

UNITED STATES PATENT OFFICE.

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EXPLOSIVE.

1,058,891.

Specification of Letters Patent.

Patented Apr. 15, 1913.

No Drawing.

Application filed November 22, 1910. Serial No. 593,713.

To all whom it may concern:

Be it known that I, SIGURD ADOLF GUSTAFSSON NAUCKHOFF, civil engineer, subject of the King of Sweden, residing at Vinterviken, Liljeholmen, Sweden, have invented certain new and useful Improvements in Explosives, of which the following is a specification.

This invention relates to explosives.

10 It has long been found desirable to have an explosive which is better suited than dynamite for blasting in loose mines, frozen earth and the like, that is an explosive of smaller shattering power but possessing 15 however the valuable properties of dynamite such as plasticity, immunity to moisture and relatively great non-susceptibility to concussion. The explosives which have heretofore replaced dynamite for the purposes stated, were principally ammonium nitrate or ammonium perchlorate explosives, but these are usually manufactured in the form of powder and therefore not well adapted for the above purposes.

25 The object of the present invention is an improved explosive possessing the valuable properties of dynamite as regards plasticity, immunity from moisture, etc., in combination with the strength and shattering power suited to its purpose, and resistance to frost.

30 The invention consists in utilizing as a chief constituent of the explosive, so-called commercial liquid trinitrotoluene or a mixture of said substance and so-called commercial liquid dinitrotoluene with or without the addition of other substances dissolved therein, gelatinized by means of nitro-cellulose, this basis material being mixed with finely powdered, oxygen yielding substances 40 such as ammonium perchlorate, nitrates of the alkalies, and the like.

A particularly suitable basis or solvent for nitro-cellulose is found in a by-product obtained in the manufacture of solid trinitrotoluene and consisting mainly in a mixture of trinitrotoluene and bi- and mononitrotoluene, etc. This product remains fluid at a temperature considerably below 0° C. The gelatin obtained in this manner is 50 mixed with a suitable quantity of oxygen yielding substances such as nitrates, perchlo-

rates, chromates and the like, for example ammonium perchlorate, sodium and potassium nitrate, whereby an explosive is obtained which is very similar in external properties to the so-called "extra-dynamite." As an example of the composition of such an improved explosive the following is given.

31% gelatinized tri-nitrotoluene, consisting of 4% nitro-cellulose and 96% of so-called commercial liquid trinitrotoluene.

43% ammonium perchlorate.
26% sodium nitrate.

100%

It is known in the manufacture of explosives, for example in the making of "plasto-menit" to gelatinized solid nitro compounds of hydrocarbons, and in other explosives di- and tri-nitrotoluol in molten condition, whereby a product is obtained possessing at ordinary temperatures the consistency of hard indiarubber and used alone as a substitute for indiarubber, celluloid, etc., or in combination with oxygen yielding substances, as an explosive.

According to the present invention and as hereinbefore stated the solid modifications of di- and tri-nitrotoluene are not used but fluid modifications of the said compounds, by means of which a gelatin is obtained which retains its plasticity even at low temperature and is therefore well adapted as a constituent of plastic explosives.

Having thus described my invention, I declare, that what I claim is:—

An improved plastic explosive comprising 90 a mixture of about 31% (by weight) so called commercial liquid trinitrotoluene, gelatinized with nitrocellulose, 43% ammonium perchlorate and 26% alkali nitrate.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

SIGURD ADOLF GUSTAFSSON NAUCKHOFF.

Witnesses:

AUG. HAGELIN,

ALMA PETTERSSON.

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