UNITED STATES PATENT OFFICE.

HERRENSTEIN COURTEILLE, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO TRIUMPH SAFETY POWDER COMPANY, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN THE MANUFACTURE OF GUNPOWDER.

Specification forming part of Letters Patent No. **167,503**, dated September 7, 1875; application filed February 27, 1875.

To all whom it may concern:

Be it known that I, HERRENSTEIN COURTEILLE, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Manufacture of Blasting-Powder; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

The chief aim and purpose of my invention are to produce a powder for blasting, which, while having great dynamical power, (which I graduate for mining purposes,) shall possess the quality of being non-explosive in the open air, or by concussion or friction, and at the same time greatly reduce the cost of manufacturing, and completing the product in from one to two hours when amalgamated under my process. To this end my invention consists of a compound composed of the following ingredients, viz: Nitrate of soda or saltpeter, sulphur, and charcoal, which form the chief elements or base, and with these I combine peat, metallic sulphates, as well as coal of a hard nature, and the oils or fats of animals, or tar of any kind which produces the equivalent results to the oleaginous matter. These ingredients comprise the compound, and are put under process in bulk.

While the proportions of these things may be slightly varied, yet experiment has shown that the following have proven the best for the purpose, varying from the minimum to the maximum, according to the strength desired. For manufacturing one hundred pounds the proportions will be: nitrate of soda or saltpeter, sixty to seventy pounds; sulphur, ten to twelve pounds; charcoal, seven to ten pounds; peat and hard coal, nine to twelve pounds; combined metallic sulphates, two to four pounds; and oleaginous matter, animal or vegetable, refined or crude, one to three pounds. Tar in any form will answer the purpose of such oily matter. All the solid matters are pulverized and mixed together with the metallic sulphates. These are all subjected to the action of steam in an open vessel until thoroughly saturated, when the direct application ceases. With this I combine the action of external heat by superheated steam, the vessel being provided with a double bottom for that purpose. The effect and result of this combined heating action are to bring the mixture to a uniform solution and perfect incorporation of the materials, and effect an entire vaporization of the liquid by prolonging the external heat until the compound becomes dry, which occupies a period of about thirty minutes. During the vaporization of the liquid the temperature of the heating element in the double bottom is being slowly reduced from 250° to 150° Fahrenheit. This reduction is made to insure perfect safety in its drying process. When nearly dry I take the mass out and put it on a drying-platform of metal heated by steam or hot air, and under this action of about fifteen minutes the powder is ready for packing.

The employment of peat, charcoal, and hard coal makes the powder less inflammable, or of slower combustion, and the combination with these of the metallic sulphates and the oily matters makes the powder non-explosive in the open air and from friction and concussion, and at the same time increases the strength when confined in the chamber of a mine. Were it not for the external application of heat simultaneous with the direct application of steam the process would be prolonged and slow, and the incorporation of the ingredients would not be so perfect. The chemical reaction which occurs when the compound has been in ebullition for a period of fifteen minutes consists in swelling or a development in bulk to an increase of about one-third of its volume, and this reaction would be defective, and the product in consequence less efficient, were it not for the application of internal and external heat. The superheated steam avoids the use of fire and all danger arising therefrom, and hastens the process.

In the manufacture of powder by my process all dangers of explosion are avoided, human life relieved from constant jeopardy, rates of insurance and transportation lessened,

security given to miners, and mining rendered more remunerative.

In practice I have found that the combination of charcoal with peat and hard coal produces the best result in rendering the combustion less instantaneous, which, for blasting-powder, is a matter of great importance, and the combination of these with the sulphates of metal gives the best effect in rendering the compound inexplosive in the open air and from concussion and friction; and I am not aware that these things have been combined in any known process for the manufacture of powder, nor that oils or fats have been employed in their natural condition with these things. In my process these things are treated at once and completed in one operation, as stated, and not carried on under separate operations. It is not new to combine peat, in the place of charcoal, with saltpeter and sulphur for making powder, and the state of the art shows sulphuric acid has been employed in connection with sawdust or ligneous matter, and that a chemical metallic salt of sulphocyanide has been used with oleaginous matter and sulphuric acid. These things, however so combined, produce such deleterious gases as to render the manufacture of powder with them almost certain death to the operator.

An essential feature of my invention is to dispense with the use of glycerine, and yet obtain a strong powder by the combined action of the peat and hard coal with charcoal, metallic sulphates, and oils, making a new compound, and a very cheap and quick process for producing the powder.

I claim—

The process of manufacturing powder by compounding, under treatment of direct and externally-applied steam, of metallic sulphates, peat, charcoal, and oils or fats with saltpeter and sulphur, in the manner and in the proportions substantially as herein set forth, whereby the product is made complete while under treatment in mass.

In testimony that I claim the foregoing as my own, I have affixed my signature in presence of two witnesses.

HERRENSTEIN COURTEILLE.

Witnesses:

A. E. H. JOHNSON,

J. A. RUTHERFORD.