

## UNITED STATES PATENT OFFICE.

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## DYNAMITE.

SPECIFICATION forming part of Letters Patent No. 323,088, dated July 28, 1885.

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*To all whom it may concern:*

Be it known that I, ROBERT W. WARREN, of Houghton, in the county of Houghton and State of Michigan, have made certain new and useful improvements in explosive compounds and the manufacture thereof not heretofore known or used; and I do hereby declare the following specification to be a full and clear description of the same.

In the use of high explosives in confined places—such as deep shafts, close drifts, and tunnels—great inconvenience is experienced from the noxious fumes and other results after explosion of a compound containing a large percentage of nitro-glycerine and an absorbent. High-grade blasting compounds have been made by the absorption of nitro-glycerine in non-explosive substances by which comparative safety has been obtained at a sacrifice of strength and the distribution of undecomposed mineral substances in the atmosphere, and a mixture of oxidizing salts with wood fiber has been used as an absorbent of nitro-glycerine by which the loss of strength is partly obviated; but the necessary excess of wood fiber required in such compounds to absorb and retain a high percentage of the nitro-glycerine produces very deleterious gases when exploded. Thus I have found in practice that in the use of infusorial earth and other similar non-explosive substances as absorbents of nitro-glycerine to make explosive compounds such absorbents are not decomposed on explosion, but are distributed in atoms through the atmosphere, causing serious injury to the lungs of those who breathe the air thus charged. In order to overcome this difficulty, and also to increase the explosive force, gunpowder has been used as an absorbent of nitro-glycerine, and nitro-glycerine has also been mixed with the component parts of gunpowder—such as nitrate of soda, charcoal, and sulphur—and also with wood fiber and nitrate of soda as the absorbent; but the carbonaceous substances heretofore known and used for this purpose are not as good absorbents of the nitro-glycerine as the infusorial earth or non-explosive ones, and in consequence there is an excess of carbon in compounds where wood fiber and other carbonaceous substances have been heretofore used as an absorbent, which produces,

on explosion, noxious fumes, where a large percentage of nitro-glycerine is used.

The object of my invention is to produce an explosive compound of such ingredients that all the component parts will be decomposed on its explosion, and little, if any, deleterious gases will be evolved, while there will not be any sacrifice of strength; and this I accomplish by compounding with nitro-glycerine substances having properties newly discovered by me in my experiments.

In preparing my new compound I take the porous vegetable substance known as "peat," which is provided with innumerable minute tubular cavities, and I have discovered that when properly prepared its absorbent qualities are equal to those of infusorial earth, while its chemical composition being different, it is entirely and readily decomposed on explosion without the resulting deleterious gases which are given off when other carbonaceous absorbents are used, or the residuum of undecomposed particles which occur when infusorial earth is used as an absorbent. The peat is first thoroughly dried and then ground to a fine powder. With this substance I mix the ordinary oxidizing salts—such as nitrate of soda—in the desired proportions, and then add the required percentage of nitro-glycerine. To this may be added a small percentage of the alkali, calcic hydrate.

The following mixture produces a very effective explosive compound: Ground peat, twelve per cent.; nitrate of soda, thirty-six per cent.; nitro-glycerine, fifty per cent.; calcic hydrate, two per cent. These proportions may be varied, and many other oxidizing salts and alkalis having the properties of those I mention may be used in this compound; and a good result may be obtained without the use of calcic hydrate, as the very large percentage of nitro-glycerine which peat is capable of absorbing without leaking renders only a small percentage of it necessary in the compound, while a corresponding large percentage of the oxidizing agent can be used, thus furnishing sufficient oxygen to combine with the carbon contained in the absorbent when explosion takes place. The calcic hydrate prevents acid reaction in the compound, but it may be omitted without materially affecting the results ob-



tained on the explosion when peat is used as the absorbent. The gases produced by the explosion of my compound are less injurious to health than those produced by any other high explosives which contain a large percentage of nitro-glycerine, and in which a large percentage of wood fiber or other absorbent containing carbon is used, while the sacrifice of strength consequent upon the use of an inert substance is avoided.

In this compound each ingredient adds to its explosive force.

The use of calcic hydrate in explosive compounds composed of nitro-glycerine and carbonaceous absorbents produces an improved explosive compound whether or not the pre-

pared peat described by me is used, as the calcic hydrate prevents acid reaction, and also renders the fumes less offensive.

What I claim as my invention is—

1. An explosive compound composed of nitro-glycerine, nitrate of soda, and the vegetable substance ground peat, combined in the proportions, substantially as described.

2. An explosive compound composed of nitro-glycerine, nitrate of soda, together with ground peat and calcic hydrate, in the proportions substantially as described.

R. W. WARREN.

Witnesses:

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