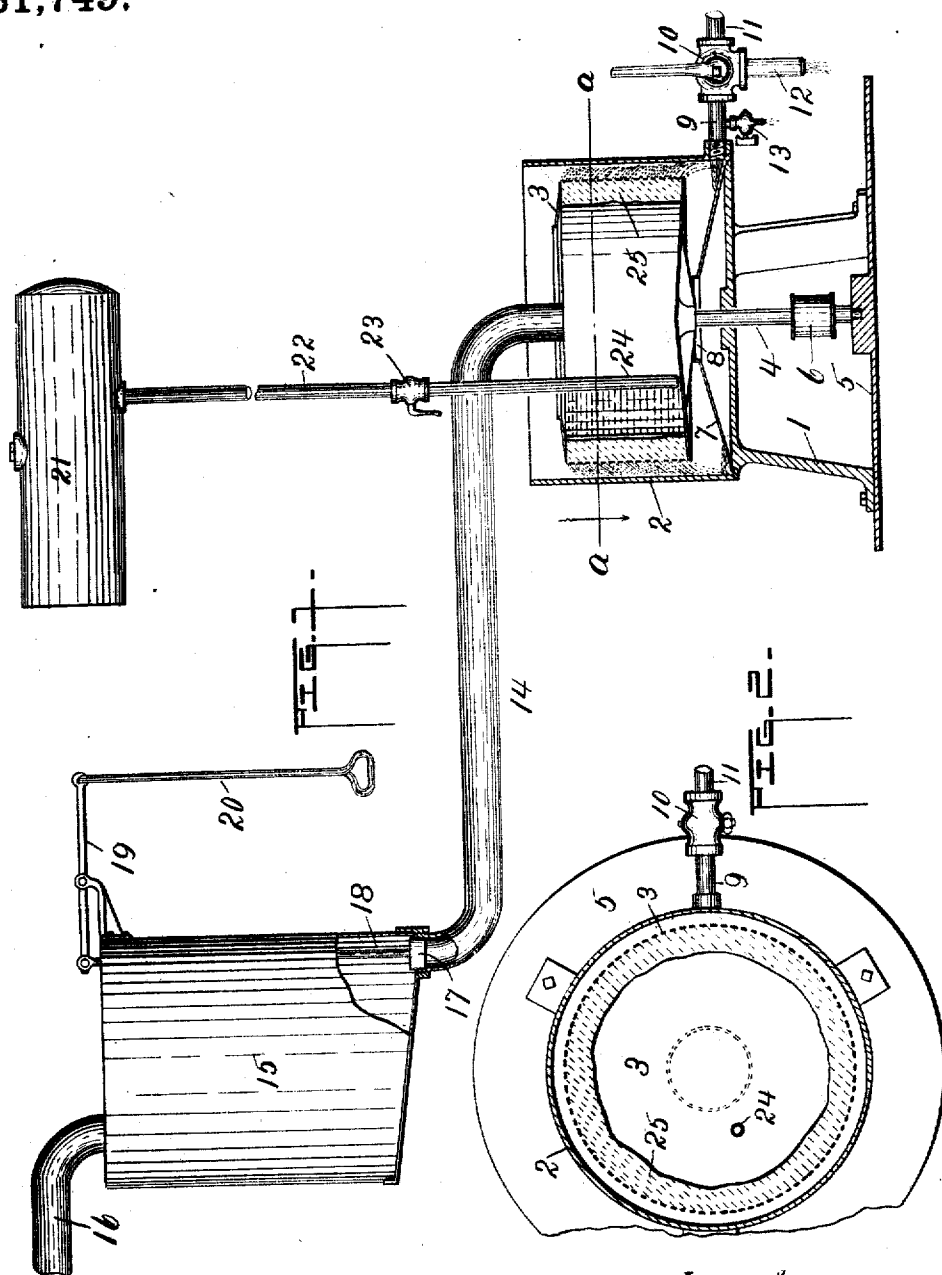


931,749.

Patented Aug. 24, 1909.



Witnesses:

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UNITED STATES PATENT OFFICE.

GEORGE W. GENTIEU, OF PEORIA, ILLINOIS.

PROCESS OF DEHYDRATING NITROCELLULOSE.

931,749.

Specification of Letters Patent.

Patented Aug. 24, 1909.

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To all whom it may concern:

Be it known that I, GEORGE W. GENTIEU, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Processes of Dehydrating Nitrocellulose; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates more particularly to processes for de-hydration of nitro-cellulose and other similar materials; and the object which I have in view is to provide a rapid and inexpensive process for dehydrating, which does not cake the material treated thereby and injure the cellular structure thereof.

The method at present in use for de-hydration of nitro-cellulose is to confine the wet nitro-cellulose in the cylinder of a press and displace the water from the mass by percolation of alcohol from the bottom of the cake and afterward subjecting the mass to great pressure, squeezing out the surplus alcohol until the desired percentage remains in the nitro-cellulose which leaves the nitro-cellulose in the form of a dense, hard block. This process not only is slow and requires an expensive apparatus, consisting of hydraulic press and pressure pump; but is injurious to the nitro-cellulose as it breaks up the cellular structure thereof and destroys the elasticity of the mass, a quality very essential in the manufacture of powder from nitro-cellulose. Furthermore, in the manufacture of powder, nitro-cellulose which has been de-hydrated in the foregoing manner has to be broken up in pieces, and the hard, compact nature thereof prevents rapid and thorough colloidizing of the same.

In my present invention, the nitro-cellulose or other material to be de-hydrated is introduced into a high speed centrifugal wringer, which removes the greater per cent. of the water therefrom, and mats the nitro-cellulose against the perforated wall of the wringer. After the surplus water has been removed from the nitro-cellulose, alcohol or other suitable liquid is sprayed against the inner surface of the mass of nitro-cellulose and as the wringer continues to revolve, forces its way through the mass of nitro-cellulose, thereby displacing the water therein and leaving the desired amount of alcohol.

In this process, the expensive hydraulic press and necessary accessory parts are replaced by the inexpensive, efficient centrifugal wringer, by the use of which the nitro-cellulose is de-hydrated in less time and with less labor, and is not compressed into a hard, compact mass, but retains practically its original light and porous condition throughout the process. The retention of the nitro-cellulose in this light porous condition is very important in the manufacture of powder, not only because it is easily acted upon by a solvent when in this state but enables a powder of superior toughness and elasticity to be made therefrom.

In order that my process may be more clearly understood, I have illustrated in the accompanying drawings an apparatus such as I prefer to employ for carrying my process into effect, and will now describe my process in connection therewith.

In said drawings, Figure 1 shows the complete apparatus, the centrifugal wringer being in vertical section; and Fig. 2 is a view of the centrifugal wringer on the line a-a of Fig. 1, looking in the direction indicated by the arrow.

Similar figures of reference indicate similar parts in both views.

1 is a base of any suitable construction upon which is supported a cylindrical receptacle or casing 2, within which is mounted a horizontally rotatable wringer basket 3 of any suitable construction. This wringer basket is carried by the shaft 4 which has its bearings in the base 1 and base plate 5 and is provided with a pulley 6 thereon whereby the wringer is driven. The bottom 7 of the receptacle or casing 2 has a central opening 8 for the shaft 4, and inclines from said central opening therein to the outer wall of the receptacle, forming an annular gutter for the liquid as it is discharged from the wringer basket. At the lowest point of said annular gutter is an outlet pipe 9 provided with the three way valve 10, by means of which the water may be discharged through the pipe 11 and the alcohol through the pipe 12. A pet cock 13 is provided on the pipe 9 for drawing off samples of the liquid for testing.

The nitro-cellulose is introduced into the wringer basket in a pulped or diluted condition through the pipe 14 from a measuring tank 15 which is adapted to contain a sufficient supply of pulped nitro-cellulose to fill

the wringer basket. The pulped nitro-cellulose is supplied to the measuring receptacle 15 through the pipe 16, and in operation it is designed that the nitro-cellulose be drawn off from the measuring receptacle while still agitated from its introduction therein, and before it has time to settle in the receptacle. The outlet from the receptacle 15 to the conducting pipe 14 is controlled by a valve 17 operated through the valve stem 18, and lever 19 by the handle 20. This valve is arranged to move clear of the valve seat so as to offer no obstruction to the passage of the pulped nitro-cellulose therethrough.

21 is a storage tank for alcohol or other suitable liquid which I may use in the process of de-hydration, and communicates through the pipe 22 and valve 23 with the interior of the wringer basket 3. The portion 24 of the pipe 22 within the wringer basket is perforated so as to direct the liquid in the form of a jet or spray against the nitro-cellulose matted against the perforated wall of the wringer basket. The tank 21 may be elevated a suitable distance above the wringer, or pressure devices may be provided to furnish pressure for spraying the liquid against the nitro-cellulose in the wringer basket.

In carrying my improved process into effect, I take wet pulped nitro-cellulose that has been thoroughly cleansed from acid and has passed the necessary stability tests equal to the requirements of the United States Government and measure out the desired amount into the tank 15. The valve 17 is then opened by pulling down on the handle 20 and the material is discharged through the pipe 14 into the perforated basket 3 of the wringer. The wringer is then set in motion by applying power by means of belting to the drive pulley 6 and as the wringer basket revolves with increasing speed, the nitro-cellulose is thrown by centrifugal force to the side of the basket and held while the greater portion of the water is forced through the perforations in the basket into the inclosing receptacle 2, from which it is drawn off through the outlet pipe 9, valve 10 and pipe 11. There now remains in the nitro-cellulose 25 matted against the perforated wall of the wringer basket from twenty to forty per cent. of water, which on account of the porosity and capillary attraction of the nitro-cellulose, is not removed by the centrifugal force of the wringer. This water must be removed in order to make the nitro-cellulose into powder which is accomplished by opening the valve 23 in the pipe 22, which allows the alcohol to flow into the spray pipe 24 from whence it is forced in the form of a jet or spray against

the inner surface of the nitro-cellulose 25. As the wringer basket continues to revolve, the alcohol is absorbed into the mass of nitro-cellulose and forced therethrough by the centrifugal force of the wringer, displacing the water before it so that by regulating the quantity of alcohol used, the entire amount of water in the nitro-cellulose may be forced from the mass. The alcohol at the beginning is slightly diluted with water and by turning the lever handle of the three way valve 10, this weak alcohol and surplus alcohol may be exhausted through the pipe 12 and collected in the storage tank (not shown) and later re-rectified and used over again. By drawing samples of alcohol through the pet cock in the discharge pipe 9 and testing the samples withdrawn from time to time, it can readily be ascertained when the water has all been withdrawn from the nitro-cellulose, the de-hydration being complete when the alcohol forced through the nitro-cellulose is not diluted with water but is of the original strength. The supply of alcohol is then shut off and the wringer revolved at a speed sufficient to remove from the nitro-cellulose all the alcohol except the amount required for the manufacture of powder, which is usually from twenty five to thirty five per cent. The power is then shut off, the wringer stopped and the nitro-cellulose being in a light porous condition is easily removed from the wringer basket.

What I claim is:

1. A process for dehydrating nitro-cellulose which consists in subjecting the nitro-cellulose in a pulpy state to the action of a centrifugal to extract the major portion of the water, subjecting the matted mass to a sprayed bath of alcohol while the centrifugal is still rotating to extract the remaining water, and then regulating the speed of said centrifugal to retain a proper amount of alcohol in said matted mass.

2. A process for dehydrating nitro-cellulose which consists in subjecting the nitro-cellulose in pulpy state to the action of a centrifugal under high speed to extract the greatest amount of water, subjecting the resulting mass to a sprayed bath of alcohol, while the centrifugal is still rotating to expel the remaining water, and then lessening the speed of said centrifugal to proportion the amount of alcohol to be left in said mass.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GEORGE W. GENTIEU.

Witnesses:

MARY E. COMEGYS,
E. M. GILES.