy without causing a harmful effect upon the sensitiveness of the powder. I have found that as much as 80% of the erythritol tetranitrate in the above powders may be substituted by nitrostarch and the powder still retain a much better sensitiveness than the ordinary nitrostarch powders.

By the term "oxygen supplying" as used herein, I mean to include those oxygen supplying salts capable of supplying oxygen for the oxidation of explosive ingredients.

As many apparently widely different embodiments of this invention may be made without departing from the spirit thereof, it is to be understood that I do not intend to limit myself to the specific embodiments thereof except as indicated in the appended claims.

I claim:

40 1. A dynamite comprising erythritol tetranitrate as the chief sensitizing explosive constituent.

2. A dynamite comprising an oxygen salt capable of supplying oxygen and erythritol tetranitrate.

45 3. A dynamite comprising an inorganic nitrate and erythritol tetranitrate.

4. A dynamite comprising an inorganic nitrate, a carbohydrate and erythritol tetranitrate.

50 5. A dynamite comprising an inorganic nitrate, a carbohydrate, a solid explosive, and erythritol tetranitrate.

55 6. A dynamite comprising an inorganic nitrate, a carbohydrate, nitrostarch and erythritol tetranitrate.

7. A dynamite comprising an inorganic nitrate, a carbohydrate, and 5 to 60% erythritol tetranitrate.

60 8. A dynamite comprising an inorganic nitrate, a carbohydrate, nitrostarch, and 5 to 60% erythritol tetranitrate.

9. A dynamite comprising a compound taken from a group consisting of sodium and

ammonium nitrate, a carbohydrate and 5 to 60% erythritol tetranitrate.

10. A dynamite comprising a compound taken from a group consisting of sodium and ammonium nitrate, wood meal and 5 to 60% erythritol tetranitrate.

11. A dynamite comprising erythritol tetranitrate and containing no liquid explosive ingredient.

In testimony whereof, I affix my signature.

FRANK H. BERGEIM.

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