

## UNITED STATES PATENT OFFICE.

HERBERT MANNING CHAPMAN, OF TRIMLEY, ENGLAND.

## EXPLOSIVE.

SPECIFICATION forming part of Letters Patent No. 516,295, dated March 13, 1894.

Application filed November 28, 1892. Serial No. 453,403. (No specimens.) Patented in England January 21, 1889, No. 1,115.

*To all whom it may concern:*

Be it known that I, HERBERT MANNING CHAPMAN, a subject of the Queen of England, residing at Trimley, in the county of Suffolk, England, have invented certain new and useful Improvements in or Relating to the Manufacture or Treatment of Explosives, (for which I have obtained Letters Patent in Great Britain, No. 1,115, dated January 21, 1889,) of which the following is a specification.

This invention relates to the treatment of explosives and may be applied to existing well-known forms of explosives such for instance as nitro-explosives certain of which after special treatment are particularly well adapted as smokeless or comparatively smokeless propelling agents in small arms and ordnance. I prefer to treat the explosive material with a solvent suited to the nature of the explosive. In continuance of the process the solvent is evaporated and the explosive left in a hard, agglomerate and generally brittle form adapted for use in block or sheet or for cutting up into grains. If preferred while still soft the explosive can be molded or otherwise made into any desired form. Where it is desired to reduce the rapidity of the explosion "moderators or combustibles" such as gums, resins, sulphur, charcoal, or the like, may be incorporated with the explosive but preferably of such a nature as to dissolve with the explosive with which it is incorporated. The action of the dissolving or gelatinizing agent may be assisted by heat, agitation, mixing or the like, in a closed vessel.

Before proceeding with the description of the process by which the explosives are treated I may mention that in the agglomeration of certain nitro-explosives may be particularized the following method, viz: that in which the agglomerating agent such as formic ether is evaporated or distilled or allowed to evaporate off completely. It will be understood that when using the gelatinizing agent it is necessary or at least advantageous to mix with it a sufficient quantity of volatile liquid such as benzol, benzoline, or other suitable liquid so that by increasing the bulk of the gelatinizing liquid or solid it is brought into thorough contact with every part of the

mass, the volatile portion being afterward removed.

In order that the process may be thoroughly understood I will now give examples of the methods of preparing the nitro-explosives and it is to be understood that wherever used in this specification by the word "parts" I invariably mean parts by weight; and by "gun cotton" I mean the commercial kind usually containing from eight to twelve per cent. of soluble nitro-cotton.

To prepare the nitro-explosive according to the first method I take ninety-two parts of dry pulped gun-cotton and eight parts of rosin and having mixed them well together by sieving or drumming and pressed them moderately tightly into a mixing machine I afterward pour into the mixing machine a mixture of from forty to sixty parts of formic ether added to one hundred and twenty to one hundred and ninety-five parts of benzole. After a short time has been allowed for the solvents to permeate the mass, the mixing machine is operated until a sample shows that the ingredients have become thoroughly incorporated. Instead of effecting the mixing by mechanical means it can be done by hand as in making or kneading dough. The mass taken out of the mixing machine in any convenient manner is formed into pellets, of any desired shape or into sheets or strips or other form convenient for being broken or cut up into grains. If formed into a continuous sheet the said sheet is cut into suitable lengths and placed into a retort wherein the explosive is raised to such a temperature that the solvents will be evaporated and may afterward be conveyed to a suitable condenser. The grains are then put into a sieve wherein the dust is removed, this dust together with that formed in the granulating machine being afterward worked up into another batch of the explosive material. By the sifting process also the grains may be assorted as to size which will of course vary according to the purpose for which they are required. When oxidizing agents are necessary to modify the rate of explosion, I employ the nitrate of soda or potash.

Among the "moderators" may be men-



tioned the gums and resins such as shellac, colophony or rosin, sulphur, charcoal, black or brown, or other combustibles suitable for the purpose.

5 I attach very especial importance to the hard agglomerate qualities imparted to the nitro-explosive by the process of gelatinization because experience has taught me that it is then in the condition best adapted for  
10 transport, for loading cartridges, for regularity in shooting qualities, for chemical stability and for resisting alternations of temperature and moisture in any climate, as this treatment has rendered it waterproof.

15 I am aware that camphor has been used for hardening explosives but never to my knowl-

edge has it been used for gelatinizing gun-cotton as is done according to this invention.

I claim—

The combination with a nitro-explosive as an agglomerating agent of formic ether.

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

HERBERT MANNING CHAPMAN.

Witnesses:

CHARLES E. ROSE,  
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THOMAS LAKE,  
Notary's Clerk, 17 Gracechurch Street, London, E. C.