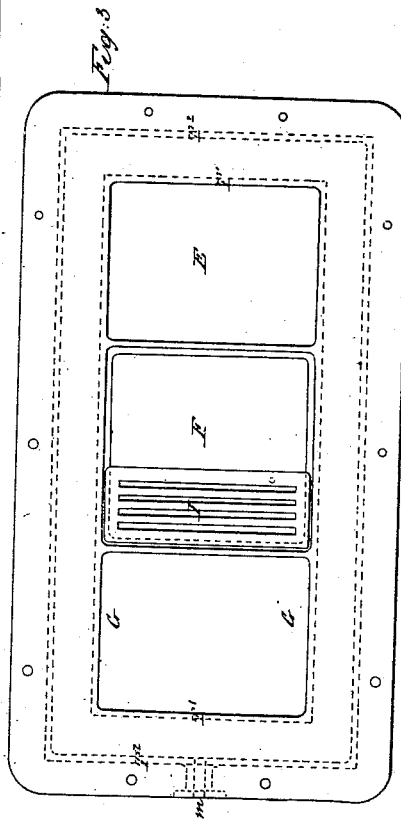
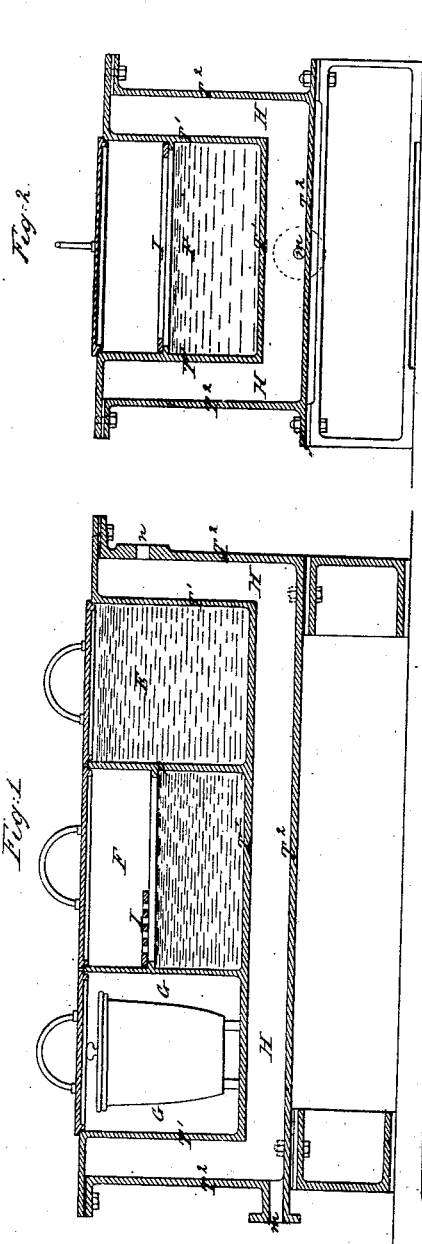


J. J. RÉVY.
MANUFACTURE OF GUNCOTTON.

No. 50,083.

Patented Sept. 19, 1865.



Witnesses
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UNITED STATES PATENT OFFICE.

J. J. RÉVY, OF NO. 28 GROSVENOR STREET, EATON SQUARE, COUNTY OF MIDDLESEX, ENGLAND.

IMPROVEMENT IN THE MANUFACTURE OF GUN-COTTON.

Specification forming part of Letters Patent No. 50,083, dated September 19, 1865.

To all whom it may concern:

Be it known that I, JULIAN JOHN RÉVY, of No. 28 Grosvenor Street, Eaton Square, in the county of Middlesex, England, civil engineer, 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 matter the same is to be performed to be particularly described and ascertained in and by the following statement thereof—that is to say:

In the specification of a former patent, granted to me in 1862, there is described a process for manufacturing explosive compounds. This process produces explosive compounds of more uniform quality than had theretofore been produced, but the process described is costly, using a great deal of acid, and the results are not so uniform as I have since been able to obtain.

The object of my present invention is, then, to obtain more uniform results than can be obtained by working according to the specification of the said former patent, and also greatly to reduce the cost of the process. In the first place, in preparing the cotton I find that if it be only washed in water and dried, as heretofore, perfectly-uniform results are not obtained, for the cotton as it comes from the spinning or twisting process is frequently greasy, and the grease is not removed by merely washing in water. I therefore first wash the cotton in a weak solution of potash or other alkali—say 3° Baumé—and then complete the washing with water, as before.

In the converting process I proceed as follows: I steep the prepared cotton yarn, thoroughly dried and in the form of bundles of lightly-twisted yarn, in an acid mixture, using the apparatus represented in Figures 1, 2, 3. I use, by preference, one part, by weight, of nitric acid, specific gravity 1.485, and three parts, by weight, of sulphuric acid, specific gravity 1.84, the acids being pure and thoroughly mixed together conveniently, as described in the specification of the patent before referred to.

The apparatus consists of two cast-iron tanks, T¹ T², the inner tank, T¹, being kept cool during the process by a constant flow of cold water,

H, which is maintained through the outer vessel. The water enters at *m* and leaves at *n*. This is done because the temperature in the dipping-tank should never rise above 80° Fahrenheit, and it should not fall below 40° Fahrenheit.

The inner tank, T¹, is divided into three compartments. E contains the store of acid mixture; F, the acid mixture in which the process of dipping or steeping is performed, and G G represent the compartment with the pot to receive the steeped cotton. Two or other convenient number of skeins of cotton yarn, together of about three to four ounces in weight, thoroughly desiccated, or containing no trace of moisture, are immersed at one operation in the acid mixture contained in F. An iron spatula being used to effect complete saturation of the cotton with the acids, this will be effected in about one minute. The cotton is next removed from the bath, laid upon the perforated shelf I, and by means of a spatula pressed to such an extent that the amount of mixed acid left absorbed by the cotton may be in the ratio of about one weight of cotton to ten and one-half weight of acid mixture. This a practiced workman does as nearly as his judgment admits. The cotton skeins are next placed in the pot G, which is filled by repeated operations, and after each dipping the portion of acid absorbed is made good by taking acid from the compartment E and putting it into the compartment F. This is done by means of a spoon capable of containing just the measure of acid which should be used at each dipping operation. In this manner the surface of the acid in F should be always maintained at the same level, *o p*. The pots G should be of the best earthenware. They are not filled more than two-thirds full, and they contain one pound of cotton and ten and one-half pounds of acid. Each pot as it is filled is weighed and the amount of acid is accurately adjusted. The pot being filled in the above manner, the cotton yarn is next compressed by a loosely-fitting perforated disk furnished with a handle in such manner that the skeins may be wholly covered with the acid mixture soaked up, to the further action of which the cotton is left exposed for about forty-eight hours. During this space of time the pots G are covered and are kept cool. They are for

this purpose immersed in a trough of water, through which a constant flow is maintained. The temperature in the pots should be kept within the limits above given for the dipping-vessel.

If, notwithstanding the precautions, a pot should heat and commence to fume, as will happen if water gets into the pot, or if the dripping be improperly conducted, the pot is removed and its contents rejected. Considerable precaution is necessary to prevent the cotton reabsorbing moisture after it has been dried and before dripping, as a very short exposure is sufficient to allow the cotton to absorb enough moisture to render it unsuitable for use.

When the cotton is removed from the pots in which it was exposed for about forty-eight hours to the action of the acid mixture it is placed in a centrifugal machine, the drum of which revolves at a high speed—say a thirty-inch diameter drum revolving at about twelve hundred revolutions per minute—to throw out most of the waste acid soaked up by the cotton. The contents of about six pots are treated thus in one operation. When the gun-cotton is removed from the centrifugal machine each hank or skein separately is thrown into a tub under a moderate fall of water, and great care is taken that each hank or skein of gun-cotton is placed rapidly and at once under the falling water, and fully immersed in the much-agitated water. The contents of about six pots having been thus placed into the water, the gun-cotton skeins are left in it for about ten minutes. After this lapse of time the skeins of gun-cotton are removed from the tub from under the falling water, and directly placed into another centrifugal machine similar to that used for the waste-acid operation, and the drum being made to revolve at a high speed, the much-diluted acid is thrown out from the gun-cotton skeins. After this operation ordinary test-paper will hardly indicate any traces of acid; but this operation should be performed a second and even a third time, the skeins of gun-cotton being again placed into a similar tub containing much-agitated water, and again returned to the centrifugal machine, to be freed from most of the water. Thus every trace of lingering acid is effectually removed from the exterior of the gun-cotton fibers. After this operation the gun-cotton skeins are placed into tanks which contain a series of trays. These trays have perforated bottoms and fit the sides of the tanks. The lowest tray being filled with gun-cotton to about six inches thickness, a second similar tray is placed over the first, filled in a similar manner with gun-cotton, and so on until all the trays of the tank are evenly filled with gun-cotton. A considerable quantity of water is forced into the tank under the lowest tray, and the water is obliged to pass through the gun-cotton skeins in all the successive trays of the tank, and so a continual and gentle change of the water in every skein of the gun-cotton placed in the tanks is obtained, which insures the removal of acid traces from the in-

terior of the gun-cotton fibers. The gun-cotton skeins are washed in these tanks for at least two days, but one week is preferable.

The water used for the washing operations should be clear and pure, and if it cannot be easily obtained at once in such condition it should be filtered.

When the gun-cotton is removed from these tanks it is treated in the manner described in my former specification, before referred to, until arriving at the process of saturating with soluble glass.

Artificial ventilation is found to be necessary over the dipping-trough, and also over the centrifugal machine, for separating the acid from the cotton after it comes out of the pots G.

In order to effect the impregnation of gun-cotton with soluble or water glass I employ a centrifugal machine. The gauze-drum is lined with a cloth and the skeins of cotton thoroughly saturated with water-glass solution, are built up around the interior of the drum, so as to form, as it were, a circular wall within it—say three or four inches thick—then an inner cylinder or frame is dropped into the drum to keep the skeins in their places, and the drum is then filled with water-glass solution. The drum is now rotated comparatively slowly, so as to keep up a steady flow through the cotton, the drum being, however, kept full by constantly admitting more solution. In this way the work goes on for two or three minutes, when the admission of water-glass solution is stopped and the speed of the drum is increased until ultimately, with a thirty-inch drum, a speed of twelve hundred revolutions per minute is obtained. The cotton, which is then nearly dry, is taken out and the skeins are hung up on rods in an open drying-shed. The strength of water-glass solution which I employ is about 12° Baumé, and the temperature should be about 82° Fahrenheit.

The water-glass solution may be used several times, so long as it remains clear. It should be protected from the air.

The cotton remains in the drying-sheds for several days, and by exposure to the atmosphere carbonic acid combines with the soda of the water-glass, and the silica is precipitated upon the gun-cotton fiber. The carbonate of soda is got rid of afterward by careful and continued washing in running water.

Thus it will be observed that in the process the water-glass is applied in a nearly-cold state, for I have found that when it is used in a boiling state, as heretofore, less uniform results are obtained.

The final cleansing of the cotton from any dirt it may have contracted in the process is effected with soap and water. Afterward it is rinsed and dried in the air. The drying-house is warmed in bad weather.

Having thus described the nature of my said invention and the manner of performing the same, I would have it understood that what I claim is—

1. The preparing the cotton for use in the

manufacture of gun-cotton by washing it in an alkaline solution.

2. The process of dipping or steeping the cotton as hereinbefore set forth, small and regular quantities of the cotton being dipped one after the other in a dipping-vessel containing a considerable quantity of acid, the contents of which are after each operation brought back to the proper strength by the addition of fresh acid to compensate for that removed by the portion of cotton last dipped.

3. The general arrangement of the apparatus hereinbefore described and shown in the annexed drawings.

4. The separating the acid from the exterior of the gun-cotton fiber by saturating the cotton with water and then again extracting this wa-

ter by means of a centrifugal machine, also the separation of the acid from the interior of the gun-cotton fiber by arranging the cotton in layers on suitable perforated shelves and causing water to filter or percolate through it.

5. The treating of gun-cotton with water-glass by means of a centrifugal machine, as hereinbefore described.

6. The employment for treating gun-cotton of water-glass solution in a cool in place of in a boiling state, as heretofore.

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