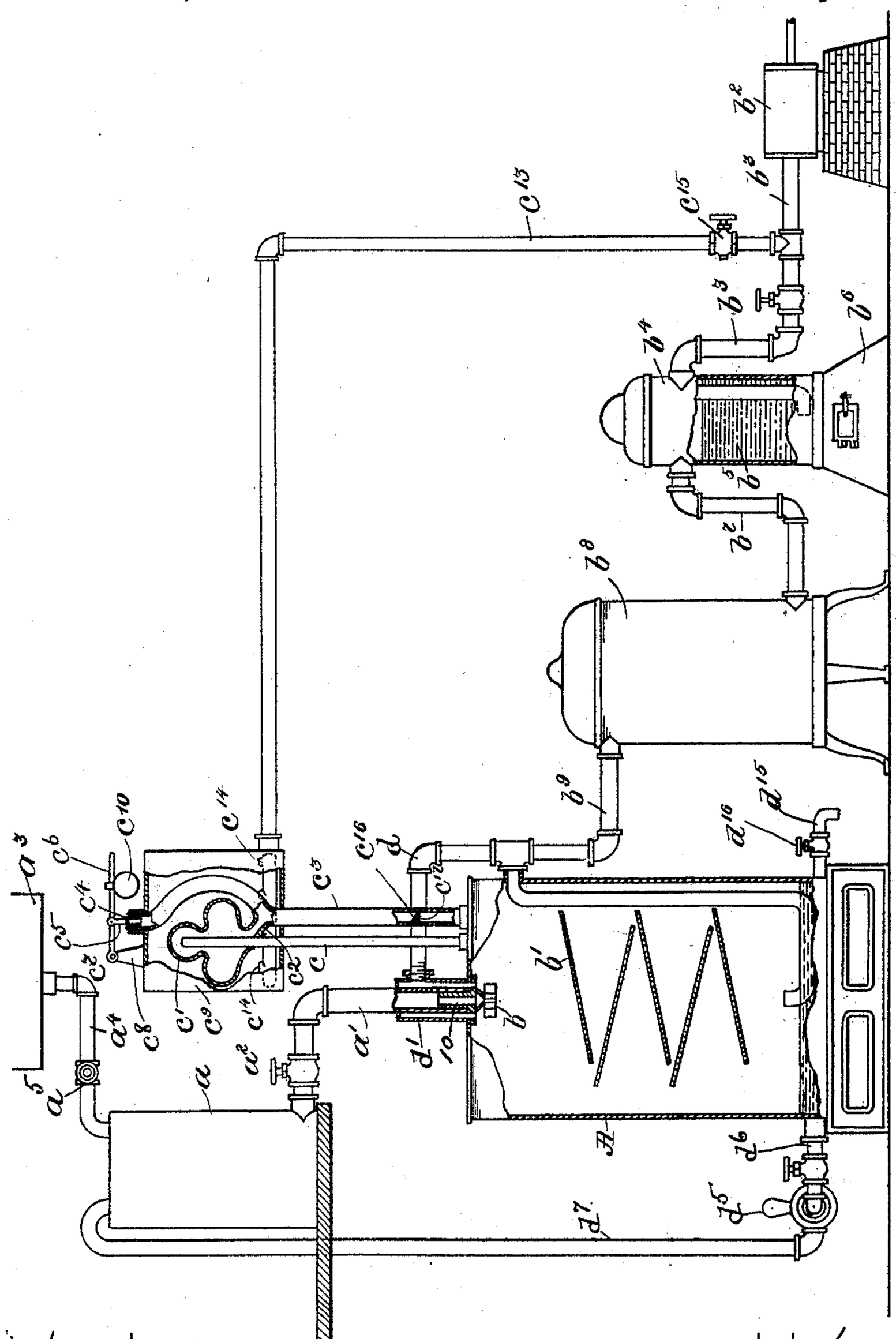
(No Model.)

C. BULLOCK.

METHOD OF AND APPARATUS FOR TREATING ALCOHOLIC LIQUORS.

No. 497,857. Patented May 23, 1893.



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METHOD OF AND APPARATUS FOR TREATING ALCOHOLIC LIQUORS.

SPECIFICATION forming part of Letters Patent No. 497,857, dated May 23, 1893.

Application filed October 11, 1892. Serial No. 448,534. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BULLOCK, of North Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Methods of and Apparatus for Treating Alcoholic Liquors, of which the following description, in connection with the accompanying drawing, is a specification, like letters and numerals on the drawing representing like parts.

This invention relates to a novel method of and apparatus for purifying and refining alcoholic liquors.

Prior to my present invention, I am aware that spirituous liquors have been subjected in large quantity or bulk to the oxidizing effect of heated air, to destroy the deleterious and poisonous alcohols, such as the propylic, butylic, amylic (fusel oil) and the aldehydes present in crude or new liquors. In the process referred to, the heated air is dry, and a considerable pressure is required to force the hot, dry air through the volume or body of liquor, and as a result, a very considerable quantity of the ethyl-alcohol is carried from the process tank or oxidizing chamber into the condenser, from which a portion of the ethyl-alcohol is carried by the air into a water vat, where the alcohol is collected. The alcohol carried by the air into the water vat, is practically lost from the liquor under treatment and, as a result, the strength or proof of the liquor after treatment is less than before treatment, that is, the treated liquor has lost some of its proof which requires the addition of alcohol to the treated liquor to restore its proof. In accordance with my invention, I obviate the loss of proof referred to, by treating the liquor in small quantity and while in action or in transit to the oxidizing effect of heated air preferably moistened, as will be described, the air being brought, under substantially little pressure, in contact with the liquor in small quantity. The pressure, at which the air is brought in contact with the liquor in small quantity, is, preferably, only sufficient to create a gentle circulation of the air, and consequently, only a substantially small quantity of alcoholic vapor is carried by the air into the condenser, wherein it is all condensed and returns to the process tank or oxidizing chamber. The air is permitted to escape from the condenser, after it has accumulated therein sufficiently to create a pressure requisite to open an escape or safety-valve. In this manner, the liquor after treatment, retains all its proof. The heated air is preferably moistened before being admitted to the oxidizing chamber, to improve the flavor of the treated liquor.

The particular features in which my invention consists will be pointed out in the claims at the end of this specification.

The drawing is an elevation, partially broken out, of the form of apparatus preferred by me with which to practice my invention.

A represents the process tank or oxidizing chamber, in which the liquor, such as whisky, brandy, &c., is treated, the said liquor being supplied from a receptacle or tank a located above the oxidizing chamber A and connected therewith by a pipe a', herein shown as provided with a cock or valve a^2, the receptacle a, as herein shown, being adapted to receive the liquor from the supply tank a^3 provided with an outlet pipe a^4 extended over the receptacle a, the outlet pipe a^4 being provided with a stop cock or valve a^5. The liquor to be treated is admitted into the oxidizing chamber A in small quantity by opening the valve a^2, and preferably the said liquor will be discharged upon a distributer b, which may be of any usual or desired construction, it being herein represented, as a series of vanes or arms on a spindle 10 adapted to be revolved by the liquor in its descent into the oxidizing chamber A. The liquor, after passing from the distributer, is preferably received upon a series of inclined plates or shelves b', over which it flows in a thin film or in small quantity, to the bottom of the chamber A. The liquor while in motion or in transit, that is, in its descent to the bottom of the chamber A is subjected to the oxidizing action of heated air, preferably moistened, as will be described. The air is supplied by means of an air pump b^2, which may be of any usual or well-known construction, having its outlet pipe b^3 connected, preferably, to the upper end of a heater b^4 containing within it a column of water b^5, the pipe b^3 being extended down through

the column of water b^5 to near the bottom of the heater b^4. The water b^5 may be heated, preferably to above its boiling point, by means of a suitable fire in a furnace b^6, herein shown as located below the heater b^4, or any other desired means for heating the column of water may be employed, such for instance, as a steam coil, not shown, but which may be located within the heater b^4. The heater b^4, above the water line, is provided with an outlet pipe b^7 connected to the bottom of an air purifier b^8, which may be of any desired construction and preferably what is known as the Tyndall air purifier, the latter being provided at its upper end, with an air outlet pipe b^9, which is extended into the oxidizing chamber A, and as herein shown, the pipe b^9 is extended into the chamber A near its upper end and then passes down to near the bottom of the chamber, so that, the air issuing from the mouth of the pipe b^9 will ascend upward in the direction opposite to that in which the current of liquor flows.

The oxidizing chamber A is connected by a vapor-outlet pipe c to a condenser, preferably of a construction substantially as herein shown, it consisting of a hollow substantially dome-shaped receptacle or chamber c', into which the vapor-pipe c is extended, the said pipe being extended to near the top of the said receptacle. The receptacle c' is provided near its bottom with an outlet passage c^2, connected to a pipe or passage c^3 communicating at its lower end with the oxidizing chamber A, and having its upper end adapted to communicate with the atmosphere, the said pipe being normally closed by an escape or safety-valve c^4, of any suitable or desired construction, the said valve having its stem c^5 pivotally connected to a lever c^6 fulcrumed as at c^7 to a standard or upright c^8 supported, as shown, on a chamber or vessel c^9. The lever c^6 is provided with the usual weight or ball c^{10}. The receptacle c' is located within the vessel or chamber c^9, which may, and preferably will, be open at its top, the said chamber or vessel containing a condensing medium preferably a brine liquor. The brine liquor is agitated for the best results, which is effected as herein shown, by forcing air through the liquor, the said air being preferably forced into the chamber or vessel by the same pump employed to force the air into the oxidizing chamber, the outlet pipe b^3 for the pump b^2 having a branch pipe c^{13} extended into the vessel or chamber c^9, and preferably provided with two or more perforations or air outlets c^{14}, the said branch pipe having a cock or valve c^{15}, by which the quantity of air admitted into the chamber c^9 may be controlled. The pipe c^3 is preferably provided with an automatically operated valve c^{16} located near the chamber A, and which is normally seated to cut off communication between the chamber A and the upper portion of the pipe c^3, the valve c^{16}, as herein shown, being normally seated by a spring c^{17}. The air inlet pipe b^9 for the oxidizing chamber A, may, and preferably will, be provided with a branch pipe d, connected to a sleeve d', which surrounds the lower end of the pipe a', and the air admitted to said sleeve passes into the chamber A, and assists in breaking up or disturbing the liquor into a spray or small quantity.

In operation, the liquor admitted to the chamber A by opening the cock or valve a', is broken up or sprayed by the distributer and falls upon the uppermost shelf, over which it flows in small quantity to the next lower shelf and so on until it reaches the bottom of the chamber A. The liquor in small quantity is subjected to the oxidizing action of purified heated air, which is supplied by the pump, the air preferably carrying into the oxidizing chamber A, a small quantity of vapor of water taken up by the air as it passes through the column b^5 of heated water. The air in the chamber A oxidizes the deleterious alcohols, principally the amyl-alcohol or fusel oil, and also passes from the chamber A up through the pipe c into the condensing chamber c', wherein any alcoholic vapor carried off by the air, is condensed and flows down into the lower portion of the pipe c^3, the air passing from the condensing chamber into the upper end of the pipe c^3, wherein it accumulates until sufficient pressure is created to open the safety-valve. The liquor of condensation flows down and accumulates in the pipe c^3, until a column of sufficient height is obtained to open the valve, whereupon the liquor of condensation descends into the chamber A, where it is again subjected to the oxidizing action of the air. The liquor collected in the chamber A, is preferably pumped back into the supply vessel a, by means of the pump d^5, having its inlet port connected by a pipe d^6 to the chamber A and its outlet port connected by a pipe d^7 to the vessel a. In this manner the liquor in small quantity may be circulated through the oxidizing chamber, either continuously or intermittently, and as a result, may be more energetically acted upon by the air, thereby materially reducing the length of time required to oxidize or "age" the liquor, which when sufficiently "aged" may be drawn off through the pipe d^{15} without interrupting the process, the discharge pipe d^{15} being provided with a cock or valve d^{16}. Owing to the fact, that the liquor is heated in small quantity or film rather than in bulk, the air admitted need be under but little pressure, thereby obviating loss by non-condensation, and thus maintaining all the proof or strength of the liquor. Furthermore, the length of time required to age the liquor is shortened, and by means of moistening the heated air as described, the flavor is improved.

I claim—

1. That improvement in the art of treating alcoholic liquors, which consists in passing air through a heated column of water and subjecting the liquor while passing in small

quantity through a chamber or vessel, to the oxidizing effect of the air thus heated and moistened, substantially as described.

2. That improvement in the art of treating alcoholic liquors, which consists in subjecting the liquor in small quantity in transit through a chamber or vessel to the oxidizing effect of moistened heated air and circulating the said liquor through the said chamber, substantially as described.

3. In an apparatus for treating alcoholic liquors, the combination with an oxidizing chamber A, a liquor supply connected to said chamber, a pump to supply air to the said chamber, and a water-heater interposed between the said chamber and pump, and through which the air is forced by the said pump, of a condenser consisting of a hollow, condensing chamber or vessel c', a vat c^9 containing condensing material and in which the vessel c' is located, a vapor and air pipe c communicating with the oxidizing chamber and with the interior of the hollow condensing chamber or vessel c', a pipe or passage c^3 connecting the oxidizing chamber with the condensing chamber or vessel, the said pipe or passage also communicating with the atmosphere, substantially as described.

4. In an apparatus for treating alcoholic liquors, the combination with an oxidizing chamber A, a liquor supply connected to the said chamber, a pump to supply air to the said chamber, and a water-heater interposed between the said chamber and pump and through which the air is forced by the pump, of a condenser consisting of a hollow, condensing chamber or vessel c', a vat c^9 containing condensing material and in which the vessel c' is located, a vapor and air pipe c communicating with the oxidizing chamber and with the interior of the hollow, condensing chamber or vessel c', a pipe or passage c^3 connected with the oxidizing chamber and with which the condensing chamber or vessel is connected, and a safety or escape-valve for the pipe c^3, substantially as described.

5. In an apparatus for treating alcoholic liquors, the combination with an oxidizing chamber A, a liquor supply connected to the said chamber, and a pump to supply air to the said chamber, of a water heater containing a column of heated water through which heated water the air is passed on its way to the said chamber, the said air being heated and moistened by its passage through the column of heated water, substantially as and for the purpose specified.

6. In an apparatus for treating alcoholic liquors, the combination with an oxidizing chamber A, a liquor supply connected to said chamber, and a pump to supply air to the said chamber, of a condenser consisting of a hollow condensing chamber or vessel c', a vat c^9 containing condensing material and in which the vessel c' is located, a vapor and air pipe c communicating with the oxidizing chamber and with the interior of the hollow condensing chamber or vessel c', a pipe or passage c^3 connected with the oxidizing chamber and with which the condensing chamber or vessel is connected, and a valve in the pipe or passage c^3 normally closed to cut off communication between the chamber A and the upper portion of the said pipe, and automatically opened by the weight of a column of liquor of condensation, substantially as described.

7. In an apparatus for treating alcoholic liquors, the combination of the oxidizing chamber A, a supply tank a connected therewith, and means to return the liquor from the chamber A to the tank a, of a condenser consisting of a hollow vessel c', a chamber or vessel c^8 containing condensing material and in which the vessel c' is located, a pipe c^3 connected to the chamber A, and with which the vessel c' is connected, a valve in said pipe operated by the weight of the liquor of condensation, and a safety-valve normally closing the pipe c^3, an air pump communicating with the chamber A, a water heater containing a column of heated water through which the air is forced by the said pump and an air purifier, substantially as described.

8. In an apparatus for treating alcoholic liquors, the combination with the oxidizing chamber A, a supply tank a, connected therewith, and means to return the liquor from the chamber A to the tank a, of a condenser consisting of a hollow vessel c', a chamber or vessel c^8 containing condensing material and in which the hollow vessel c' is located, a pipe c^3 connected to the chamber A, and with which the vessel c' is connected, a valve in said pipe operated by the weight of the liquor of condensation, and a safety-valve normally closing the pipe c^3, an air pump communicating with the chamber A, a branch pipe connecting said pump with the chamber or vat c^9, substantially as described.

9. In an apparatus for treating alcoholic liquors, the combination with the oxidizing chamber A, a supply tank a connected therewith, and means to return the liquor from the chamber A to the tank a, of a condenser consisting of a vessel c', a chamber or vessel c^8 containing condensing material and in which the vessel c' is located, a pipe c^3 connected to the chamber A, and with which the vessel c' is connected, a valve in said pipe operated by the weight of the liquor of condensation, and a safety-valve normally closing the pipe c^3, an air pump communicating with the chamber A, a branch pipe connecting said pump with the chamber or vat c^9, and a second branch pipe from the air pipe communicating with the oxidizing chamber near the liquor inlet to cause the air to act on and spray the liquor as it flows into the chamber A, substantially as described.

10. In an apparatus for treating alcoholic liquors, the combination with the oxidizing chamber A, a liquor supply connected therewith, and means to cause the liquor to flow through the said chamber in small quantity,

of a condenser having a vapor inlet pipe connected to the oxidizing chamber and constructed to trap the liquor of condensation and provided with a liquor outlet pipe connected to the oxidizing chamber to return the liquor of condensation into the oxidizing chamber, and a pump to supply air to the oxidizing chamber under substantially little pressure and means to circulate the liquor through the oxidizing chamber, substantially as described.

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

CHARLES BULLOCK.

Witnesses:

JAS. H. CHURCHILL,

J. MURPHY.