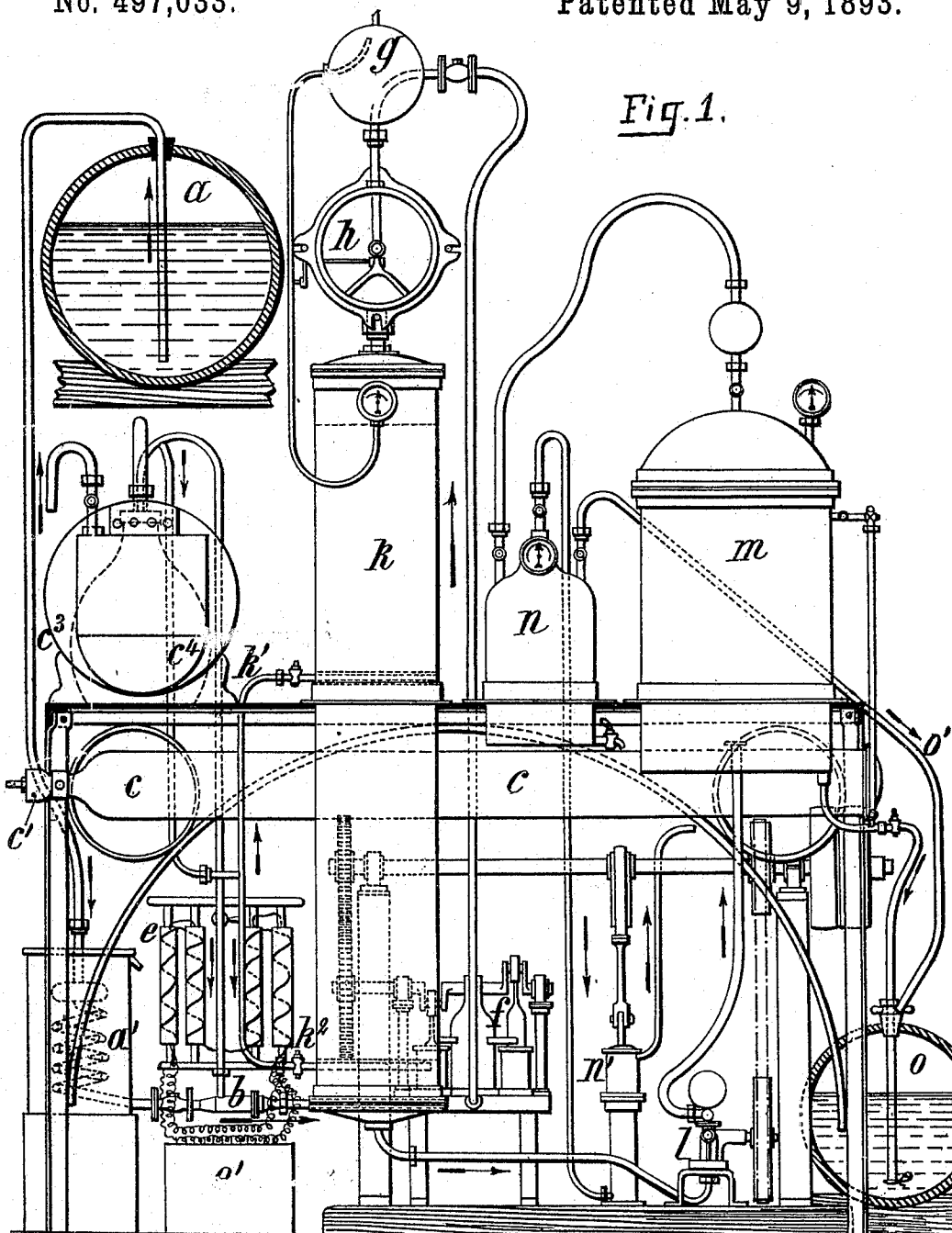


W. SAINT MARTIN.

APPARATUS FOR MATURING AND IMPROVING FERMENTED
ALCOHOLIC LIQUIDS.

No. 497,033.

Patented May 9, 1893.



Witnesses:
L. M. Hachschlager,
E. L. Sherman

Inventor
William Saint Martin
By his Attorneys
Bresen & Maudslayi

(No Model.)

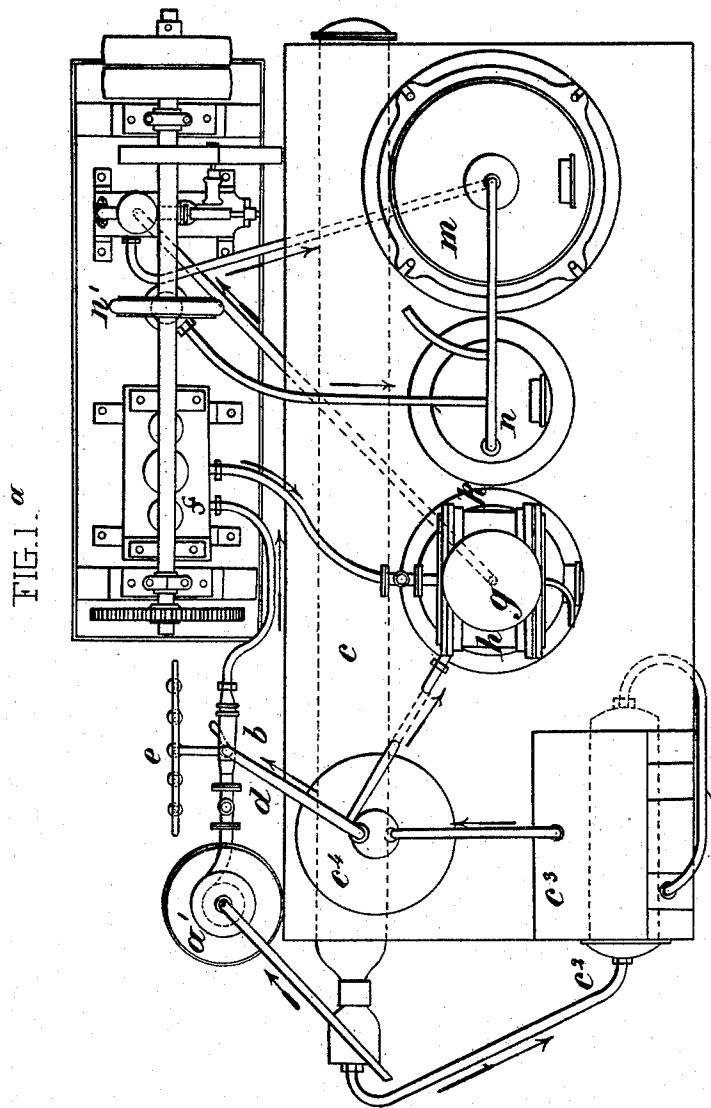
W. SAINT MARTIN.

4 Sheets—Sheet 2.

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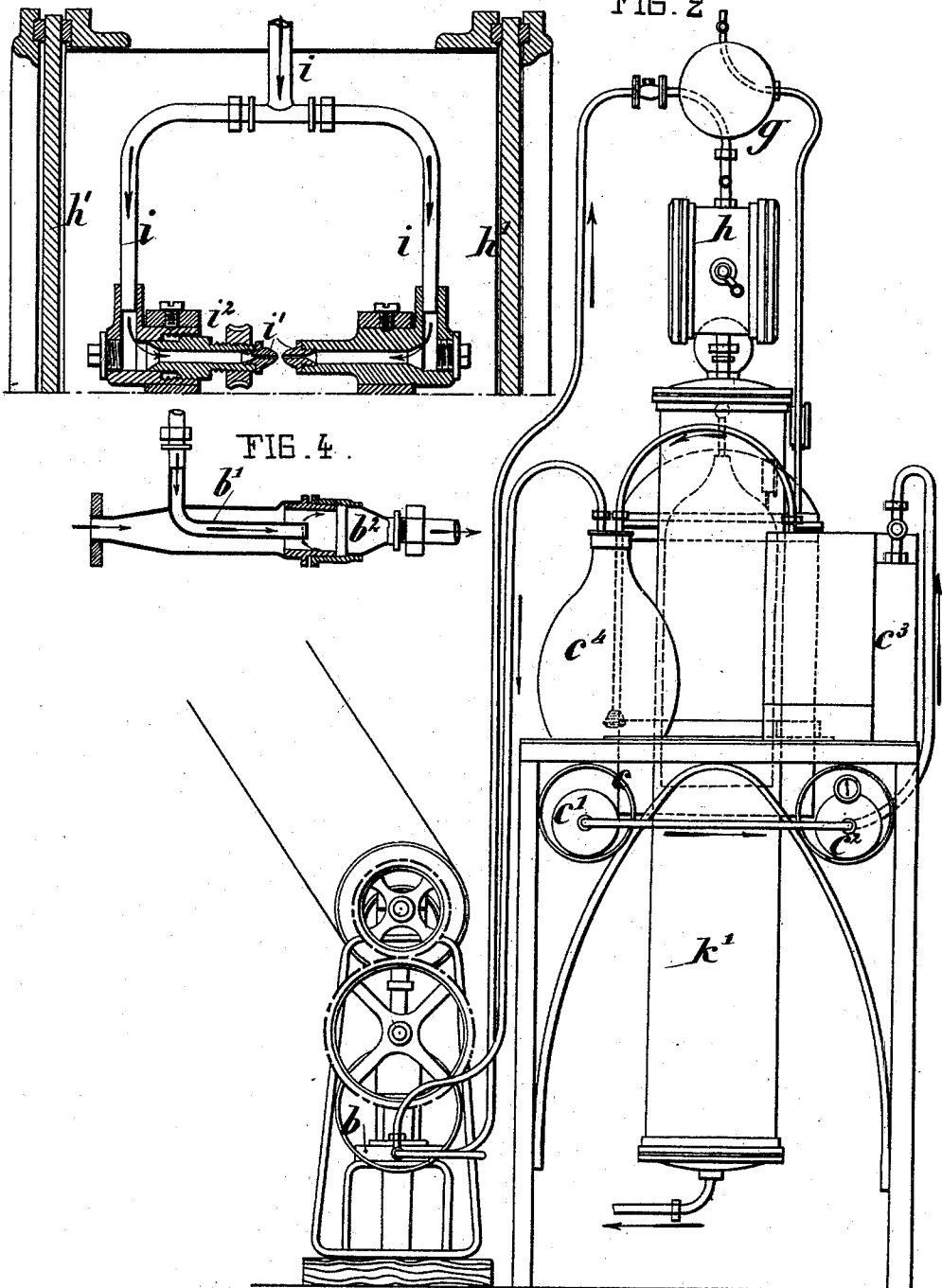
4 Sheets—Sheet 3.

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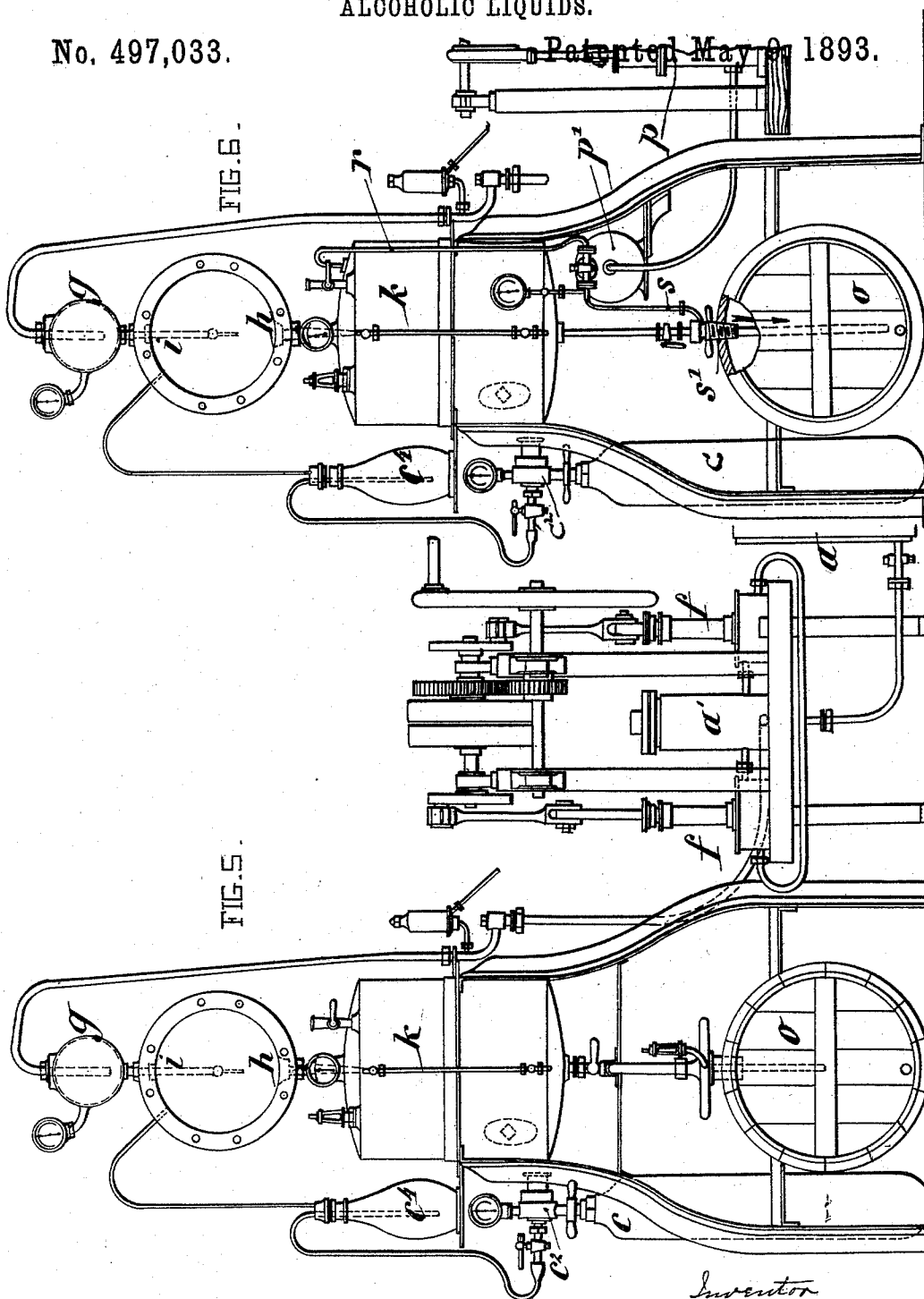
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No. 497,033.

Patented May 9, 1893.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM SAINT MARTIN, OF PARIS, FRANCE.

APPARATUS FOR MATURING AND IMPROVING FERMENTED ALCOHOLIC LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 497,033, dated May 9, 1893.

Application filed December 15, 1892. Serial No. 455,302. (No model.) Patented in France July 7, 1891, No. 214,728; in England December 22, 1891, No. 22,413, and in Belgium August 31, 1892, No. 100,195.

To all whom it may concern:

Be it known that I, WILLIAM SAINT MARTIN, of the city of Paris, France, have invented Improvements in Apparatus for Maturing and
5 Improving Fermented Alcoholic Liquids, applicable also for oxidizing oleaginous and other liquids, (for which I have obtained Letters Patent in France for fifteen years, dated July 7, 1891, No. 214,728; in England for four-
10 teen years, dated December 22, 1891, No. 22,413, and in Belgium for fifteen years, dated August 31, 1892, No. 100,195,) of which the following is a full, clear, and exact description.

15 It is known that fermented alcoholic or oleaginous liquids cannot be obtained in a state of purity whatever may be the care used in the process of manufacture or purification; they are always mixed with a varying quantity of aldehydes, essential oils and other organic compounds of a dangerous character
20 and disagreeable flavor. It is also well known that the substances which communicate their unpleasant taste to alcohol are composed of aldehydes, oils and ethers of special composition.

My system, which may be applied to any liquid requiring to be oxidated energetically, has for its object to destroy these substances,
30 by oxidating them, by simply passing them through the improved apparatus, in which this liquid, being finely divided, is subjected to the action of oxygen or ozone, which favor the development of the aroma of liquids. In
35 this manner I am enabled to purify these liquids with great rapidity and above all with great efficiency, the oxygen employed being changed into ozone, either before mixture with the liquid to be treated, or during the
40 passage of the mixture through the apparatus, in manner hereinafter more fully explained. In order to transform the oxygen into ozone in the midst of the liquid being treated, I convey the mixture, under great
45 pressure, into the apparatus, and I so divide the particles that the oxygen, by suddenly expanding, and under the action of a violent shock, develops a large quantity of electricity and is transformed into ozone, which, owing to
50 the extreme division of the liquid, acts upon

it in all its parts and destroys all the injurious substances aforesaid.

In order that my said invention may be fully understood and readily carried into effect, I will proceed, aided by the accompanying
55 drawings, fully to describe the same.

In the drawings Figure 1 represents a longitudinal elevation partly in section and Fig. 1^a a plan of my apparatus. Fig. 2 shows an end elevation. Fig. 3 represents in section
60 drawn to a larger scale, the arrangement for finely dividing the liquid. Fig. 4 shows a longitudinal section of an injector as applied to my apparatus. Figs. 5 and 6 show in elevation two slight modifications in the arrange-
65 ment of the apparatus.

In all the figures like parts are indicated by similar letters of reference.

The liquid to be treated is placed in a receiver or barrel *a*, whence it passes into a coil
70 *a'*, which serves to cool or to heat it, according to the nature of the liquid under treatment, as shown in Fig. 1. It then runs into an injector *b*, shown in vertical section at Fig. 4, where it is mixed with a certain quantity of oxygen
75 or ozone. This gas, under very high pressure, is contained in a reservoir or metallic bottle *c*, whence it passes into a regulator *c'*, into an expansion chamber *c''*, into a meter *c'''* and into a washing vessel *c''''*, and arrives in
80 the injector *b* either directly by the tube *d* or after having traversed an ozoning apparatus *e*, where, under the action of an electric current coming from a battery *e'*, it is partly transformed into ozone. The gas enters the
85 injector *b*, Fig. 4, through orifices arranged around the circumference of a tube *b'*, the end of which is closed. It also penetrates radially into all parts of the liquid, and the mixture or emulsion thus obtained passes through
90 a sieve *b''* having very small openings, which also helps to intimately mix the two fluids, at the same time retaining the impurities which may be in the liquid being treated. From there the mixture passes to the pump *f*, which
95 drives it into a pressure reservoir *g* furnished with a manometer and thence into a spray diffuser *h* (Fig. 3) where the oxidation, properly so called, of the liquid takes place. This spray diffuser (see Fig. 3) is formed of a cy- 100

lindrical drum *h*, the two ends of which are made of disks of thick glass *h'*, which allows the operations carried on within to be seen from the exterior. The mixture of liquid and oxygen or ozone enters this drum by a tube *i* which divides into two branches, each of which is bent back at right angles and has at its extremity a nipple *i'* of very small section, which allows a very small jet of fluid to pass with great pressure. The two mouths are placed exactly opposite to each other at a very slight distance apart but capable of being varied by a screw *i²* according to the nature of the liquid to be treated.

It will be readily understood that the force of the two jets of liquid coming together is such that the shock is extremely violent and the infinitely fine spray which holds the oxygen in suspension is thrown in all directions. The same shock determines also the production of a considerable quantity of electricity, and the oxygen, under the action of the electricity, is cooled and is strongly and briskly transformed in a large proportion into ozone, which acts upon the products of the liquid capable of being oxidized. The liquid, after having thus been submitted to a perfect spray diffusion, and to the action of the ozone, flows away into the receiver *k*. In the arrangement shown at Fig. 1, the receiver *k* has the form of a tower. It receives, by the tube *k'* and about the middle, a new current of oxygen or ozone which mixes with the liquid. At the base of the column, a fresh quantity of oxygen or ozone is injected by the tube *k²* and whence a pump *l* forces the mixture to the base of a large reservoir *m*, in which the liquid is finally cleared of the gaseous or volatile products which are formed in the oxidating re-actions. For this purpose the top of this reservoir is placed in communication with a receiver *n* in which a vacuum is created by means of the pump *n'*. This draws the liquid into receiver *n*, and divides up the liquid, which when in receiver *m* was in a large mass, so that said volatile constituents can be readily removed by the vacuum pump. To enable the apparatus to be worked continuously I arrange two of these reservoirs *m*, which enables me to empty one while the other is being filled with liquid. The liquid thus oxidated is collected in a receiver *o*, which is itself in communication, by means of a pipe *o'* and the receiver *n*, with the vacuum pump, which causes, in a continuous manner, the removal of the volatile products formed by the oxidation of the injurious bodies and remaining in the liquid when it reaches receiver *o*, and the oxygen which is in excess.

As is shown at Figs. 5 and 6, my apparatus is capable of various modifications, resulting from the suppression of certain organs, which suppression is permitted by the nature of the liquid under treatment; thus in Fig. 5 the liquid to be treated is sent direct from the receiver *a* into the pressure chamber *g* by the pumps *f*, thence into the spray producing ap-

paratus *h*, into the receiver *k* and into the receiver *o*, where it is collected as just described. Also, in this simplified arrangement of my apparatus, the oxygen from the bottle *c* passes directly from the expansion chamber *c²* to the washer *c⁴* and to the spray producing apparatus *h*.

Fig. 6 shows how I can apply a vacuum to my apparatus; *p* is the vacuum pump, which is in communication with a vacuum chamber *p'*; this chamber is in communication, first, with the receiver *k* by the pipe *r* to draw off the ethers which are disengaged from the liquid in this receiver and secondly with the receiver *o* by the pipe *s* and the screw plug *s'* to cause a vacuum in this chamber. The injector *b* and the spray diffuser *h* are the parts which are essentially new and which, in addition to the industrial result above described obtained by the treatment of liquids with oxygen, enable me to mix very intimately liquids which have hitherto been very difficult to mix by ordinary known means. I would mention particularly the mixing of wines and spirits, which has never hitherto been perfectly accomplished, but which I am enabled to do in an absolutely efficient manner.

I claim—

1. The combination, in an apparatus for oxidizing or maturing liquids, of an injector *b*, having an outer chamber or passage and a central perforated pipe, means for conducting an oxidizing fluid to said passage, and for conducting a different fluid to the perforated pipe of the injector, whereby the two fluids are thoroughly mixed, means for forcing the mixed fluid into a receiver, a spraying device communicating with the receiver, through which the fluid passes, and a vacuum producing apparatus for removing the products of the oxidation.

2. The combination, in an apparatus for oxidizing or maturing liquids, of an injector *b*, having an outer chamber or passage and a central perforated pipe, means for conducting an oxidizing fluid to said passage, and for conducting a different fluid to the perforated pipe of the injector, whereby the two fluids are thoroughly mixed, means for forcing the mixed fluid into a receiver, a spraying device communicating with the receiver, through which the fluid passes, an oxidizing chamber *k*, and a vacuum producing apparatus for removing the products of the oxidation.

3. The combination of an injector *b*, and means for passing liquid therethrough, a receiver *c* for containing oxidizing gas under pressure, an expansion chamber connected thereto and thence to the injector, where the liquid and gas are mixed, a spraying device *h*, to which the mixture is led, communicating gas and liquid receiving chamber *k*, and means for separating the oxidized impurities from the liquid, substantially as described.

4. The combination, in an apparatus for oxidizing or maturing liquids, of a receiver *a*, a pressure chamber *g*, a pumping apparatus

for forcing liquid into said chamber, a spray
producing device *h* communicating with
chamber *g*, a separate receiver for the liquid
treated and a vacuum producing device con-
5 nected with said receiver substantially as de-
scribed and for the purposes specified.

5. The combination, in an apparatus for
oxidizing or maturing liquids, of a receiver *a*,
a pressure chamber *g*, a pumping apparatus
10 for forcing liquid into said chamber, a spray
producing device *h* communicating with
chamber *g*, and a separate receiver for the liq-
uid treated, and means as described, for intr-

ducing oxygen to said separate receiver and
the liquid being treated, substantially as de- 15
scribed.

The foregoing specification of my improve-
ments in means or apparatus for maturing
and improving fermented alcoholic liquids,
applicable, also, for oxidizing oleaginous and 20
other liquids, signed by me this 1st day of
December, 1892.

WILLIAM SAINT MARTIN.

Witnesses:

ROBT. M. HOOPER,
ALBERT MOREAUX.