Nov. 15, 1938. F. BERKA ET AL 2,136,485

METHOD OF DENICOTINIZING TOBACCO

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Fig.1

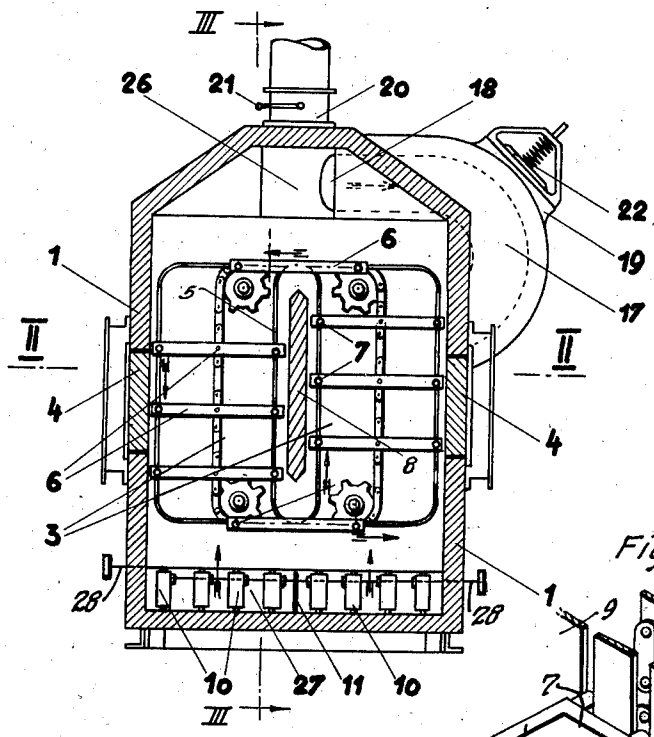


Fig. 1a.

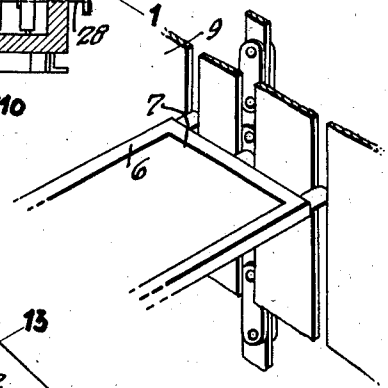
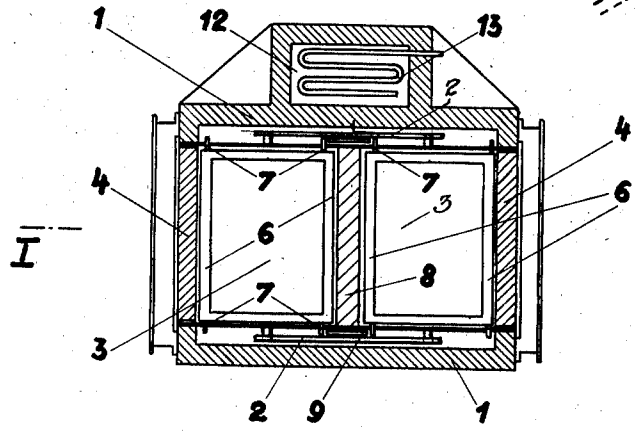


Fig.2



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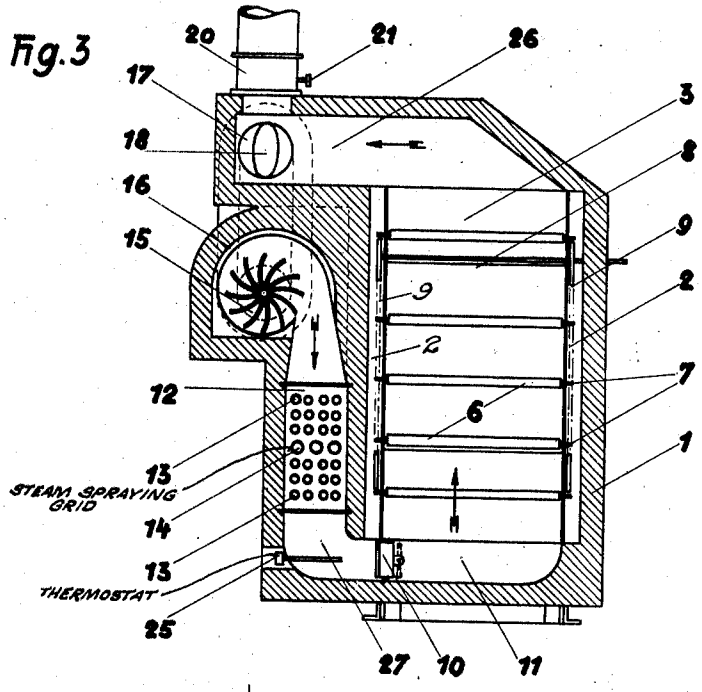
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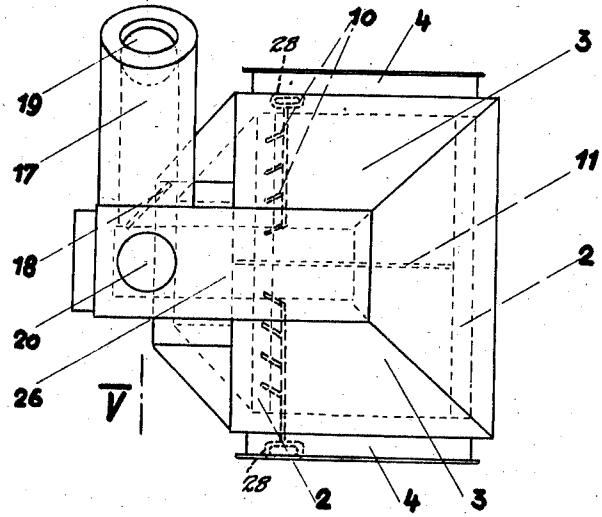
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Fig. 3



V

Fig. 4



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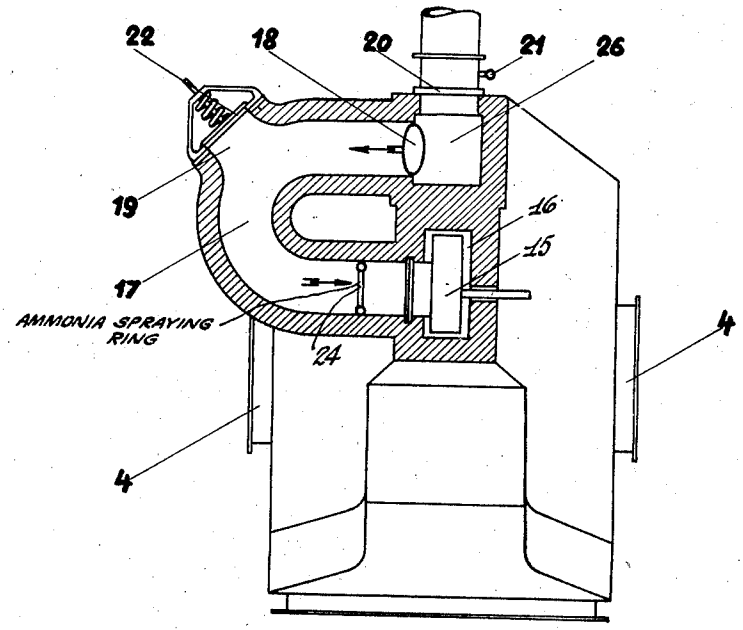
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Fig. 5



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METHOD OF DENICOTINIZING TOBACCO

Fritz Berka and Alexander Giller, Vienna, Austria

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6 Claims. (Cl. 131—6)

This invention relates to the denicotinizing of tobacco, and provides improved method of accomplishing this end.

Hitherto tobacco has been denicotinized by the passing of superheated steam and air therethrough. With this method, in order to break down the nicotine salts it is necessary to employ a temperature varying according to the nature of the tobacco used, between about 120 and 160° C. Such relatively high temperature has a deleterious influence on some kinds of tobacco, and more particularly on those of light color, since it gives rise to darkening of the color. In consequence of this fact it has often been the practice hitherto to denicotinize light colored tobaccos uneconomically by extraction.

It has also already been proposed to subject tobacco, before extraction by means of nicotine-dissolving liquids, to treatment with ammoniated steam containing carbon dioxide, in order to inhibit the occurrence of undesirable oxidation effects, and more particularly darkening of the leaves.

It is also known to treat tobacco with a stream consisting of a mixture of gaseous ammonia and steam first of all in a container capable of air-tight closure, in order to disengage the nicotine from its salts, and finally to distil off the nicotine with the aid of steam.

With this latter method the tobacco becomes subjected to extraction by the steam, which brings about undesired alteration in its flavor and appearance. In order to avoid these results, attempts have been made to effect denicotinizing of tobacco by treatment with ammonia and after-treatment in a stream of carbon dioxide.

In known methods of this description gaseous ammonia is added in great excess to the steam, so that a special after-treatment is required to remove all traces of ammonia from the tobacco.

Now we have succeeded in establishing the surprising fact that tobacco can be denicotinized to a great extent, without suffering discoloration or loss of aroma, with the use of but slight quantities of ammonia and steam, provided air be employed in great excess. Preferably sufficient steam is added to saturate the air with moisture at the temperature at which the tobacco is treated.

In our method ammonia is only required in the amount theoretically necessary for the conversion of the nicotine content of the tobacco treated. However, since air is employed in great excess we use in practice two to three times the quantity of ammonia theoretically required for the conversion of the nicotine salts present in the tobacco treated, that is to say on an average 200 grams of NH_3 in 300,000 liters of moisture-saturated air per hour.

For the purposes of our method temperatures under 100° C. are sufficient.

The method according to the present invention also differs essentially from known denicotinizing processes in which alkaline liquids are sprayed on to the tobacco. These methods give rise to the formation of spots and blotches on the tobacco, while at the same time it is not possible at low temperature to obtain the required extent of conversion of the nicotine salts.

In accordance with the present invention air is preferably used in quantities amounting to about two hundred times the volume of the tobacco, per minute. During and after the denicotinizing, the tobacco is subjected to aeration for the purpose of removing the traces of ammonia.

The method according to the invention is preferably carried out with the aid of apparatus consisting essentially of a container which is divided by a partition wall into two compartments. Through a common conduit there is blown into these chambers, from below, the reaction mixture consisting of heated air, ammonia, and steam required to effect the denicotinizing, while this mixture is drawn off at the top likewise through a common conduit. In the chambers there are provided angle-iron frames for the reception of latticed screens filled with tobacco, these frames being adapted for movement or conveyance in such a manner that each individual screen can be conducted from the one chamber past the inlet aperture or blower nozzle, and upwards in the second chamber, so that, aided by the circulatory movement of the latticed screens, the reaction mixture effects thorough denicotinizing of the tobacco.

A form of construction of apparatus in accordance with the invention is shown, by way of example, in the accompanying drawings, in which:

Fig. 1 is a vertical middle section taken on the line I—I of Fig. 2.

Fig. 1*a* is a partial perspective view of the conveyor means.

Fig. 2 is a horizontal section taken on the line II—II of Fig. 1.

Fig. 3 is a vertical section taken on the line III—III of Fig. 1.

Fig. 4 is a plan view.

Fig. 5 shows a detail, on an enlarged scale, in section taken on the line V—V of Fig. 4.

Referring to the drawings, there are provided within the outside walls 1 of the suitably lagged box-like container two vertical wrought-iron shafts or compartments 2 of rectangular cross-section. The resulting intermediate space 3 is divided by means of a partition 8 into two chambers each of which is provided with a closed air-tight door 4. The inner walls of the shafts or compartments 2 are provided with track-like slots 5 (see Fig. 1). Angle-iron frames 6 serve to carry the latticed screens and are provided with rollers 7 projecting through the slots 5 into the shafts or compartments 2. Conveying means 9 of any conventional type, e. g. endless chains driven by sprocket wheels are housed in the shafts or compartments 2 (see Figs. 2 and 3) to carry the frames 6 in a continuous movement through the chambers. A blow-fan 15 located in the chamber 16 forces the reaction mixture past the heater 12, in which a divided heating coil 13 is housed, into the conduit 27 which is divided into two parts by a partition wall 11. The baffles 10 provided in the conduit 27 serve to effect uniform distribution of the reaction mixture in the chambers, for which purpose they are adjustable from the outside by means of rods 28. The baffles are a series of plates pivotally mounted so as to turn about their vertical center lines, as indicated in Figs. 1 and 4. The rods 28 are connected to one vertical edge of each plate so that, by pulling the rods out or pushing them in, all of the plates can be turned about their pivots. From the drawing-off conduit 26 there is branched off a U-shaped tube 17 which leads down to the blower fan 15 (Fig. 5). At the juncture between this U-shaped tube 17 and the conduit 26 there is provided a pivoted damper 18 by which the relative proportions of fresh and circulated air can be controlled during the course of the reaction.

From the conduit 26 there is branched the discharge pipe 20 for the spent reaction mixture. In the U-tube 17 there is provided an inlet 19 through which fresh air can be drawn in. The discharging of the spent reaction mixture is regulated by means of a pivoted damper 21, and the supply of fresh air by a valve 22. Both of these controlling members can be operated independently of each other, and can be fixed in any desired position. Just before the aperture or orifice of the passage leading to the suction side of the blower 15 there is mounted in the U-shaped tube 17 a spraying ring 24 through which the ammonia required for the process is blown in. In the heater 12, between the turns of the coil 13, there is provided a spraying grating 14 through which the necessary steam is supplied.

At the commencement of the process, the conveying mechanism which moves the latticed screens is set in operation, while the damper 21 and the valve 22 are closed. The pivoted damper 18 is fully opened. The air contained in the apparatus is drawn from the space 3 by the blower 15 and forced in again after traversing the heater 12. As soon as the required temperature has been reached by this internal circulation, which is automatically regulated by a thermostat 25 built into the conduit 27, steam is fed in through the spraying grid 14. The damper 21 and the valve 22 are then opened, the damper 18 set to the required ratio between fresh air and circulated air, and ammonia fed in through the spraying ring 24. The blower fan sucks in fresh air through the inlet 19, which becomes mixed with the ammonia introduced through the spraying ring 24, and forces the resulting mixture through the heater 12 in which steam is added to the mixture through the spraying grid 14. The spent reaction mixture containing nicotine escapes into the open through the outlet 20, or is partly returned into circulation, according to need, by suitable adjustment of the pivoted damper 18.

We have found it to be essential that the air, ammonia, and steam be intimately commixed on entering the apparatus and before coming in contact with the tobacco. This is effected as described by means of the blower.

In Figure 1 the tobacco is shown moving downwardly on the left side of the apparatus and upwardly on the right side. The arrows in the lower portion of the figure indicate the direction of movement of the gas mixture. This renders it apparent that in one part of the movement of the tobacco the gas mixture moves in the same direction and in another part of the movement of the tobacco the gas mixture moves in the opposite direction of the movement of tobacco. This indicates that a counter-current movement of the gas relative to the tobacco takes place.

We claim:

1. The method of denicotinizing tobacco which consists in treating tobacco with a gaseous mixture consisting of an excess of moisture-saturated air at a temperature under 100° C. and ammonia in a proportion amounting to approximately 2 to 3 times the quantity theoretically necessary to effect conversion of the nicotine salts contained in the tobacco treated, the air being used at the rate of substantially two hundred times the volume of the tobacco treated, per minute, and any residual ammonia is removed by thorough aeration of the denicotinized tobacco.

2. A method of denicotinizing tobacco which consists in conducting tobacco on a conveyor on the counter-current principle in a tunnel through a reaction mixture consisting of an excess of air at a temperature under 100° C., ammonia in a proportion amounting to approximately two to three times the quantity theoretically necessary to effect conversion of the nicotine salts contained in the tobacco treated, and sufficient steam to saturate the air with moisture.

3. A method of denicotinizing tobacco, which consists in conducting tobacco on a conveyor on the counter-current principle in a tunnel through a reaction mixture consisting of air employed at the rate of approximately two hundred times the volume of the tobacco treated, per minute, ammonia in a proportion amounting to approximately two to three times the quantity theoretically necessary to effect conversion of the nicotine salts contained in the tobacco treated, and sufficient steam to saturate the air with moisture, the said mixture being at a temperature below 100° C.

4. A method of denicotinizing tobacco, which consists in conducting tobacco in reaction chambers, first in counter-current movement through a reaction mixture consisting of an excess of air at a temperature below 100° C., ammonia in a proportion amounting to approximately two to three times the quantity theoretically necessary to effect conversion of the nicotine salts contained in the tobacco treated, and sufficient steam to saturate the air with moisture, then pass the point at which said mixture is admitted to said chambers, and finally in movement parallel to the flow of the said mixture.

5. A method of denicotinizing tobacco, which

consists in conducting tobacco in reaction chambers, first in counter-current movement through a reaction mixture consisting of air employed at the rate of approximately two hundred times the volume of the tobacco treated, per minute, ammonia in a proportion amounting to approximately two to three times the quantity theoretically necessary to effect conversion of the nicotine salts contained in the tobacco treated, and sufficient steam to saturate the air with moisture, the said mixture being at a temperature below 100° C., then conducting the tobacco past the point at which said mixture is admitted to said chambers, and finally conducting the tobacco in movement parallel to the flow of the said mixture.

6. The method of denicotinizing tobacco which consists in treating tobacco with a stream of a gaseous mixture consisting of ammonia in a proportion amounting to approximately two to three times the quantity theoretically necessary to effect conversion of nicotine salts in the tobacco treated and moisture saturated air at a temperature under 100° C. and in a quantity per minute sufficiently exceeding the volume of the tobacco to be treated, to continuously remove any residual ammonia from the denicotinized tobacco.

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