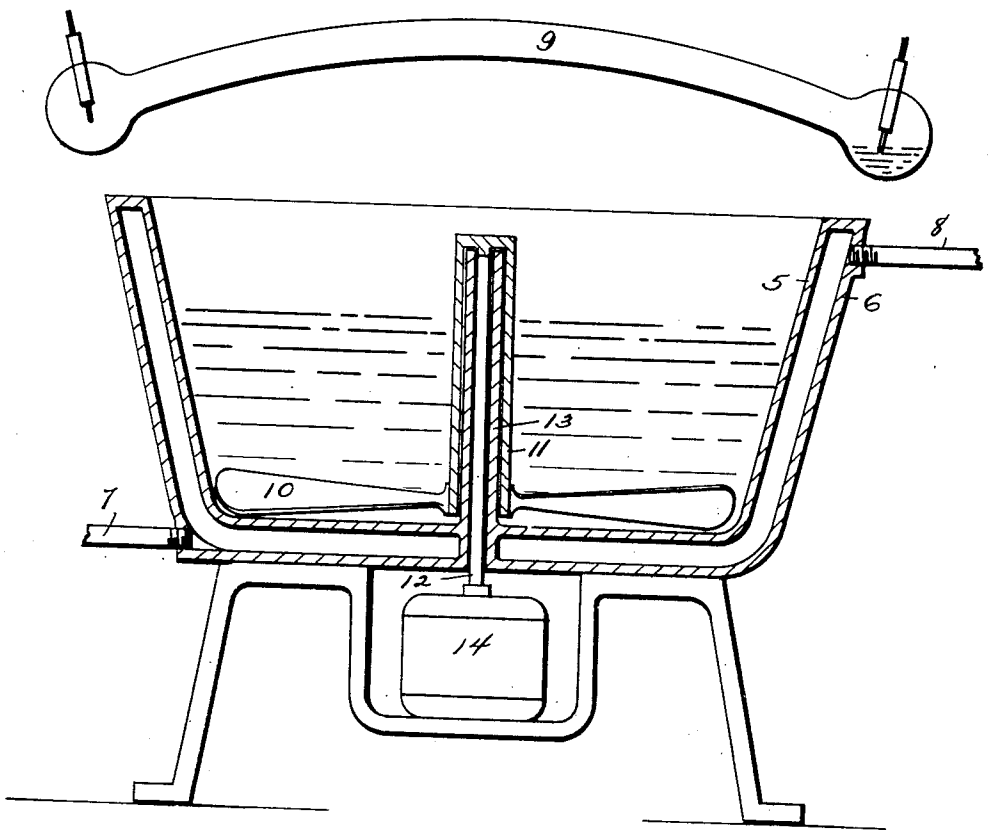
G. C. BACON AND W. C. WILSON.

PROCESS OF TREATING NITROCELLULOSE AND TO A VALUABLE NITROCELLULOSE PRODUCT RESULTING THEREFROM.

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1,397,915. Patented Nov. 22, 1921.



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UNITED STATES PATENT OFFICE.

GILBERT C. BACON AND WILLIAM C. WILSON, OF TAMAQUA, PENNSYLVANIA, ASSIGNORS TO ATLAS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

PROCESS OF TREATING NITROCELLULOSE AND TO A VALUABLE NITROCELLULOSE PRODUCT RESULTING THEREFROM.

1,397,915. Specification of Letters Patent. Patented Nov. 22, 1921.

Application filed February 7, 1921. Serial No. 443,175.

To all whom it may concern:

Be it known that we, GILBERT C. BACON, and WILLIAM C. WILSON, citizens of the United States of America, residing at Tamaqua, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Processes for Treating Nitrocellulose and to a Valuable Nitrocellulose Product Resulting Therefrom, of which the following is a specification.

This application is a continuation in part of our copending application Serial Number 363100, filed March 3, 1920. The invention relates to a process of treating nitrocellulose to increase its solubility and decrease its viscosity.

In the manufacture of varnishes and lacquers it has not heretofore, to our knowledge, been possible to make nitrocellulose solutions containing more than ten ounces of nitrocellulose to the gallon while maintaining sufficient fluidity to permit of satisfactory use of the product for the purposes stated.

By virtue of the present invention we are able to produce a highly concentrated nitrocellulose solution of very low viscosity. In the manufacture of varnishes and lacquers of nitrocellulose and a solvent it is the solvent that constitutes the expensive element of the mixture. Where this solvent carries only a small amount of nitrocellulose it follows that it is necessary to apply many more coats in order to secure a nitrocellulose film of a given thickness upon the surface to be finished than would be the case if the solution contained a larger amount of the nitrocellulose. When a coat of this lacquer is applied, the solvent evaporates and the nitrocellulose film hardens. It is manifest that if it is necessary to apply a great many coats, a very considerable quantity is evaporated and the cost is correspondingly increased.

According to the present invention we increase the solubility of nitrocellulose by subjecting the same to the action of ultra-violet light. The particular type of apparatus employed is immaterial since the apparatus may be varied widely without departure from the invention. However, for purposes of illustration, we have shown in the accompanying drawing an apparatus capable of carrying out the practice of the invention.

The figure shown in the drawing is a vertical sectional view through a tank and with some of the associated parts in elevation.

In practising the invention a nitrocellulose solution of the desired strength is made up by adding a solvent or liquid vehicle to the nitrocellulose. The reason that we make a distinction between solvent and liquid vehicle is that by the action of the ultra-violet light the nitrocellulose is rendered soluble in liquids not ordinarily solvents thereof. Therefore by the term solvents we mean liquids ordinarily solvents of nitrocellulose and by liquid vehicle we mean liquids not ordinarily solvents of nitrocellulose but which may be rendered solvents thereof by the action of the ultra-violet light. The prepared solution is transferred to a tank 5 which is preferably surrounded by a jacket 6. A pipe 7 leads to the jacket and a pipe 8 leads from the jacket. These pipes render it possible to circulate a cooling liquid about the tank 5 to prevent excessive heating of the contents of the tank by the ultra-violet rays. This is to prevent excessive loss of the powerful constituents of the solution by evaporation. One or more ultra-violet lamps 9 of a well known and conventional type are suspended over the tank which tank is without a cover but is equipped with agitating blades 10. These agitating blades are carried by a sleeve 11 and this sleeve is in turn carried by a shaft 12 which projects upwardly through a sleeve 13 which is in one piece with the bottom of the tank. This construction renders the use of a stuffing box unnecessary. The shaft 12 may be driven by any suitable source of power, such as an electric motor, indicated conventionally at 14. The function of the agitators is to subject all parts of the solutions to the action of the ultra-violet light rays. The agitation continually exposes fresh parts of the nitrocellulose solution to the action of said light rays. The ultra-violet light may be furnished by any commercial apparatus with the exception of those which produce a spark. Any sparking would, of course, be dangerous due to

the volatile and explosive nature of the solvents when mixed with air. After the viscosity has been reduced sufficiently, which is determined by viscosity determination on samples taken from the apparatus, the ultra-violet light is discontinued and the material is ready for use. The time of the exposure to ultra-violet light depends upon the intensity of the light employed, the distance the light is maintained from the liquid and also upon the viscosity desired in the finished product. We have found that ordinarily, from 60 minutes to 600 minutes is required to carry out the process.

As stated above the action of the ultra-violet light renders the nitrocellulose soluble in liquids not ordinarily solvents thereof. For example, ethyl alcohol is a solvent of nitrocellulose after the latter has been subjected to the action of ultra-violet light though not a solvent thereof before such action.

The invention includes the subjection of the nitrocellulose alone to the action of ultra-violet light. While we prefer to subject the nitrocellulose to the action of the ultra-violet light in the presence of a liquid vehicle or solvent, said solvent or liquid may be added after the treatment of the nitrocellulose alone by ultra-violet light.

If we desire to make a forty ounce solution of nitrocellulose of low viscosity, we add forty ounces of nitrocellulose to a gallon of liquid vehicle or solvents and subject the whole to the action of ultra-violet light and for a time dependent upon the intensity of the light and the nature of the liquid vehicle.

We desire to emphasize the fact that the particular type of apparatus employed is immaterial. We have found that an ordinary mercury arc rectifier, such as is used for changing alternating current to direct current, will yield a light suitable for the purposes set forth.

Where the nitrocellulose is treated alone, *i. e.* without the solvent no tank need be used but the nitrocellulose may be spread beneath a violet ray lamp or plurality of such lamps and agitated by hand.

Having described our invention, what we claim is:

1. The herein described process for making highly concentrated solutions of nitrocellulose which consists of treating nitrocellulose with artificial ultra-violet light.

2. The herein described process for making highly concentrated solutions of nitrocellulose which consists of treating nitrocellulose with artificial ultra-violet light in the presence of a liquid vehicle not ordinarily a solvent thereof but which is thereby rendered a solvent of the nitrocellulose.

3. The herein described process for making highly concentrated solutions of nitrocellulose which consists of treating nitrocellulose with artificial ultra-violet light in the presence of a solvent.

4. The herein described process for making highly concentrated solutions of nitrocellulose which consists of subjecting said nitrocellulose to the action of artificial ultra-violet light while agitating said nitrocellulose.

5. The herein described process for making highly concentrated solutions of nitrocellulose which consists of treating a solution of nitrocellulose and a solvent with artificial ultra-violet light and simultaneously agitating said solutions to continuously expose fresh portions of the nitrocellulose to the action of said light.

6. The herein described process for making highly concentrated solutions of nitrocellulose which consists of treating a solution of nitrocellulose and a liquid vehicle with artificial ultra-violet light and continuously exposing fresh portions of said nitrocellulose to the action of said light.

In testimony whereof we affix our signatures in the presence of two witnesses.

GILBERT C. BACON.
WILLIAM C. WILSON.

Witnesses:
W. N. STOCKTON,
CHARLES KUHN.