

WASC 388

Improvements in the mfr
of Nitro Cellulose

Patent 7269 1903

R. Nathan

(Replacing water with
alcohol)

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[Second Edition.]E. K. D. E.,
Library Services,
Waltham Abbey,
Essex.N^o 7269

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PROVISIONAL SPECIFICATION.

“Improvements in the Manufacture of Nitro-cellulose”

We, FREDERIC LEWIS NATHAN, Major, Royal Artillery, JAMES MILN THOMSON, Manager, and WILLIAM THOMAS THOMSON, Chemist, all of the Royal Gunpowder Factory, Waltham Abbey, Essex, do hereby declare the nature of this invention to be as follows;—

- 5 This invention relates to improvements in the methods of removing the water left in nitro-cellulose after washing by replacing the water by alcohol to avoid the necessity of drying. Among the various methods which have been proposed are; intermittent treatment with alcohol; partial removal of the water by considerable pressure followed by percolation with alcohol assisted by either pressure
10 or suction: percolation of the alcohol through a column of nitro-cellulose which had previously been partially freed from water by means of light pressure or treatment in a centrifugal separator.

- The object of the present invention is to replace the water with alcohol without the use of pressure or equivalent treatment, and in such a manner that a very
15 small amount of dilution of alcohol with water takes place.

It is specially desired to avoid the dilution of the alcohol which occurs in the percolation method of treatment which has been hitherto proposed and tried with but little success.

- In such method of treatment the wet nitro-cellulose in some cases after pressing
20 has been suspended in air, and alcohol caused to trickle over it. The alcohol thus percolates through and among the fibres of the nitro-cellulose, and washes out the water. This process is, however, very imperfect, owing to the presence of air, and further involves the use of a large quantity of alcohol, and results in its great dilution.

- 25 The invention accordingly consists in a process of removing the water from nitro-cellulose by treatment with alcohol alone without access of air, thus dispensing with the expensive apparatus which has hitherto been necessary. Such process comprising: (1) suspension in water of the nitro-cellulose to be treated; (2) the floating on of a quantity of alcohol on the top of the water; and (3) the
30 downward displacement of the water by the alcohol in such a way as to involve very little mixing of the two, whereby the water is quickly removed with but small dilution of the alcohol.

- In carrying our invention into effect according to one modification, the nitro-cellulose in the condition in which it is left after purifying is covered with water
35 so that practically all air is excluded. Alcohol is then quietly run on to the surface of the water so as to form a layer on the surface separated from the water by a sharp line of demarcation. A cock or valve at the bottom of the vessel is slightly opened so that the water is allowed to flow away slowly. As the level of the water falls the alcohol follows
40 it and replaces it in the interstices of the nitro-cellulose, fresh alcohol being

[Price 8d.]

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added at the top of the vessel as required. This treatment is continued until all the water has been displaced by alcohol, which is shown by the specific gravity of the effluent falling until it is the same as the inflowing alcohol. We find that the alcohol and water practically do not mix to any extent during this process, the result of this being that only a relatively small quantity of dilute alcohol is formed. After the de-hydration of the nitro-cellulose has been completed, as much of the alcohol as possible is removed by draining, pressing, or treatment in a centrifugal machine. The nitro-cellulose is then ready for use in the manufacture of explosives without further drying. The process is suitable for the treatment of materials either in the pulped or unpulped condition.

The essential feature of the invention is the omission of all pressing or other similar preliminary operations, and in contrast to previous processes involves the actual immersing of the material to be treated in water so as to obtain at the start a definite surface of separation between the water and alcohol.

Dated this 27th day of March, 1903.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.,
13, Temple Street, Birmingham, and 30, Cross Street, Manchester,
Agents.

COMPLETE SPECIFICATION.

"Improvements in the Manufacture of Nitro-cellulose."

We, FREDERIC LEWIS NATHAN, Major, Royal Artillery, JAMES MILN THOMSON, Manager, and WILLIAM THOMAS THOMSON, Chemist, all of the Royal Gunpowder Factory, Waltham Abbey, in the County of Essex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in the methods of removing the water left in nitro-cellulose after washing by replacing the water by alcohol to avoid the necessity of drying. Among the various methods which have been proposed are: intermittent treatment with alcohol; partial removal of the water by considerable pressure followed by percolation with alcohol assisted by either pressure or suction; percolation of the alcohol through a column of nitro-cellulose which had previously been partially freed from water by means of light pressure or treatment in a centrifugal separator.

The object of the present invention is to replace the water with alcohol without the use of pressure or equivalent treatment, and in such a manner that a very small amount of dilution of alcohol with water takes place.

It is specially desired to avoid the dilution of the alcohol which occurs in the percolation method of treatment which has been hitherto proposed and tried with but little success.

In such method of treatment, the wet nitro-cellulose, in some cases, after pressing, has been suspended in air, and alcohol caused to trickle over it. The alcohol thus percolates through and among the fibres of the nitro-cellulose, and washes out the water. This process is, however, very imperfect, owing to the presence of air and further involves the use of a large quantity of alcohol, and results in its great dilution.

The invention accordingly consists in a process of removing the water from nitro-cellulose by treatment with alcohol alone without access of air and without preliminary mechanical treatment, thus dispensing with the expensive apparatus

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which has hitherto been necessary; such process comprising; (1) suspension in water of the nitro-cellulose to be treated; (2) the floating on of a quantity of alcohol on the top of the water; and (3) the downward displacement of the water by the alcohol in such a way as to involve very little mixing of the two, whereby
5 the water is quickly removed with but small dilution of the alcohol.

In carrying our invention into effect according to one modification, the nitro-cellulose in the condition in which it is left after purifying is covered with water so that practically all air is excluded. Alcohol is then quietly run on to the surface of the water so as to form a layer on the surface separated from the water
10 by a sharp line of demarcation. This may conveniently be effected by allowing the alcohol to flow gently down the sides of the vessel. A cock or valve at the bottom of the vessel is slightly opened so that the water is allowed to flow away slowly. We have found that a rate of from one half inch to one inch per hour is suitable. As the level of the water falls, the alcohol follows it and replaces
15 it in the interstices of the nitro-cellulose, fresh alcohol being added to the top of the vessel as required. This treatment is continued until all the water has been displaced by alcohol, which is shown by the specific gravity of the effluent falling until it is the same as the inflowing alcohol. We find that the alcohol and water practically do not mix to any extent during this process, the result of
20 this being that only a relatively small quantity of dilute alcohol is formed. After the de-hydration of the nitro-cellulose has been completed, as much of the alcohol as possible is removed by draining, pressing, or treatment in a centrifugal machine. The nitro-cellulose is then ready for use in the manufacture of explosives without further drying. The process is
25 suitable for the treatment of materials either in the pulped or unpulped condition.

The essential feature of the invention is the omission of all pressing or other similar preliminary operations; and, in contrast to previous processes, involves the actual immersing of the material to be treated in water so as to obtain at the start a definite surface of separation between the water and alcohol.

30 Our process may be carried out in any suitable vessel adapted to enable water to be withdrawn without the production of serious eddies. It may, for example, have a bottom sloping to an outlet cock, through which the water can be slowly and steadily withdrawn.

The vessel should be of shape adapted to give liquid surfaces large in proportion
35 to their depth, to enable large quantities to be treated at a time. For example, the vessel, if cylindrical, may be of diameter equal to or greater than its depth.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed we declare that what we claim is:—

40 1. In the manufacture of nitro-cellulose, the process for removal of water from the washed bulk consisting in immersing it in water, floating on to the surface of the water a quantity of alcohol, drawing off the water slowly so that downward displacement of the water takes place with the minimum mixing and the water is removed without mechanical treatment, substantially as described.

45 2. The improved process for removing water from nitro-cellulose hereinbefore described.

Dated this 23rd day of December, 1903.

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