

UNITED STATES PATENT OFFICE.

ALFRED NOBEL, OF PARIS, FRANCE; ASSIGNOR TO CHARLES EUGENE ARMENGAUD, SR., OF SAME PLACE.

IMPROVEMENT IN GELATINATED EXPLOSIVE COMPOUNDS.

Specification forming part of Letters Patent No. 175,735, dated April 4, 1876; application filed March 15, 1876.

To all whom it may concern:

Be it known that I, ALFRED NOBEL, engineer, residing in Paris, in the Republic of France, have invented Improvements in Explosive Compounds, of which the following is a specification:

The object of my invention is to convert liquid explosives (especially nitro-glycerine) from their fluid state, which is fraught with great danger and much inconvenience, to a solid or semi-solid consistency, highly conducive to safety, and offering great facility for use.

To attain that object, I dissolve in the explosive liquid a substance capable of gelatinating it without destroying or materially weakening the explosive power. Nitro-glycerine, which is the most powerful of explosive liquids, I gelatinate by dissolving in it when gently heated nitrated fiber, such as gun-cotton, or collodion-cotton, or other substance serving the same purpose.

Nitro-glycerine, when heated in a water-bath, readily dissolves nitrated cotton, and forms, with that substance, a new composition of matter, which, when it contains from six to seven per cent. of nitrated cotton, has the consistency of a solid jelly, which is very safe, and highly suitable for every purpose to which very powerful explosives can be applied.

Nitro-glycerine is not the only explosive liquid which can thus be gelatinated; but those that rank next in power—viz, the nitrates of methyl and ethyl—are very volatile, and cannot compete with nitro-glycerine as blasting agents.

Nitro-glycerine and gun-cotton have been mixed long ago—first by me in 1863; but that mechanical mixture is widely different from the above composition of matter, which consists of nitrated cotton dissolved in nitro-glycerine.

Gelatinated nitro-glycerine readily takes up, by kneading them together, any kind of explosive or semi-explosive matter—such as gunpowder, organic nitro-compounds, or organic compounds in general—mixed in due chem-

ical proportions, calculated for complete combustion, with oxidizing agents—such as are the nitrates and chlorates. Such mixtures serve to reduce the concentration of power, violence of action, and manufacturing cost, and are sometimes useful for blasting mild rock. Fifty parts, by weight, of gunpowder, mixed with fifty parts, by weight, of gelatinated nitro-glycerine; or forty-three parts of chlorate of potash, seven parts of charcoal, and fifty parts of gelatinated nitro-glycerine; or forty-six parts of nitrate of ammonia, four parts of charcoal, and fifty parts of gelatinated nitro-glycerine; or forty-two parts of nitrate of soda, eight parts of charcoal, and fifty parts of gelatinated nitro-glycerine may be cited as types of such mixtures.

To render nitro-glycerine less sensitive to concussion, which sometimes is required chiefly in its application to military purposes, I mix it with a small quantity (more or less, according as the sensibility is to be more or less reduced) of a non-explosive or obtusely-explosive substance having the property of not being volatile, and of dissolving readily in nitro-glycerine without preventing its gelatination. Such a substance is, for instance, triacetine—the acetic ether of glycerine.

Like all other nitro-glycerine compounds, the above-named solidified or gelatinated nitro-glycerine hardens in cold weather; but it can be readily exploded in that state by inserting over the charge a small cartridge of gunpowder, gun-cotton, picrate of potash, unfrozen dynamite, unhardened gelatinated nitro-glycerine, or other suitable substance.

Gelatinated nitro-glycerine, mixed or not with other explosives, or semi-explosives, does not absolutely require the aid of a detonator-cap (such as used for dynamite) to explode it in a confined space; but although a common fuse will set it off, a detonator-cap quickens the explosion.

What I claim, and desire to secure by Letters Patent, is—

1. The method of gelatinating nitro-glycerine and other explosive liquids—such as

the nitrates of methyl and ethyl—by dissolving in the explosive liquid a substance capable of gelatinating it, substantially as described.

2. As a new article of manufacture, gelatinated nitro-glycerine, substantially as described.

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

ALFRED NOBEL.

Witnesses:

ALFRED COINY,

AUGUSTE CHÉRUT.