UNITED STATES PATENT OFFICE.

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SMOKELESS POWDER AND PROCESS OF MAKING SAME.

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To all whom it may concern:

Be it known that I, WILLIAM J. WILLIAMS, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Propellent Powders and Processes of Preparing Same, of which the following is a specification.

The object of my invention is to provide a process for the treatment of powder, more particularly of the smokeless variety, by which a product will be secured which under ordinary conditions of use shall exert materially less pressure in a gun than would otherwise be the case, at the same time decreasing the erosion on the gun on account of the decreased temperature and pressure, but which shall notwithstanding impart to a projectile substantially the same velocity as if the powder had not been so treated.

The invention also includes the powder resulting from the above-noted process and capable of attaining the results also noted.

In carrying out my invention I prepare a weak solution of a deterrent combustible, preferably mononitro-naphthalene, in the desired solvent or solvents, which latter are chosen to suit the particular brand of powder to be treated. For example, the solvent may be ether, any one of a number of the alcohols, mixtures of ether and alcohol, amyl acetate, acetic ether, or acetic acid, &c. In such solvent the mononitro-naphthalene is dissolved so as to make approximately a five-per-cent solution—*i. e.*, five grams of mononitro-naphthalene in one hundred cubic centimeters of the solvent. The powder is then immersed in the solution for a space of time varying from two seconds to three or four minutes, according to the texture and hardness of the grains which are coated or coated and impregnated with said solution. As a general rule the process is complete when the grains of powder begin to soften, at which time it is removed from the solution, drained, and allowed to dry in the air until the greater part of the solvent has evaporated. The drying is then completed at whatever temperature may be found suitable to the particular brand of powder under treatment, and I have found this temperature to vary between 40° and 70° centigrade.

If the grains of powder have a tendency to adhere after drying, it may be desirable to separate them by agitation or tumbling. This can be well done by passing the powder through a "tumbler" with or without round shot or other objects for causing separation of the grains while the powder is still damp or before all of the solvent has evaporated. The drying may be completed after the separation of the grains.

If the powder is in thread or rod form, it may be passed through the solution above noted before being dried, after which the drying may be proceeded with in the ordinary manner. Again, the mononitro-nahpthalene or other deterrent combustible may be dissolved in the solvent used for colloidation of the nitrocellulose or powder and the manufacture of said powder proceeded with in the customary manner.

If desired, other deterrent combustibles may be employed in place of mononitro-naphthalene—as, for example, urea or camphor, &c.—though in place of making a solution of the deterrent and then coating or coating and impregnating the powder I may accomplish the same end by the use of the glazing or tumbling barrel. In such case the necessary proportion, usually three to five per cent. of the weight of powder taken, of finely-ground and freshly-sieved mononitro-naphthalene or other deterrent is added to the charge and the barrel revolved in the usual manner. During this operation the temperature of the contents of the barrel rises, probably from the effect of friction, it being desirable that the temperature reaches such a point as to cause either partial or complete melting of the deterrent—such, for example, as 43° centigrade or above. If the heat generated by friction is insufficient to cause such a rise of temperature, then hot air should be passed through the barrel or the temperature of the powder should be raised in some other manner until it is sufficiently high to wholly or partially melt the deterrent and cause it to be absorbed by the outer surfaces of the powder-grains.

While I have found that with mononitro-naphthalene the temperature of 43° centigrade is sufficient, it is immaterial if the temperature rises to a point higher than this, provided it does not fire the powder or impair its stability. The deterrent should be dry and in a finely-divided condition and should be pulverized and sieved shortly before its introduction into the glazing-barrel. After the deterrent has been melted and absorbed by the powder ground graphite should be added,

so that the grains are glazed in the usual way. The powder is finally sieved until it is free from dirt, &c.

It is to be understood that my improved process is applicable to the treatment of powders for sporting purposes, as well as those designed for military use in guns of large or small caliber.

If a projectile fired with powder treated as above described be found to have a decreased velocity, such decrease can be compensated for by slightly increasing the powder charge, though even with such increase it will be found that the pressure is very considerably decreased from the pressure otherwise exerted by untreated powder. As an example of this I have found that if in a .30-caliber rifle a charge of thirty-five grains of smokeless powder gives to the projectile a velocity of one thousand nine hundred and fifty feet per second and a pressure of thirty-eight thousand pounds to the square inch a charge of about thirty-eight grains of powder treated in accordance with my invention will impart the same velocity to the projectile, while the pressure per square inch would be reduced approximately to thirty-two thousand pounds or by about five thousand or six thousand pounds.

I claim as my invention—

1. As a new article of manufacture, a smokeless powder coated with mononitro-naphthalene.

2. As a new article of manufacture, a smokeless powder coated and impregnated with mononitro-naphthalene.

3. The process which consists in immersing the grains of a completed smokeless powder in a solution of mononitro-naphthalene in a relatively volatile liquid and then evaporating said liquid, substantially as described.

4. The process which consists in immersing the grains of a completed smokeless powder in a solution of mononitro-naphthalene until said powder begins to soften, then removing it from the solution and freeing it of the solvent, substantially as described.

5. The process which consists in immersing the grains of a completed propellent powder in a solution of mononitro-naphthalene until said powder begins to soften, then removing it from the solution and freeing it of the solvent, substantially as described.

6. The process which consists in immersing the grains of a completed propellent powder in a solution of mononitro-naphthalene, removing said powder from said solution, allowing the surplus of the solution thereon to evaporate and drying the powder at a temperature between 40° and 70° centigrade, substantially as described.

7. The process which consists in placing the grains of a completed propellent powder in a solution of a volatile solvent and mononitro-naphthalene, permitting said powder to remain in said solution until it is coated and impregnated therewith, removing the powder from the solution and permitting it to dry in the atmosphere and then completing the drying at a temperature from 40° to 70° centigrade, substantially as described.

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

WILLIAM J. WILLIAMS.

Witnesses:

HERMANN AUTH,

ALLAN J. CASSIDY.