

Improvements in the Preparation  
and Treatment of GC

Patent 1102 1865

FA Abel





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A.D. 1865, 20th APRIL. N° 1102.

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**Preparing Gun Cotton.**

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**LETTERS PATENT** to Frederick Augustus Abel, of the Royal Arsenal, Woolwich, in the County of Kent, for the Invention of "IMPROVEMENTS IN THE PREPARATION AND TREATMENT OF GUN COTTON."

Sealed the 13th October 1865, and dated the 20th April 1865.

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**PROVISIONAL SPECIFICATION** left by the said Frederick Augustus Abel at the Office of the Commissioners of Patents, with his Petition, on the 20th April 1865.

I, FREDERICK AUGUSTUS ABEL, of the Royal Arsenal, Woolwich, in the  
5 County of Kent, do hereby declare the nature of the said Invention for  
"IMPROVEMENTS IN THE PREPARATION AND TREATMENT OF GUN COTTON," to be  
as follows:—

My Invention has reference to the explosive compound known as gun  
cotton. Such compound has heretofore been employed either in a loose,  
10 fibrous, or woolly state, or of late it has been spun into the form of rovings,  
yarn, or thread, and has then been formed into cartridges, either by winding,  
braiding, or weaving.

Now my Invention has for its object to assimilate the physical condition of  
gun cotton as nearly as possible to that of gunpowder, by mechanically con-  
15 verting it into a solid homogeneous state, and imparting to it either a granular  
or other suitable form that will present the exact amount of surface and  
compactness required for obtaining a certain rapidity or intensity of combustion.

The method of treating the gun cotton which I prefer to employ in carrying

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my Invention into practice is as follows:—I first convert cotton wool by the processes now well known into gun cotton. For this purpose I prefer to use the cotton in the form of a loose roving. When the gun cotton has been purified from acid by washing in running water and in very dilute alkali I transfer it to a beating engine of the description commonly used in the manu- 5  
facture of paper where it is reduced to a pulp, which is then converted into solid masses, such as sheets, discs, cylinders, and other forms, either perforated or not, by any of the processes ordinarily employed for producing sheets, discs, cylinders, and other forms from paper pulp. No size is mixed with the pulp, but, in some cases, a small quantity of gum or other binding material soluble 10  
in water is mixed with the pulp. To obtain any required degree of density of the solid gun cotton I subject the mass, whilst in a moist state, to the action of hydraulic or other presses, or of any other known arrangement of machinery for exerting the requisite pressure on the material.

To produce a granular structure I either cut the sheets, discs, and other 15  
solid forms into small pieces of the required size, or I introduce the pulp containing water and a small quantity of the binding material into a vessel, to which a vibrating motion is imparted, whereby the pulp is at once formed into granules of different sizes, which are subsequently sorted, if necessary. In the above processes in place of water other fluids such as wood spirit, spirit 20  
of wine, ether, or mixtures of those liquids, with or without some binding material soluble in the liquid may be employed.

Instead of forming the whole of the mass of gun cotton into pulp as described, a portion of the same may be left in the original state, and be mixed with the pulp in such proportions that when subjected to the requisite pressure, such 25  
combination will become a solid conglomerate mass of the requisite density. Such solid gun cotton, whether formed of pulp only, or of pulp mixed with fibre, may also be coated or mixed with soluble gun cotton, known as colloidion, applied in the form of solution. The pulp may also be formed of mixtures of gun cotton of different composition, the properties of which are 30  
well known, that is to say, of gun cotton which is soluble in mixtures of spirit of wine and ether, and in wood spirit alone or mixed with spirit of wine, and of gun cotton which is insoluble in those liquids. Such pulp, or a mixture of that pulp and the fibrous cotton, may be converted into solid masses by the processes already described, in which case a portion of the soluble gun cotton 35  
present in the mixture may be made to serve as binding material by the employment of the liquids above named, which act upon it as solvents.

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**SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said Frederick Augustus Abel in the Great Seal Patent Office on the 20th October 1865.

**TO ALL TO WHOM THESE PRESENTS SHALL COME, I, FREDERICK**  
5 **AUGUSTUS ABEL**, of the Royal Arsenal, Woolwich, in the County of Kent, send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twentieth day of April, in the year of our Lord One thousand eight hundred and sixty-five, in the twenty-eighth year of Her reign,  
10 did, for Herself, Her heirs and successors, give and grant unto me, the said Frederick Augustus Abel, Her special licence that I, the said Frederick Augustus Abel, my executors, administrators, and assigns, or such others as I, the said Frederick Augustus Abel, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time, and at all  
15 times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN THE PREPARATION AND TREATMENT OF GUN COTTON,**" upon the condition (amongst others) that I, the said Frederick Augustus Abel,  
20 my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of  
25 the said Letters Patent.

**NOW KNOW YE**, that I, the said Frederick Augustus Abel, 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:—

30 My Invention has reference to the explosive compound known as gun cotton. Such compound has heretofore been employed either in a loose, fibrous, or woolly state, or of late it has been spun into the form of rovings, yarn, or thread, and has then been formed into cartridges, either by winding, braiding, or weaving.

35 Now my Invention has for its object to assimilate the physical condition of gun cotton as nearly as possible to that of gunpowder by mechanically converting it into a solid conglomerate state, and imparting to it either a granular or other suitable form that will present the exact amount of surface and

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compactness required for obtaining a certain rapidity or intensity of combustion.

The method of treating the gun cotton, which I prefer to employ in carrying my Invention into practice is as follows:—I first convert cotton wool by the processes now well known into gun cotton. For this purpose I prefer to use 5 the cotton in the form of a loose roving. When the gun cotton has been purified from acid by washing in running water and in very dilute alkali, I transfer it to a beating engine of the description commonly used in the manufacture of paper, where it is reduced to a pulp, which is then converted into solid masses, such as sheets, discs, cylinders, and other forms, either perforated 10 or not, by any of the processes ordinarily employed for producing sheets, discs, cylinders, and other forms from paper pulp. A small quantity of gum or other binding material soluble in water may be mixed with the pulp. To obtain any required degree of density of the solid gun cotton I subject the mass, whilst in a moist state, to the action of hydraulic or other presses, or of any other known 15 arrangement of machinery for exerting the requisite pressure on the material.

To produce a granular structure I either cut the sheets, discs, and other solid forms into small pieces of the required size, or I introduce the pulp containing water and a small quantity of the binding material into a vessel to which a vibrating motion is imparted, whereby the pulp is at once formed 20 into granules of different sizes, which are subsequently sorted, if necessary. In the above processes, in place of water other fluids, such as wood spirit, spirit of wine, ether, or mixtures of those liquids, with or without some binding material soluble in the liquid, may be employed.

Instead of forming the whole of the mass of gun cotton into pulp as 25 described, a portion of the same may be left in the original state, and be mixed with the pulp in such proportions that, when subjected to the requisite pressure, such combination will become a solid conglomerate mass of the requisite density. Such solid gun cotton, whether formed of pulp only, or of pulp mixed with fibre, may also be coated or mixed with soluble gun cotton, 30 known as collodion, applied in the form of solution.

The solidified gun cotton may also be formed of mixtures of gun cotton of different composition, the properties of which are well known, that is to say, of gun cotton which is soluble in mixtures of spirit of wine and ether, and in wood spirit, alone or mixed with spirit of wine, and of gun cotton which 35 is insoluble in those liquids, and the mixtures may be produced either by reducing both or only one of the varieties of gun cotton to pulp, leaving the other in a fibrous state, or by combining them when both are in the fibrous state. Such mixtures may be converted into solid masses, either by the aid

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of pressure alone (that is, when one or both varieties is or are in the form of pulp), or by making the soluble gun cotton present in the mixtures serve as a binding material by their treatment with the liquids above named, which act as solvents, in which case the mixtures may be consolidated with or  
5 without the aid of pressure.

Having now described the nature of my Invention, and in what manner the same is to be performed, I wish it to be understood that what I claim as the Invention secured to me by the herein-before in part recited Letters Patent is,—

10 First, reducing gun cotton to a pulp, and consolidating such pulp with or without the aid of pressure into the form of sheets, discs, granules, cylinders, or other solid forms, either with or without the admixture of binding materials.

Second, combining with gun cotton reduced to a pulp gun cotton in a fibrous  
15 state, and consolidating such mixture into sheets, discs, granules, cylinders, or other solid forms, either with or without the admixture of binding materials.

Third, combining soluble and insoluble gun cotton, either when both are in a state of pulp or when one is in a state of pulp, and the other in a fibrous condition, and consolidating such mixtures into cylinders, sheets, discs,  
20 granules, or other solid forms, either with or without the admixture of binding materials.

Fourth, subjecting mixtures of soluble and insoluble gun cotton, either when both are in a fibrous condition, or when both are in a state of pulp, or when one only is in the state of pulp and the other in a fibrous condition,  
25 to the action of solvents of the soluble gun cotton, either alone or with the employment of pressure, so as to effect the consolidation of the same.

Fifth, the application to the surface of the consolidated gun cotton of a solution of the soluble forms of gun cotton, or of shellac, or other suitable gums or resins.

30 In witness whereof, I, the said Frederick Augustus Abel, have hereunto set my hand and seal, this Eighteenth day of October, in the year of our Lord One thousand eight hundred and sixty-five.

F. A. ABEL. (L.S.)

Witness,

35 C. D. ABEL,  
20, Southampton Buildings.

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