UNITED STATES PATENT OFFICE.

EVELYN PAUL AURAND, OF TAMAQUA, PENNSYLVANIA, ASSIGNOR TO ATLAS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

BINDER FOR BURNING COMPOSITIONS.

1,388,501. Specification of Letters Patent. Patented Aug. 23, 1921.

No Drawing. Application filed May 5, 1921. Serial No. 467,129.

To all whom it may concern:

Be it known that I, EVELYN PAUL AURAND, a citizen of the United States of America, residing at Tamaqua, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Binders for Burning Compositions, of which the following is a specification.

The object of my invention is to bind readily burning compositions for use in torches, rockets, flares, signals, colored lights, etc., with a binder which is itself readily inflammable and combustible and which serves to provide a highly water and moisture resistant product of any desired degree of flexibility.

I have found that nitro-starch, when mixed in various proportions with various gelatinizing agents for such nitro-starch, such as acetone, amyl acetate, butyl acetate, or other suitable solvent, forms a plastic composition into which other materials, which are water soluble, hygroscopic, or affected by water or moisture in any way, may be incorporated to form a highly water resistant mass of remarkable burning properties and desirable flexibility. I may further improve the flexibility by incorporating with the mixtures various amounts of such liquid substances as liquid nitro-aromatic compounds, castor oil, and other vegetable, mineral, or animal oils. The resultant product may be readily molded by many well-known means into any desired form, such as blocks, rods, strips, balls, plates, etc., this being accomplished while enough solvent is still present to insure sufficient plasticity for ready molding. After molding, the solvent is driven off by any well known means and the product may be used in the condition then existant or may be coated with shellac, nitro-cotton lacquers, paint, or other well-known protective substances. By my invention I have been enabled to so protect materials even as susceptible to water or moisture as black powder that they may be stored under water for many days without deterioration. In addition, I may obtain a product which will burn with an intensely hot, sharply directed spit of flame or one in which the flame may resemble that of a burning candle, or one which will give any intermediate character of flame, the rate of burning being controlled by varying the proportions of the powder or analogous material and the nitro-starch. The flames are not extinguishable by the strongest winds. My finished products may be sufficiently rigid to support themselves or sufficiently flexible to be molded. It will have become evident from the foregoing that by the use of my process the products require no containers such as metal or paper tubes, though I may use a container if I desire.

While mealed black powder in combination with my binder has been mentioned by way of example, I desire it understood that I do not limit myself to this, but may bind and treat any desirable burning composition according to my process. It should also be understood that my invention does not deal with nitro-starch in its functions as a detonating or propellant explosive, but merely as a readily ignited and easily burning binder, water-proofing and moisture proofing agent, and giver of flexibility under the proper conditions to such burning compositions as are desirable for use in such products as torches, rockets, flares, signals, colored lights, etc.

Having described my invention, what I claim is:

1. As an article of manufacture and use, a non-explosive burning composition bound together essentially by means of gelatinized nitro-starch.

2. A non-explosive article of manufacture comprising an inflammable ingredient and a binder of gelatinized nitro-starch.

3. A non-explosive article of manufacture comprising an inflammable ingredient of a granular nature having its particles bound together by a binder of gelatinized nitro-starch.

4. A non-explosive article of manufacture comprising an inflammable ingredient, a binder of gelatinized nitro-starch and a protective coating of inflammable material.

5. A non-explosive article of manufacture comprising an inflammable ingredient, a binder of gelatinized nitro-starch, and an oily substance.

6. A non-explosive article of manufacture

comprising an inflammable ingredient, a binder of gelatinized nitro-starch, an oily substance and an inflammable protective coating.

7. A non-explosive article of manufacture comprising a black powder and a binder for said powder of gelatinized nitro-startch.

In testimony whereof I affix my signature in the presence of two witnesses.

EVELYN PAUL AURAND.

Witnesses:
R. L. HILL,
R. M. COOK.