

UNITED STATES PATENT OFFICE.

THORSTEN NORDENFELT, OF WESTMINSTER, ENGLAND, AND VICTOR ALGER-
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MANUFACTURE OF GUNPOWDER.

SPECIFICATION forming part of Letters Patent No. 362,899, dated May 10, 1887.

Application filed August 25, 1884. Serial No. 141,419. (No specimens.) Patented in England April 18, 1884, Nos. 6,514 and 6,515; in France August 21, 1884, No. 163,868; in Germany August 21, 1884, No. 30,676; in Belgium August 30, 1884, No. 66,085, and in Italy September 30, 1884, No. 17,257.

To all whom it may concern:

Be it known that we, THORSTEN NORDENFELT, of 53 Parliament Street, in the city of Westminster, England, civil engineer, and VICTOR ALGERNON MEURLING, of Christianstad, Sweden, subjects of the King of Sweden, have invented certain new and useful Improvements in the Manufacture of Gunpowder, (for which we have obtained Letters Patent in Great Britain, Nos. 6,514 and 6,515, dated April 18, 1884; in France, No. 163,868, dated August 21, 1884; in Belgium, No. 66,085, dated August 30, 1884; in Italy, No. 17,257, dated September 30, 1884, and in Germany, No. 30,676, dated August 21, 1884,) of which the following is a specification.

At the present time in the manufacture of gunpowder it is usual to incorporate the sulphur and saltpeter with the other materials by a process of grinding. This grinding is a dangerous operation after the saltpeter is added, and it has to be long continued in order that the mixture of the materials may be sufficiently intimate. Now, in place of thus producing a mechanical intermixture, which after all can only result in placing minute particles of sulphur, saltpeter, and charcoal side by side, we bring the sulphur to a state of solution in bisulphide of carbon, and in this state we combine it with suitable carbonaceous matter. In this manner we diminish risk in manufacture, we manufacture the powder more cheaply, and obtain a powder which is more even in its results.

If it be deemed desirable to use wood-charcoal, it may be employed as the carbonaceous matter in the manufacture of the gunpowder in carrying out our invention; but as we have found cotton or wood fiber or other like vegetable fiber reduced to a state of fine powder by a chemical process a preferable carbonaceous matter, we employ it. The vegetable fiber, whether it be cotton or wood fiber, such as is used in paper-making, or other vegetable fiber, is placed in a loose state in a vessel, through which a current of hydrochloric gas is caused to pass, so that it may permeate the fiber. After a time the fiber will be found in a friable state, such that it may easily be reduced

to powder by friction. The current of hydrochloric gas is then stopped, and it is replaced by a current of air, which is continued until the gas is thoroughly expelled.

The following is the manner in which we conduct the manufacture of gunpowder: The ingredients are sulphur, saltpeter, and the carbonaceous matter. The materials should be pure and the proportions the same as now used in gunpowder, subject to variation to some extent, and as is now usual to adapt the powder to the various purposes for which it is required.

We first grind the carbonaceous matter to a very fine powder, the finer the better. We prepare the sulphur for use by dissolving it in bisulphide of carbon. The solution is effected by the aid of a gentle heat in a water bath, and evaporation of the bisulphide may be prevented by covering its surface with a layer of water. A saturated or nearly-saturated solution should be thus prepared. The pulverized carbonaceous matter and the solution of sulphur in bisulphide of carbon are then thoroughly mixed together in a closed vessel containing a mechanical stirrer. When the mixture is complete, the solvent is evaporated or distilled off by the aid of a gentle heat. The vapor of the bisulphide is collected and condensed, so that the solvent may not be lost. The means for this purpose may be such as are employed when this liquid is used in the preparation of extracts and for like purposes. When the bisulphide of carbon is evaporated, the carbonaceous matter and sulphur remain intimately mixed, and each particle of carbonaceous matter has become impregnated with sulphur, instead of as at present, where the admixture is obtained by grinding the particles of carbonaceous matter and sulphur being only mechanically placed side by side. The saltpeter is prepared for use by dissolving it in water, the solution is added to the pulverized carbonaceous matter already impregnated with sulphur, as described above, and the whole is stirred together in a mechanical mixer.

We find it advisable not to add the whole of the saltpeter at one time, but to divide it into two or three separate quantities, and with

each quantity we have sufficient water to render it sufficiently fluid for impregnating the carbonaceous matter already before impregnated with sulphur.

5 After each admixture the water is separated by evaporation, and heat may be applied to hasten this evaporation, but in such manner as to avoid risk of the materials igniting as they become dry. After the first drying operation the material, in a state of powder, is again mixed with saltpeter solution, and it is afterward again dried, as before, and so for three or more times, should it be considered desirable to divide the operation of incorporating the saltpeter into so many operations. When the incorporation of the saltpeter is complete, it only remains to finish the powder for use by the ordinary methods. It may be compressed into cakes or prisms, dried, broken up, and granulated in the usual manner.

By this method the dangerous process of grinding the powder after it has been rendered explosive by the addition of the saltpeter may be altogether avoided; or if in any case it should be considered advisable to resort to a grinding process after the materials have been mixed in the manner above described the danger would be much less than at present, because of the lessened time during which the grinding would be continued.

The carbonaceous matter may also be submitted without risk to a grinding operation after the sulphur has been incorporated with it and before the saltpeter is added.

Although our invention is mainly intended for the manufacture of gunpowder from the ordinary ingredients, it is also applicable to the manufacture of like compounds in which the saltpeter is replaced by nitrate of soda or other salt capable of furnishing oxygen to the carbonaceous matter and sulphur.

In the preparation of the cotton or vegetable fiber liquid hydrochloric acid may be employed; but the use of the gas as herein described is preferable.

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Having thus particularly described and ascertained the nature of our said invention and the manner of performing the same, we declare that what we claim is—

50 I. As an improvement in the manufacture of gunpowder, the method described of incorporating the sulphur with carbonaceous matter, which consists in dissolving the sulphur in bisulphide of carbon, impregnating the carbonaceous matter with the solution so obtained, and separating the bisulphide of carbon by evaporation, substantially as set forth.

2. As an improvement in the manufacture of gunpowder, the method described of incorporating the sulphur and the saltpeter or equivalent salt with the carbonaceous matter, which consists in dissolving the sulphur in bisulphide of carbon, impregnating the carbonaceous matter with the solution so obtained, separating the solvent by evaporation, also impregnating the carbonaceous matter with saltpeter or equivalent salt in solution, and separating the solvent by evaporation, substantially as set forth.

3. The hereinbefore described method of manufacturing gunpowder, which consists in treating cotton or equivalent vegetable fiber with hydrochloric acid (either gaseous or liquid) to obtain carbonaceous matter, and incorporating the carbonaceous matter with the sulphur and the saltpeter, substantially as set forth.

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Witnesses:

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Witnesses to the signature of the within-named Thorsten Nordenfelt:

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