UNITED STATES PATENT OFFICE.

HUDSON MAXIM, OF NEW YORK, N. Y.

FULMINATING COMPOUND.

SPECIFICATION forming part of Letters Patent No. 529,334, dated November 13, 1894.

Application filed October 2, 1893. Serial No. 486,978. (No specimens.)

To all whom it may concern:

Be it known that I, HUDSON MAXIM, a citizen of the United States of America, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Fulminating Compounds, of which the following is a specification.

The object of my invention is to provide a fulminating compound for detonating large masses of high explosives, especially for use in aerial torpedoes or projectiles where it is necessary in order to obtain the highest destructive results of high explosives to employ a large quantity of fulminating compound.

It is well known in the art that one of the chief difficulties in the employment of high explosives in projectiles and aerial torpedoes is in throwing with safety a sufficient quantity of fulminate of mercury or fulminating compound to secure complete detonation of the high explosive thrown. If a sufficiently small quantity of fulminate be used, to insure safety, a secondary or incomplete detonation of the high explosive results; and on the other hand, if a sufficient quantity of fulminate or fulminating compound such as heretofore made be employed to secure complete detonation, there is imminent danger of premature detonation from the sensitiveness of the large quantity of fulminate necessary to be used.

In carrying out my invention I thicken nitro-glycerin with pyroxylin, preferably to a rubbery consistence or to the consistence of raw rubber. This I do by employing usually about seventy-five to eighty-five per cent. nitro glycerin to from fifteen to twenty-five per cent. pyroxylin, according to the stiffness or elasticity of the compound that may be desired. To facilitate the admixture of the nitro glycerin with the pyroxylin I usually employ a sufficient quantity of a solvent of the pyroxylin in conjunction with the nitro glycerin to cause the mixture to be sufficiently yielding or pasty as to admit of the admixture and thorough incorporation therewith of a desired quantity of fulminate of mercury. I then mix in the proper amount of fulminate such as fulminate of mercury or its equivalent, usually about the proportion of seventy-five to eighty-five per cent. of the entire compound. The solvent employed preferably volatile such as acetone is afterward evaporated from the compound, leaving the same of a desired consistence as regards elasticity and of a character as regards sensitiveness to percussion or detonation in proportion as the various ingredients are varied in quantity.

I may prepare the above compound of a porous or spongy character, that is, containing a large number of air spaces or pores. This may be done by agitating the compound in the presence of air when the compound will be of a proper consistence prior to the evaporation of the volatile solvent therefrom. By this means I make a yielding or elastic fulminating compound, even when so confined as to have no opportunity to expand or yield laterally, the pores or air spaces permitting of the material to be compressed, whereas, were it non-porous it would be practicably incompressible, and more subject or sensitive to detonation from percussion. I may also, and I preferably, secure the desired porosity of the compound by using a high grade pyroxylin or tri-nitro cellulose, added in a fine state of division, in the same manner as the fulminate is added, and it may be added in conjunction with the fulminate. When proceeding in this manner it is necessary that the pyroxylin employed in forming the rubbery compound with nitro-glycerin be of a lower grade of nitration, and that a volatile solvent of the same be employed which will not dissolve the higher grade of pyroxylin when the same is added in the fibrous condition. I usually employ wood alcohol for this purpose which is a very good solvent of the lower grades of pyroxylin while it does not dissolve that of the highest grade of nitration.

It is obvious that although I prefer to employ nitro-glycerin for the reasons specified herein, yet I may obtain very good results without its employment, as in the last instances where a porous compound is made. Were the material not made porous and were not nitro glycerin employed and were the fulminate simply mixed into collodion or dissolved pyroxylin and the solvents the latter being afterward evaporated, the resulting compound would be very dense, hard and

hornlike and would not possess the obvious qualities which I desire in my fulminating compound.

The fulminate compound made in either of the forms suggested or in any other equivalent manner may be shaped by rolling into sheets, pressed, molded or cut into suitable forms according as the nature of the use of the fulminate compound may require. So many obvious forms may be used it is needless to specify them.

A compound of nitro-glycerin and pyroxylin such as I have described is of itself very insensitive to percussion or shock and cannot be detonated by any ordinary means. In fact, a compound of nitro-glycerin and pyroxylin containing twenty-five per cent. of pyroxylin may be said to be incapable of detonation when not mixed with a more sensitive explosive or detonating substance; but when such a substance is combined as described with fulminate of mercury or its equivalent, it may be detonated with an ease in proportion to the quantity of fulminate employed.

I have secured very good results with equal parts of fulminate and the nitro-glycerin-pyroxylin compound, but I prefer to emyloy a larger percentage of fulminate as before described.

It may be desirable in some compositions to add a deterring medium or agent, such as nitro-benzole or nitro-naphthalene, to lessen the sensitiveness of the compound to detonation, in which case such agent may be added to the compound at any stage of the process of manufacture.

Such a compound as I have described of fulminate, nitro-glycerin, pyroxylin, &c., while it may be detonated by percussion, is still much less sensitive to percussion than fulminate uncombined or with many of the fulminate mixtures heretofore employed. The improved fulminate compound is especially advantageous on account of the enormous quantity of heat developed by the nitro-glycerin in its combustion, while the rubbery nature or elastic character of the compound renders it sufficiently insensitive to percussion to permit of its being thrown from ordnance.

I do not desire to confine myself or limit my invention to exact quantities or proportions of the constituents employed.

While I have described pyroxylin as the thickening medium of nitro-glycerin it is obvious that other equivalent mediums may be used.

What is claimed is—

1. The herein described pliable, yielding or elastic explosive, consisting of a fulminate with its particles agglutinated by a dissolved organic nitro-compound.

2. The herein described pliable, yielding or elastic explosive consisting of an admixture of a fulminate with a dissolved nitrated carbohydrate.

3. The herein described yielding or elastic explosive consisting of an admixture of a fulminate with a dissolved nitrated carbohydrate and nitro-glycerin subsequently dried.

4. The herein described yielding or elastic explosive consisting of a fulminate agglutinated by means of an organic nitro-compound in conjunction with nitro-glycerin and a deterring agent for lessening its sensitiveness to detonation.

In witness whereof I have hereunto signed my name in the presence of two witnesses.

HUDSON MAXIM.

Witnesses:
GEO. M. GRAHAM,
E. L. TODD.