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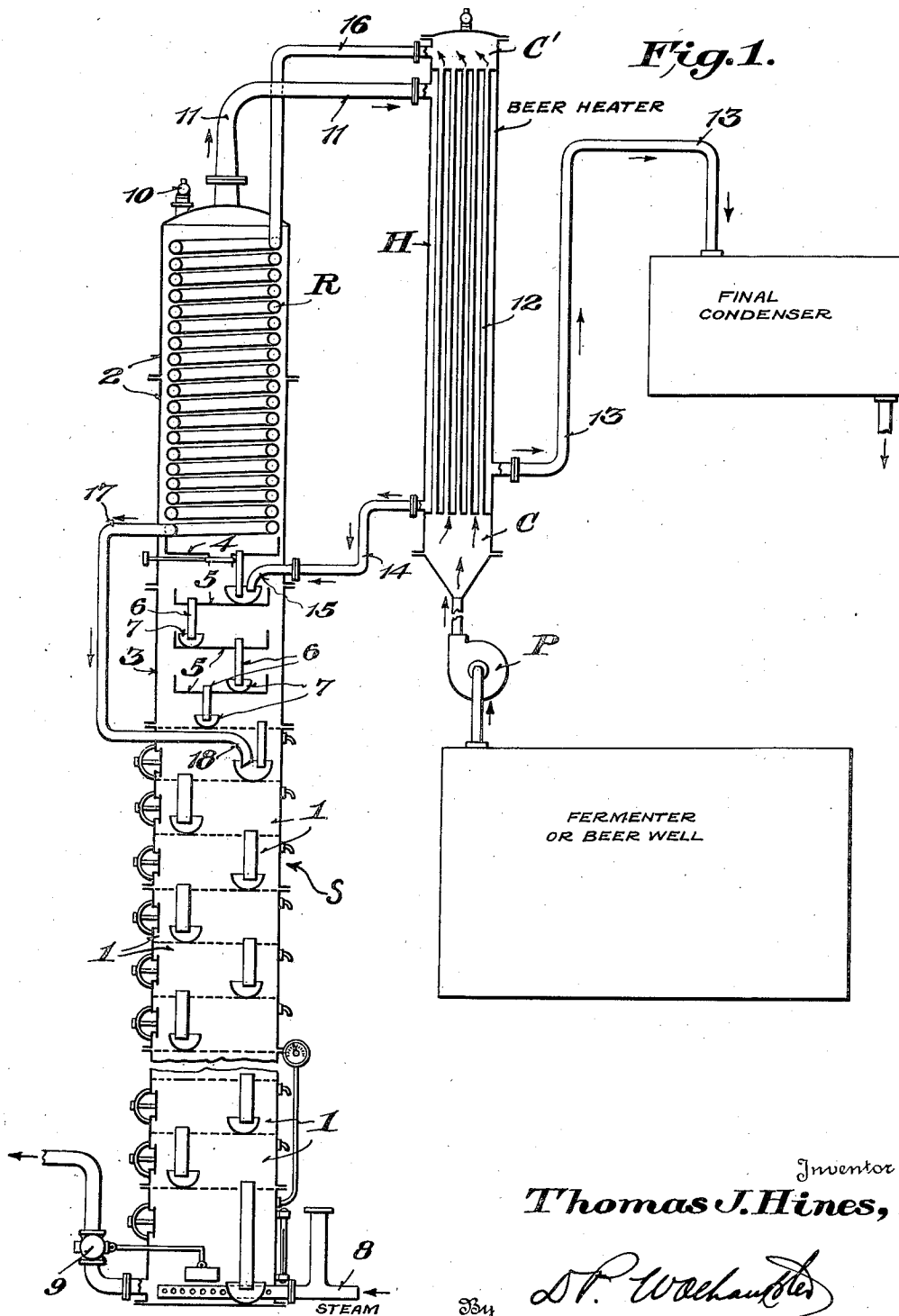
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APPARATUS FOR DISTILLING SPIRITUOUS LIQUORS

Filed Nov. 16, 1933

2 Sheets-Sheet 1



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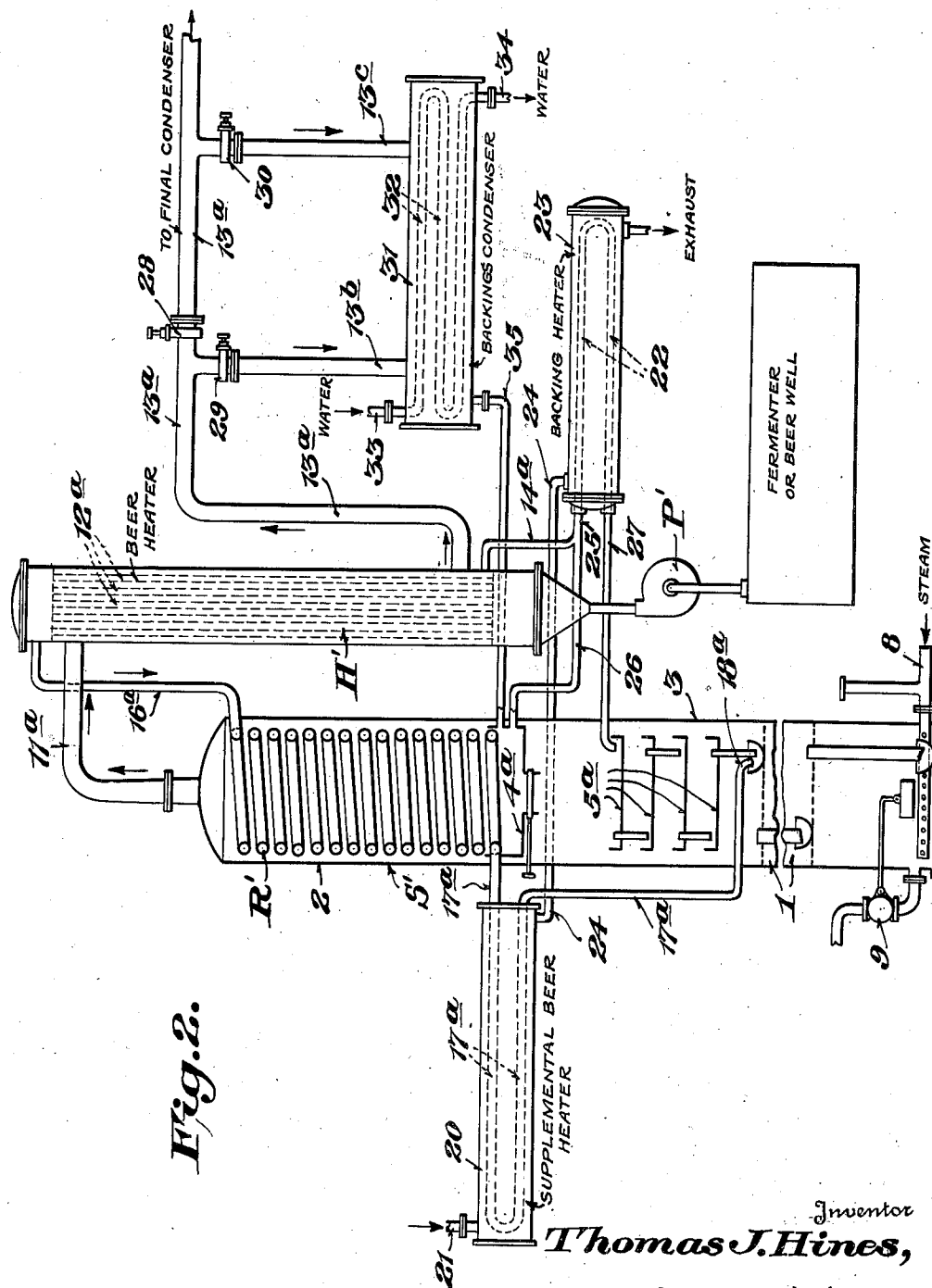


Fig. 2.

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APPARATUS FOR DISTILLING SPIRITUOUS LIQUORS

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3 Claims. (Cl. 202—159)

This invention relates to an improvement in the method and apparatus employed for distilling spirituous liquors such as whiskey and the like.

One of the objects of the invention is to provide an apparatus for effecting distillation in a continuous and therefore more rapid manner because the necessity of using a doubler is eliminated, while at the same time obtaining a greater yield and a higher quality finished product from a given quantity of stock, and also effecting economy in operating costs by fully and advantageously utilizing the heat of the distilling process with a consequent economy in the quantity of water used for condensing the final product.

Another object of the invention is to provide a continuous still wherein low grade high temperature vapors containing oils and grain fats are condensed in the upper part of the still and returned for further distillation without leaving the still, while the high grade vapors from the top of the still are conducted to the final condenser for recovering the final product, namely a high grade whiskey. That is to say, the present invention contemplates placing a coil in the upper end of the still proper for conducting preheated but relatively low temperature beer into the still so that it is further heated before being discharged in the boiler of the still, while the consequent relatively low temperature of the coil acts as a condenser to throw down the vapors containing the undesirable oils and fats for further distillation. Furthermore, the presence of the relatively low temperature of the coil in the top of the still has, among other advantages, the very desirable and practical feature of preventing the still from blowing back or boiling over into the heater and connections leading to the final condenser in the event that excess steam pressure is accidentally or intentionally applied to the still.

A further object of the invention is to provide a modified form of apparatus for producing a higher proof whiskey wherein the low grade condensates precipitated by the coil in the top of the still and in the beer heater may be further heated in other associated apparatus before being returned to the still, thereby to cause the low grade distillate to more readily give off its alcoholic vapors when it is returned to the still proper.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the invention consists in the novel features of construction, combination and arrangement of parts,

hereinafter more fully described, illustrated in the accompanying drawings and defined in the appended claims.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is a diagrammatic view of a distilling apparatus embodying the present improvements.

Figure 2 is a diagrammatic view illustrating a modification of the apparatus intended to obtain a higher proof whiskey when desired.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

The best way to obtain high class whiskey distillation is by distilling the beer at low temperature, thereby preventing carrying over the excess of fusel oils, grain fats and other non-essentials which require high temperatures to vaporize.

Heretofore, it has been the general practice to collect the low grade vapors containing fats and the like in an apparatus separate from the still and redistill them separately. However, according to the present invention it is proposed to condense these low grade vapors in the upper part of the still or column itself and precipitate them into the still proper so that they are continuously refined by the original heat of the still without the necessity of using a doubler.

Referring to Figure 1, the still is designated generally as S, the same consisting of a vertical column including at its lower end a boiler section comprising a plurality of foraminous boiler units of the type for example shown in the Brennan Patent No. 822,573, June 5, 1906 and having at its upper end or dome a refining section 2, while the intermediate portion 3 constitutes a "backings" separating and flow retarding section including the low grade condensate collecting pan 4 and the additional imperforate separating pans 5 which communicate with each other by the pipes 6 and the cups 7 of the type shown in the patent referred to. Steam is supplied to the bottom of the still column by the conduit 8 and bubbles or "boils" upwardly through the foraminous units. In accordance with the usual practice the bottom section of the still is provided with a float controlled blow-off valve 9 for permitting the spent beer to go to waste at intervals under pressure within the still.

The top refining section or dome 2 of the still column is provided with an air inlet valve 10 to break any vacuum in the column, and is also provided with a conduit 11 leading to the upper end of the jacket of the heater H. The latter

contains a plurality of beer conducting tubes 12 secured in suitable end sheets to provide lower and upper chambers C and C'. At a suitable distance above the lower sheet supporting the tubes 12, the jacket of the heater has connected thereto a discharge pipe 13 leading to a final condenser in which the final product is condensed in the conventional manner. Also, the extreme bottom portion of the jacket of the heater H has connected thereto a "backings" return or drain pipe 14 which discharges at 15 into the cup 7 of one of the separating pans 5. The purpose of this pipe is to return condensed vapors from the heater jacket H to the still, as will presently more fully appear.

The liquid from the fermenter or beer well is pumped by the pump P into the lower chamber C of the heater and forced upwardly through the tubes 12 to the chamber C' at the top of the heater. As the liquid from the fermenter or beer well passes through the tubes 12 it becomes heated due to the fact that the steam heated vapors rising in the still column are conducted through the pipe 11 to the jacket surrounding the pipes or tubes 12. From the upper chamber C' of the heater the beer is conveyed by pipe 16 to a coil R located within the upper section 2 of the still column. This coil serves to further heat the beer before it is discharged into the boiler of the still, and also because of the low temperature of the beer supplied thereto, it serves as a condenser. That is to say, the beer passing through the pipe 16 and refining coil R is heated to a temperature of approximately 125° F., due to passing through the heater H, and therefore the temperature of the refining coil R is considerably less than the temperature of vapors rising in the still column to provide in effect a relatively cool surface with which the rising vapors make contact and some of which condense in the manner to be later described. The bottom of the refining coil R is led back into the still at the head of the foraminous boiler units 1 as indicated at 18, thereby to discharge the beer or liquid into the top of the boiler section so that it will be cascaded downwardly through the foraminous walls thereof while the steam supplied from the bottom of the still will ascend and carry with it the relatively volatile vapors extracted from the beer.

One of the distinctive features of the present invention resides in placing the refining coil R directly within the still column. In other words, the present invention intends to provide a condensing medium in the top of the still column so that the low-grade high-temperature vapors containing oils and fats will be precipitated into the upper separating pan 4 of the separating section 3 within the still. As previously explained, the temperature of the refining coil R is considerably less than the temperature of the vapors rising in the still column and which are directed between the outer side of the coil R and the inside of the section 2 by the pan 4. Thus, this pan serves not only as a collecting medium but also to deflect and direct the rising vapors against the coil surfaces so that the said low-grade high-temperature vapors entrained in the vapor mass will be condensed and not carried along with the high grade vapors through the pipe 11 into the jacket of the heater H which is in circuit with the final condenser. Such condensation of low grade vapors as may occur within the jacket of the heater H are returned to the upper pan 5 of the separating section 3 by the pipe 14.

The advantages of locating the refining coil R

within the upper end of the still column chamber are many. The chief advantages are however, that it serves to condense low grade relatively high temperature vapors in the upper part of the still and also prevents the still from blowing into the heater, and furthermore uses the heat in the still to further heat the beer before it is discharged into the boiler. The low grade vapors may be condensed and thrown down into the still proper not only to effect more complete separation of the alcoholic content therefrom but to avoid carrying them over into the final condenser. Also, if the operator of the still should attempt to speed up the distilling operation by supplying more than the required amount of steam to the bottom of the still as often happens by design or accident, the relatively cool condition of the refining coil R will prevent the still from boiling over into the heater.

Other advantages of the arrangement described are that a greater refinement of the vapors occurs within the still and only the more desirable high grade low temperature vapors can run the gantlet of the refining apparatus and get into the final condenser. Furthermore, the presence of the refining coil R in the still itself condenses the low-grade vapors to such an extent, directly within the still, that only a small amount of the low-grade vapors are carried over into the jacket of the heater. However, such condensation as occurs within the heater is also returned to the backing pans below the refining section. By leading the condensation from the heater H through the pipe 14 and from the refining coil R directly into the backing pans below the coil, a separation is made of the whiskey content in those returns before mixing with the beer. In other words, the pans 4 and 5 of the separating section 3 provide a means for aiding in extracting the whiskey content in this low-grade return before they are carried into the beer at the top of the boiler section of the column.

By causing a primary condensation of the low grade vapors in the refining section, through the medium of the coil R, a more uniform result can be obtained in a highly more efficient and economical way than can possibly be obtained through the use of a doubler, or a second separate distillation. The quality and volume is good at all times and is not subject to the variations of doubled whiskey, not properly processed. When whiskey is doubled or redistilled in the ordinary way, each operation entails a loss in volume of approximately two to four points. With the present apparatus and process, however, this loss is avoided and consequently a higher yield of high quality product is assured.

In the event that it is desired to obtain a high proof whiskey, the modification shown in Figure 2 may be used. In this construction beer is pumped from the beer well by the pump P' into the tubes 12a of the heater H' and from thence it is conducted by pipe 16a to the refining coil R' located in the top of the still column S' which otherwise has all of the features pointed out in connection with the column S, namely a lower boiler section 1, an upper refining section 2, and an intermediate separating section 3. The refining coil R' is led out of the still as indicated at 17a and is by-passed around the separating section 3 containing the pans 4 and 5, and then goes into the upper unit of the boiler at 18a. However, before the pipe 17a or its equivalent leads back to the still it passes through a heater 20 to which steam is supplied at 21, for the pur-

pose of heating the beer in the coil to a higher temperature before introducing it into the boiler. The low grade constituents of the vapor rising in the still are thrown down into the backing or separating pan 4a after they have been condensed on the refining section R'. The high grade vapors are, of course, conducted out of the top of the still by the pipe 11a into the jacket of the heater H' from whence they pass out of the lower end of the heater jacket into the pipe 13a.

In this modification it will be observed that the low grade liquid condensate collecting in the heater H' is not returned directly to the lower pans of the separating section as by the pipe 14 in Figure 1, but is conducted by the pipe 14a into tubes or coils 22 in a backings heater 23 whose jacket communicates by the pipe 24 with the jacket of the supplemental beer heater 20. The pipe 14a leading to the tubes or coils 22 joins as at 25 with a pipe 26 leading to the pan 4a which collects the drippings from the coil R' so that all of the condensate thrown down into the pan 4a by the coil, as well as all of the condensate from the heater H' will be reheated by the heater 23 before being returned by the pipe 27 to the upper pan 5a of the separating section 3.

A further refining of the normally high grade vapors carried in the pipe 13a may be effected by closing the valve 28, in the line 13a leading to the final condenser, and by opening the valves 29 and 30 in pipes 13b and 13c which communicate with the jacket of a "backings" condenser 31. This will force all vapor to go through the preliminary condenser 31 before going to the final condenser to insure that all low grade liquids are condensed. The condenser 31 is provided with a suitable water circulating coil system or its equivalent 32, the intake and exhaust for the water being indicated respectively at 33 and 34. The lowest portion of the vapor jacket of the backing condenser is connected by a pipe 35 with the backing pan 4a of the separating section. Thus, by causing the vapors passing through the pipe 13a from the heater to go through the backings condenser 31, any remaining low volatile vapors will be condensed and led back to the pan 4a of the separating section of the still from whence they will pass to the heater 23 and then to the upper and succeeding pans 5a of the separating section before emptying into the beer.

From the foregoing it will be apparent that all of the condensate collected in the upper pan 4a of the separating section, whether such condensate is furnished by the refining coil R' or obtained from the backing condenser 31, will pass from the pan 4a through the pipe 26 into the tubes 22 of the final heater 23 before being returned to the uppermost pan 5a of the separating unit in the still. It will also be recalled that any condensate occurring in the jacket of the beer heater H will be carried through the final heater due to the fact that the jacket of the heater is connected with the line 26 by the pipe 14a.

In connection with the illustration of the heaters 20 and 23 it will, of course, be understood that these units may be of any conventional type such as tube heaters or coil heaters well

known in the art, and the same is likewise true of the backings condenser 31.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention and scope of the appended claims.

I claim:

1. A distilling apparatus including a still column, a beer heater including beer conducting tubes surrounded by a jacket, said jacket communicating with the upper end of the still, a coil arranged within the upper end of the still column communicating with the beer tubes of the heater, said coil having its other end led out of the still, a heater for the latter portion of the coil, and said coil leading back into the still to discharge the beer therein, a pan located beneath said coil within the still to receive condensate from the coil, a backings heater connected to said pan to receive and to heat the condensate collected in the pan, means for returning the condensate into the still column, means for conducting vapors from the heater jacket to a final condenser, valve means for controlling the flow of vapor to the final condenser, a backings condenser into which the vapor may be directed by manipulation of certain of said valve means, a return pipe from the backings condenser to said collecting pan, and a pipe connecting the lower end of the beer heater jacket to the backings heater.

2. A distilling apparatus including, in combination, a still column having a top outlet, a beer conducting coil arranged within the space at the top of the still column and in the path of vapors ascending in the still toward the top outlet, a final condenser, means for conducting vapors from the top outlet of the still after they have been in contact with the exterior of the beer coil to said final condenser, a pan located within the still below the beer coil, a backings condenser, means for directing vapors on their way to the final condenser through said backings condenser, a pipe connection between the jacket of said backings condenser and said pan, and means connected with said pan for conducting liquid therefrom to a backings heater and also leading the same into the still column.

3. A distilling apparatus for producing high-proof alcoholic liquors including a still column, a beer heater of the tube type providing spaced tubes for conducting beer, and a condensing space around the tubes, said condensing space communicating with the top of the still column, a beer coil connected with the tubular beer conducting portion of the beer heater and disposed within the top space of the still column, thereby to lie directly in the path of all ascending vapors in the column, a pan beneath the coil, a backings heater having pipe connections respectively with said pan and the condensing space of the beer heater, thereby to receive condensate from said pan and from said beer heater and to heat the same, and means connected with said heater for conducting the heated condensate back into the still column at a point below said pan.

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