

UNITED STATES PATENT OFFICE.

ALEXANDRE JOSEPH MARIN, OF STOCKHOLM, SWEDEN.

EXPLOSIVE.

1,297,213.

Specification of Letters Patent.

Patented Mar. 11, 1919.

No Drawing.

Application filed May 29, 1918. Serial No. 237,237.

To all whom it may concern:

Be it known that I, ALEXANDRE JOSEPH MARIN, a subject of the King of the Belgians, residing at Stockholm, Sweden, have invented certain new and useful Improvements in Explosives, of which the following is a specification.

The invention relates to explosives of the kind containing ammonium perchlorate and nitro organic bodies, said mixtures being compressed. It also relates more particularly to the mixture of ammonium perchlorate, sodium nitrate and organic nitro bodies such as trinitronaphthalene.

The object of the invention is to produce compressed perchlorate explosives which do not give rise to the production of large volumes of deleterious vapors, are convenient to handle, and are not unduly sensitive to shock, while at the same time they can be readily detonated by a detonator at present commonly used, namely, detonator No. 6.

With this object in view the invention consists in a process for the preparation of compressed solid safety explosives detonating freely in the open air under the detonation of a No. 6 detonator consisting in mixing in a damp state 28 to 34 parts by weight of a nitronaphthalene with 72 to 66 parts by weight of an oxidizing mixture composed of 47 parts by weight of ammonium perchlorate and 34 parts by weight of sodium nitrate; the mixture thus prepared being compressed to form any desired shape and in such a manner that its specific gravity is between 1.3 and 1.62 after drying.

The explosive mixture, which is difficultly inflammable may be formed of 28 parts by weight of trinitronaphthalene alone, with 72 parts by weight of a mixture (the oxidant) composed of ammonium perchlorate 47 parts and sodium nitrate 34 parts, and has been studied and experimented with to ascertain the degree of compression to which it can be subjected without losing its sensitiveness to detonation with a No. 6 detonator.

These experiments gave the following results:—

A cartridge of this compressed explosive having a density of 1.3 and primed with a No. 6 detonator, promotes easily the detonation of a second cartridge compressed to the same degree, if the two cartridges are separated by a space of 18 m. m. to 20 m. m.

If compressed to a density of 1.45 then the detonation of the second cartridge only takes plates if the two are in contact.

During the preparation of the trinitronaphthalene by the action of nitric and sulfuric acids upon naphthalene, there also forms easily at the same time tetranitronaphthalene and it is sometimes difficult to obtain a trinitronaphthalene completely free from tetranaphthalene. Likewise, it is commercially nearly impossible to obtain a tetranitronaphthalene not containing trinitronaphthalene but one easily obtains mixtures containing from 40 to 60 per cent. of tetranitronaphthalene.

Following this, it was necessary to study the influence of the presence of tetranitronaphthalene in trinitronaphthalene employed in the making of the explosive mixture named M.3N—N.

The explosive mixtures based on oxidizing salts $H_4NClO_4 + NaNO_3$ prepared with a trinitronaphthalene containing 10 per cent. of tetranitronaphthalene may be compressed up to a density of about 1.45 without ceasing to detonate freely with primer No. 6. It is practically the same density as that observed in the case of the use of trinitronaphthalene at 99 per cent. of pure product.

If a trinitronaphthalene be used with about 36 per cent. of tetranitronaphthalene an explosive mixture is obtained according to the following formula:—

Mixture of the salts $H_4NClO_4 + NaNO_3$ —	69	90
Trinitronaphthalene —————	19	
Tetranitronaphthalene —————	12	

100 95

There is a marked advantage and the explosive mixture may be compressed to a density of about 1.5 without ceasing to detonate freely with a No. 6 detonator.

If in the preparation of these explosives a tetranitronaphthalene at 25 to 26 per cent. of trinitronaphthalene is used, compression may be forced up to a density of 1.6 without the mixture ceasing to detonate with a No. 6 detonator.

I claim:—

1. A process for preparation of compressed solid safety explosives, detonating freely in the open air with the detonation of a No. 6 detonator, consisting in mixing in a damp state 28 to 34 parts by weight of a nitronaphthalene with 72 to 66 parts by

weight of an oxydizing mixture composed of 47 parts by weight of ammonium perchlorate and 34 parts by weight of sodium nitrate, the mixture thus prepared being compressed 5 to form any desired shape and in such a manner that its specific gravity is between 1.3 and 1.62 after drying.

2. A process for preparation of compressed solid safety explosives, detonating 10 freely in the open air with the detonation of a No. 6 detonator, consisting in mixing in a damp state 28 to 34 parts by weight of trinitronaphthalene with 72 to 66 parts by weight of an oxidizing mixture composed

of 47 parts by weight of ammonium per- 15 chlorate and 34 parts by weight of sodium nitrate, the mixture thus prepared being compressed to form any desired shape and in such a manner that its specific gravity is between 1.3 and 1.62 after drying. 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALEXANDRE JOSEPH MARIN.

Witnesses:

CHAS. P. PRESSLY,
EMILE BERTRAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."