

UNITED STATES PATENT OFFICE.

THOMAS VARNEY, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE GIANT POWDER COMPANY AND THE ATLANTIC GIANT POWDER COMPANY, OF SAME PLACE.

IMPROVEMENT IN EXPLOSIVE COMPOUNDS.

Specification forming part of Letters Patent No. 139,746, dated June 10, 1873; application filed June 4, 1873.

To all whom it may concern:

Be it known that I, THOMAS VARNEY, of the city and county of San Francisco, and State of California, have invented an Improved Method for Preparing Frozen Dynamite and other like Explosive Compounds, of which the following is a specification:

My invention is based chiefly on the fact, discovered by me, that dynamite or giant powder, as well as all other like explosive compounds, when frozen, explode much more easily if granulated or pulverized than when in the solid state. These frozen compounds are also much more safe and convenient for use when in the pulverized state.

It is very desirable, and the general practice, to use this class of explosives in cartridges, being paper tubes filled with powder well packed.

The cartridges are necessarily somewhat less in diameter than the bore hole. In charging the hole the cartridge is rammed until it is made to fill the bore and leave no space. This is absolutely essential in order to make the full force of the powder available. But this cannot be done when the cartridges are frozen. The powder freezes at a temperature below about 42° Fahrenheit, and the cartridges thus prepared become hard. In the ordinary winter weather of all the United States, except perhaps a few of the extreme southerly ones, the powder thus freezes and hardens. In this condition it is practically useless. It cannot be compressed into the bore-hole so as to make it fit and fill the hole, nor can it be exploded without great difficulty.

For these reasons the usual practice has been to thaw it before using it. At a moderate temperature it thaws very slowly, but if the temperature be so high as to thaw it rapidly the powder is liable to be injured by evaporation, and if the heat be increased and continued sufficiently it will take fire and sometimes explode.

To avoid these and other difficulties is the purpose of my invention. It is as follows: During the process of manufacture the ingre-

dients of which the powder is formed and the powder itself when finished are unfrozen. In this state I expose it to any convenient temperature that will freeze it, and while it is freezing I cause it to be disturbed and broken up so constantly and thoroughly that it is prevented from adhering and hardening into a solid mass. This may be done by stirring, sifting, or otherwise agitating and breaking it as it hardens.

If it be sifted once through a coarse sieve just before it congeals, and be allowed to fall lightly and lie loose and undisturbed until it freezes, its particles will be found to adhere to each other slightly; but it may be easily crumbled into dry coarse powder, and thus made to answer the purposes of my invention very well; but in order to obtain the best result the powder must be constantly stirred or otherwise agitated until the particles harden and will not adhere to each other. The agitation can be effected by hand or any proper machinery. By this means the powder can be made as fine and mealy as desired.

A solid mass of frozen powder may be crushed and pulverized into the same condition as when granulated while freezing; but the expense and possible danger attending this method, and especially when the powder is very hard, forbids its general use. It is better to thaw it, and then treat it as though it had not been frozen. But in thawing it great care must be taken to do it gradually, for the reasons already stated. When once thus frozen and granulated, the powder can be kept in this state for any length of time by not allowing it to thaw. In this form it can be transported, handled, poured and rammed into bore-holes, either in bulk or in cartridges, with entire safety, and the utmost convenience.

But its great advantage lies in the fact that it can be exploded with certainty by a cheap and simple means. This means consists of an exploder in every respect like those used to explode these compounds when unfrozen, except that it should be somewhat stronger. The percussion-cap commonly used

to explode unfrozen dynamite, with about three times its ordinary quantity of fulminate, makes the most cheap and convenient and best exploder known to me.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The process of granulating or pulverizing dynamite and similar compounds of nitro-glyc-

erine with absorbent matter, by treating them while freezing in the manner substantially as hereinbefore set forth, whereby such compounds are rendered more easy of explosion and more efficient in use.

THOMAS VARNEY.

Witnesses:

ARNOLD FULLER,
JORDAN W. ROPER.