May 17, 1927. 1,628,736

E. V. OLIVER

CONDENSER FOR STILLS

Filed March 5, 1925 2 Sheets-Sheet 1

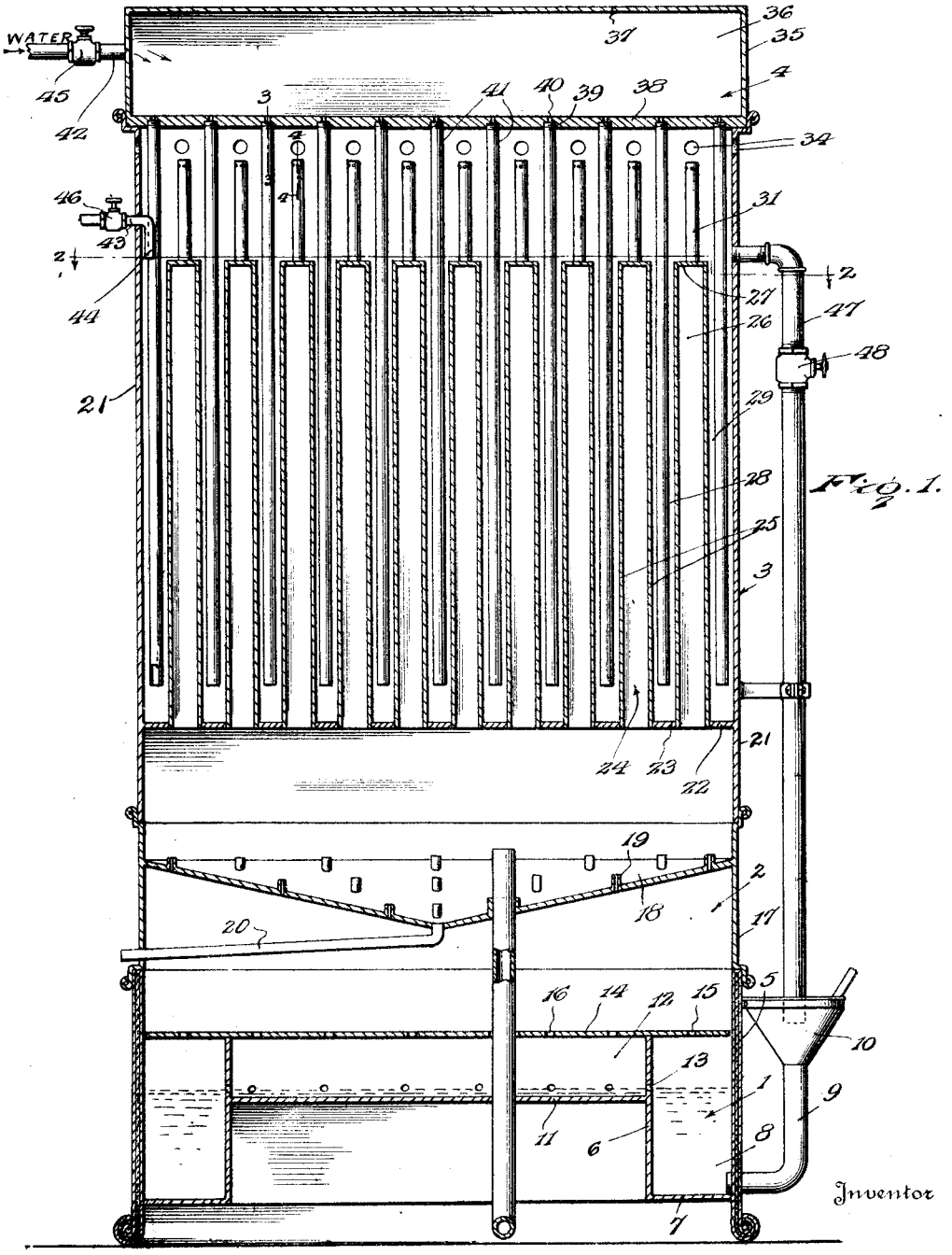


Fig. 1.

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Fig. 2.

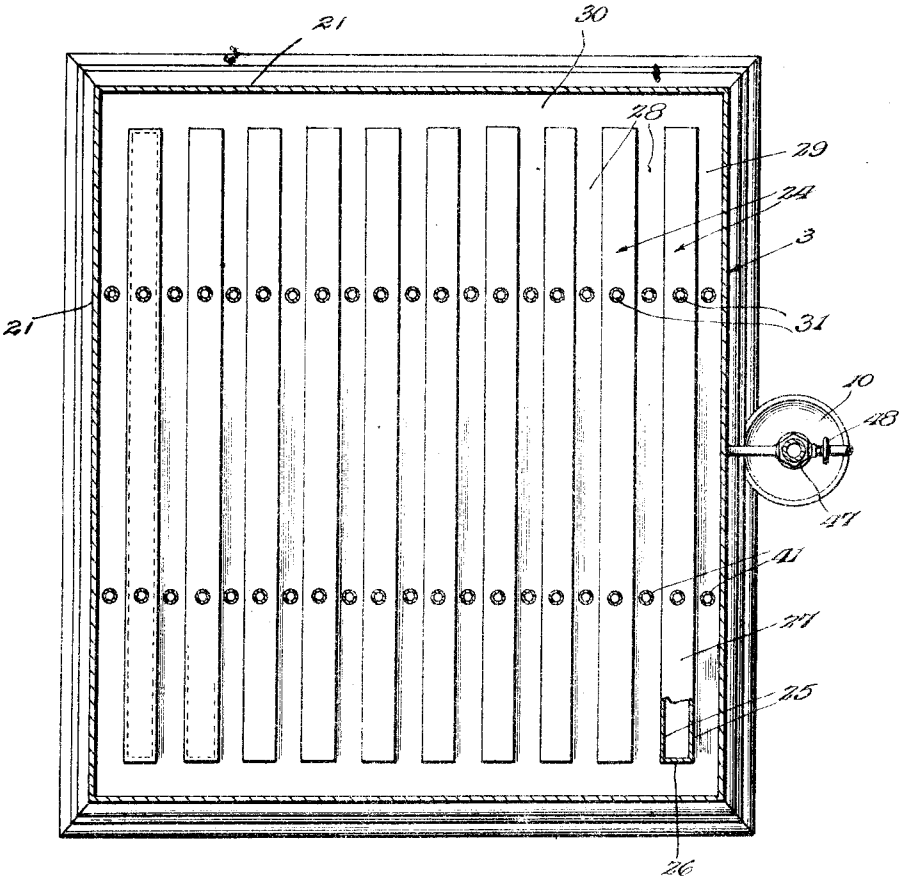


Fig. 3.

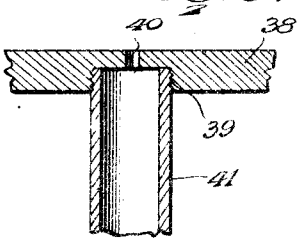
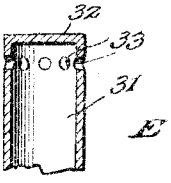


Fig. 4.



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UNITED STATES PATENT OFFICE.

ERNON V. OLIVER, OF PORTLAND, OREGON.

CONDENSER FOR STILLS.

Application filed March 5, 1925. Serial No. 13,282.

This invention relates to improvements in water stills and more particularly to an improved construction of condenser for such a still and means for supplying cooling water thereto, and one of the objects of the present invention is to provide a condenser so constructed as to insure of rapid and economical condensation of the water vapors with a minimum waste of water for cooling purposes and which condenser will present to the vapors to be condensed, a maximum cooling or condensing surface within a given space.

Another object of the invention is to so construct the condenser that obnoxious volatile impurities in the water will be carried off so as not to contaminate the distillate.

Another object of the invention is to so construct the means provided for supplying cooling water to the condenser that the water will be initially introduced into the condenser at a point where its cooling effect will prove most effective and in such manner that the exchange of heat will take place in a way to insure of complete condensation of the water vapors or steam in the most effective manner.

Another object of the invention is to provide, in connection with a condenser, a novel construction of reservoir and means associated therewith for supplying cooling water to the cooling water chambers of the condenser.

In the accompanying drawings:

Figure 1 is a vertical sectional view through a still constructed in accordance with the present invention.

Figure 2 is a horizontal sectional view taken substantially on the line 2—2 of Figure 1, looking in the direction indicated by the arrows.

Figure 3 is a detail vertical sectional view on the line 3—3 of Figure 1.

Figure 4 is a similar view on the line 4—4 of Figure 1.

The still embodying the invention comprises, generally speaking, a generator which is indicated in general by the numeral 1, a receiver indicated in general by the numeral 2, a condenser indicated in general by the numeral 3, and a cooling water reservoir indicated in general by the numeral 4. The generator 1 and receiver 2 are of the construction illustrated and described in my co-pending application Serial No. 678,451, filed December 4, 1923, and, consequently, a brief description of these component parts of the still will suffice. The generator 1 comprises a hollow body which, in the present illustrated embodiment of the invention is of rectangular form and comprises surrounding walls 5 and other walls 6 which are spaced inwardly from the walls 5 and connected therewith by a bottom 7, forming a preheating chamber 8 into which water is introduced by a supply pipe 9 provided at its top with a funnel 10, the purpose of which will be presently explained. A bottom wall 11 is arranged within the bounds of the walls 6 and defines, in conjunction with the upper portions of said walls 6, a generator chamber indicated by the numeral 12, the walls 6 having openings 13 formed therein to provide for the passage of preheated water from the preheating chamber 8 into the generating chamber 12, whereby a constant shallow level of water is maintained upon the bottom 11 and rapidly converted into steam, the apparatus being, of course, arranged with the open bottom of the generator above a source of heat as, for example, a cooking range. A plate 14 is arranged within the generator to rest upon the upper edges of the walls 6 and is formed with perforations 15 and 16 located respectively above and communicating with the preheating chamber 8 and generating chamber 12, so that the steam generated in these chambers and especially in the chamber 12, may pass upwardly through the open top of the generator.

The receiver 2 comprises a hollow rectangular body 17 provided in its upper portion with a receiving pan 18 having a number of short nipples or spouts 19 extending upwardly from its surface and establishing communication between the spaces above and below the pan. A water outlet pipe 20 leads from the lowermost portion of the pan, the pan being inclined from all sides toward its mid-portion, and serves to carry off the distilled water. The body of the receiver is removably disposed upon the top of the body of the generator, and the condenser 3 is, in turn, supported upon the top of the receiver.

The condenser 3 comprises a hollow rectangular body including surrounding walls indicated by the numeral 21, the body being disposed at its open lower end to rest upon the open upper end of the receiver 2, as clearly shown in Figure 1 of the drawings. Arranged within the body of the condenser 3 above the open lower end thereof is a bot-

tom sheet or plate indicated by the numeral 22, which is formed at intervals throughout its area with parallel longitudinal slots 23 into which are fitted and secured, in a fluid-tight manner, the open lower portions of condensation chambers indicated in general by the numeral 24. Each of these chambers comprises side walls 25, end walls 26, and a closed top 27, and the arrangement of the chambers is best illustrated in Figure 2 of the drawings. It will be observed by reference to this figure and Figure 1 of the drawings, that the chambers are spaced so that cooling water chambers 28 are provided between each two adjacent ones of the chambers 24, and that similar cooling water chambers 29 are provided between the side walls of the endmost ones of the series of chambers 24 and the corresponding side walls 21 of the body of the condenser, the end walls 26 of the chambers 24 being likewise spaced from the other side walls of the body of the condenser to provide cooling water chambers 30. Water is to be introduced into the cooling water chambers by means to be presently described, and it will be evident at this point that steam rising through the nozzles 19 will enter the condensation chambers 24 and be condensed upon coming in contact with the cooled walls of the chambers 28, 29 and 30, the condensate dripping onto the surface of the pan 18 of the receiver 2 and flowing out through the pipe 20. The tops 27 of the condensation chambers 24 are spaced below the open top of the body of the condenser 3, and vent pipes 31 are fitted at their lower ends into openings in the said tops 27 of the condensation chambers and extend above the chambers to a point spaced slightly below the upper edges of the walls 21 of the condenser body. These pipes, as best shown in Figure 4 of the drawings, are closed at their upper ends, as indicated by the numeral 32, except that in their sides, immediately below their upper extremities, they are formed with a circumferential series of openings indicated by the numeral 33, through which any obnoxious volatile impurities in the water or, more specifically the water vapors generated in the generator, may pass through the upper portion of condenser body, these gases finding exit by way of a series of openings 34 which are formed in the walls 21 of the body of the condenser in a plane above the plane occupied by the closed upper ends of the vent pipes 31, the said openings 34 establishing communication between the upper portion of the interior of the condenser body and the atmosphere.

Water is supplied to the condenser from the reservoir 4 which comprises a hollow rectangular body including side walls 35, end walls 36, a closed top 37, and a bottom 38, the reservoir being removably disposed at its lower side upon the upper edges of the walls 21 of the body of the condenser 3. The bottom 38 of the reservoir 4 is preferably in the form of a relatively thick metal plate which, as best shown in Figure 3 of the drawings, is formed in its under side at suitable intervals, with threaded openings 39 which extend part way through the plate, the plate being further formed, centrally of each opening 39, with a smaller opening or vent 40 communicating with the opening 39 and opening through the upper side of the said plate. The arrangement of the openings 39 and 40 is preferably such that one, two, or any other desired number of such openings 39 will be located directly above the open upper end of the cooling water chambers 28 and 29, as best illustrated in Figure 2, and a distributing pipe 41 is threaded at its upper end and fitted into each opening 39, the upper extremity of the pipe abutting firmly against the upper wall of the respective opening and the connection of the pipes with the plate 38 comprising the bottom of the reservoir 4, being in this manner firmly established. It will be observed by reference to Figure 3, that the openings 40 are of considerably less diameter than the openings 39 and the bores of the respective pipes 41, so that, by reason of this construction, no sediment or particles of foreign matter can enter the pipes 41 which would be of a size to clog the pipes. Another advantage resulting from this peculiar manner of connecting the pipes with the bottom plate 38 is that there is no possibility of the upper ends of the pipes 41 projecting above the surface of the plate so that the said surface of the plate is left entirely smooth, thereby providing for an equal distribution of water to all the pipes and preventing the accumulation of sediment or foreign matter.

A water supply pipe 42 is fitted at its delivery end into one of the side walls 35 of the reservoir 4 and the reservoir is so mounted upon the top of the condenser 3 that the pipes 41 will extend downwardly into the cooling water chambers 28 to a point near the closed bottoms thereof and deliver the cooling water into the chambers at their lower portions, from the reservoir. In order that a constant level of water may be maintained in the condenser 3 at a point below the perforated upper ends of the vent pipes 31, an overflow pipe 43 is fitted through one of the side walls 21 of the condenser body and has its inner end turned downwardly, as at 44, and this pipe leads to any suitable point of discharge as, for example, a kitchen sink, and manually adjustable cut-off or regulating valves 45 and 46 are arranged in the pipes 42 and 43 respectively, so that the supply of water to the reservoir 4 and the discharge of water

through the outlet pipe 43 may be properly regulated to maintain the proper water level within the condenser. At this point, it will be evident that cooling water is continuously supplied to the condenser and permitted to overflow from the same after it has served its purpose and that the water is supplied to the cooling water chambers at their portions which are subjected to the highest degree of temperature, the water initially supplied being, of course, at a lower temperature than the water overflowing from the condenser. Therefore, the walls of the condensation chambers 24 are equably cooled to correspond to the temperature variations prevailing over different portions of their areas.

As in my previously mentioned co-pending application, a second overflow pipe 47 is led from the side of the condenser body 3 with its lower end entering the mouth of the funnel 10, and a cut-off valve 48 is interposed in this pipe and may be adjusted to permit of a regulated flow of water through the said pipe 47 to the funnel 10 and from the funnel through the pipe 9 to the preheating chamber 8. As the water in the condenser is heated through the exchange of heat between it and the walls of the condensation chambers, and rises to the overflow, this partially heated water is delivered to the preheating chamber, thereby effecting an economy in fuel.

In the drawings, the apparatus is illustrated as of general rectangular form but it will be readily understood that it may be of cylindrical form and that the condensation chambers and water cooling chambers may be made annular or cylindrical, as this general idea is embraced in my co-pending application Serial No. 678,450, filed December 4, 1923, and it is obvious that the water reservoir of the present application might be employed in connection with the condenser of the said co-pending application with the necessary modification.

Having thus described the invention, what I claim is:

1. In distilling apparatus, a casing having a bottom provided with inlet passages for vapors from a generator, a horizontal wall in the casing, a plurality of spaced condensation chambers having open lower ends supported upon and opening through the partition wall within the casing, to receive said vapors, the spaces between the said chambers constituting cooling-water chambers open at their tops, a reservoir at the upper portion of the casing having a bottom closing the top of the casing, a plurality of distributing pipes extending downwardly from the bottom of the reservoir and into the cooling-water chambers, and an overflow leading from the casing at a level above the open tops of the said cooling-water chambers.

2. In distilling apparatus, a casing having a bottom provided with inlet passages for vapors from a generator, a horizontal partition wall in the casing, a plurality of spaced condensation chambers within the casing, having open lower ends supported upon and opening through the partition wall to receive said vapors, the spaces between the chambers constituting cooling-water chambers open at their tops, a closed reservoir at the upper portion of the casing having a relatively thick bottom closing the top of the casing and provided with a plurality of threaded openings extending part way through the bottom and a corresponding number of smaller openings communicating with respective ones of the first mentioned openings and opening through the upper side of the bottom, a plurality of distributing pipes having threaded upper ends fitted into respective ones of the first mentioned openings and extending downwardly from the bottom of the reservoir and into the cooling-water chambers, and an overflow leading from the casing at a level above the open tops of the said cooling-water chambers.

3. In distilling apparatus, a casing having a bottom provided with inlet passages for vapors from a generator, a horizontal partition wall within the casing, a plurality of spaced condensation chambers within the casing having open lower ends supported upon and opening through the said partition wall to receive said vapors, the spaces between the chambers constituting cooling-water chambers open at their tops, a closed reservoir at the upper portion of the casing, a plurality of distributing pipes extending downwardly from the bottom of the reservoir and into the cooling-water chambers, an overflow leading from the casing at a level above the open tops of the said cooling water chambers, and vent pipes extending upwardly from and communicating with the tops of the condensation chambers and at their open ends communicating with the space within the casing above the water level therein.

4. In distilling apparatus, a casing having a bottom provided with inlet passages for vapors from a generator, a horizontal partition wall in the casing, a plurality of spaced condensation chambers within the casing, having open lower ends supported upon and opening through the partition wall to receive said vapors, the spaces between the chambers constituting cooling-water chambers open at their tops, a closed reservoir at the upper portion of the casing, a plurality of distributing pipes extending downwardly from the bottom of the reservoir and into the cooling-water chambers, an overflow leading from the casing at a level above the open tops of the said cooling water chambers, and vent pipes extending upwardly

from and communicating with the tops of the condensation chambers and at their open ends communicating with the space within the casing above the water level therein, the walls of the casing above the said water level having a plurality of openings formed therein communicating with the atmosphere.

5. In distilling apparatus, a casing having a bottom provided with inlet passages for vapors from a generator, a horizontal partition wall in the casing, a plurality of spaced condensation chambers, within the casing, having open lower ends supported upon and opening through the partition wall to receive the said vapors, the spaces between the chambers constituting cooling-water chambers open at their tops, a closed reservoir at the upper portion of the casing, a plurality of distributing pipes extending downwardly from the bottom of the reservoir and into the cooling-water chambers, an overflow leading from the casing at a level above the open tops of the said cooling-water chambers, vent pipes extending upwardly from and in communication with the tops of the condensation chambers, the said pipes being closed at their upper ends and terminating at a level above the plane of the overflow, each pipe having a plurality of openings surrounding its upper end portion, the walls of the casing having openings located above the level of the overflow, and means for supplying water to the reservoir.

In testimony whereof I affix my signature.

ERNON V. OLIVER. [L. S.]