

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. 812,959.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed May 8, 1905. Serial No. 259,220.

To all whom it may concern.

Be it known that I, FIN SPARRE, a subject of the King of Sweden and 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, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to explosives.

The object of the invention is to produce an explosive that in certain situations will be an effective substitute for and improvement on certain other explosives heretofore known.

Among these explosives may be mentioned dynamite, which in its usual form consists of nitroglycerin and an active base comprising usually nitrate of sodium or other nitrate and wood-pulp or sawdust, such bodies as resin or sulfur being also common. Among the practical objections to dynamite may be mentioned its property of freezing at a comparatively high temperature, its dangerous qualities, the impossibility of handling it without suffering from severe headaches, and the noxious fumes given off by the explosive, all of which objectionable qualities are due to the presence of nitroglycerin and are pronounced in view of the large proportion of nitroglycerin employed.

Another explosive as strong as dynamite is the ammonium nitrate metallic composition. The objection to this explosive is that it is too difficult to detonate for practical use.

Another explosive, an improvement on the last named, is set forth in my application filed March 17, 1905, Serial No. 250,568, this explosive consisting of an oxygen-carrier, such as nitrate of ammonium, a metallic ingredient, such as aluminium and ferrosilicon, nitrocellulose, and kerosene or other equivalent liquid hydrocarbon. While this explosive possesses decided advantages, being fumeless, non-freezing, safe to manufacture and use, easy of manufacture, and adapted for use in compressed form, it is comparatively expensive, owing to the relatively high cost of nitrocellulose, and strong compression is necessary to obtain proper load.

The explosive embodying my present invention consists of nitrate of ammonium or

other oxygen-carrier, ferrosilicon or other metallic ingredient, kerosene or other liquid hydrocarbon, and nitroglycerin, the proportions of the ingredients varying with the grade desired. This explosive minimizes the objections to dynamite hereinbefore set out, as it is necessary to use only one-fourth to one-third of the percentage of nitroglycerin used in dynamite to produce an explosive of equal strength. For instance, a grade of dynamite containing forty per cent. of nitroglycerin corresponds in strength to a grade of my present explosive containing but ten per cent. of nitroglycerin, while dynamite containing seventy-five per cent. of nitroglycerin is not superior to a grade of my present explosive containing only from twenty to twenty-five per cent.

While the base employed in my present explosive is somewhat more expensive than the base usually employed in dynamite manufacture, still owing to the cost of nitroglycerin being several times higher than the price of the base my explosive is cheaper than dynamite, and for high grades very much cheaper.

While my present explosive is inferior to that set forth in my said application filed March 17, 1905, in that it is not fumeless, is not so safe, and freezes at a higher temperature, it has the advantage of being relatively cheap and the advantage of not requiring strong compression to obtain proper load. Besides it contains less of ammonium nitrate, as nitroglycerin contains more oxygen than nitrocellulose.

One preferred composition of the base that I use in connection with the nitroglycerin consists of the following ingredients in the proportions specified: nitrate of ammonia, seventy-six per cent.; ferrosilicon, fifteen per cent.; kerosene, six per cent.; charcoal, three per cent.

The proportion of ammonium nitrate may vary from sixty-five to eighty-five per cent. and that of the ferrosilicon from ten to twenty per cent., while the proportion of kerosene should be less than ten per cent. and may sometimes be omitted altogether.

One grade of my explosive consists of the following ingredients in the proportions specified: nitrate of ammonia, sixty-eight per

cent.; ferrosilicon, thirteen per cent.; kerosene, five per cent.; nitroglycerin, twelve per cent.; charcoal, two per cent.

It will be understood that nitrate of ammonium may be partly replaced by another oxygen-carrier.

A lower grade of my explosive may consist of charcoal, two per cent.; nitrate of ammonia, fifty-seven per cent.; ferrosilicon, fifteen per cent.; kerosene, five per cent.; nitrate of sodium, ten per cent.; nitroglycerin, eleven per cent.

The proportion of ammonium nitrate or the oxygen-carrier may vary from fifty to seventy-five per cent., the ferrosilicon from five to twenty per cent., and the nitroglycerin from five to twenty-five per cent., while the kerosene should constitute less than ten per cent. of the composition and may sometimes be omitted.

In the composition I have also set forth a percentage of charcoal. The percentage of charcoal may be replaced by some other carbonaceous matter—say sawdust. The reason for this addition is that I have found it adds great strength to the composition. It must be borne in mind that there must be rather too little oxygen for complete combustion to obtain the highest strength from explosives containing metals.

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

1. An explosive composition containing an oxygen-carrier, ferrosilicon and nitroglycerin.

2. An explosive composition containing nitrate of ammonia, ferrosilicon and nitroglycerin.

3. An explosive composition containing an oxygen-carrier, a metallic ingredient, a liquid hydrocarbon, and nitroglycerin.

4. An explosive composition containing an oxygen-carrier, ferrosilicon, kerosene and nitroglycerin.

5. An explosive composition containing

nitrate of ammonia, ferrosilicon, kerosene and nitroglycerin.

6. An explosive composition containing nitrate of ammonia, ferrosilicon, kerosene, nitrate of sodium and nitroglycerin.

7. A nitroglycerin explosive composed of nitroglycerin and a base containing of an oxygen-carrier sixty-five to eighty-five per cent. and of a metallic ingredient ten to twenty per cent.

8. A nitroglycerin explosive composed of nitroglycerin and a base containing of an oxygen-carrier sixty-five to eighty-five per cent. and of a metallic ingredient ten to twenty per cent., and of a liquid hydrocarbon less than ten per cent.

9. A nitroglycerin explosive composed of nitroglycerin and a base containing of nitrate of ammonia sixty-five to eighty-five per cent., of ferrosilicon ten to twenty per cent., and of kerosene less than ten per cent.

10. An explosive composition containing of an oxygen-carrier fifty to seventy-five per cent., of a metallic ingredient five to twenty per cent., and of nitroglycerin five to twenty-five per cent.

11. An explosive composition containing of nitrate of ammonia fifty to seventy-five per cent., of ferrosilicon five to twenty per cent., of nitroglycerin five to twenty-five per cent., and of kerosene less than ten per cent.

12. An explosive composition containing an oxygen-carrier, a metallic ingredient, a liquid hydrocarbon, nitroglycerin, and charcoal.

13. An explosive composition containing nitrate of ammonia, ferrosilicon, kerosene, nitroglycerin, and charcoal.

In testimony of which invention I have hereunto set my hand, at Wilmington, on this 26th day of April, 1905.

FIN SPARRE.

Witnesses:

CHARLES G. GUYER,
S. E. BECKER.