March 29, 1932. M. H. KOTZEBUE 1,851,849

STILL FOR SEPARATING ABSORPTION OIL FROM GASOLINE

Filed Nov. 26, 1929 2 Sheets-Sheet 1

Fig. 1.

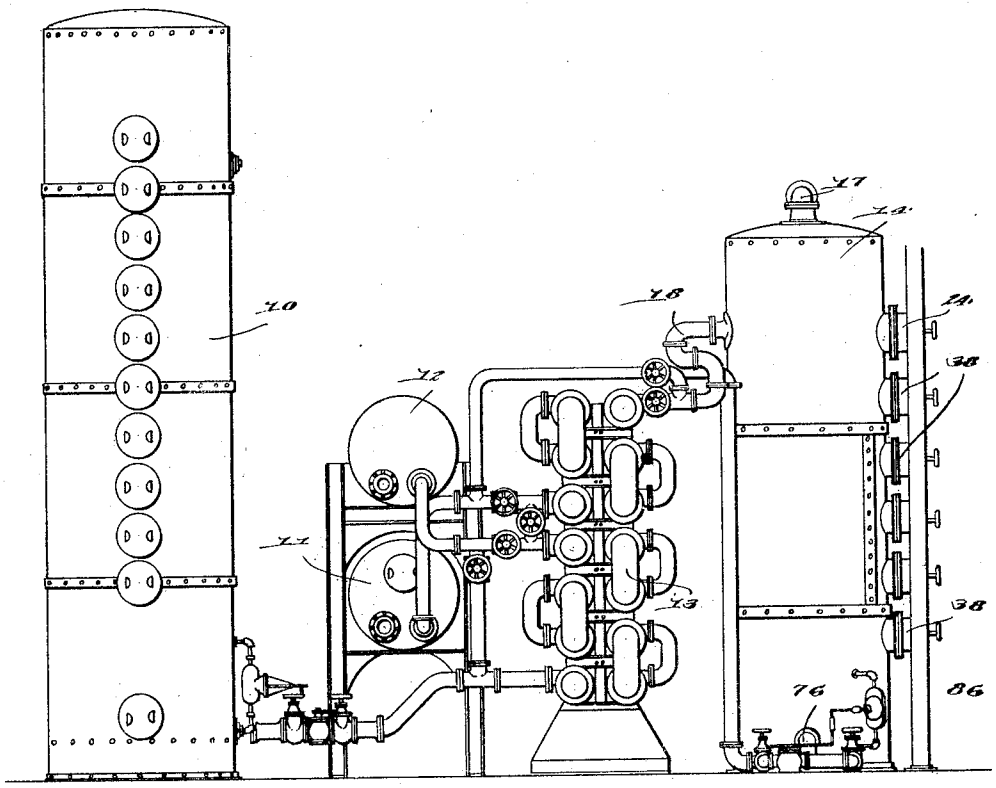

Fig. 5.

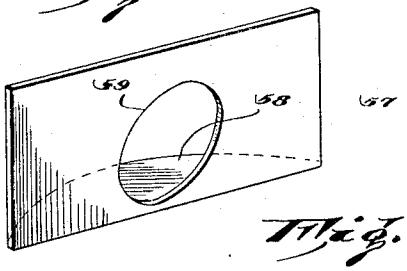

Fig. 6.

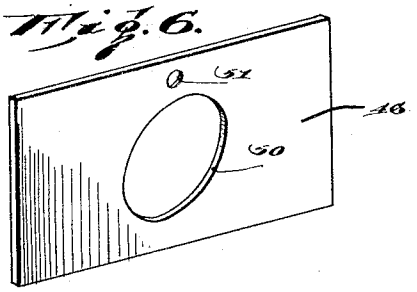

Fig. 7.

WITNESS

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Fig. 2.

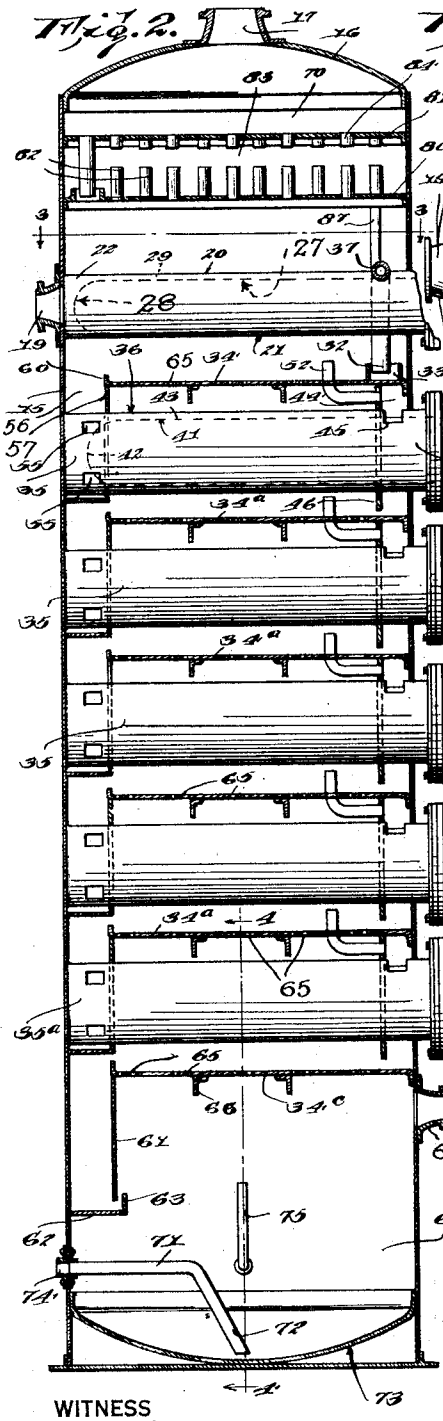


Fig. 3.

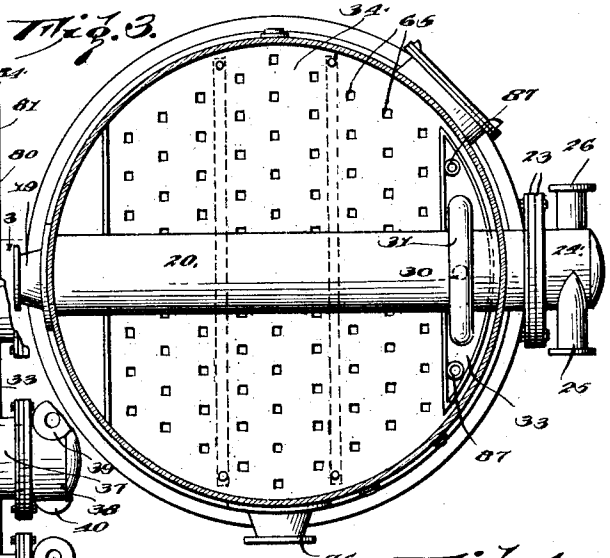
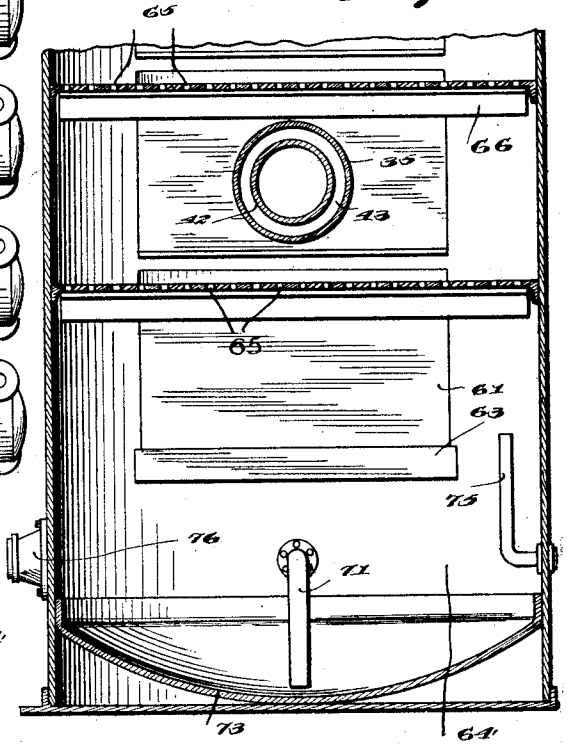


Fig. 4.



WITNESS

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Patented Mar. 29, 1932 1,851,849

UNITED STATES PATENT OFFICE

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STILL FOR SEPARATING ABSORPTION OIL FROM GASOLINE

Application filed November 26, 1929. Serial No. 409,920.

This invention relates to a distillation unit associated with an absorber system.

An object of the invention is the provision of a distillation unit connected with an absorber system for removing the light hydrocarbons, such as gasoline, from a saturated absorption oil which has passed through various steps of treatment before entering the evaporation or distillation unit.

Another object of the invention is the provision of a distillation unit in which the saturated absorption oil must pass through a tortuous path of an auxiliary heat unit for progressively vaporizing high test gasoline from the absorption oil which is collected in a chamber at the bottom of the still, superheated steam being applied directly to the surface of the collected absorption oil for creating a vapor tension thereon with a consequent evaporation of any high test gasoline in the oil, the superheated steam being conducted through the perforated bubble trays for agitating the absorption oil moving over said trays and in close association with the heating unit.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawings forming a part of the specification; nevertheless it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a view in elevation of an absorber and distillation unit constructed in accordance with the principles of my invention,

Figure 2 is a vertical section of the distillation unit,

Figure 3 is a horizontal section taken along the line 3—3 of Figure 2,

Figure 4 is a fragmentary vertical section taken along the line 4—4 of Figure 2,

Figure 5 is a view in perspective of one end of a casing associated with a heating unit,

Figure 6 is a view in perspective of the baffle associated with the opposite end of the heating unit, and

Figure 7 is a view in perspective of the base member of the casing associated with the casing shown in Figure 5.

Referring more particularly to the drawings, 10 designates an absorber tower of well known construction in which the casing head gas is passed through a series of baffles or trays where it is absorbed by the usual oil passing by gravity from the top of the tower.

11 and 12 represent storage tanks, respectively, for collecting the lean oil and the saturated oil from the absorber tank 10. Heat exchangers, generally designated by the numeral 13, are connected between the tanks 11 and 12 and an evaporator or still 14.

Referring more particularly to Figures 2 to 4, inclusive, it will be seen that the evaporator still includes a tank 15 located in a vertical position having a bowl-shaped closure 16 in which is incorporated a vapor outlet 17. A pipe 18 connects the heat exchangers with an inlet 19 of a heating unit 20. This heating unit consists of an outer casing 21 of tubular form having one end 22 connected to the wall of the tank 15 adjacent the opening 19. The other end extends through the tank at a diametrically opposite point and is connected by means of flanges 23 to a nipple 24. This nipple has an inlet 25 connected with a source of steam and an outlet 26 to permit the condensed steam from the inner tubular member 27 of the heating unit 20 to be carried away. The inner tubular member 27 has a rounded inner end 28 close to the casing 21 and spaced from the inner face of the wall of said casing to provide a hair pin heating chamber 29 of restricted area around the tubular member 27. The chamber 29 is not in communication with the tubular member 27 so that the steam from said member does not mix with the oil in the annular chamber 29 since the oil is merely in heat-interchange relation with the steam. The oil from the chamber 29 passes through an opening 30 in the U-shaped pipe 31 which has two legs extending downwardly over the outside of the exterior of the casing 21 with the lower ends terminating at 32 in an elon-

gated cup-shaped member 33 mounted on a bubble tray 34 which is located below the heating unit 30.

A second heating unit 35 is located below the heating unit 20 and below the baffle 34 and is of a slightly different construction from the heating unit 20. This unit consists of an outer shell 36 having one end connected to the portion of the wall of the tank while the other end is shown at 37 and passes through the wall at diametrically opposite points. This end is connected with a nipple 38 having a steam inlet 39 and a condenser steam outlet 40. The inner tubular member 41 has its inner end 42 closed and spaced from the adjacent end of the casing 36 which provides an annular oil passage 43 around the tubular member 41 which is in communication with a restricted space 44 of the tank by means of an opening or outlet 45 in one end of the casing 36. The casing depends from the underface of the bubble tray 34 adjacent the opening 45 and is spaced from a baffle 34ª. A baffle 46 is provided with an opening 50 which receives the casing 36 and also has a restricted opening 51 adapted to receive a vapor outlet pipe 52 which extends upwardly through the bubble tray 34 and thereby prevents any excessive pressure of the high test gasoline which has been forced from the absorber oil passing through the annular chamber 43.

One end of the casing 36 is provided with openings 55 located within a pocket 56 formed by means of an end plate 57 and a bottom plate 58. The end wall 57 of the pocket is provided with an opening 59 through which is inserted the casing 36. The pocket 56 forms a seal to receive the absorber oil flowing over the flange 60 from the end of the bubble tray 34ª so that the absorber oil will enter the openings 55 and pass through the annular chamber 43 when said oil is discharged through the openings 45 onto the next lower bubble tray 34ª. It will be noted that a plurality of these heating units and bubble trays are arranged in spaced relation within the tank 15 and are of similar construction to the heating unit 35 and the bubble trays 34 and 34ª and these associated elements will therefore not be described in detail.

Beneath the last heating unit 35ª is a bubble tray 34ᵇ from which depends the baffle 61 terminating adjacent the base member 62 and a cup-shaped seal 63. This bubble tray is also located above a storage chamber 64 for the denuded absorption oil. All of the bubble trays are provided with openings 65 for a purpose which will be presently described and angle irons or baffles 66 depend from the face of each bubble tray in spaced relation.

An inlet 67 is connected with a source of superheated steam under pressure so that when the steam enters the chamber 64 above the level of the absorption oil in said chamber it will act upon its surface and cause the vapor tension to provide for evaporation of any high test gasoline in the absorption oil in the said chamber. In view of the superheated steam entering the chamber 64, a temperature of 275° to 400° is maintained in said chamber. The temperature, however, above the heating unit 20 is aproximately from 200° to 250° Fr. Pressure of from 5 to 50 lbs. per square inch is obtained in the vapor chamber 70 at the top of the tank 15.

A drain pipe 71 has a bent end 72 located adjacent the curved bottom 73 of the tank and has an outlet at 74. A pipe 75 extending inwardly and upwardly within the chamber 34 provides means for the return of oil from the dephlegmator.

A nipple 76 is connected with the chamber 64 to provide an oil outlet.

The upper end of the tank is provided with a pair of partitions 80 and 81 spaced from each other. The partition 80 carries short pipes 82 placing the portion of the tank above the heater 20 in communication with a chamber 83 between the two plates. Short pipes 84 place the chamber 83 in communication with the vapor chamber 70. The elements just described comprise a mist extractor described in Patent No. 1,695,192, dated Dec. 11, 1928.

The openings 65 in the various baffles provide passages for the vapors from the lowermost portions of the absorption tower or tank to the uppermost portion. These perforations further provide means for bringing the absorption medium into contact with the gases or vapors.

I claim:

1. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely in the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit, one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket, each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, and means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit.

2. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely in the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit, one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket,

each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, and means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit, the bottom of the tank having a chamber for receiving the denuded absorption oil, and means for supplying superheated steam to the surface of the absorption oil in the chamber.

3. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely of the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit, one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket, each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, and means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit, means for supplying a heating medium to the interior of the heating units, the heating units being provided with passages for conducting the absorption oil through said units in heat interchange relation with the heating medium.

4. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely in the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit, one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket, each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit, each heating unit having an internal chamber and a chamber externally of the first-mentioned chamber to receive oil from its respective casing, means for supplying the internal chamber with steam.

5. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely in the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit, one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket, each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit, and means adjacent the outlet of each unit for limiting the discharged oil from the unit to the adjacent ends of the bubble trays.

6. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely in the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit, one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket, each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, and means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit, the bottom of the tank having a chamber for receiving the denuded absorption oil, and means for supplying superheated steam to the surface of the absorption oil in the chamber, the trays being perforated to permit the steam from the storage chamber and vaporized gasoline to circulate around the heating units while causing agitation of the oil on the trays.

7. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely in the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit, one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket, each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit, a baffle depending from each bubble tray adjacent the discharge opening and having the lower end terminating short of another baffle to provide a confined space at the opening for preventing the discharge opening from directly communicating with the space between a pair of baffles.

8. A still for separating gasoline from absorption oil comprising a tank, spaced heating units located transversely in the tank, a bubble tray located beneath each heating unit, a pocket enclosing an end of each unit,

one end of each tray terminating short of an adjacent wall of the tank and providing a passage for the absorption oil to the pocket to permit oil from a tray to flow into the pocket, each unit being in communication with the associated pocket to receive absorption oil, means for supplying the top of the tank with absorption oil, means for conducting gasoline vapor from the tank, each unit having an outlet at the opposite end of the unit for discharging absorption oil onto a bubble tray beneath the respective unit, a baffle depending from each bubble tray adjacent the discharge opening and having the lower end terminating short of another baffle to provide a confined space at the opening for preventing the discharge opening from directly communicating with the space between a pair of baffles, and means providing an escape for gasoline vapors from the confined space adjacent each discharge opening.

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