UNITED STATES PATENT OFFICE.

JULIAN JOHN RÉVY, OF VIENNA, AUSTRIA.

IMPROVEMENT IN THE MANUFACTURE OF GUN-COTTON.

Specification forming part of Letters Patent No. **50,082**, dated September 19, 1865.

To all whom it may concern:

Be it known that I, JULIAN JOHN RÉVY, of Vienna, in the Empire of Austria, a subject of the Emperor of Austria, have invented or discovered new and useful Improvements in the Manufacture of Explosive Compounds; and I, the said JULIAN JOHN RÉVY, do hereby declare the nature of the said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement thereof—that is to say:

This invention has for its object improvements in the manufacture of explosive compounds. For this purpose ordinary cotton is used by preference, cotton being a lignine substance—a compound of carbon, (C,) hydrogen, (H,) and oxygen, (O,) the chemical formula of which expressed in equivalents is $C_{12}H_{10}O_{10}$. By subjecting cotton and most of the lignine substances of the above formula to the action of nitric acid in a peculiar manner, hereinafter to be described, a new element—nitrogen—enters into the composition, forming an explosive compound of the chemical formula $C_{12}H_7N_3O_{22}$, which may also be expressed $C_{12}\left\{\begin{matrix}H_7\\3NO_4\end{matrix}\right\}O_{10}$.

One hundred parts of the said explosive compound contains—

C = 24.24
H = 2.37
N = 14.14
O = 59.25

as expressed by weight and corresponding to the chemical formula above given.

It is only by preference that I use cotton; most other vegetable matter of the above chemical formula $C_{12}H_{10}O_{10}$ may be substituted, as linen, paper, starch, or wood.

To produce the explosive compound:

First. Ordinary cotton is spun by aid of suitable machines into a lightly-twisted yarn.

Second. It is washed by immersing it in pure and fresh running water, or, better still, by submitting it to the action of a moderate fall of water during forty-eight hours or upward, the bulk of water being then squeezed out by the aid of suitable machines.

Third. It is then thoroughly to be dried in suitable well-ventilated rooms heated by steam or hot water to a temperature not exceeding 50° centigrade. The process will be completed in from six to twelve hours, according to circumstances.

Fourth. The perfectly-dried yarn is subjected to the action of a mixture of the purest and most concentrated acids, monohydrated nitric acid ($HONO_5$) of a specific gravity not under 1.52 and monohydrated sulphuric acid of a specific gravity not under 1.84 being employed. These acids are mixed as follows:

Fifth. The above-named acids (No. 4) are each separately, but at the same time, to be poured in a small jet into a suitable vessel, in which two or more blades are caused to oscillate to and fro. The blades are perforated with small holes to insure a most thorough mixture of the acids, which cannot by any means be attained by the usual method of simply mixing the acids by pouring them together. This operation requires about one hour continuous working to produce about twenty gallons of the acid mixture in a vessel of about that capacity. The acids thus mixed are allowed to cool and are not used in less than about twenty-four hours after mixing.

Sixth. The prepared cotton yarn thoroughly dried, (see No. 3,) in the form of bundles of lightly-twisted yarn, is next immersed in the acid mixture, (see No. 5,) and exposed to the action thereof during about forty-eight hours, being repeatedly stirred up during this time it is left to the action of the acid mixture in pots under cover.

Seventh. The great bulk of the acid mixture being poured off, the saturated yarn is next submitted to the action of a centrifugal or other suitable machine to throw off most of the acid mixture retained in the cotton yarn.

Eighth. It is then washed, in a similar way to that described in No. 2, during about forty-eight hours and upward in fresh running water, or, by preference, under a moderate fall of water, to insure its entire freedom from acids, which in this manner will be thoroughly attained. Although the saturated cotton-yarn by the above washing process in less than one hour is so far freed from acids that not the slightest trace of it can be discovered by ordinary tests, yet the body of the yarn is by no means sufficiently cleansed from acid, which, however, will be attained by subjecting, as above described, the saturated yarn to the action of great masses of fresh water during a considerable time.

Ninth. The thorough washing of the saturated cotton yarn being duly completed, it is dried in a similar way to that described in No. 3.

Tenth. The cotton yarn is next boiled in a weak solution of soluble or water glass (silicate of potassa, KOS_1O_2) for about one and a half hour, and then the bulk of the solution of the water-glass is squeezed out by suitable machines.

Eleventh. The cotton yarn is next placed in tanks perforated with holes through which fresh water is kept running during several days.

Twelfth. The cotton yarn is finally dried in a similar way to that described in No. 3, and, that process being completed, pure gun-cotton is obtained, this being an explosive compound of constant qualities and of a most explosive nature, but entirely free from self-explosion. It is far less affected by moisture than gunpowder, and if wetted and again dried will regain its previous power and qualities; its explosion is not attended by smoke; its power can be regulated at pleasure; and, employing equal weights, its force is six times that of the strongest gunpowder.

In preparing for use the explosive compound made as above described, in order that regular and uniform results may be obtained from the explosion, it is made up into cartridges of regular texture. This is done by regularly winding the yarn into the form of cartridge required, or by spinning it into ropes and then making it up into cartridges, or by first weaving it into cloth. The arrangement of the fiber in the cartridge being in all cases regular, but varied according to the rapidity of explosion required.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

An explosive compound made substantially in the manner and for the purposes described.

Witnesses: J. J. RÉVY.

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