

UNITED STATES PATENT OFFICE.

JESSE B. BRAUNSTEIN, OF ALLENTOWN, PENNSYLVANIA.

NITRO-STARCH EXPLOSIVE

No. 868,826.

Specification of Letters Patent.

Patented Oct. 22, 1907.

Application filed November 19, 1906. Serial No. 344,067.

To all whom it may concern:

Be it known that I, JESSE B. BRAUNSTEIN, a citizen of the United States, residing at Allentown, in the county of Lehigh and State of Pennsylvania, have invented certain Improvements in Nitro-Starch Explosives, of which the following is a specification.

My invention relates in general to the manufacture of nitrated carbohydrates for use as explosive bases and its specific object is to produce for such purpose a stable and economical nitro-starch.

Nitro-starch is well known to be a powerful explosive, but its commercial use heretofore has been small owing to its instability as ordinarily made and its high expense when made by methods heretofore proposed for rendering it stable. I have discovered however, a treatment which is inexpensive and at the same time results in satisfactory stability of the resulting explosive base.

It is generally understood that the instability of nitro-starch is due to the presence of impurities resulting from the nitration, these impurities being probably admixed lower nitrates. Stabilization is by some effected by washing or otherwise treating the nitrated starch with reagents intended to remove the impurities. I have discovered another method, that is to say, I mix into the nitrated starch a reagent not for the purpose of removing the impurities but to remain in the mass and unite with and render harmless the products of incipient decomposition due to the presence of said impurities when said incipient decomposition takes place, and I have discovered that common commercial borax is a suitable reagent for said purpose. My explosive base is accordingly a mixture of nitro-starch and borax.

The nitro-starch may be prepared by any of the known methods but preferably by one which will give the product as much inherent stability as possible, before the stabilizing agent is added. I have successfully used as an acid mixture 33 to 36% nitric acid, 63 to 67% sulfuric acid and 3 to 4% water, adding one weight

of the starch to four of the acid mixture. The nitrated product is washed in any suitable manner, water and weak solution of ammonia accomplishing the object satisfactorily.

To nitro-starch properly prepared is added a suitable quantity of borax. I prefer to use approximately 3% of borax, but much larger proportions may be used with the same result, and I do not limit myself to any specific proportions. The borax may be added in aqueous solution afterward driving off the water, or part may be added in aqueous solution and part in solid form or the entire amount of borax may be added in solid form.

Other borates may be substituted for borax, if desired, with the same result. I prefer to use common commercial borax, however, because of its cheapness.

It will of course be understood that the stabilized nitro-starch mixture herein described is to be used as an explosive base, other usual ingredients being added in making up a commercial powder in the manner well-known to those skilled in the art.

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

1. An explosive consisting of a mixture of nitro-starch and a borate the latter being added in such proportion as to stabilize the nitro-starch in substantially the manner described.
2. An explosive consisting of a mixture of nitro-starch and borax the latter being added in such proportion as to stabilize the nitro-starch in substantially the manner described.
3. An explosive consisting of a mixture of nitro-starch with 3 to 5% of borax.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JESSE B. BRAUNSTEIN.

Witnesses:

CHARLES H. HOWSON,
JOS. H. KLEIN