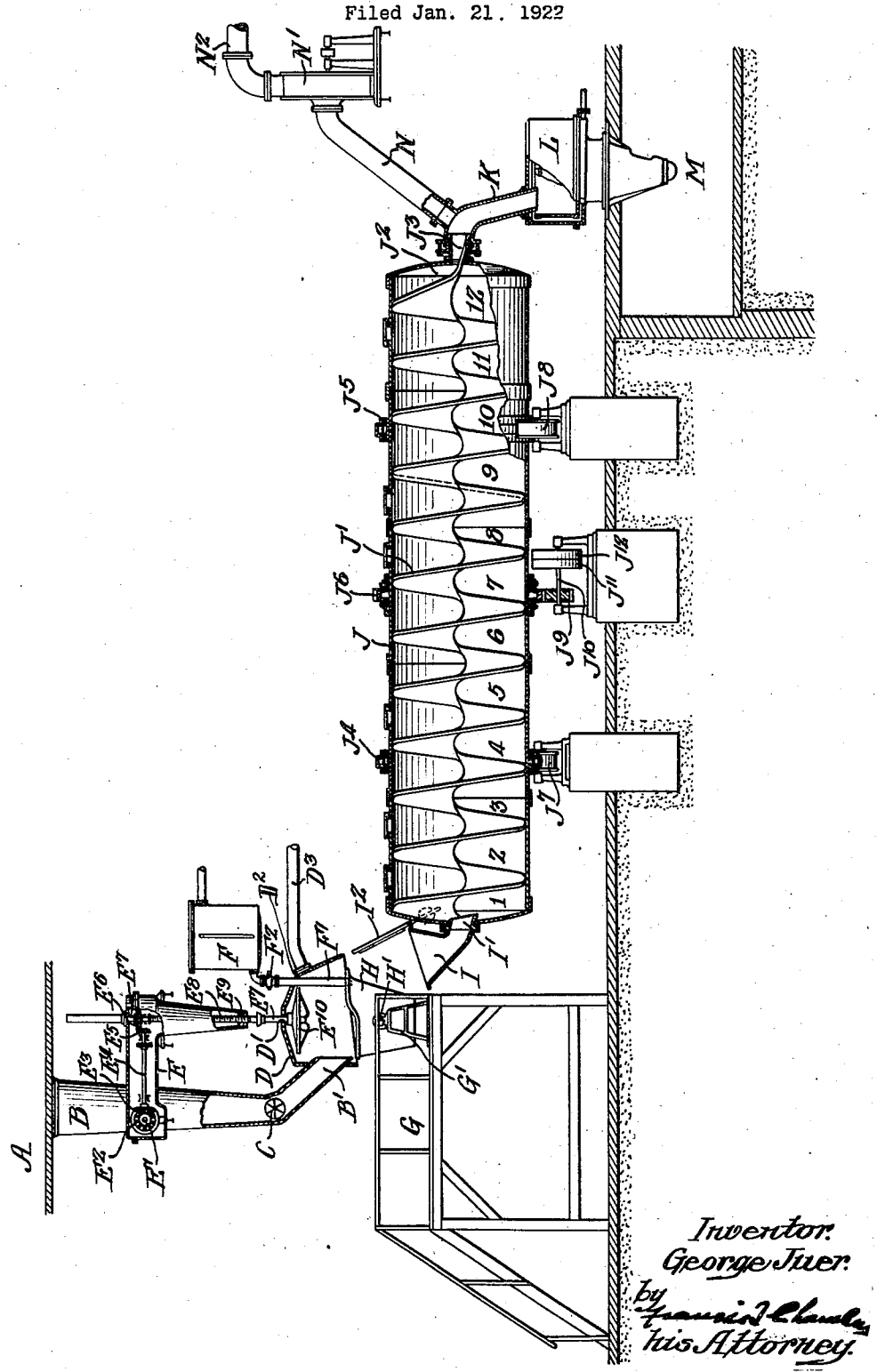
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NITRATING APPARATUS

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NITRATING APPARATUS.

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To all whom it may concern:

Be it known that I, GEORGE JUER, recently a subject of the former Austro-Hungarian Empire, and now a resident of Hopewell, in the county of Prince George, in the State of Virginia, have invented certain new and useful Improvements in Nitrating Apparatus, of which the following is a true and exact description, reference being had to the accompanying drawing, which forms a part thereof.

My invention relates to nitrating apparatus suitable for use in the treatment of cotton to convert it into nitro-cellulose. The object of my invention is to provide a simple, compact and comparatively inexpensive and thoroughly efficient mechanism for carrying on the nitrating operation, and the leading feature of my invention consists in combining with a nitrating pot an apparatus of ordinary construction, a cylindrical receiver rotatable at will and provided internally with a spirally twisted plate secured to its inner wall so as to serve as a conveyer for the material delivered to the cylinder and also acting to separate the lower portion of the cylinder into a series of chambers, each of a capacity sufficient to hold and keep separate the entire charge of the mixing pot.

In operation it is my intention that the receiving cylinder is given one complete movement of rotation after each charge of the mixing pot is dumped into it so that the charges will be moved progressively and intermittently through the cylinder, the length of the cylinder being such as to insure that each charge will remain in the cylinder for a sufficient period to insure the complete nitration of the cotton. Operated in this way each charge from the mixing pot is not only kept entirely separate from each other charge but is in the cylinder intermittently tumbled as the cylinder is given a motion of rotation. This tumbling and the simultaneous longitudinal movement given to the charge by the helical walls of the containing chamber effecting a most desirable mixing of the cotton and acid and of the different layers of acid with the least possible tearing or disintegrating action on the fibres of the cotton.

My invention and its details will be best understood and described in connection with the drawing in which it is illustrated and which is an elevation for the most part in section of a plant embodying my invention.

A indicates the flooring of a room at a higher elevation than the nitrating apparatus in which the cotton to be nitrated is stored and from which leads a hopper B provided with a feeding device indicated at C. B′ indicates the delivery end of the hopper opening as shown into a hood D which extends over the top of the mixing pot. D′ is an opening in the top of the hood through which the shaft of the mixing device extends. D^2 is an opening in the hood through which an acid pipe is introduced into the hood and D^3 is a pipe or conduit leading from the hood and connected with a fan, not shown, for drawing off the acid fumes which rise in the hood from the mixing pot. E indicates the housing for the mixing apparatus, E′ indicating a driving shaft which, as shown, is connected by a mitre wheel E^2 and the mitre wheel E^3 with the shaft E^4 which through a mitre gear E^5 drives a mitre gear E^6 from which extends a shaft E^7 connected so as to rotate with the gear E^6 but free to move up and down in it, the lower part of this shaft being threaded as indicated at E^8 and the threaded portion of the shaft being engaged with a threaded portion E^9 of the housing E. E^{10} indicates the mixing wheel supported at the bottom of the shaft E^7. This part of the apparatus is not new with me and is not shown in detail. It will be understood that the shaft E^4 is rotated alternately in opposite directions so that the mixing device E^{10} also rotating in opposite directions will alternately rise and fall in its downward movement pressing the cotton entering the hood through the hopper into the mixing pot and while in the pot acting to mix the cotton thoroughly with the acid.

F is a measuring tank for the acid from which leads a pipe F′ for delivering the acid into the mixing pot, F^2 indicating a cap for opening and closing this pipe. G is a platform on which are supported the standards G′ which support the trunnions H′ of the mixing pot indicated at H. I is a hopper secured in the end of the cylinder J and opening into the cylinder through its lower end indicated at I′. I^2 is a closure for the hopper which is opened when the charge is being dumped into it from the mixing pot and which should remain closed during the

rotating movement of the cylinder. J is the cylinder to the inner wall of which is secured the helically bent plate indicated at J'. The depth and pitch of this helix should be such as will divide the lower portion of the cylinder into a series of containing chambers indicated in the drawing by the numerals from 1 to 12 and each of such dimension as to hold and keep separate a charge delivered into the cylinder from the mixing pot. I consider it advisable that each chamber, 1, 2, etc., should have a capacity of about three times that of the mixing pot. The end of the helix indicated at J^2 is formed so as to lead directly into the delivery passage J^3 at the rear end of the cylinder. J^4 and J^5 are circular rings or bearings secured to the cylinder J and through which it is supported on rollers indicated at J^7 and J^8. J^6 is an annular rack or gear wheel secured to the cylinder J and engaged with the pinion J^9 on a shaft J^{10} to which, as shown, are secured fast and loose pulleys J^{11} and J^{12}. K is a delivery conduit with which the delivery end J^3 of the cylinder connects as shown and which leads into a centrifugal wringer indicated at L and which may be of ordinarily used construction from which the dried nitrate of cotton is delivered into a storage chamber M. N is a conduit leading from the upper end of the delivery conduit K to a fan indicated at N', from which leads an outlet conduit N^2.

In operation a measured charge of acid is delivered into the mixing pot H and a measured charge of cotton is dumped into the hopper B. The feeding device C and mixing device E^{10} are then set in operation, the cotton being fed with uniform determined speed into the mixing pot and the mixer E^{10} in its downward movement pressing the cotton which has passed the delivery end B' of the hopper down into the mixing pot H and thoroughly stirring it into the acid. When the full charge of cotton has been delivered into the mixing pot and thoroughly mixed with the acid therein the cylinder J brought to the position shown in the drawing with its hopper I in proper position to receive the charge from the mixing pot has the contents of the mixing pot dumped into it, the charge occupying the divisional chamber indicated at 1 and thereafter the cylinder J is rotated through one complete revolution so that the charge just dumped into it will occupy the chamber indicated at 2. A new charge of acid and cotton is then mixed in the mixing pot and dumped into the chamber 1 of the cylinder J and so on. The number of chambers into which the cylinder J is divided by the spirally twisted plate is such as to insure that each charge progressively delivered to the cylinder and progressively moved along the length of the cylinder should remain in the cylinder for a sufficient length of time to insure its complete nitration so that when the charges are delivered from the end chamber 12 into the outlet passage J^3 and through the conduit K into the wringer L nitration will be completely effected.

It will be obvious that my mechanism is such that a single mixing pot and mixing apparatus can be kept in practically continuous operation to thoroughly mix the cotton and acid together and begin the nitrating operation while the greater part of the operation of nitration goes on in the mixing cylinder which keeps the charges from the mixing pot separated from each other and retains each charge for a sufficient length of time to insure the complete nitration of the cotton before delivering it to the drying apparatus.

The leading off of fumes from the hood over the mixing pot and from the conduit K is a detail of practical importance enabling my apparatus to be used without exposing the workmen to the acid fumes which arise from the mixing pot and cylinder.

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

1. A nitrating apparatus comprising in combination a mixing pot, a rotatable nitrating cylinder having a charging opening at one end, a delivery conduit at its other end and a spirally twisted plate secured to its inner surface, said plate having such pitch and height as to form with the walls of the cylinder and along the bottom of the cylinder a multiple series of receptacles separated from each other by the lower portions of the spiral plate and each of greater capacity than the pot and all connected in series by the upper spaces between convolutions of the spiral plate, and means for rotating the cylinder.

2. A nitrating apparatus comprising a hood for a mixing pot, and a mixing pot supported below said hood, a hopper for the purified cotton opening into said hood and having a feeding wheel, means for dipping and agitating the cotton working in the hood, a rotatable cylinder arranged to receive in its front end a charge from the pot, a spirally twisted plate secured on the inside of the cylinder, said plate having such pitch and height as to form with the walls of the cylinder and along the bottom of the cylinder a multiple series of receptacles separated from each other by the lower portions of the spiral plate and each of greater capacity than the pot and all connected in series by the spaces between the upper convolutions of the spiral plate and means for rotating the cylinder.

3. A nitrating apparatus comprising a hood for a mixing pot, and a mixing pot supported below said hood, a hopper for the

purified cotton opening into said hood and having a feeding wheel, means for dipping and agitating the cotton working in the hood, a rotatable cylinder arranged to receive in its front end a charge from the pot, a spirally twisted plate secured on the inside of the cylinder, said plate having such pitch and height as to form with the walls of the cylinder and along the bottom of the cylinder a multiple series of receptacles separated from each other by the lower portions of the spiral plate and each of greater capacity than the pot and all connected in series by the spaces between the upper convolutions of the spiral plate, means for carrying off fumes from the pot and delivery conduit and means for rotating the cylinder.

GEORGE JUER.