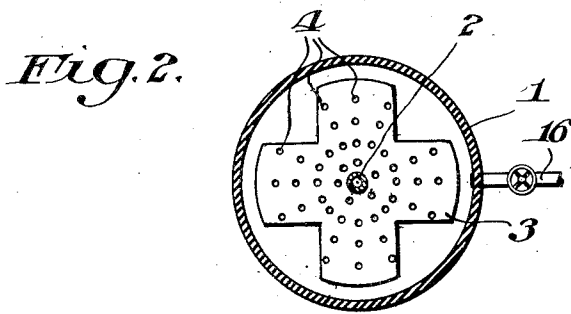
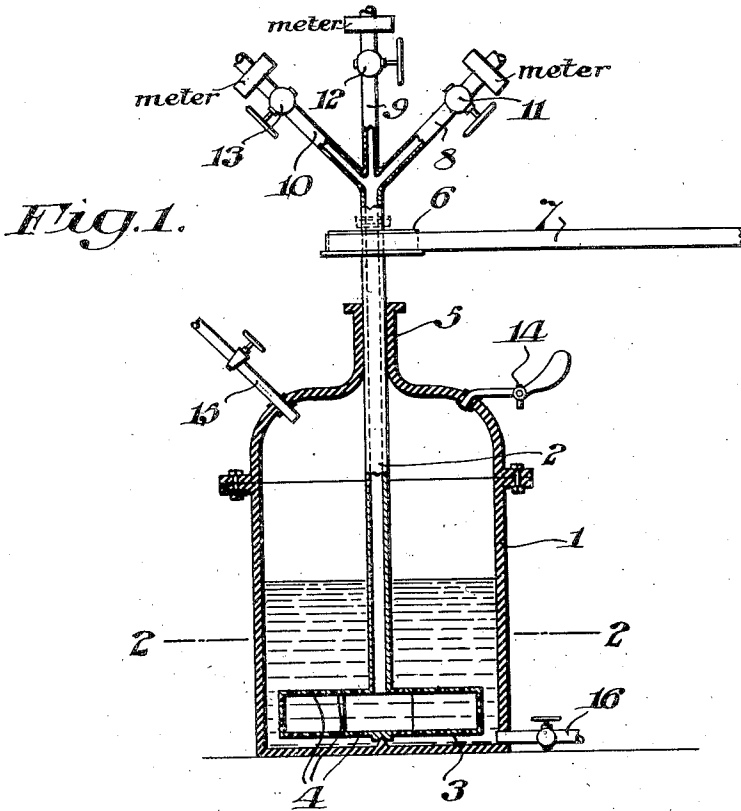


I. KITSEE.
PRODUCING NITRATING LIQUOR.
APPLICATION FILED FEB. 7, 1919.

1,380,392.

Patented June 7, 1921.



Inventor:

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Witnesses:

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PRODUCING NITRATING LIQUOR.

1,380,392.

Specification of Letters Patent.

Patented June 7, 1921.

Application filed February 7, 1919. Serial No. 275,549.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Producing Nitrating Liquor, of which the following is a specification.

My invention relates to an improvement in producing nitrating liquor.

Its object is to produce nitrating liquors in a more economical manner than is the case today.

My invention is useful in all cases where inorganic or organic materials have to be nitrated, but I will describe here my invention as being applied to the nitration of fibrous material, such as cotton or wood fiber, out of which then such articles as celluloid may be produced.

To illustrate one form my invention may take I have reference to the accompanying drawing.

In this drawing Figure 1 is a vertical section of a device useful in producing nitrating liquor in accordance with my invention. Fig. 2 is a horizontal section on the line 2—2 of Fig. 1.

I will now describe the mode or method of procedure in obtaining the required result and in doing so I will refer to the different numbers as indicating the different parts of these figures.

1 indicates the container. This container is here illustrated as consisting of two parts, a lower part in which the liquor is contained and an upper part closing the container proper against the undue inflow or outflow of gases. The upper part is removable from the lower part, but securely fastened thereto, here with the aid of bolts. 2 is a pipe reaching into the liquor and provided on its lower end with perforated wings or paddles; the paddles are indicated by 3 and the perforations by 4. The upper end of this pipe is provided with the branch pipes 8, 9, 10; each of these branch pipes is provided with a valve indicated by 11, 12, 13 respectively. Each of these branch pipes is also provided with a device adapted to measure the inflow of the gaseous or moist material and these devices are indicated by the word "meter." The main pipe is also provided with means to revolve the same; these means are here indicated by 6 and 7. The upper part 5 of the container is provided with the

pressure valve 14 and the inlet pipe 15. The lower part of the container is provided with the outlet 16.

It is well understood that the nitrating liquor for cotton and other fibrous material comprises:—

Nitric acid one part.

Sulfuric acid two parts.

Today these two acids are well inter-mixed and the material to be nitrated is immersed therein.

I have found that it is possible to use instead of the sulfuric acid, the sulfurous acid gas out of which the sulfuric acid is produced, directly instead of the dearer sulfuric acid. To produce the sulfurous acid gas, either the sulfur itself may be heated so as to produce the sulfurous gas, which is more convenient for my purpose, or materials carrying sulfur in combination, such as pyrites may be brought to the necessary temperature, so as to generate the required gas, and it is supposed that one of the branch pipes, say pipe 9 is connected with a container in which the gases are generated. But as, for the production of sulfuric acid a certain amount of oxygen or oxygen carrying substances are required I connect one of the branch pipes, say pipe 8 with a source of compressed air, preferably heated, and as it is advantageous to have a certain amount of moisture present, the pipe 10 is connected to a steam generating apparatus.

The operation is as follows:—Necessary quantities of the sulfurous gas are conveyed through 9 at one and the same time as necessary quantities of air are conveyed through 11 and the necessary quantities of steam conveyed through 10 into the pipe 2 where they inter-mix and as their pressure is greater than the pressure of the nitric acid contained in the container at the beginning of the operation, the combined gases and moisture will issue out of the perforations of the paddles into the nitric acid. During the whole operation the tube with its appended wings or paddles is revolved and through this revolving action the gases with the moisture are brought in contact with different parts of the nitric acid; through this procedure the sulfurous acid gas (SO_2) is converted into sulfuric acid (H_2SO_4). Either during the time of operation or after the operation is completed, nitric acid may be added through the pipe 15. Too great a pressure is relieved through the valve 14, which may be

regulated to suit requirements. The meters are a necessity so as to inform the operator of the quantities of the different gases or moisture conveyed into the nitric acid and he can then, as occasion requires, either open or close one or the other of the valves.

After the operation is completed, that is after the necessary quantity of sulfurous acid is produced in the compartment in conjunction with the nitric acid, the upper part is removed and in the liquor, now consisting of nitric acid and sulfurous acid combined in required ratio, the material to be nitrated is immersed as usual.

I have here illustrated means to convey the required gases and moisture into the nitric acid, I have also illustrated means to agitate the nitric acid and thereby bring every particle of the gases in contact with different parts of the acid, but it is obvious that persons versed in the art may change one or the other part of the device without departing from the scope of my invention.

It is obvious that in practice where more than one nitrating vat is required, only one generating source of the sulfurous acid gas with its accessories is necessary and the gas may then be conveyed through a large main pipe and multiple pipes connected thereto, to the different vats or stills, but I do not deem it necessary to illustrate this part of my invention, it suffices to state this fact.

The production of sulfuric acid *per se* is entirely disclaimed and the invention has only reference to the economical production of a solution adapted to be used for nitrating cellulose or such substances as require a nitration with the aid of a nitric and sulfuric acid.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of producing a nitrating liquor useful for nitrating cellulose which consists in conveying into a nitric acid bath sulfurous acid gas and simultaneously agi-

tating the bath, thereby bringing in contact the gas with different parts of said bath whereby sulfuric acid is produced, the proportions to be such as required for successful nitration of cellulose immersed therein.

2. The method of producing a nitrating liquor useful for nitrating cellulose which consists in simultaneously conveying into a nitric acid bath a sulfurous gas and an oxygen carrying material and agitating the bath, so as to bring the conveyed bodies in contact with different parts of said bath, the proportion of the generated sulfuric acid to the nitric acid being approximately two to one.

3. The method of producing a nitrating liquor for cellulose which consists in first producing a nitric acid and then adding to said nitric acid sulfurous acid gas in combination with an oxygen carrying material and heated steam, the quantity being such that the generated sulfuric acid overbalances in quantity the nitric acid present.

4. In the production of nitrating liquors the improvement which consists in conveying simultaneously sulfurous acid gas, air and steam inter-mixed into a nitric acid bath and agitating during said process the bath, so as to bring the conveyed bodies in contact with different parts of said bath whereby sulfuric acid is produced, the proportions to be such as required for successful nitration of cellulose immersed therein.

5. The method of producing a liquor for the purpose of nitrating a cellulose which consists in generating in the required nitric acid, sulfuric acid in required quantities so that both acids produce the necessary nitrating solution.

In testimony whereof I affix my signature in the presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

E. E. MILLER,

JOHN J. RUTHERFORD.