

Nov. 5, 1935.

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2,020,009

BUBBLE STILL

Filed Jan. 23, 1935

2 Sheets-Sheet 1

Fig. 1.

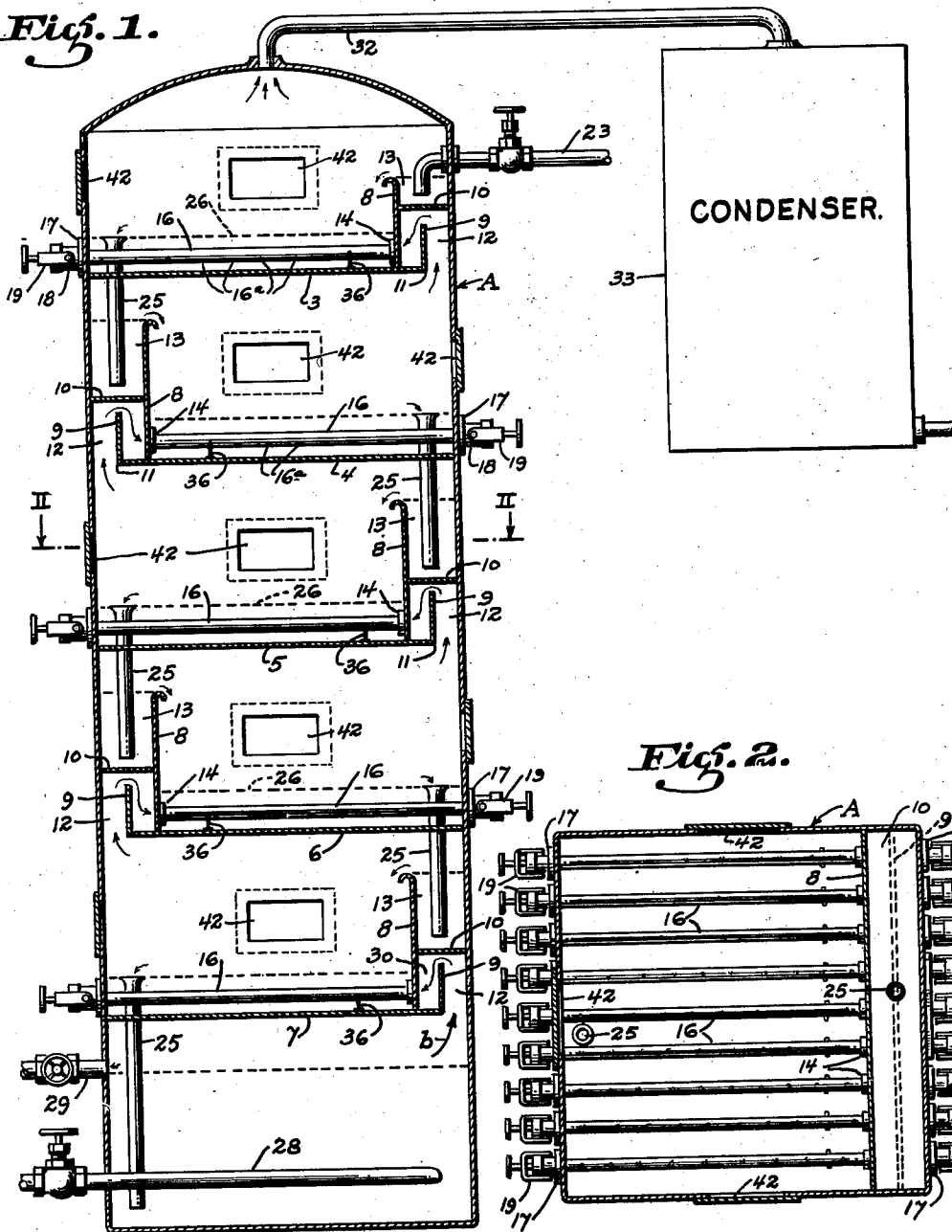
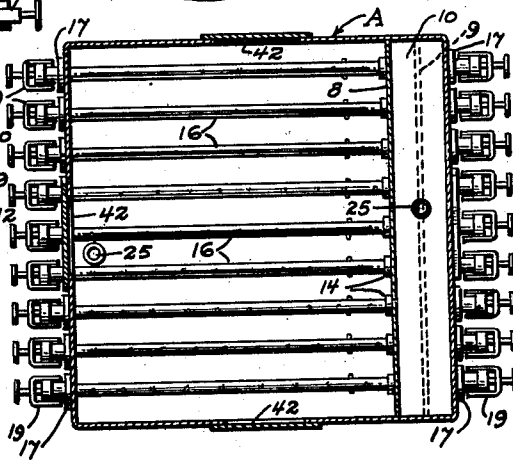


Fig. 2.



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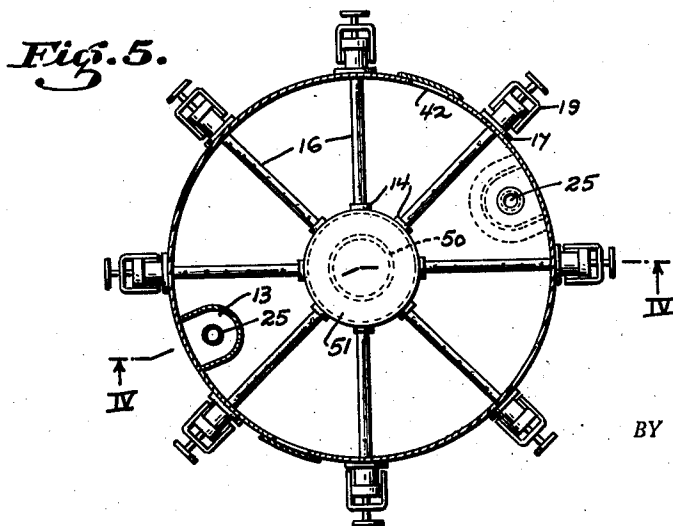
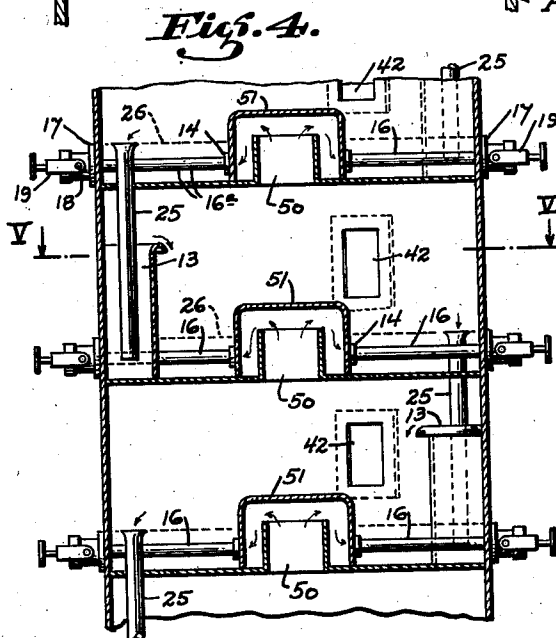
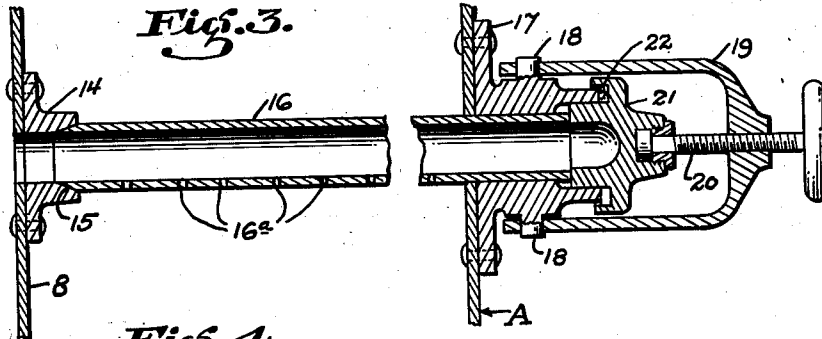
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2,020,009

BUBBLE STILL

August A. Zeitler, Oakland, Calif.

Application January 23, 1935, Serial No. 3,025

3 Claims. (Cl. 261—114)

This invention relates to a bubble still of the multiple stage type and especially to a still structure in which all parts are accessible for cleaning, repair, etc.

5 The object of the present invention is generally to improve and simplify the construction and operation of stills of the character described; to provide a still structure employing bubble tubes which are readily removable for cleaning, repair, etc.; to provide a still structure in which all parts are accessible for cleaning, repair, etc.; to provide a still structure which is simple and compact in construction and efficient in operation; and, further, to provide a still structure which insures large bubble areas and which will provide uniform distribution and flow both of liquids and vapors.

The construction of the still is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a central, vertical section showing one form of the still.

Fig. 2 is a cross section taken on line II—II of Fig. 1.

Fig. 3 is a detailed sectional view showing one of the removable bubble tubes and the means for securing it in the still.

Fig. 4 is a partial vertical section of the cylinder type of still taken on line IV—IV of Fig. 5.

Fig. 5 is a plan view in section of a modified form of the still showing a drum or cylinder type taken on line V—V of Fig. 4.

Referring to the drawings in detail, and particularly Figs. 1 and 2, A indicates a housing which, in this instance, is square or rectangular in cross section as shown in Fig. 2. Extending crosswise of the housing and horizontally thereof are plates, such as indicated at 3, 4, 5, 6, and 7, which divide the still into a number of superimposed compartments. Extending upwardly from each partition plate is a vertically disposed tube plate, such as shown at 8. Disposed intermediate said plate and the housing is a second plate 9 and disposed directly above the same is a cross plate 10. The plates 3, 4, 5, 6 and 7 extend substantially crosswise of the housing but terminate at a point indicated at 11, thereby leaving an elongated passage 12 for the free flow of vapors as will hereinafter be described.

The plates indicated at 10 form in conjunction with the vertical plate 8 a series of overflow wells 13 and the vertical plates 9 cooperating with the partition plates 3, 4, 5, 6 and 7 form a second set of wells through which vapors flow before entering the bubble tubes hereinafter to be described.

Secured to the face of each plate 8 is a series of tube receiving flanges 14, see Fig. 3, in which are formed conical seats 15. The bubble tubes generally indicated at 16 are similarly cone-shaped at their inner ends and as such engage the cone seats 15 and form a joint therewith. The outer ends of the bubble tubes 16 project through the wall of the casing A and through flanges 17 on which are pivotally mounted, as at 18, bale-shaped brackets 19. Each bale carries a screw 20 and this is engageable with a closure plug 21. When the plugs are placed in the outer ends of the flanges and the bales swing into position and the screws 20 tightened, the plugs are forced inwardly and as such push the bubble tubes 16 into engagement with their cone-shaped seats 15. The plugs are provided with gaskets as shown at 22 and each bubble tube is thus secured in position and leakage is prevented.

The liquid to be distilled or otherwise treated enters the uppermost compartment through a feed pipe indicated at 23. This pipe discharges into the well 13 and overflows from the same into the upper compartment until it reaches a level controlled by an overflow tube 25, which discharges into the well 13 of the next compartment. The overflow tube 25 is maintained at an elevation where the liquid will assume the level indicated at 26. That is, at a point where the bubble tubes 16 will be fully submerged and when vapors discharge from the perforations 16a formed therein the vapors will bubble upwardly through the liquid so as to heat the same and drive off the alcohol, or other content to be removed.

Each compartment is identical in construction with the exception of the lowermost compartment. This carries a steam heating coil 28 through which steam or any other heating medium is circulated in the usual manner and the lowermost compartment is also provided with a pipe 29 through which the spent liquor is discharged, any means being provided for maintaining the discharging spent liquor under pressure so as to maintain a predetermined pressure in the still.

In actual operation let it be assumed that the still is in operation and that all compartments contain the liquid to be distilled. The temperature will be the highest in the lowermost compartment as the liquid therein is directly heated by the coil 28. The vapors liberated, whether in the form of alcohol or whatever it may be, discharge upwardly in the direction of arrow b and as such enters the first trap 30 from where it

flows into the lowermost set of bubble tubes. The vapor discharges through these perforated tubes and bubbles upwardly through the liquid and as such passes up to the next trap, through the same and the connected bubble tubes into the next compartment, and so on, until the uppermost compartment is reached. This compartment is provided with a vapor discharge tube 32 and this may be connected with a condenser 33, or similar means, which are here only diagrammatically indicated.

The liquor to be treated, whether it be wine, or otherwise, will as previously stated enter through the pipe 23. It will overflow from the well into which it discharged and will collect in the upper compartment until it overflows through the pipe 25. This discharges into the well of the compartment below and overflows therefrom into the compartment until overflow takes place in the overflow pipe which discharges into the well below. The liquid thus flows from one compartment to the other and finally enters the lowermost compartment from where the spent liquor will discharge through pipe 29.

If wine is being treated, the alcoholic content will be the greatest in the uppermost compartment and as it passes from compartment to compartment the alcoholic content gradually decreases until all alcohol has been removed by the time the lowermost compartment is reached.

The still operates on the counter flow principle, that is, the liquid to be treated flows by gravity in a downward direction while the vapors whereby heat is imparted to drive off the alcohol travels in an upward direction and finally discharges through pipe 32.

An apparatus of this character is exceedingly efficient in operation as large bubble areas are provided in each compartment as can be readily seen from Fig. 2. Where certain types of liquid or material is being treated the tubes and the perforations formed therein have a tendency to choke or clog up. In the present instance this is readily taken care of as the tubes can be removed one by one and cleaned as often as desired and spare tubes may be employed to replace the dirty tubes, if desired, so that the dirty tubes can be cleaned when convenient. When the clean or spare tubes are being replaced they are merely shoved through the flanges 17 and they are guided during this movement by engaging guide brackets 36, which direct them directly into the cone-shaped seats. Holes are formed in the sides of the housing as shown at 42 and these may be opened and a light inserted when the tubes are being removed and replaced so that the tubes can be easily aligned and inserted at their proper seats, also when all of the tubes are removed the entire interior surfaces are accessible for cleaning and the work can thus be rapidly and efficiently accomplished.

In still structures of this character fairly high temperatures are often employed and warping of partition plates and the like may take place. Such warping is of little consequence where bubble tubes of the character here shown are employed. Warpage due to welding during construction of the still is also of little consequence in this structure as misalignments are readily compensated. Also the liquid levels maintained in the several compartments and wells are ample so as to secure complete submersion of all the bubble tubes, or whatever it may be. Hence, uniform distribution and flow both of liquid and vapors is insured and as large areas are pro-

vided efficient rapid operation can be depended upon.

While the structure shown in Figs. 1, 2 and 3 discloses a square or rectangular type of still, it may also be made in circular form as shown in Figs. 4 and 5. In this instance the bubble tubes are radially disposed but they are secured and removed in an identical manner to that illustrated in Figs. 1, 2 and 3. The overflow pipe and wells are arranged in the same manner, as previously described, but the vapor passages are centrally positioned as shown at 50. These passages are covered by caps or bonnets 51 and the inner ends of the bubble tubes are seated therein while the outer ends extend through the flanges welded or otherwise secured to the outer surface of the housing or shell. Accessibility for cleaning and repair is also obtained in the cylindrical structure, and while certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. In a bubble still of the character described a housing, plates dividing the housing into a plurality of superimposed compartments, each plate having an opening forming a vapor flow passage, a pair of vertically disposed spaced plates carried by each compartment plate and forming vapor traps, a plurality of openings with cone-shaped seats formed in one of said vertical plates, said openings being in communication with the vapor traps, openings formed in the housing in alignment with said openings in the vertical plates, bubble tubes insertable through the housing openings, said tubes having cone-shaped ends to engage the cone-shaped seats in the vertical plates, means carried by the housing for exerting endwise pressure on the outer ends of the bubble tubes to hold them in engagement with the cone-shaped seats and to close the outer ends, and means for maintaining the bubble tubes in each compartment submerged in a liquid.

2. In a bubble still of the character described a housing, plates dividing the housing into a plurality of superimposed compartments, each plate having an opening forming a vapor flow passage, a pair of vertically disposed spaced plates carried by each compartment plate and forming vapor traps, a plurality of openings with cone-shaped seats formed in one of said vertical plates, said openings being in communication with the vapor traps, openings formed in the housing in alignment with said openings in the vertical plates, bubble tubes insertable through the housing openings, said tube having cone-shaped ends to engage the cone-shaped seats in the vertical plates, means carried by the housing for exerting endwise pressure on the outer ends of the bubble tubes to hold them in engagement with the cone-shaped seats and to close the outer ends, a cover plate above each vapor trap to direct vapor through the vapor traps and the connected bubble tubes, means for admitting the liquid to be treated to the uppermost compartments, an overflow pipe in each compartment, an overflow well in each compartment into which the overflow pipes extend, means for heating the liquid in the lowermost compartment and a liquid discharge connection in the lowermost compartment.

3. In a bubble still of the character described
a housing divided into a plurality of superim-
posed compartments, a vapor trap in each com-
partment, said traps having a plurality of open-
ings terminating in tube seats, openings formed
in the housing in alignment with said seats, re-
movable bubble tubes insertable through the
housing openings and having their inner ends

movable in the tube seats, enclosure means car-
ried by the housing and engaging the outer ends
of the tubes, said closure means also exerting
endwise pressure to maintain the inner ends of
the bubble tubes in engagement with the tube
seats.

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