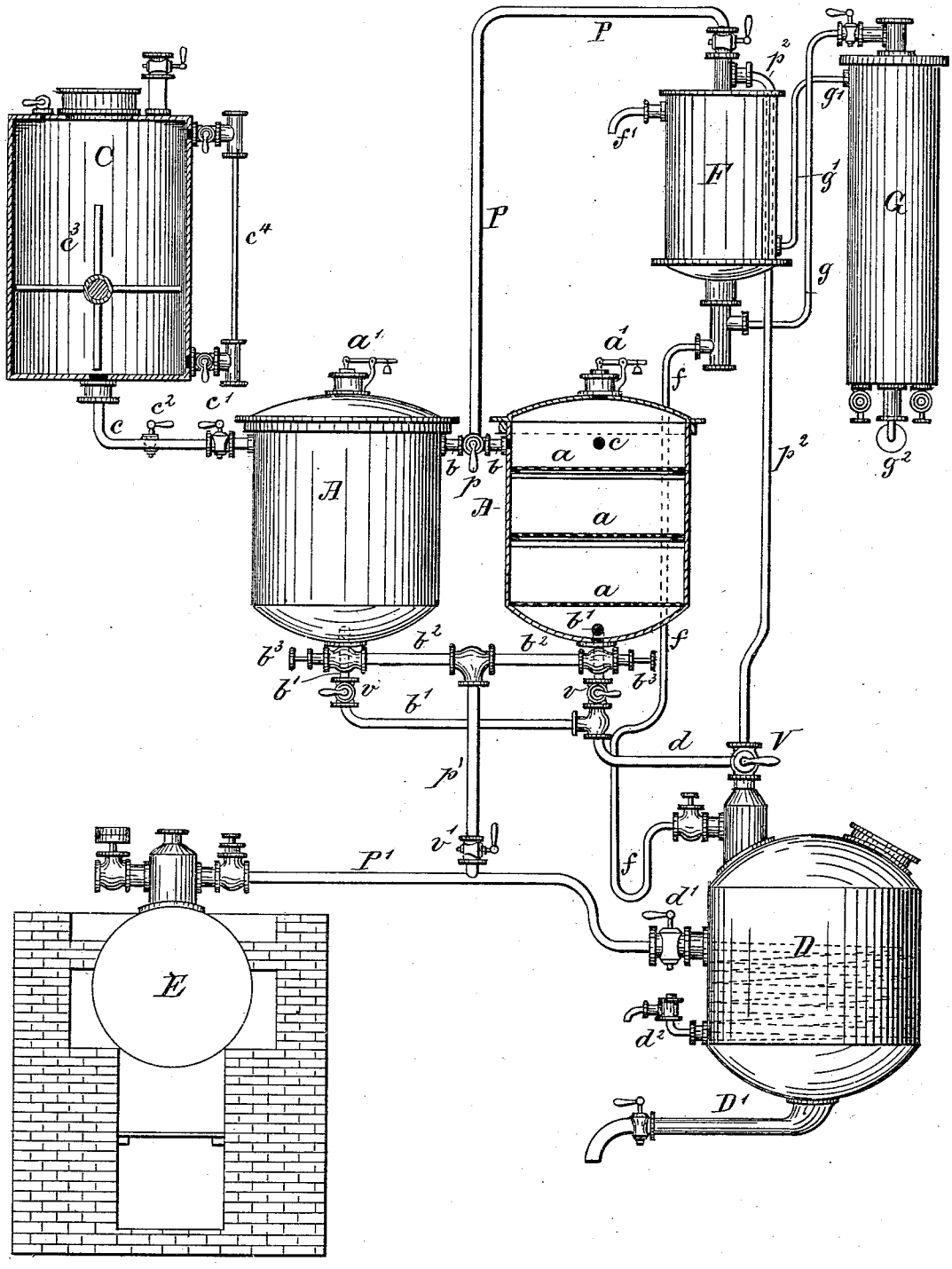
(No Model.)

R. KISSLING.

METHOD OF AND APPARATUS FOR CURING TOBACCO.

No. 259,553. Patented June 13, 1882.



Witnesses.
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UNITED STATES PATENT OFFICE.

RICHARD KISSLING, OF BREMEN, GERMANY, ASSIGNOR TO FABRIK NICOTIN FREIER TABACKE PATENT, DR. R. KISSLING & CO., OF SAME PLACE.

METHOD OF AND APPARATUS FOR CURING TOBACCO.

SPECIFICATION forming part of Letters Patent No. 259,553, dated June 13, 1882.

Application filed November 15, 1881. (No model.)

To all whom it may concern:

Be it known that I, RICHARD KISSLING, a citizen of Bremen, residing at Bremen, German Empire, have invented certain new and useful Improvements in the Manufacture of Tobacco Fabrics which are Free from Nicotine, and Apparatus therefor; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention consists in a novel process of denicotinizing tobacco and in the apparatus for carrying out the said process. The elimination of nicotine from tobacco is effected by first treating the tobacco-leaves with a solution of chloride of calcium and then drawing off the solution and subjecting the tobacco to the action of steam under pressure to remove the remaining nicotine.

In carrying out this process of denicotinizing tobacco any suitable apparatus may be employed. I prefer, however, to use the apparatus shown in elevation, partly in section, in the accompanying drawing. The tobacco-leaves are placed in loose layers upon two or more perforated screens, *a*, arranged within a digesting vessel or vessels, A, that are constructed to be hermetically closed, and are provided each with a suitable safety-valve, *a'*. If, as shown in the drawing, more than one digesting-vessel is employed, they are connected at or near their upper ends with a pipe, P, by means of the pipe *b*, and a three-way cock, *p*. These vessels are also connected at or near their lower ends with a discharge-pipe, *b'*, and a steam-induction pipe, b^2, provided with suitable valves, b^3. The vessels A are further connected with a feed-tank, C, by means of the pipe *c* and a branch pipe, (not shown in the drawing,) said pipes being provided with stop cocks or valves c' c^2, respectively. The feed-tank C is charged with a solution of chloride of calcium either in dilute alcohol or in water, and said tank is provided with suitable stirrers, c^3, operated by hand or other motive power, and with a suitable level-indicator, c^4, said tank being also arranged to be hermetically closed. When the denicotinization is carried on by means of an alcoholic solution of chloride of calcium, I preferably employ a solution containing about seventy per cent. of alcohol.

The discharge-pipes b' of the vessels A are provided with suitable valves or stop-cocks, *v*, and are connected by means of a pipe, *d*, with a still, D, and the steam-pipes b^2 are connected by means of a pipe, p' and P', with a steam-boiler, E, the said pipe P' being also connected with the worm of the still D. The inlet of the steam taking place through valve or stop-cock d' escapes at d^2. The still D is also connected by means of a pipe, p^2, with a receiver, F, for the water resulting from the distillation of the alcohol, and said receiver is connected with the vessels A by means of the pipe P, and with the condenser (by means of a pipe, *g*) wherein the alcohol is condensed.

The operation of the apparatus is as follows: The valves b^3 of the steam-pipe b^2, the valves *v* of the discharge-pipe b', the valve or stop-cock v' of the steam-pipe p', the valve or stop-cock d' of the steam-pipe P', the three-way valves *p* V of the pipe *d*, and still D being closed and the stop-cocks or valves c' c^2 opened, the solution of the chloride of calcium is admitted to the vessels A, previously charged with tobacco. This solution is prepared by slowly adding under constant agitation the concentrated watery solution of chloride of calcium to the required quantity of alcohol previously introduced into the tank C. After the vessels A are filled with the calcium solution the stop-cocks c' c^2 are closed and the vessels are allowed to stand about twenty-four hours, when the solution, charged with nicotine is drawn off and treated as hereinafter described. Under this treatment of the tobacco the following chemical process takes place: The nicotine contained in the tobacco combines with the malic (citric) acid, and by double decomposition nicotine chloride and malic-acid calcium are produced, the latter remaining in the tobacco, and are expressed by the following chemical formula, to wit: $C_4H_6O_5(C_{10}H_{14}N_2) + CaCl_2 = C_4H_4O_5 + (C_{10}H_{14}N_2)2HCl$.

Inasmuch as the nicotine chloride is much

more volatile than the nicotine itself, that which remains in the tobacco after the withdrawal of the solution may be readily eliminated therefrom by means of steam under pressure admitted to the digesting-vessels after the calcium solution has been drawn off. The nicotine-charged solution of chloride of calcium is then treated with a slight excess of ammonia to neutralize the calcium acid, and the alcohol is finally distilled off to be used over again.

As above stated, the discharge-pipes b' connect with the still D by means of the three-way valve V, which latter being properly set, the calcium solution is run into said still and treated with an excess of ammonia, as stated. The valves v v are now closed, and the valve V is turned into position to allow the vapors from the still to ascend to the receiver F through pipe p^2. The valves b^3, v', and d' are now opened, (the three-way valve p being yet closed,) steam is admitted to the digesting-vessels A, and the tobacco therein is subjected to its action for several hours. At the same time the steam admitted to the still vaporizes the alcohol, the vapors ascending through p^2 to the vessel F, and thence through g into the condenser G, where they are finally drawn off at g^2 for further use. The water of distillation returns from the receiver F through the bent pipe f to the still, such pipe being necessary to provide for the required counter-pressure, and such water is drawn off from said still through pipe D'. The pipes g' f' carry the cooling agent away from the condenser and receiver. When this operation is terminated, and when the tobacco has been subjected to the action of the steam under pressure for a sufficient length of time, the valve V is again turned to disconnect the still from the receiver F. The three-way cock p is now opened to connect the vessels A, or either of them, with the receiver F, and the nicotine chloride, together with any alcohol remaining in the tobacco, is driven off and carried to the receiver, and finally said alcohol is recovered by condensation in the condenser G, as above described. The products of condensation during the action of the steam upon the tobacco are collected at the bottom of the vessels A, and are run into the still through the discharge-pipes b' and connections, as above described.

The treatment of the tobacco by means of steam to complete the denicotinization has the further advantage that when removed from the digesters or after a short exposure to the air the leaves of tobacco are in proper condition to be worked up either into denicotinized cigars or tobacco.

When the denicotinization is carried on by means of a watery solution of chloride of calcium the tobacco is subjected to the action of steam under pressure for a longer period, (about eight hours,) the chemical reaction being the same as in the case of an alcoholic solution of chloride of calcium, and may be carried out in the apparatus described, dispensing with the distilling devices, the nicotine solution being then drawn off directly at v.

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

1. The method of denicotinizing tobacco which consists in decomposing the nicotine into a nicotine chloride and malic-acid calcium by means of chloride of calcium, as described.

2. The method of denicotinizing tobacco which consists in first steeping the same in a solution of chloride of calcium and then subjecting it to the action of steam under pressure, as and for the purpose specified.

3. In an apparatus for denicotinizing tobacco by means of a calcium solution and steam, the combination of a solution-reservoir, one or more digesting-vessels divided into two or more chambers by perforated diaphragms, a steam-generator, and suitable valve-connecting pipes between the digesting vessel or vessels, the solution-reservoir, and the steam-generator, substantially as and for the purpose specified.

4. In an apparatus for denicotinizing tobacco by means of an alcoholic solution of chloride of calcium and steam, and for recovering the alcohol, the combination of a solution-reservoir, one or more digesting-vessels, a steam-generator, a still, a receiver for the water of distillation, a condenser, and suitable valved pipes connecting the digesting vessel or vessels with the reservoir, the generator, the still, the receiver for the water of distillation, and the condenser, substantially as and for the purpose specified.

5. The combination, with the vessels A A, of the pipes b', having valves v, the pipe d, the pipe p^2, having three-way valve V, the still D, the receiver F, and condenser G, substantially as and for the purpose specified.

6. The combination, with the vessels A A, divided into two or more chambers by means of perforated diaphragms, the reservoir C, and suitable valved connecting-pipes, of the pipes b^2, having valves b^3, the pipe p', having valve v', the pipe P', and the generator E, substantially as and for the purpose specified.

7. The combination, with the vessels A A, of the pipes b b, having three-way valve p, the pipe P, receiver F, pipe g', and condenser G, substantially as and for the purpose specified.

8. The combination, with the vessels A A, the pipe P, receiver F, condenser G, still D, and pipes f p^2, the latter having three-way valve V, of the valved pipes b' d b^2 p' P', and the generator E, all arranged for operation substantially as and for the purpose specified.

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

RICHARD KISSLING.

Witnesses:

HEINRICH WILKENS,

CARL WILKENS.