UNITED STATES PATENT OFFICE.

FREDERICK WILLIAM JONES, OF BARWICK, NEAR WARE, ENGLAND.

METHOD OF TREATING GUNPOWDER.

SPECIFICATION forming part of Letters Patent No. 693,548, dated February 18, 1902.

Original application filed December 6, 1898, Serial No. 698,413. Divided and this application filed April 19, 1900. Serial No. 13,537. (No specimens.)

To all whom it may concern:

Be it known that I, FREDERICK WILLIAM JONES, a subject of the Queen of Great Britain, residing at Barwick, near Ware, in the county of Hertford, England, have invented a new and useful Improvement in Methods of Treating Gunpowder, of which the following is a specification, and for which I have obtained a patent in Great Britain, No. 15,553, bearing date July 15, 1898.

The present application is a division of my application, Serial No. 698,413, filed December 6, 1898.

My invention relates to methods of treating granulated gelatinized gunpowder for controlling the time occupied in the combustion of such powder.

Heretofore with granulated gelatinized gunpowder the grains composing the charge were all practically ignited before the projectile had time to move any material distance along the barrel of the gun, and efforts have been made to control the time occupied in the combustions of such powder by varying the size or shape of the grains or forming perforations through the grains. These objects have been sought because the practically simultaneous ignition of the whole of the grains of the charge is very disadvantageous in view of the fact that this takes place early in the travel of the projectile and often in a chamber of comparatively small capacity, in which such simultaneous ignition produces a too high initial pressure, and thus the weight of the charge, and thereby the velocity given to the projectile, are unduly limited by reason of the mechanical difficulties of gun construction. These efforts have been directed to the slowing of the combustion of the grains after ignition. My present invention therefore differs therefrom in dealing with the ignition of the grain before combustion, and I have found that a more beneficial effect can be produced by delaying the passage of ignition from grain to grain, or, in other words, the communication of ignition by the primer is regulated progressively, the whole of the grains not being ignited until, so to speak, some time after the initial ignition.

In carrying out my invention the manufactured grains of gelatinized gunpowder are provided with an applied coating and an outer glaze, such coating adhering to the grains and practically continuous, forming an inclosing shell. This applied coating consists of a dry finely-divided wax which will not melt at a service temperature—that is, it will not melt or become adhesive at any temperature below 150° Fahrenheit and is not and does not become explosive. This thin adhering surface coating is mechanically applied by a prolonged agitation of the commingled masses of powder-grains and the finely-divided wax placed in a suitable agitating-receptacle, where the attrition of the particles through prolonged agitation deposits, as it were, a thin continuous coating or glaze of the finely-divided wax upon the surface of the powder-grains, completely inclosing the same. This applied coating of wax may vary in thickness according to the requirements of the particular kind of powder or the caliber of the gun in which the same is to be used. This, however, is a question solely of degree and does not affect the present invention. Of course if the coating is too thin the delay of ignition from grain to grain would not be sufficiently slow. If the coating is excessive, the powder will hang fire, and the proper thickness of coating can only be known by experiment, bearing in mind the particular powder and the gun in which the same is to be used. This coating is to be applied to a granulated gelatinized gunpowder previously dried and freed from solvent, and the wax is preferably added in about the proportion of three per cent. of the powder to be treated. The wax is to be in a finely-divided or commingled state, and the said wax and powder are to be placed in a suitable receptacle and subjected to agitation, and I prefer after the grains of powder are thus treated to polish or glaze the same with powdered graphite in order to render the gunpowder smooth and easy to handle and load into the gun.

I prefer in practice to add the coating material in excess of what is required, so that after the process of agitation the unattached coating material may be sifted out.

I will now give a practical example of the method of carrying out my invention where-

in the coating material is composed, for instance, of carnauba-wax and is to be applied to a small-bore-rifle powder consisting of a thin lamina of gelatinized guncotton, such as now in use. One hundred parts of this powder and one and one-third parts of finely-divided wax are agitated for a period of eight hours and then sifted to separate the free coating material. About three-fourths of the wax will be found to adhere to the powder-grains in the form of an evenly-distributed film. These grains are preferably thereafter polished with graphite by agitation.

The term "grain" is herein used in its ordinary sense as applied to gunpowder and does not include the particles of which such grains are composed, nor the relatively granular particles of non-granulated explosives, nor "blocks or other pieces or charges of explosive material" as distinguished from the more or less minute grains.

Blocks or other pieces or charges of explosive material have heretofore been coated with carnauba-wax or mixtures containing the same, and powder-grains have been coated with various substances, the object in both cases being to waterproof the explosive and protect it against climatic influence and the like. Powder-grains have also been glazed for the same purpose by tumbling them with powdered graphite. I have discovered that a wholly superficial waxy coating, suitably applied to the grains of granulated gelatinized gunpowder and protected by an outer glaze of graphite, serves not only to waterproof and protect the explosive, but also to delay ignition from grain to grain, as above set forth, and thus affords convenient means for effectively regulating such ignition without impairing the explosive value of each grain or the adaptation of the powder to flow freely in loading it into cartridges and the like. In applying a waxy coating for this purpose it is essential that the coating material shall not, as heretofore, be applied in a melted or dissolved condition and that the same shall at the same time be thoroughly applied, so as to completely envelop each grain with the required thickness of ignition-retarding shell. This is accomplished by the method hereinbefore specified, by which a coating or shell of any required thickness is made to consist of abrasions of the waxy material in cohesion, while the shell as a whole adheres to the powder-grain without penetrating its surface to the least extent. This would not be the case if the coating material were applied in a melted or dissolved condition. The product of said method or process is claimed in a companion specification forming part of an application for United States Patent, Serial No. 13,536, filed herewith the 19th day of April, 1900, and is hereby disclaimed as forming no part of the method invention to which my claims herein are confined.

Having thus described said method, I claim as my invention and desire to patent under this specification—

1. The method of treating granulated gelatinized gunpowder for the purpose of delaying the passage of ignition from grain to grain, consisting in mixing together a quantity of the powder-grains and a quantity of a waxy coating material in a dry and finely-divided condition, and subjecting the commingled materials to agitation together, and forming by their attrition and the cohesion of abrasions a continuous coating or shell of the required thickness of the waxy material upon and around each powder-grain, substantially as hereinbefore specified.

2. The method of treating granulated gelatinized gunpowder for the purpose of delaying the passage of ignition from grain to grain, consisting in mixing together a quantity of the powder-grains and a quantity of dry finely-divided carnauba-wax and subjecting the commingled materials to agitation together, and forming by their attrition and the cohesion of abrasions a continuous coating or shell of the required thickness of the waxy material upon and around each powder-grain, substantially as hereinbefore specified.

3. The method of treating granulated gelatinized gunpowder for the purpose of delaying the passage of ignition from grain to grain consisting in mixing together a quantity of the powder-grains and a quantity of a waxy coating material in a dry and finely-divided condition, and subjecting the commingled materials to agitation together, and forming by their attrition and the cohesion of abrasions a continuous coating or shell of the required thickness of the waxy material upon and around each powder-grain, and then tumbling the coated powder with powdered graphite and thereby providing each grain with an outer glaze of graphite, substantially as hereinbefore specified.

FREDERICK WILLIAM JONES.

Witnesses:
GRIFFITH BREWER,
THOMAS WILLIAM ROGERS.