

No. 623,798.

Patented Apr. 25, 1899.

R. MACKILL.  
EXTRACTING NICOTIN.  
(Application filed July 27, 1897.)

(No Model.)

FIG. 1.

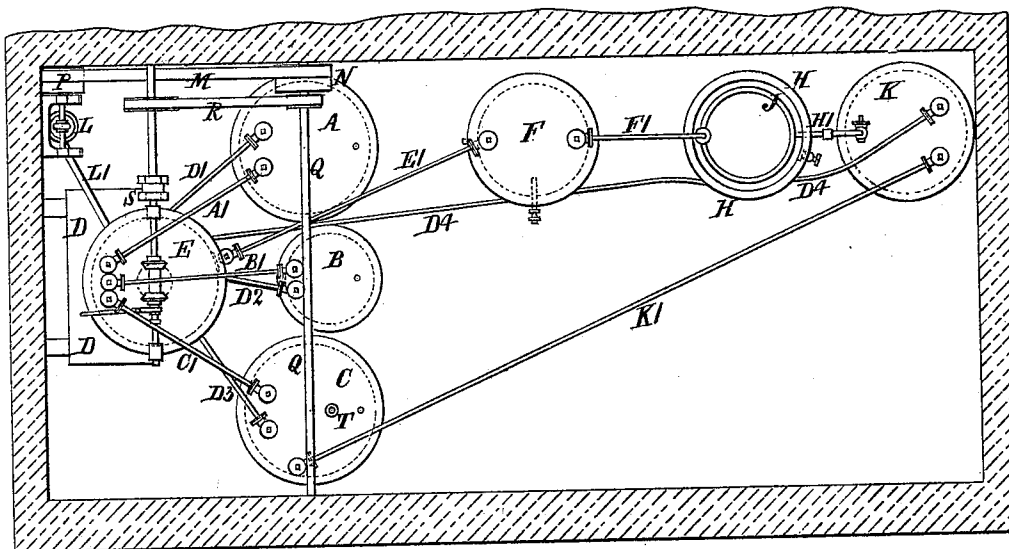
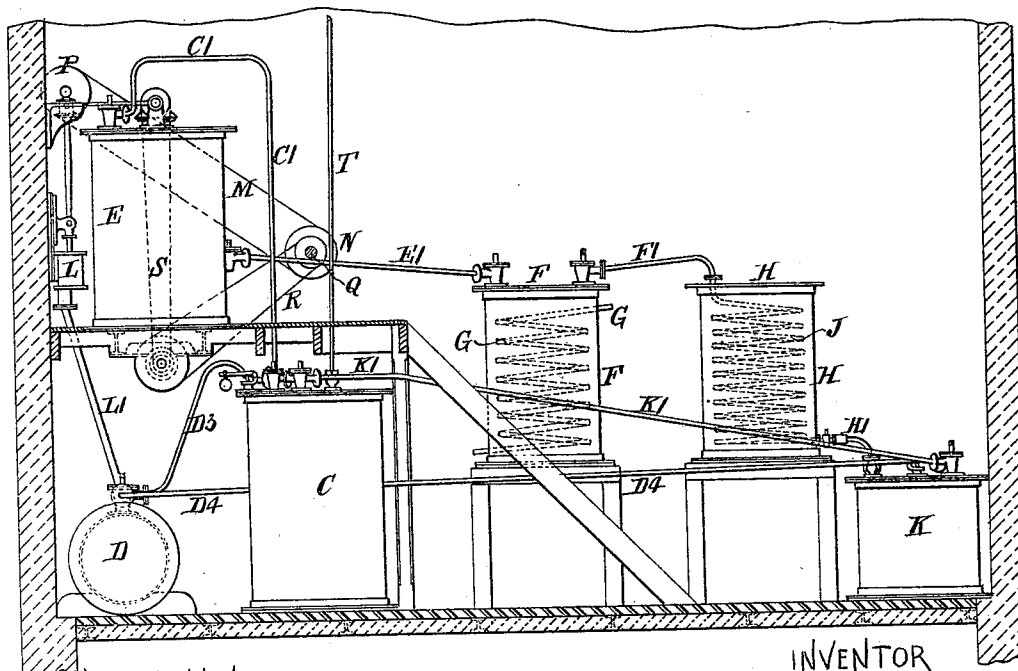


FIG. 2.



WITNESSES:

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ROBERT MACKILL  
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# UNITED STATES PATENT OFFICE.

ROBERT MACKILL, OF GLASGOW, SCOTLAND.

## EXTRACTING NICOTIN.

SPECIFICATION forming part of Letters Patent No. 623,798, dated April 25, 1899.

Application filed July 27, 1897. Serial No. 646,138. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT MACKILL, a subject of the Queen of Great Britain and Ireland, and a resident of Glasgow, Scotland, have invented Improvements in the Manufacture or Obtaining of Nicotin, of which the following is a specification.

My invention has for its object the economical production of nicotin in a practically free state and separate from the acids and other impurities which accompany it in tobacco and in the ordinary infusions, decoctions, or extracts of tobacco, and which injuriously interfere with its efficiency in the various applications that may be made of it. The impurities referred to consist of inactive and useless vegetable matters, such as ligneous fiber, albuminous bodies, gums, and coloring and extractive matters, together with citric and malic acids. Not only do the infusions, decoctions, or extracts contain a very few units per cent. of effective nicotin, but also the amount is variable in different samples or lots, and the strengths of compositions made therewith are extremely uncertain.

In carrying out my improved process I employ ordinary tobacco extract, which is merely a concentrated aqueous infusion of tobacco, containing only a few units per cent. of nicotin, and to this I add a strong solution of caustic soda in order to liberate the nicotin from its state of chemical combination in the extract. Then after agitating the mixture for some time I introduce a volatile hydrocarbon, such as gasolin, to dissolve the free nicotin, and I continue the agitation. The gasolin takes up and forms a solution of the nicotin, which solution, on allowing the mixture to settle, separates completely from the soda solution, which retains the other matters. The gasolin solution of nicotin which rises to the top of the mixture is decanted into a separate vessel, in which it is subjected to distillation, and the gasolin is thereby removed and may be condensed and used over again. The nicotin is left in the still in a commercially-pure state and contains ninety per cent. or upward of the alkaloid, any little remaining impurity being principally gasolin.

The apparatus employed may consist of a number of vessels of any suitable kind such

as are employed in chemical manufactures. I prefer to use vertical cylindrical vessels of steel or iron, these vessels being closed and provided with the requisite pipe connections fitted with stop-valves, and the liquid may be transferred from one vessel to another by pumps. I, however, prefer to effect the transference by means of air compressed by a pump driven by any convenient motor. The vessels comprise a stock-tank for tobacco extract, a stock-tank for solution of caustic soda, a stock-tank for gasolin, and a receiver for compressed air. Besides the stock-tanks the following vessels are required: a vessel fitted with an agitator consisting of a rotating shaft having blades on it, in which vessel the tobacco extract is to be mixed with the caustic-soda solution, the subsequent mixture with gasolin also taking place in the same vessel; a vessel to receive the gasolin solution of nicotin and fitted with a steam-coil for distilling the gasolin; a vessel provided with a condensing-coil and filled with cold water for condensing the gasolin, and a vessel to receive the condensed gasolin. With the described arrangement of closed vessels connected by pipes any escape of gasolin-vapor into the building in which the apparatus is placed is prevented. Pipes extending to the outside of the building may be connected to the tops of any of the vessels, which will contain gasolin at one time and air at another, so that when the air is displaced by the admission of liquid such air with any gasolin-vapor it may have taken up may escape innocuously. One such escape-pipe T is shown as extending up from the tank C; or if it is desired to avoid the small loss of gasolin taken up by the air used for transferring the liquids the escape-pipes instead of extending to the outside of the building may be arranged to lead the air to a gas-holder or other receiver, from which the air-compressing pump may draw its supply of air, the air thus circulating through the apparatus.

Apparatus such as is employed in carrying out the invention is shown, by way of example, in sectional plan, Figure 1, and sectional side elevation, Fig. 2, in the accompanying drawings.

The vessels comprise a stock-tank A for

tobacco extract, a stock-tank B for solution of caustic soda, a stock-tank C for gasolin, and a receiver D for compressed air, and which is connected with these tanks by valved pipes 5 D' D<sup>2</sup> D<sup>3</sup>. Besides the stock-tanks the following vessels are required: A vessel E, which may be fitted with an agitator consisting of a rotating shaft having blades on it, which vessel is connected with the tanks A B C by 10 pipes A', B', and C', and in which vessel E the tobacco extract is to be mixed with the caustic-soda solution, the subsequent mixture with gasolin also taking place in the same vessel. A pipe E' connects the vessel E with 15 a vessel F, which receives the gasolin solution of nicotin and is fitted with a steam-coil G for distilling the gasolin, which passes over through a pipe F' to a vessel H, provided with a condensing-coil J and filled with cold water 20 for condensing the gasolin, the condensed gasolin passing through a pipe H' to a vessel K to receive the condensed gasolin. Compressed air is admitted from the receiver D through a pipe D<sup>4</sup> to the vessel K and forces 25 the gasolin back through a pipe K' to the stock-tank C, and thus permits of its being used over again, as hereinbefore stated. The air is compressed in the receiver D by a pump L, connected to the receiver by a pipe L', 30 and the pump is driven by a belt M and pulleys N P from a shaft Q, deriving its motion from any convenient source. The agitator in

the vessel E is also driven from the same shaft Q by belts R S and pulleys, as shown.

What I claim is—

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1. The process for the manufacture or obtainment of nicotin which consists, first, in agitating tobacco extract with a caustic-soda solution, second, in agitating the mixture of tobacco extract and caustic-soda solution with 40 gasolin, third, in decanting the gasolin which contains the nicotin in solution from the remainder of the mixture, and, fourth, distilling the gasolin so as to separate it from, and leave, the nicotin, substantially as herein set 45 forth.

2. Apparatus for conducting the herein-described process, comprising a mixing vessel, as E, a series of closed vessels, as A, B, C, connected by valved pipes to the said vessel 50 E, a still connected with the mixing vessel, a condenser and a receiving vessel connected to the gasolin vessel, as C, and an air-compressor and valved connecting-pipes for admitting compressed air to the top of any ves- 55 sel from which liquid has to be transferred, as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT MACKILL.

Witnesses:

WILLIAM HASTIE,  
GEORGE PATTERSON.