UNITED STATES PATENT OFFICE.

FIN SPARRE, OF WILMINGTON, DELAWARE, ASSIGNOR TO THE E. I. DU PONT DE NEMOURS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF NEW JERSEY.

EXPLOSIVE.

No. 850,268. Specification of Letters Patent. Patented April 16, 1907.

Application filed February 8, 1906. Serial No. 300,090.

To all whom it may concern:

Be it known that I, FIN SPARRE, a subject of the King of Norway, residing at Wilmington, county of Newcastle, and State of Delaware, have invented a new and useful Improvement in Explosives, of which the following is a full, clear, and exact description.

My invention relates to ammonium-nitrate metallic explosives.

In a patent issued to me February 20, 1906, No. 812,958, I have set forth an ammonium-nitrate metallic explosive containing ungelatinized nitrocellulose. This explosive possesses decided advantages over the ordinary ammonium-nitrate metallic explosive in that it is fumeless, non-freezing, safe to manufacture and use, and is adapted for use in compressed form. It is, however, comparatively expensive, owing to the relatively high cost of the nitrocellulose, and compression is necessary to obtain proper load.

I have discovered that high-nitrated compounds of organic, principally aromatic, hydrocarbons, alcohols, phenols, or other substances belonging to the nitro compounds in which the nitrogen is not combined as in the nitric-acid group, but as in the well-known nitro group—such, for example, as trinitrotoluol—may be employed in part as a substitute for nitrocellulose. Such an explosive possesses all the advantages of the composition set forth in my said patent except that it is not adapted for use in compressed form. It has, however, the advantage over the composition set forth in my said patent of being even safer to manufacture and use. Certain substances of the group named, notably trinitrotoluol, are much cheaper than nitrocellulose. In speaking of such high-nitrated compounds I comprehend trinitro compounds, such as trinitrotoluol and picric acid or compounds of higher nitration, but not mononitro compounds or dinitro compounds. Of course the lower nitrated compounds may be present in the composition. It is advisable, but not necessary, to add kerosene, charcoal, or other oxidizable substance. As the metallic ingredient I prefer to use ferrosilicon or other silicid of a metal or compound of a metal and a metalloid performing the same duty, such as iron pyrites. The well-known aluminium may also be used, although its expense will ordinarily be prohibitive.

The following is an example of a composition embodying my invention: ferrosilicon, twelve per cent.; trinitrotoluol, six per cent.; nitrocellulose, six per cent.; kerosene, two per cent.; ammonium nitrate, seventy-four per cent.

In place of trinitrotoluol a mixture of two or more trinitro compounds may be used.

The ingredients may be mixed together in any well-known way. For example, they may be placed in a pulverizing-barrel or rolling-mill, such as is commonly employed in the manufacture of both black powder and safety-powder, and allowed to remain therein for approximately three hours.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. An ammonium-nitrate metallic explosive containing trinitrotoluol and ungelatinized nitrocellulose substantially as described.

2. An ammonium-nitrate metallic explosive containing, of ammonium nitrate sixty-five to eighty-five per cent., of a metallic ingredient five to twenty per cent., of trinitrotoluol five to twenty per cent., and of ungelatinized nitrocellulose less than twelve per cent. substantially as described.

3. An ammonium-nitrate metallic explosive containing a trinitro compound and ungelatinized nitrocellulose substantially as described.

4. An ammonium-nitrate metallic explosive containing, of ammonium nitrate sixty-five to eighty-five per cent., of a metallic ingredient five to twenty per cent., of a trinitro compound five to twenty per cent., and of ungelatinized nitrocellulose less than twelve per cent. substantially as described.

5. An ammonium-nitrate metallic explosive containing five to twenty per cent. of trinitrotoluol and less than twelve per cent. of

ungelatinized nitrocellulose substantially as described.

6. An ammonium-nitrate metallic explosive containing five to twenty per cent. of a trinitro compound and less than twelve per cent. of ungelatinized nitrocellulose substantially as described.

In testimony of which invention I have hereunto set my hand, at Wilmington, on this 1st day of February, 1906.

FIN SPARRE.

Witnesses:

CHARLES G. GUYER,

ALVIN B. ROBERSON.