

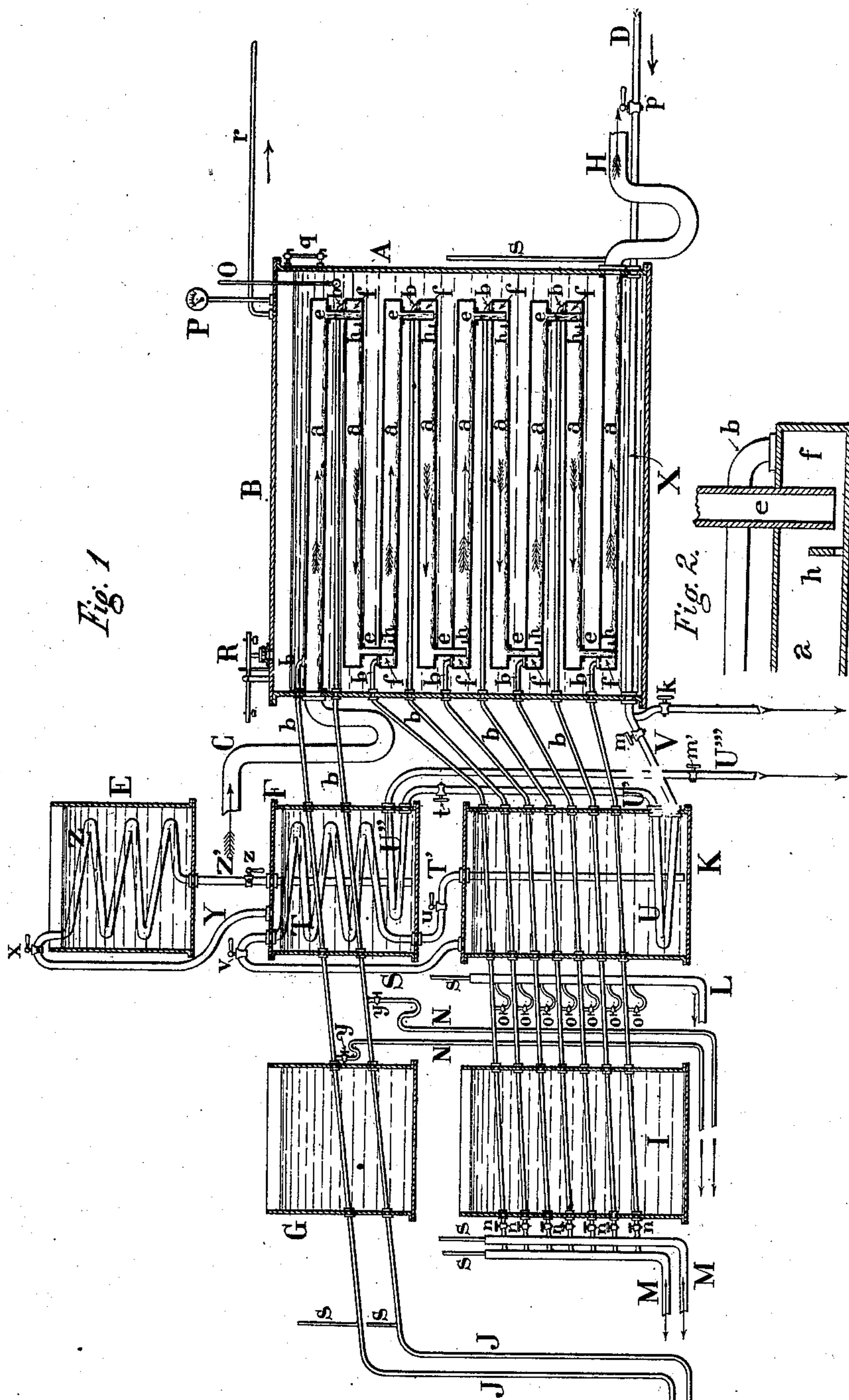
(No Model.)

L. BÉCHAUX, FILS.

APPARATUS FOR DISTILLING ALCOHOL.

No. 389,539.

Patented Sept. 18, 1888.



Witnesses:

*Mattie S. Dodge*  
*R. S. Ferguson*

*Louis Béchaux fils*  
*Inventor,*

*by* *Dodge & Son*  
*his Attys.*



# UNITED STATES PATENT OFFICE.

LOUIS BÉCHAUX, FILS, OF PORENTRUY, SWITZERLAND.

## APPARATUS FOR DISTILLING ALCOHOL.

SPECIFICATION forming part of Letters Patent No. 389,539, dated September 18, 1888.

Application filed August 4, 1886. Serial No. 210,011. (No model.) Patented in France June 27, 1884, No. 162,997, and in Germany December 23, 1884, No. 33,300.

*To all whom it may concern:*

Be it known that I, LOUIS BÉCHAUX, Fils, of Porentruy, Switzerland, have invented a new and useful Improvement in Apparatus for Distilling Alcohol and other Liquids, (for which I have obtained patents in France, dated June 27, 1884, No. 162,997, and in Germany, dated December 23, 1884, No. 33,300,) which is fully set forth in the following specification.

10 The object of my invention is to obtain a continuous process of distilling or rectifying alcoholic or other liquids with the use of one single apparatus and by means of a water-bath kept at a nearly constant temperature, the  
15 said liquids remaining for a very short time only in the said apparatus.

In the accompanying drawings, Figure 1 is a side view, partly in section, of my improved apparatus; and Fig. 2, a detail view.

20 A is a vessel or tank filled with water or any other liquid or fluid substance, and constitutes the water-bath, which is intended for raising and keeping at the required temperature the liquid to be distilled or rectified, the  
25 latter passing through the flat pipes *a a a . . .*, of rectangular sections.

Vessel A is closed by means of a cover, B, and can be heated by any means, but preferably by steam. The liquid to be operated  
30 upon enters the apparatus through the pipe C, and its progress is indicated by a series of arrows. A pipe, D, provided with a regulating-cock, *p*, brings the steam into the coil X, which latter may be in contact with the lowest  
35 pipe *a*. The said pipe D is prolonged by a pipe, V, which is also provided with a regulating-cock, *m*, and is connected to a coil, U. The object of the coil U is to heat the volatile liquid contained in the analyzer condenser-  
40 vessel K, in which are condensed the aqueous vapors. The coil U is continued by a pipe, U', which is fitted with a cock, *t*, and is connected to the coil U''. The object of the coil U'' is to heat the liquid, also volatile, con-  
45 tained in the analyzer condenser-vessel F of the alcoholic vapors. The condensed steam runs out through pipe U'''. The vessels K F are closed, and can be fitted with safety-valves, steam and water gages, and thermometers.

50 When it is desirable to send less or no steam

at all in the coils U U'', the cock *m* is more or less shut, and the steam and hot water of the coil X are exhausted through the cock *k*. The pipe U''' is also fitted with a cock, *m'*, so that the heating may be regulated at will. The  
55 vapors of the liquid contained in the analyzer K are conducted through the pipe S into the coil T, which is immersed into the liquid contained in the analyzer F. They are condensed and return through the pipe T' into the an-  
60alyzer K.

The liquid contained in the analyzers K F is composed of water mixed with ethereal or alcoholic substances, or of any volatile liquid. The cocks *v u* are intended for the expulsion  
65 of the atmospheric air at the beginning of the operation. In the same manner the vapors of the alcoholic liquid, etherealized essences, or water more or less diluted with alcohol or etherealized essences contained in the ana-  
70lyzer F, are led to the coil Z through the pipe Y. The said coil Z is immersed in the liquid contained in the condenser E, and the vapors which circulate through it are condensed and return through the pipe Z' into the analyzer  
75 F. The cocks *x z* are used for expelling the atmospheric air at the beginning of the operation.

The tank I is filled with cold water, which is made to circulate in it at any desirable  
80 speed. It is the refrigerating-condenser for the alcoholic vapors, and the tank G, also filled with circulating cold water, is the refrigerating-condenser of the ethereal vapors.

The water-bath tank A, the analyzer-con-  
85 denser K F, the refrigerating-condenser E, and the refrigerating-condenser I G are connected together, as shown in the drawings, by means of various pipes, some of which are fitted with cocks, and for the purposes hereinafter de-  
90scribed.

The flat pipes *a a a . . .*, in which circulates, in a thin layer, the liquid to be operated upon, are connected together by means of the tubes  
95 *eee . . .*, and in such a manner as to constitute a vertical plane coil. These flat pipes are isolated from each other as regards the vapors which are generated, owing to the following arrangement: A lip, *h*, placed vertical near the tube *e*  
100 and rising above the lower end of the latter,



constitutes, together with the end of the pipe *a*, a small reservoir, *f*, in which the liquid acts as a hydraulic joint, so that the vapors contained in one pipe are prevented from ascending from a lower pipe into a higher one. A small hole is provided at the foot of the lip *h*, as shown in Fig. 2, so that in case of stoppage the liquid remaining in the reservoirs *f f f'* can run out and the coil *a a a* becomes perfectly empty.

Any number of water-bath vessels, each containing any number of flat or plane coils, *a a a*, may be employed instead of the single one described.

The vapors which are successively generated in each of the pipes *a a a*... are led to the analyzers and refrigerators through the incline pipes *b b b*..., those which are generated at the lowest temperature being conveyed through the highest tubes. The top tubes *b b*... at first cross the analyzer-condenser *F*, in which the first alcoholic vapors are condensed and run out through the cocks *y y* and the pipes *N N*. They then cross the refrigerator *G*, in which the ethereal vapors are condensed and run out through the pipes *J J*, which, like the majority of pipes intended for the discharge of liquids or of condensed vapors, are fitted with small pipes *s s*..., intended for the expulsion of the atmospheric air, and can be fitted with small cocks. The lower tubes *b b b*... convey the vapors of alcohol of good taste, and the lowest ones the aqueous alcoholic vapors. They first cross the analyzer-condenser *K*, in which the aqueous vapors are condensed. These condensed vapors run out through the cocks *o o o*..., which regulate the alcoholic strength of the distilled products and the pipe *L*. They then cross the refrigerator *I*, in which the alcoholic vapors are condensed, and evacuated into either of the tubes *M M* by means of the two-way cocks *n n n*...

The vessel *A* can be provided with a safety-valve, *R*, a water-gage, *q*, a pressure-gage, *P*, a thermometer, *O*, and a pipe, *r*, the latter being in communication with a pressure-regulator which maintains in the water-bath a constant pressure, securing thus a constant temperature of the same. The temperature of the water-bath may be varied and regulated by means of the pressure-regulator or of any other regulator acting on the temperature of the liquid itself.

The water-bath vessel can be completed by another water-bath at another temperature, and especially when it is desired to more strongly heat the residues in order to increase the efficiency of the apparatus.

It will be seen, as a result of the above-described arrangements, that the more or less volatile liquids contained in the analyzers *F K* are maintained at nearly a constant boiling-point, so that the degree of heat at which the alcoholic vapors only are to be condensed in the analyzer *F*, and the aqueous vapors only are to be condensed in the analyzer *K*, varies as little as possible. The latent heat arising from the

condensation of these vapors passes through successive vaporizations from the analyzer *K* to the analyzer *F*, and from the latter into the regulator *E*, which can, as well as the refrigerators *I G*, be used as a wine-heater by utilizing the latent heat arising from the final condensations for the heating of the liquid itself to be operated upon.

The starting and mode of working of the apparatus are clearly described in the foregoing and illustrated in the drawings. It is, however, as well to observe that before the liquid to be operated upon is admitted into the flat coil of the water-bath *A*, the analyzers *F K* and the said water-bath *A* itself may be warmed at the required temperature, so that the operation of distilling begins at the very moment the liquid is introduced into the apparatus, and continues with an apparatus set at the proper point.

The water-bath distillation or rectification apparatus which I have described, and in which the operation is effected at a very nearly constant temperature, which is of the required degree, is possessed of the following advantages, the description of which is characteristic of the means by which they are obtained. The distillation being effected according to the rational and methodical conditions which have been described, the rectification may in certain cases become useless. It is possible with this same apparatus to obtain by a first distillation some *eau-de-vie* of good taste without going through the process of rectification. The rectification of the phlegms is conducted so that the essential oils and the heavy essences run out with the residues, whereas the alcoholic vapors are generated according to their degree of volatility. The alcoholic vapors are generated without being—as is the case with a high-temperature boiler—submitted to a long contact with the essential oils and the heavy essences, or having before being collected to bubble up through these condensed oils and essences on the trays of a distilling-column. Alcohol of good taste is obtained without any retrogradation by the distillation itself and a single analysis of the various alcoholic vapors, which result is due to the rational and successive separation of the various vapors according to the order of their generation. The distillation of wines or of alcoholic liquors, as well as the rectification of the phlegms, gives simultaneously some products varying as regards the alcoholic strength and taste.

The same apparatus can, indifferently, effect, first, the distillation, and, secondly, the rectification of the phlegms, be the quantity to be treated a large one or only a few gallons, and the operation may be interrupted at any time and resumed without any inconvenience.

The apparatus can be made to give separately the products of all the vapors generated by the distillation, even if the complementary vessels *E F* and *I G* were done away with.

There is no fear of explosion.



Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

5 1. The combination, with a tank, A, of the flat pipes *a a*, each provided with a depending tube, *e*, to extend into the pipe below, a lip, *h*, extending upward from the bottom of the pipe near the tube *e*, and provided with a hole or  
10 perforation at its base, and pipes *b*, communicating with the pipes *a*.

2. The combination, with the tank A, having pipes *a a*, and heater X, of analyzers K F, containing liquids more or less volatile, the  
15 refrigerator E, the coils T and Z, located, respectively, within the analyzer F and refrigerator E, and communicating, respectively, with the analyzers K and F, and pipes *b b*, extending from the pipes *a a* through the ana-  
20 lyzers F and K.

3. The combination, with the tank A, hav-

ing pipes *a b*, and a steam-coil, X, of the analyzers K F, coils U U", forming a continuation of the coil X, and extending into the analyzers K F, traversed by the pipes *b*. 25

4. The combination, substantially in the order indicated and for the purposes set forth, of a water-bath, A, provided with a heater and with pipes *a a*, the analyzer-condensers K F, and the condenser-refrigerator wine-heater 30 E, located one above another, the condenser-refrigerators or wine-heaters I G, and pipes *b*, passing from the pipes *a a* through the condensers K F I G.

In testimony whereof I have signed this 35 specification in the presence of two subscribing witnesses.

LOUIS BÉCHAUX, FILS.

Witnesses:

G. DUPONT,

CH. CASALONGA.