

# UNITED STATES PATENT OFFICE.

ALFRED LUCK, OF DARTFORD, ENGLAND.

## EXPLOSIVE.

SPECIFICATION forming part of Letters Patent No. 649,852, dated May 15, 1900.

Application filed June 19, 1899. Serial No. 721,122. (No specimens.)

*To all whom it may concern:*

Be it known that I, ALFRED LUCK, chemist, a citizen of England, residing at Brentcote, Dartford, in the county of Kent, England, have invented certain new and useful Improvements in Explosives, (for which I have applied for a patent in Great Britain, dated November 22, 1898, No. 24,662,) of which the following is a specification.

It is well known that gelatinous or colloid explosives may be produced from nitro-glycerin in conjunction with cellulose nitrates whether these are of high or of low nitration. The known explosives, cordite and ballistite, for guns of various kinds, and blasting gelatine, gelignite, &c., for mining and blasting purposes generally are instances of such compounds. These explosives produce on explosion great heat, which, especially in the case of firearms, is a serious disadvantage. Compounds of nitro-glycerin and cellulose nitrates also appear to have great tendency to instability, especially in hot climates, and much trouble is sometimes caused with explosives like gelignite, which seem peculiarly liable to deteriorate. I propose to form an entirely new series of explosives free from these objections by using, wholly or in part, instead of the nitrates other esters—such as the acetate, benzoate, butyrate, &c.—or compound esters of cellulose or mixtures of them. Of these esters I prefer the acetate, chiefly on account of the fact which I have discovered that it readily forms with nitro-glycerin a very firm and stable gelatinous or colloid body without requiring addition of any solvent, such as acetone, to assist the nitro-glycerin. By varying the proportions of the acetate thick or thin jellies may be obtained, and to these other substances may be added, if desired. A solvent may also be added to assist the nitro-glycerin, but this is not necessary unless cellulose nitrate is present, in which case a solvent is required to attack the nitrate.

The products obtained may be formed into cords, flakes, or cartridges, or any shape required.

In the manufacture of sporting smokeless gunpowder I have obtained good results by using the acetate of cellulose mixed with the nitrate, the acetate serving to restrain the

speed of combustion of the nitrate. For instance, seventy-five parts of cellulose nitrate (of thirteen per cent. nitrogen) may be mixed with twenty-five parts of cellulose acetate and the mixture formed into grains in the usual well-known manner and then hardened to the required degree in any suitable way. Other ingredients, such as barium nitrate or di-nitro-benzene or nitro-glycerin or the like, may also be used in the composition of the grains. These other ingredients may be added either before or after hardening the grains, and in some cases—when, for instance, it is desired to add di-nitro-benzene or nitro-glycerin—these bodies may be added dissolved in the hardening liquid. In the case of nitro-glycerin that substance itself will of course assist in hardening the grains by virtue of its solvent action upon the cellulose acetate.

The esters may be mixed with the usual nitrate—that is, nitrate of cellulose, guncotton, &c.—and partly or completely gelatinized by means of the ordinary dough-making machine commonly employed and a solvent to act upon either or both of the ingredients. The paste thus obtained may then be formed in the usual manner into cords, flakes, or other shapes, as desired.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

1. An explosive containing an explosive organic nitrate and a non-explosive ester of cellulose, substantially as described.

2. An explosive containing nitro-glycerin and a non-explosive ester of cellulose, substantially as described.

3. An explosive containing an explosive organic nitrate and acetate of cellulose, substantially as described.

4. An explosive containing nitro-glycerin and acetate of cellulose, substantially as described.

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

ALFRED LUCK.

Witnesses:

JEREMIAH MAHONEY,  
DARBY GREALLY.