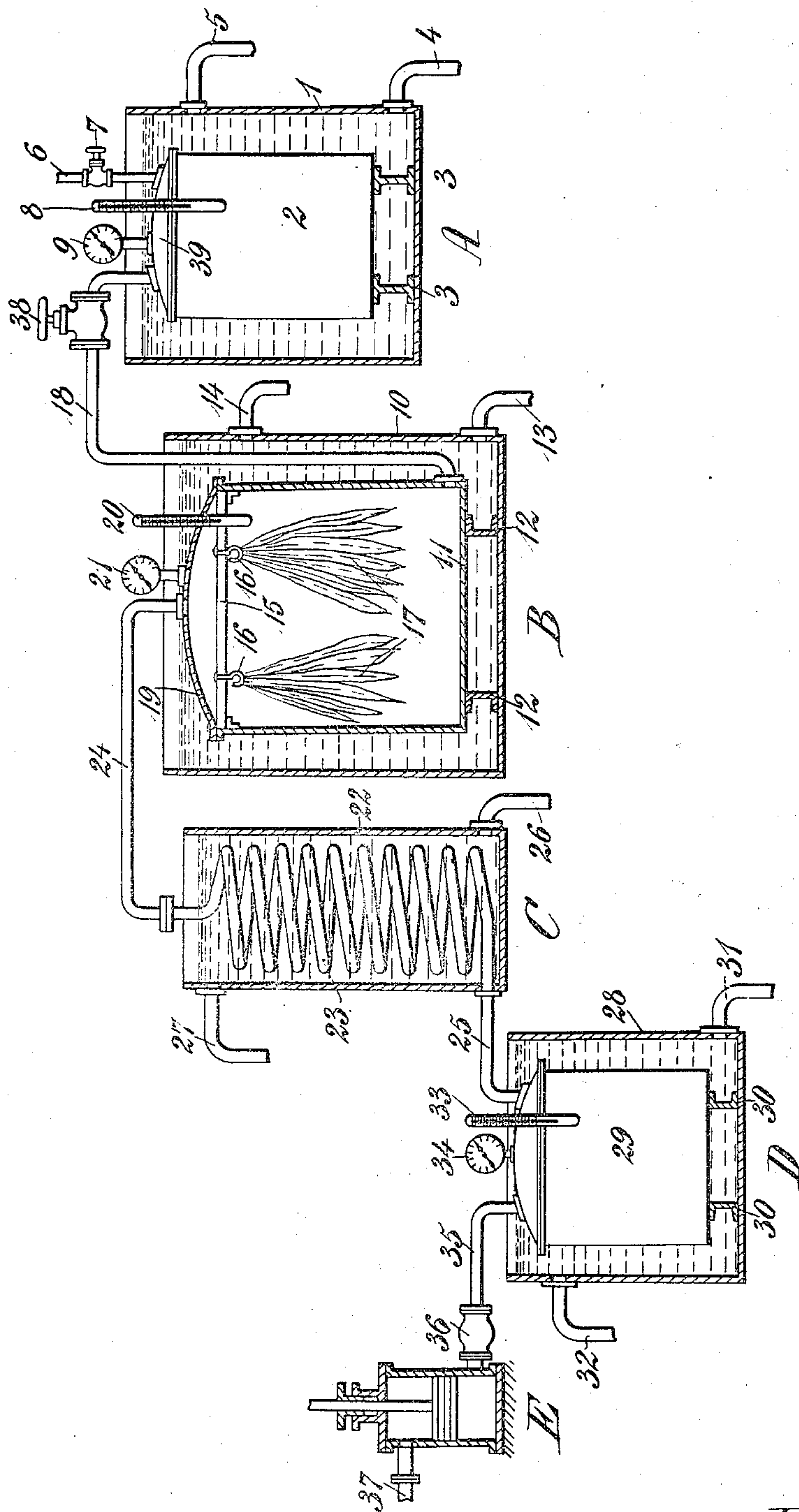


J. SARTIG.  
METHOD OF REMOVING NICOTIN FROM TOBACCO.  
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Witnesses:

J. P. Davis  
C. L. Rollhaus

Inventor:  
Johannes Sartig  
By *Munroe*  
Attorneys



# UNITED STATES PATENT OFFICE.

JOHANNES SARTIG, OF NIKOLASSEE, NEAR BERLIN, GERMANY.

## METHOD OF REMOVING NICOTIN FROM TOBACCO.

999,674.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, JOHANNES SARTIG, a citizen of the Empire of Germany, residing at Nikolassee, near Berlin, in the Empire of Germany, have invented a new and useful Method of Removing Nicotin from Tobacco, of which the following is a specification.

The known methods of removing nicotin from tobacco or tobacco products by means of high pressure or superheated steam present the defect, that together with the nicotin also certain quantities of other volatile constituent parts of the tobacco, more particularly a good deal of the aroma and of the tobacco resin, are removed from the tobacco. For the manufacture of nicotin, of course, this fact is of no importance, but for the purpose of smoking this defect is most objectionable, since the quality of the tobacco is necessarily essentially reduced for want of a great part of the aroma and of the tobacco resin, more particularly because the elasticity of the tobacco is diminished and this the more the higher the temperature is at which the tobacco was treated, so that the tobacco becomes more or less fragile and consequently in proportion useless.

In the usual fermentation of the tobacco in general the temperature of the latter is not permitted to exceed from 50° to 60° centigrade. Only in the subsequent complete drying of the tobacco and of the tobacco ribs or stalks higher temperatures are employed, many of the experts being of the opinion, that the temperature in the drying room should never rise beyond 65° centigrade, and that by increasing the temperature up to 80° or 90° centigrade already the aroma and the elasticity of the tobacco suffer considerable damage. In view of this fact it would seem, that at temperatures of 100° centigrade and more of the steam the quality of the tobacco will be essentially injured and this the more the higher the temperature is at which the tobacco is treated and the longer the time is during which it is exposed to this high temperature above 100° centigrade.

My invention consists in a new method of removing nicotin from tobacco while on the one hand preserving as much as possible the quality of the tobacco as regards aroma and elasticity and on the other hand obtaining the nicotin in its undecomposed state from the tobacco. For attaining this effect, it is absolutely necessary to treat the tobacco at

as low a temperature as possible and to avoid every oxidation of the substances contained in the tobacco, so that every contamination of the treated tobacco with products of the oxidation of the substances and with so-called resinified matters is rendered impossible, while at the same time the nicotin removed from the tobacco is recovered in its undecomposed state. These important requirements are fulfilled with none of the hitherto known methods, but are completely satisfied by my new method, which is based upon my detailed experiments.

My new method essentially consists in treating the tobacco or tobacco products in closed vessels, where the air is rarefied, with low pressure steam at any temperature below 100° centigrade, while simultaneously preventing every condensation of the steam in the tobacco by heating the closed vessels from without by surrounding liquid, and in conducting the volatilized nicotin with the steam carrying it away to devices of any known construction for recovering the nicotin.

I will now proceed to describe my invention with reference to the accompanying drawing, which represents a vertical section through an apparatus that may be used for carrying into effect the new method.

The apparatus may for example comprise a low pressure steam generator A, a steaming tray B, a cooler C, a condenser D and an air-pump E.

The low pressure steam generator A is shown to consist of an open heating vessel 1 filled with water, a closed vessel 2 disposed on suitable supports 3 on the bottom of the vessel 1 and mostly filled with water, and at least two tubes 4 and 5 connecting the vessel 1 at the bottom and near the level of the water with some steam boiler or other generator (not shown). It will be understood that by heating the boiler or generator the water will be kept circulating through the tube 4, the vessel 1 and the tube 5, so that always warm or hot water will be in the vessel 1 for heating the water in the closed vessel 2. The latter can be charged with water through a supply tube 6 and a stop valve 7 placed on the cover 39. A thermometer 8 and a vacuum gage 9 are shown to be provided on the vessel 2, and where so preferred a glass water gage (not shown) may be equally provided on the vessel 2. The low



pressure steam generator A may also be of any other known construction, the essential point being that it be capable of producing steam of less than one atmosphere and of a temperature under 100° centigrade.

The steaming tray B is shown to consist of an open heating vessel 10 filled with water, a closed vessel 11 disposed on suitable supports 12, 12 on the bottom of the vessel 10 and two tubes 13 and 14 connecting the heating vessel 10 at the bottom and near the level of the water with say the same steam boiler or other generator mentioned above. The closed vessel 11 is shown to be connected with the cover 39 of the vessel 2 by a bent tube 18 with a stop valve 38 and to contain horizontal bars 15 with several hooks 16, 16, from which tobacco leaves may be suspended in clusters 17. In case it is desired to steam the tobacco in a loose heap or in layers, the bars 15 with the hooks 16, 16 may be replaced by several superposed perforated horizontal removable plates of any known construction, so that it is possible to lay the tobacco in layers on the several plates, or the bar 15 with the hooks 16, 16 may be replaced by a perforated false bottom at a small height above the bottom proper of the vessel 11, so that the tobacco can be placed loosely on the false bottom. The cover 19 of the vessel 11 is preferably provided with a thermometer 20 and a vacuum gage 21. The steaming tray B described may of course be of any other known construction, the essential point being, that the steam coming from the vessel 2 through the pipe 18 be enabled to pass through the vessel 11 and to act upon the tobacco.

The cooler C is shown to consist of an open vessel 22 filled with water, a coil 23 connected at the upper end with the vessel 11 through a tube 24 and at the lower end with a tube 25 without the vessel 22, and of two tubes 26, 27, of which one 26 may connect the vessel 22 at its bottom with some source of cold water and the other tube 27 may connect the vessel 22 near the level of the water with some discharging place. Of course the cooler C may be of any other known construction, the essential point being, that the water flowing through the vessel 22 upward be enabled to cool the coil 23 and thereby to condense the steam with the nicotin distilled over from the vessel 11 through the tube 24.

The condenser D is shown to consist of an open vessel 28 filled with water, a closed vessel 29 disposed on suitable supports 30, 30 on the bottom of the vessel 28 and two tubes 31, 32, of which one 31 connects the vessel 28 at its bottom with some source of cold water and the other tube 32 connects the vessel 28 near the level of the water with some discharging place. A thermometer 33 and a vacuum gage 34 are preferably pro-

vided on the vessel 29, and where so preferred, also a glass water gage may be provided, although it is not shown. The condenser D may equally be of any other known construction or it may be replaced by a simple closed receptacle without any cooling device, the essential point being, that the distillate arriving at the condenser D or other receptacle be kept at a sufficiently low temperature.

E denotes an air-pump of any known construction, which is capable of sucking the distillate from the vessel 29 through a suction tube 35 and a suction valve 36 and discharges it through a tube 37 to some storage vessel, while the pump E rarefies the air in the closed vessel 2 above the water, in the closed vessel 11, in the coil 23, in the closed vessel 29 and in the tubes connecting all these parts together.

My new method is as follows: Tobacco of any kind, either prepared or fermented or unprepared, either in leaves or as finished products, is introduced into the closed vessel 11, where it may be suspended in clusters 17, 17 from the hooks 16, 16 as shown, or it may be placed in a loose heap or in layers, as mentioned above. After closing the vessel 11 with the cover 19 the stop valve 38 is opened and the air pump E is started, and the water in the two vessels 1 and 10 is gradually and uniformly heated up to any desired temperature corresponding to the degree of rarefaction of the air until the water in the closed vessel 2 commences to boil, when the low pressure steam so generated will pass through the valve 38 and the tube 18 to the vessel 11 and act upon the tobacco. The steam is prevented from cooling and condensing by the heating of the vessel 11 with the water in the vessel 10. The steam passing through the tube 24 and carrying with it the free nicotin separated from the tobacco will be condensed partly in the coil 23 and partly in the vessel 29. The distillate containing the nicotin is removed from the vessel 29 by the air-pump E and is passed to the storage vessel (not shown). From the distillate the nicotin can then be recovered in any known manner. By increasing or decreasing the speed of the air-pump E the degree of rarefaction of the air in the several closed parts of the apparatus can be regulated. The temperature of the heating water in the vessel 1 can be adjusted by regulating the circulation of the water through the tubes 4 and 5 and the vessel 1 by means of stop valves or the like (not shown), so that the temperature of the low pressure steam within the vessel 2 can be in this manner adjusted. In a similar manner the temperature of the heating water in the vessel 10 and consequently the temperature in the closed vessel 11 can be adjusted. Also the



temperature of the cooling water passing through the vessel 22 of the cooler C and through the vessel 28 of the condenser D can be adjusted by means of stop valves or  
5 in any other known manner.

The stop valve 38 shown may be useful for the operation of the apparatus, which operation can be varied in accordance with the circumstances. Where so preferred, the  
10 stop valve 38 may be omitted.

In the manner described above it is possible to distil any quantity of water at any desired temperature under 100° centigrade with the aid of the rarefaction of air and  
15 to pass the steam through the tobacco without any condensation. As the nicotin in the room with rarefied air is equally volatile at all the temperatures under 100° centigrade, it will pass with the steam at the  
20 moment that it separates from the tobacco, while of the other volatile constituent parts valuable for the tobacco, more particularly of the aroma and of the tobacco resin only quantities will separate by distillation which  
25 are the smaller, the more the temperature of distillation is lowered beneath 100° centigrade. At a temperature of 50° centigrade besides the nicotin no traces of aroma or tobacco resin could be any more found in  
30 the distillate which is as clear as water and perfectly odorless.

When it is desired to fully maintain the aroma and the elasticity of the tobacco, it is now possible with the aid of the rarefaction of air to remove the nicotin from  
35 the tobacco at a vacuum of about 92 millimeters mercurial column or less which corresponds to a maximum temperature of 50° centigrade or less.

By the method so far described only the free nicotin contained in the tobacco can be distilled and recovered, but not the nicotin bound with acids. In case it is desired to also distil and recover the nicotin bound  
45 with acids, it will be necessary to first treat the tobacco or tobacco products in any known manner with ammonia before freeing it from the nicotin. This can be effected for example in the manner, that  
50 either the tobacco is simply sprinkled with a watery solution of ammonia and is allowed for some time to be thereby acted upon, or the tobacco or tobacco products is or are for some time placed loosely or suspended in a closed vessel on the bottom of  
55 which a sufficient quantity of ammoniacal water is placed, until the tobacco is sufficiently saturated with water steam and ammoniacal steam. Thereby all the nicotin  
60 bound with acids contained in the tobacco is freed from its combinations and is replaced by the ammonium.

When the tobacco treated with ammonia is introduced into the steaming tray B and  
65 the apparatus is operated in the manner

described above, a distillate will be obtained which contains besides the distilled and undecomposed nicotin the excessive ammonia previously contained in the tobacco. From the distillate the nicotin can  
70 again be recovered in any known manner.

The tobacco treated with ammonia or ammoniacal water can be at will more or less completely freed from nicotin by varying the duration of the distillation. The  
75 tobacco so freed from nicotin contains ammonium instead of the nicotin separated and originally bound with acids, but otherwise it contains all the remaining constituent parts, more particularly the full aroma  
80 and all the tobacco resin and extractive matters, so that this tobacco freed from nicotin can be worked in exactly the same manner as the tobacco not freed from nicotin and has suffered no damage, so that it  
85 is fit for smoking purposes.

From detailed experiments I have established the fact, that certain kinds of tobacco containing a high percentage of nicotin and being called "heavy" by the smokers prove when freed from nicotin at a temperature of at most 50° centigrade according to the above described method to be still "heavy." When, however, these  
90 "heavy" kinds of tobacco are treated with low pressure steam in closed vessels with rarefied air at temperatures above 50° centigrade, but under 100° centigrade, according to the above method, the tobacco freed from nicotin will prove to be more or less  
100 "light" in accordance with the amount of temperature employed, while the aqueous distillate will contain besides the nicotin and ammonia the more of the aroma, the higher the temperature employed was. In  
105 cases, therefore, where it is desired to turn a very "heavy" tobacco into a "lighter" kind by freeing it from nicotin while disregarding a loss or a smaller part of the aroma, this can be effected according to my  
110 method by more or less increasing the temperature above 50° centigrade in proportion to the quality required, care being taken that this temperature in the closed vessel with rarefied air be kept under 100°  
115 centigrade. In this manner the tobacco can be simultaneously freed from nicotin and rendered lighter without removing too great parts of the aroma and of the tobacco resin from the tobacco. The tobacco freed  
120 from nicotin and rendered lighter is still sufficiently aromatic and elastic, can be well worked and is fit for smoking purposes.

In the drawing I have shown cooling and  
125 condensing devices, in which the air is rarefied, for turning the steam containing the nicotin into a watery solution of nicotin, from which the nicotin can be recovered in any known manner. Instead of  
130



these devices of course also other devices of any known kind may be used, in which the steam containing the nicotin can be treated in any known manner for recovering the  
5 nicotin, either in its free state or in combination with acids. For example the steam containing the nicotin may be passed through a diluted solution of acid in a suitable recipient with rarefied air for binding the nicotin with the acid, and the solution may be concentrated in the same rarefied air.

I claim:

1. The method of removing nicotin from  
15 tobacco, which consists in passing low pressure steam in a continuous current through the tobacco in a suitable vessel while rarefying the air in the latter so as to keep the temperature of the steam at any point beneath 100° centigrade, in at the same time  
20 preventing the steam during its passage through the tobacco from cooling and con-

densing, in recovering the nicotin carried off with the steam, and in working the tobacco as usual for smoking purposes. 25

2. The method of removing nicotin from tobacco, which consists in treating the tobacco with ammonia for liberating its bound nicotin, then in passing low pressure steam in a continuous stream through the tobacco in a suitable vessel while rarefying the air in the latter so as to keep the temperature of the steam at any point beneath 100° centigrade, in at the same time preventing the steam during its passage  
35 through the tobacco from cooling and condensing, in recovering the nicotin carried off with the steam, and in working the tobacco as usual for smoking purposes.

JOHANNES SARTIG.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.