# United States Patent [19]

**Brochot**

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[54] **TOBACCO-DENICOTIZATION PROCESSES**


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[52] **U.S. Cl.**..... **131/143,** 131/133 A, 131/134

[51] **Int. Cl.**..... **A24b 15/02**

[58] **Field of Search**..... 131/17, 140–144, 131/133 A



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[57] **ABSTRACT**

Processes are provided for reducing the amount of nicotine and other desirable agents in tobacco, which processes do not require a final drying stage, and the resulting tobacco products are easy to keep and retain the essence of their physical and gustative qualities. The processes are characterized essentially by successive injections of ammonia gas and steam below atmospheric pressure, which injections are preceded, separated and followed by the drawing of industrial or low vacuums. The tobacco to be treated may be suitable prehumidified, and damp (humid) or dry (non-humid) industrial vacuums may be used at various stages of the processes in order to adjust the humidity of the tobacco as desired.


**11 Claims, No Drawings**

# TOBACCO-DENICOTIZATION PROCESSES

## BRIEF SUMMARY OF INVENTION

This invention relates to an industrial process for treating tobaccos by more or less elaborate elimination of the amount of nicotine, other alkaloids, and possibly other compounds in order to reduce their strength. Thus, nicotine, alkaloids and possibly other compounds may give a certain pungency to the smoke which is released by the slow combustion of tobaccos. The processes of the present invention are based on the implementation of ammonia gas which partially volatilizes the alkaloids and makes possible or facilitates their elimination in gaseous form. The processes are essentially characterized by the combination of successive injections of ammonia gas and steam, with these phases of treatment being preceded, followed and separated by vacuum-drawings. These vacuum-drawings favor the volatilization of the undesirable tobacco constituents after extraction of the major part of interstitial air. At the same time, the vacuum-drawings facilitate penetration of the injected gaseous agents into the more or less compact mass of tobacco matter to be treated. This facilitated penetration thereby permits the process to be applied to both tobaccos treated in bales, casks, or loose (plugs or strips) as well as to tobaccos already cut or chopped.

## BACKGROUND OF THE INVENTION

The joint action of ammonia and water has long been used on tobacco to reduce the nicotine content of the tobacco. It is known that ammonia displaces the nicotine from its organic salts (this alkaloid is naturally present in tobacco mainly in the form of citrates and malates) and that water easily washes away the released nicotine as well as the excess ammonia.

It has already been proposed to bring the tobacco into contact with ammonia and water either in liquid form, or in gaseous form, or else by the successive action of an ammoniacal solution and steam at low temperature. For example, the liquid form may comprise washing or sprinkling the tobacco with an ammoniacal solution followed by rinsing with pure water. The gaseous form may include washing small quantities of tobacco with a stream of water-ammonia vapor, which may be obtained for example by distilling an ammoniacal solution of the appropriate strength.

All of these previous processes have in common the disadvantage that in the process of washing away the nicotine and residual ammonia, a much greater weight of water is used than is strictly necessary. This excess water entails two principal drawbacks. In the first place, after the treatments are completed, the tobacco remains full of humidity, and must thereafter be dried effectively in order to ensure that it will keep later on. In the second place, the water or steam, even at a relatively low temperature, washes away together with the nicotine a fraction of the organoleptic compounds which give the tobacco its scent and its taste. The greater the excess amount of water, the larger the fraction, since the relatively less volatile substances are permitted to be diluted in the confined atmosphere.

Tobaccos denicotinized by these methods generally have little scent, and their taste is predominantly pungent.

The present invention is primarily interested in furnishing a process for reducing the amount of nicotine and other undesirable agents in the tobacco. Such process should allow the direct obtainment, without a final drying stage, of products which are easy to keep and which can be advantageously cured or matured during a later storage period under the best hygrometric conditions. Another object of the invention is to obtain tobacco products which retain the essence of their physical and gustative qualities.



It is also an object of the present invention to obtain a process which allows the quantities of injected extraction agents to be dosed at will, and permits an immediate repetition of the treatment cycle, should this be needed. Yet another object of the invention is to permit a denicotization process which may be as elaborate as desired both in relation to the characteristics of the tobacco initially subjected to treatment and to the desired qualities of the final product, but which permits a remarkable economy of raw materials and energy.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The process in accordance with the present invention differs from those previously used, by combining different successive phases of treatment whose most noble characteristics are as follows:

Ammonia and steam are successively brought into contact with the tobacco, preferably in an enclosed space so that the pressure can be controlled at all times. In particular, when the ammonia is in contact with the tobacco, the pressure can be controlled so that the vapor pressure of the ammonia gas forms the main constituent of the sub-atmospheric pressure within the treatment area.

In accordance with the present invention, before submitting the tobacco to the action of pure ammonia gas, a vacuum which is large in relation to the atmospheric pressure should be drawn within the treatment area.

According to a preferred method, particularly from an economic point of view, the ammonia will be introduced into the treatment area under conditions such that the total pressure within the treatment area is lower than the atmospheric pressure.

In order to remove excess ammonia from the treatment area before the introduction of steam, the phase or sequence of contact between tobacco and ammonia should be followed by the drawing of an industrial vacuum. As described below, the industrial vacuum may be either humid (also referred to as a damp vacuum) or dry (non-humid or non-damp).

For the same reason, and also in order to condition the treated tobacco at a level of humidity balanced in relation to the ambient atmosphere, the phase of contact between tobacco and steam should be followed by placing the tobacco in the treatment area under a damp or humid vacuum; that is, a vacuum in which the absolute pressure corresponds to the steam pressure at the temperature of the treatement.

In order to accelerate the process, the vacuum following a tobacco-ammonia or tobacco-steam contact sequence can be broken by a direct injection of steam.

Prior to treatment, the tobacco can be brought to a humidity level most favorable to the subsequent action of ammonia gas.

The tobacco can, for example, undergo pre-humidification under a vacuum within the treatment area itself. This pre-humidification comprises an initial drawing of the vacuum, followed by an injection of

steam, and finally effecting of a damp or humid vacuum corresponding to the temperature of the tobacco.

An example will now be given of the preferred sequence recommended in a great number of cases for application of the process of the present invention. This preferred treatment, which is particularly suitable for so-called "dark" and average nicotine content tobaccos (for example, between 1 and 2 weight percent nicotine), can include numerous variations without exceeding the scope of the present invention. These variations will depend on the nature of the tobacco, its degree of maturity or dryness, the final product desired, etc. The preferred process consists fundamentally of the following phases or sequences:

1. Drawing of an industrial vacuum over the batch of tobacco to be treated in order to eliminate a large proportion of the ambient and interstitial air and to facilitate penetration of the succeeding treating agent.

2. Optional: Introduction of steam at a predetermined pressure and up to a well-defined pressure, followed by drawing of a damp or humid vacuum, so as to reheat and humidify the tobacco to the optimum conditions for action by the ammonia.

3. Introduction of ammonia gas up to a desired pressure still below atmospheric pressure. During this sequence, which lasts longer than the others, a drop in pressure is noted due to the absorption of the gas by the tobacco and residual humidity. If desired, this drop in pressure may be compensated by further injections of ammonia gas.

4. Renewed dry drawing of a vacuum in order to eliminate excess ammonia, ammonia-solution condensations, and the first volatile components released from the tobacco.

5. Admission of steam under the same conditions as in (2). However, the purpose of the steam this time is to obtain action on the nicotine which has been freed of its salts in the tobacco by the ammonia gas, and possibly to obtain action on any residual ammonia, while at the same time reheating the tobacco.

6. Renewed drawing of a vacuum in order to extract vapor and nicotine by pseudo-distillation.

7. Re-establishing atmospheric conditions over the tobacco, unless it is preferred to recommence the process at step (3), which step would follow naturally from step (6).

If atmospheric conditions are to be re-established, a damp or humid vacuum will be drawn in step (6) if the tobacco is not to be dried too much. If the process is to recommence at step (3), a dry (non-humid) vacuum will naturally be preferred in step (6).

Moreover, application of the process requires only the implementation of ordinary industrial or low vacuums, with the exclusion of so-called elaborate or high vacuums. Nevertheless, the greater the compactness of the matter to be treated, the higher the vacuums that will be required, due to the greater resistance of the compact material to penetration and extraction of the gases.

The values given in the following specific example have been considered suitable for leaf tobaccos of the type currently harvested in Metropolitan France. Such tobaccos have already undergone initial fermentation and have a total water content of 15 to 20 percent. It is obvious that under different conditions, these values would have to be modified appropriately.

## SPECIFIC EXAMPLE

A bale of tobacco in plugs in loaded into a cell which can be isolated or connected to (1) two vacuum devices; (2) a saturated steam intake; and (3) an adjustable ammonia feed device. The two vacuum devices would include (a) a dry vacuum by means of a vacuum pump whose volume produced per hour is between 30 and 50 times the volume of the cell; and (b) a damp or humid vacuum by means of a group comprising filter pump and condenser.

The load of tobacco first of all undergoes a dry vacuum, up to an absolute pressure of 20 mm of mercury. Live steam is then admitted and maintains the pressure at a value of 300 mm of mercury (corresponding temperature: 75° C.) for five minutes. A damp or humid vacuum is effected to remove the excess vapor resulting from the preceding conditioning operation (prehumidification), this vacuum being limited to a pressure of 60 mm of mercury.

Ammonia is then admitted, for 15 minutes, until the absolute pressure rises to 400 mm of mercury.

The load is then maintained in this gaseous environment for 60 minutes.

At the end of this contact period, the gaseous treating atmosphere is evacuated by drawing a dry vacuum. This vacuum is effected up to 30 mm of mercury (absolute pressure).

Next, the load undergoes rinsing with live steam with the vacuum climbing up to 300 mm of mercury (absolute pressure), and this environment is maintained for 5 minutes.

The treatment terminates with a final damp or humid vacuum pulled down, for example, to an absolute pressure of 20 mm of mercury.

Atmospheric pressure is then restored by introducing air.

The above treatment, lasting about 2 hours total, allows the nicotine content of the treated tobacco to be reduced by more than 50 percent. As has already been indicated, the duration and the results of the treatment can be modified by changing the characteristics of the different phases of the process.

As used in the preceding specification and the following claims, the term "pure ammonia" is intended to mean ammonia gas without substantial water. That is, the term is intended to exclude the ammoniacal solutions or water-ammonia vapors used in the prior art.

I claim:

1. A process for treating tobacco in an enclosed space with the aim of reducing its content of nicotine, comprising the following steps:

a. drawing an industrial vacuum in the enclosed space in which the tobacco has been placed;

b. injecting steam into the enclosed space while still maintaining the pressure below atmospheric pressure;

c. drawing a humid vacuum in the enclosed space;

d. injecting pure ammonia gas into the enclosed space and again maintaining the pressure below atmospheric pressure in the enclosed space; e. reducing the pressure in the enclosed space to occasion the removal of the ammonia gas from the enclosed space;

f. injecting steam into the enclosed space while maintaining the pressure below atmospheric pressure;

g. reducing the pressure to that of a humid vacuum in the enclosed space; and

h. breaking the vacuum and re-establishing ambient atmospheric conditions in the enclosed space.

**2.** A process for treating tobacco in an enclosed space with the aim of reducing its contact of alkaloids and other undesirable products, particularly free or combined nicotine, the steps comprising:

a. drawing an industrial vacuum in the enclosed space in which the tobacco has been placed;

b. injecting pure ammonia gas into the enclosed space while maintaining pressure below atmospheric pressure in the enclosed space;

c. reducing the pressure in the enclosed space to occasion removal of ammonia gas and released volatile components from the enclosed space;

d. injecting steam into the enclosed space while maintaining the pressure below atmospheric pressure;

e. reducing the pressure in the enclosed space to extract vapor, alkaloids and the like; and

f. breaking the vacuum and re-establishing atmospheric conditions in the enclosed space.

**3.** A process according to claim **2** wherein the vacuum of step (e) is a humid vacuum.

**4.** A process according to claim **3** wherein before step (b) the tobacco is prehumidified by injecting steam into the enclosed space followed by drawing a humid vacuum in the enclosed space.

**5.** A process according to claim **4** wherein the prehumidification step is repeated at least once.

**6.** A process according to claim **3** wherein the vacuum of step (c) is a humid vacuum.

**7.** A process according to claim **4** wherein the vacuum of step (c) is a humid vacuum.

**8.** A process according to claim **3** wherein before step (f), steps (b) through (e) are repeated at least once.

**9.** A process according to claim **8** wherein during the first time step (c) is performed the vacuum of step (c) is a humid vacuum.

**10.** A process according to claim **9** wherein before step (b) the tobacco is prehumidified by injecting steam into the enclosed space followed by drawing a humid vacuum in the enclosed space.

**11.** A process according to claim **10** wherein the prehumidification step is repeated at least once.

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# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 3,742,962 Dated July 3, 1973

Inventor(s) Claude Brochot

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover page, below item [21] should be inserted -- [30] Foreign Application Priority Data March 6, 1969 France 69 06 225 --.

Signed and sealed this 26th day of March 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents



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