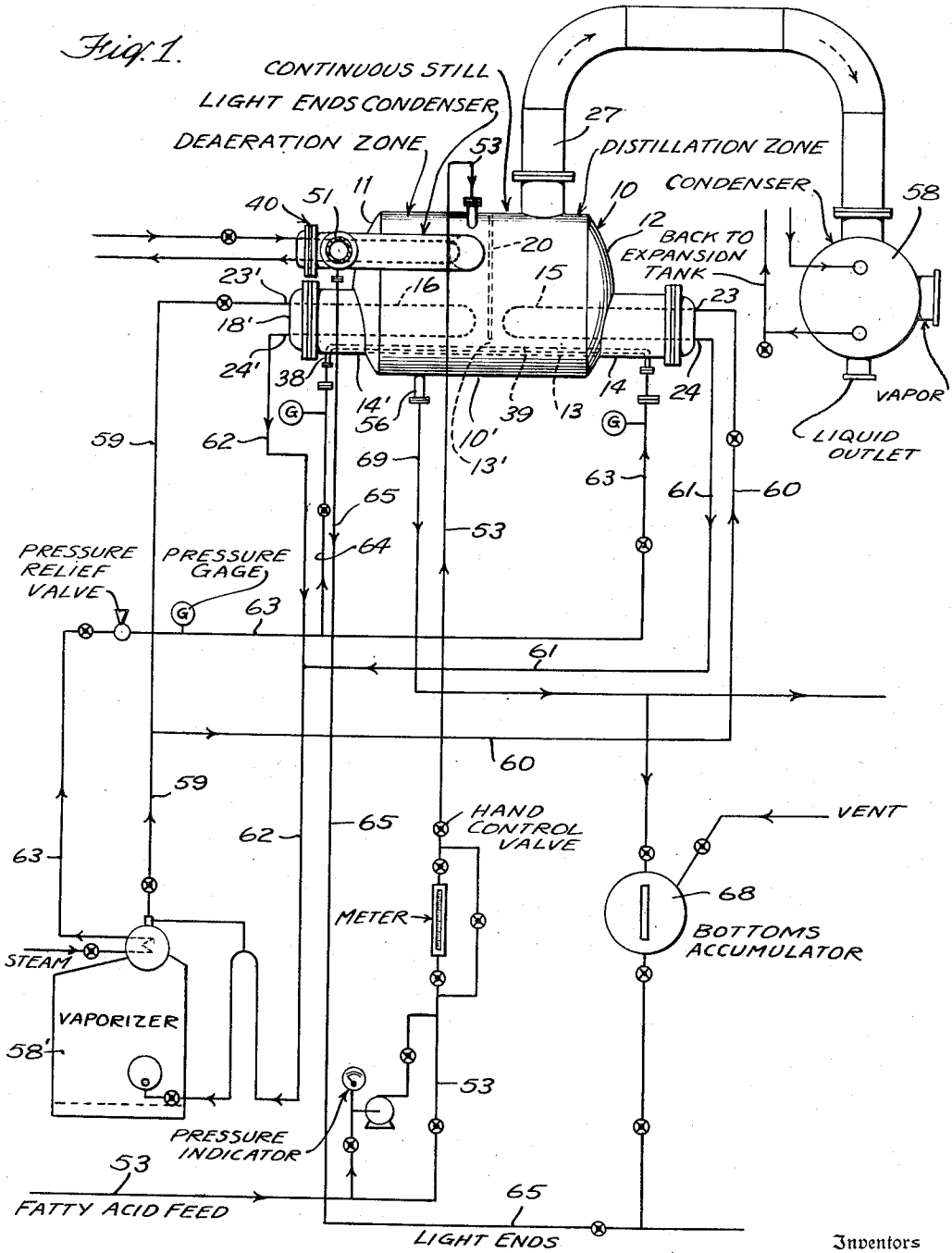
Jan. 8, 1957 F. B. WHITE ET AL 2,776,938

DISTILLING APPARATUS

Filed Dec. 29, 1951 5 Sheets-Sheet 1

Fig. 1.



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DISTILLING APPARATUS

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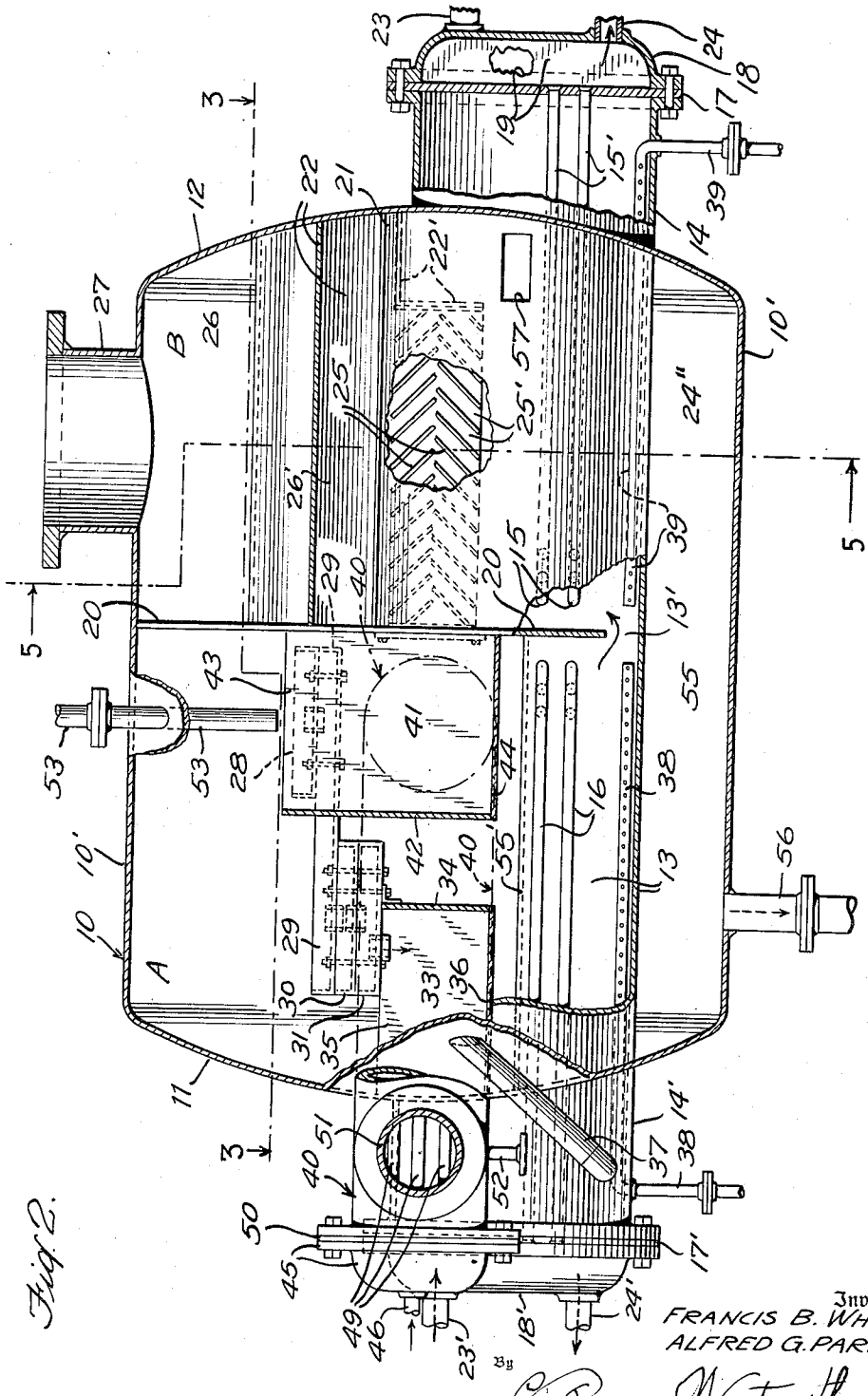


Fig. 2.

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DISTILLING APPARATUS

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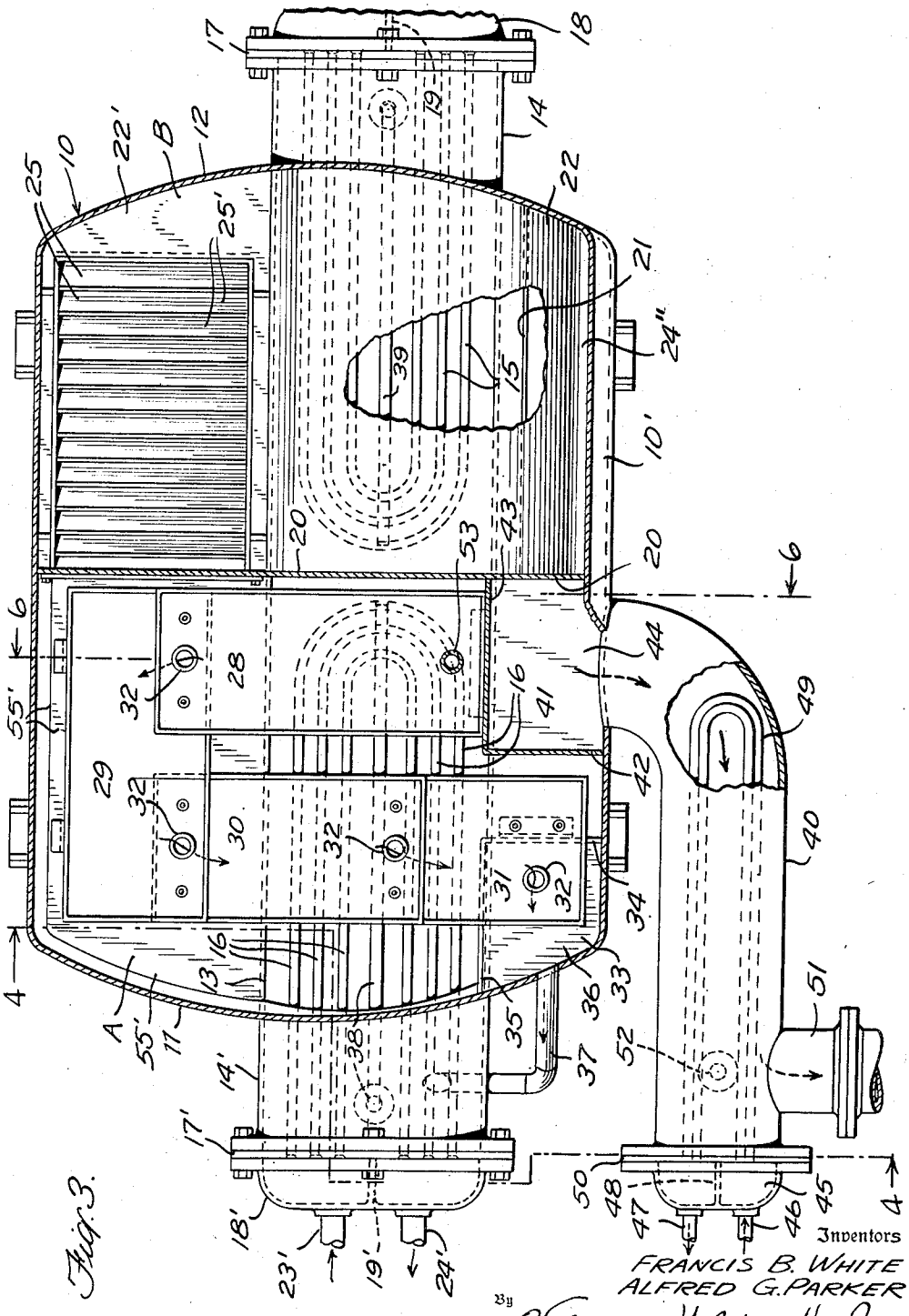


Fig. 3.

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DISTILLING APPARATUS

Filed Dec. 29, 1951 5 Sheets-Sheet 4

Fig. 4.

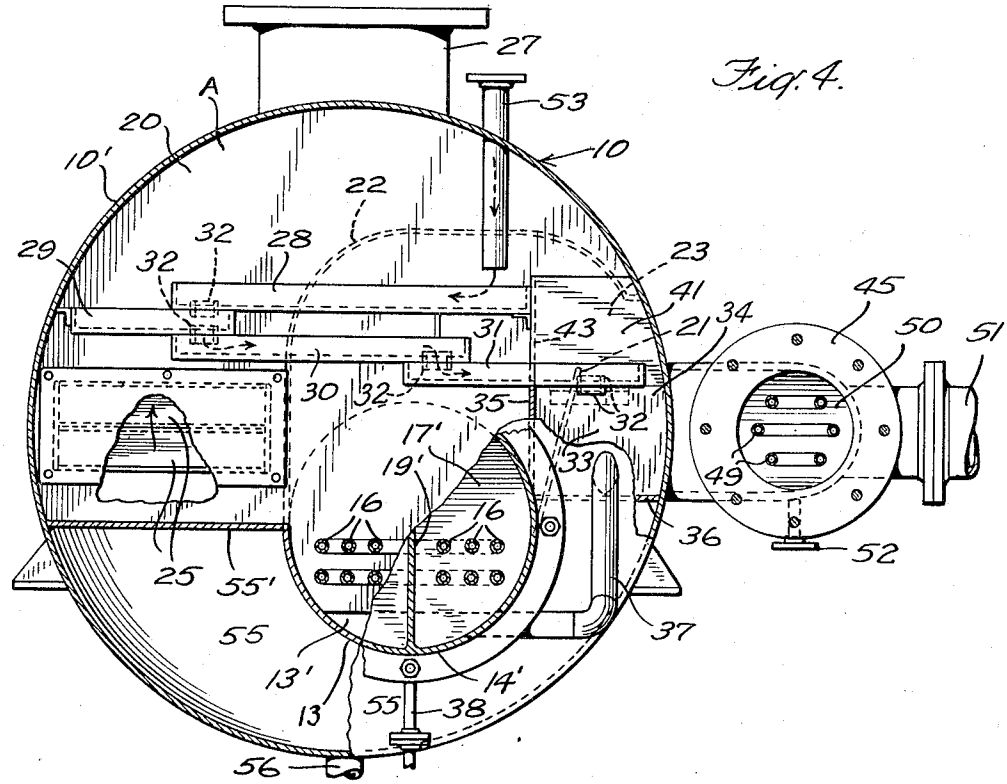
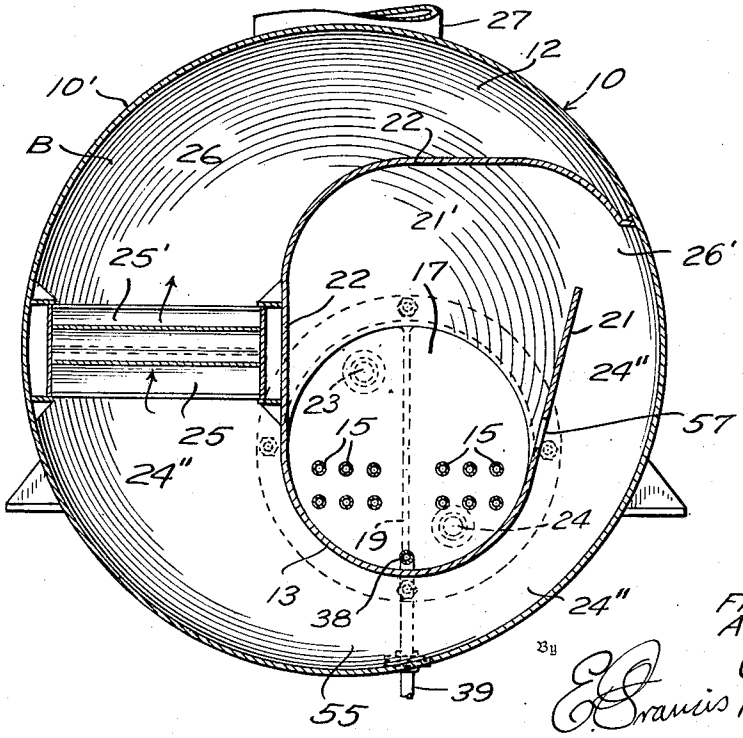


Fig. 5.



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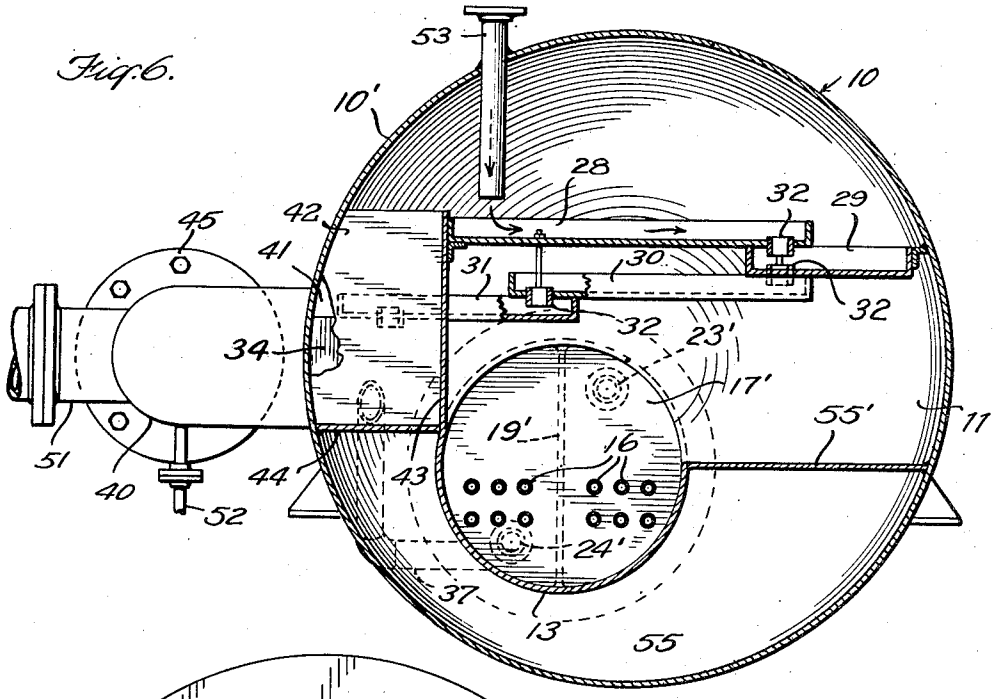
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DISTILLING APPARATUS

Filed Dec. 29, 1951 5 Sheets-Sheet 5

Fig. 6.



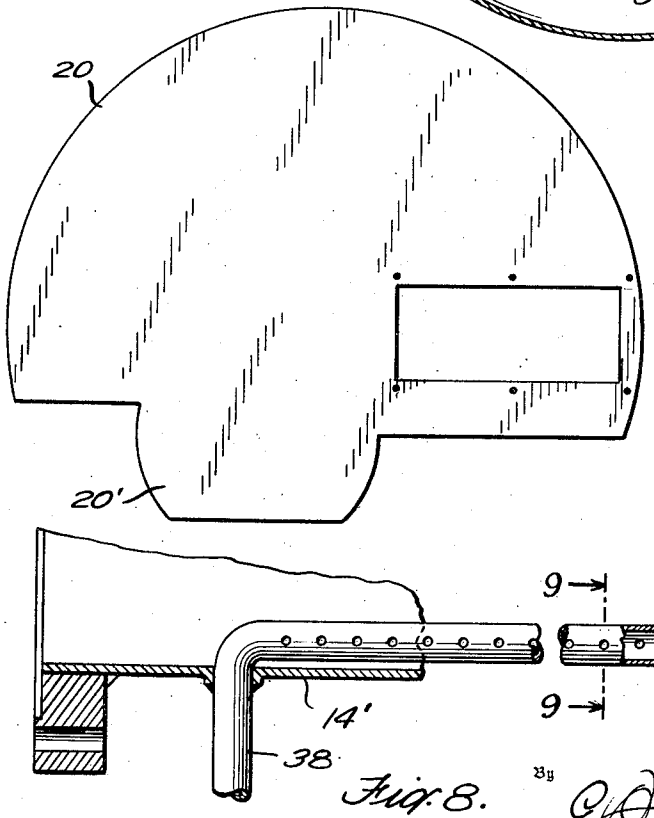
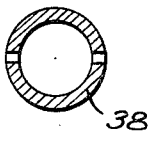


Fig. 8.

Fig. 7.

Fig. 9.



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United States Patent Office 2,776,938 Patented Jan. 8, 1957

2,776,938

DISTILLING APPARATUS

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Application December 29, 1951, Serial No. 264,044

10 Claims. (Cl. 202—173)

This invention relates to distilling apparatus and more particularly to apparatus for the treatment of stock containing fatty acids or the like wherein said stock is distilled.

The production of fatty acids for either the plastics, candle, or toilet-soap industries requires a product that is light in color and has other properties in conformity with established standards. To obtain a light color and desirable properties, distillation of fatty acids has been practiced for many years. The preferred manufacture of light-colored fatty acids is accomplished by separating the product from a low-boiling, light-end fraction which is prone to darken and from a relatively nonvolatile highly colored residue. Most distillation units overlook the need for removing light ends and therefore do not achieve a color-stable product. This oversight may be due to the relatively large improvement obtained by removal of the residue, which contains all of the glyceride oils or fats remaining from the previous splitting operation along with most of the darker impurities.

Fatty acids, particularly the more unsaturated ones, are subject to degradation when maintained at an elevated temperature. This degradation will be hastened if oxygen comes into contact with the acids. Considering these important factors among others, a good distillation system will include the following principles in its design:

(*a*) Operation of the still should be at minimum temperature. This implies that high vacuum is mandatory and that a premium may be placed upon two additional factors:

(1) The use of stripping steam;
(2) The maintenance of low pressure drop in the vacuum system.

(*b*) There is always a correlation between time and temperature when considering the breakdown of fatty acids. Higher temperatures can be employed if the time element is kept to a minimum and, in a complementary sense, the time of distillation may be extended if the temperature is kept low. A suitable economic balance must, therefore, be selected.

(*c*) The means of applying heat to the boiling fatty acids in the still is an important consideration. The use of a uniform temperature throughout the heating zone is desirable. Such a condition is possible when employing condensing steam or diphenyl, diphenyl oxide (Dowtherm) as the heating medium.

(*d*) To insure a light-colored distillate, it is important that there be no substantial mechanical carry-over of residue into the vapor stream.

The present invention provides compact apparatus for the distillation of fatty acids, which apparatus consists of a two-compartment still having a prestripping zone and bulk overhead distilling zone, thereby providing not only more compact but considerably less expensive equipment than heretofore used.

This invention provides a distillation unit by means of

which maximum productivity and high quality product are obtained.

The present invention provides a still which is easily maintained in good operating condition and is compact in its arrangement.

Further, the invention provides an arrangement of apparatus wherein entrainment is separated from vapor through centrifugal action prior to withdrawal of said vapor from the still.

The still of the present invention comprises a substantially cylindrically shaped shell, the longitudinal axis of which extends in a horizontal plane, the shell having two heated reboiler tube bundles located adjacent the bottom thereof and extending thereinto from the opposite ends thereof toward one another and to a point between said opposite ends. Intermediate between the opposite ends of the shell and between the adjacent ends of the tube bundles is located a vertical separating wall secured within the shell and dividing said shell into two compartments which communicate with one another beneath the partition to permit passage of liquid from one compartment to another. Crude moist fatty acid feed stock is fed to one of the compartments, the prestripping or light-ends compartment, in which compartment is arranged a plurality of baffles or trays extending in vertically spaced horizontal planes above the reboiler tube bundle in that compartment. The trays are so disposed that the feed stock introduced thereinto flows across each tray and from one tray to the next tray therebelow. Feed stock from the trays flows into the lower portion of said light-ends compartment and is heated by the reboiler tube bundle, the rising vapors in the compartment passing in heat exchange relationship with the feed stock flowing across the baffles or trays. In this manner the feed stock is heated considerably, substantially deaerating and dewatering the feed before it reaches the hot surfaces of the reboiler bundle, a provision which minimizes salting out on the heat transfer surfaces.

The light-ends reboiler in the above mentioned compartment supplies preheat to the feed by direct contact condensation plus an additional amount of heat sufficient to vaporize a small part of the feed. This vaporized part of the feed will contain the light ends, particularly dark-colored odor bodies, which will be pumped from the condenser built into the vent pipe communicating with the still.

The hot fatty acids in the lower portion of the light-ends compartment will gradually increase in level and be forced under said partition into the other or bulk overhead compartment of the still. In the bulk overhead compartment additional heat from the other reboiler bundle will vaporize the bulk of the fatty acids remaining, allowing the bottoms to overflow to a bottoms receiver. The degree of heat transmitted to the fatty acids in this section of the still will be so regulated that the high-boiling color bodies will be left behind in the bottoms to the extent they are present in the feed.

The bulk overhead vapors generated in said bulk overhead compartment are deflected downwardly around the outside of a heater trough therein and thence upwardly through an entrainment eliminator, changing direction of flow before leaving through bulk overhead section vapor line to the fatty acid condenser, thereby limiting carry-over of residue with the distillate to a minimum.

While the invention has been described above and will hereinafter be described as used in the distillation of fatty acids, it will be understood that said invention may be used in the distillation of other materials.

The invention will be understood from the following description when considered in connection with the accompanying drawings forming a part thereof, in which:

Fig. 1 is a flow diagram of a cycle of operations for the production of fatty acids from feed stocks containing the same and in which the continuous distillation unit of the present invention is incorporated;

Fig. 2 is a side view of said continuous distillation unit with various parts broken away to disclose the arrangement of the parts of the unit contained within the outer shell thereof;

Fig. 3 is a plan view taken on the line 3—3 of Fig. 2;

Fig. 4 is an end view taken on the line 4—4 of Fig. 3;

Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 2;

Fig. 6 is a transverse sectional view taken on line 6—6 of Fig. 3;

Fig. 7 is a view of the separation wall dividing the distillation unit of the present invention into distilling compartments;

Fig. 8 is an enlarged view of the sparger steam feed pipe in the unit; and

Fig. 9 is an enlarged section of the sparger steam pipe taken on line 9—9 of Fig. 8.

Like characters of reference refer to the same or similar parts throughout the drawings.

Referring to the drawings, the reference number **10** designates an enclosed cylindrically shaped horizontally extending distilling unit comprising a shell **10'** closed at the opposite ends **11** and **12** thereof. A heater trough **13** is disposed in the shell **10'** and extends axially between the opposite ends thereof in a horizontal plane in the lower portion and in spaced relationship with the bottom thereof. The trough **13** communicates with cylindrical extensions **14** and **14'** which project beyond and are respectively secured to opposite ends of the shell. Trough **13** is semicircular in shape at the lower portion thereof and has horizontal return bend reboiler bundles **15** and **16** positioned therein, which bundles are respectively inserted in the troughs through extensions **14** and **14'** and are supported in tube sheets **17** and **17'** respectively.

The tube sheets together with heads **18** and **18'** are removably secured to extensions **14** and **14'** so that the heads may readily be removed and the tube bundles withdrawn from the trough **13** by removal of the tube sheets in a direction away from the opposite ends of the shell. The heads **18** and **18'** are partitioned at **19** and **19'** to form a heating fluid inlet compartment in communication with one leg of a tube bundle and a fluid-heating outlet compartment in communication with the other leg of said bundle. A heating fluid inlet pipe **23** is in communication with the inlet compartment of head **18** and an outlet pipe **24** communicates with the outlet compartment thereof, while heating fluid inlet and outlet pipes **23'** and **24'** respectively communicate with the inlet and outlet compartments of head **18'**. The tube bundles project into the shell toward one another to a point short of a vertical separating partition **20** dividing the shell into two distilling compartments or sections, light-ends section A and overhead bulk section B. Partition **20**, shown in detail in Fig. 7, is welded to shell **10'** extends transversely thereof at a point nearer one end of the shell than another. The partition projects downwardly into the trough but in spaced relationship with the bottom thereof to permit passage of liquid through opening **13'** from one distilling section to the other.

Heater trough **13** is open in the upper portion thereof so that vapor heated therein by the tube bundles may flow upwardly. Trough **13** in the bulk overhead section B extends upwardly and outwardly at one side **21** in a substantially vertically inclined plane (Fig. 5) to a point in spaced relationship with the inner periphery of shell **10'**, while opposite side **22** of said trough extends substantially vertically to a point in spaced relationship with the top of the shell and the uppermost edge of side **21** and then horizontally until it joins the periphery of the shell to which it is attached, said sides thereby forming

a longitudinal vapor chamber **21'** extending between partition **20** and the end of the shell and vapor outlet **26'** (Fig. 5) in the bulk overhead section B into a circular passage **24''** formed between the inner periphery of shell **10'** and trough **13** through which vapor from outlet **26'** flows.

An entrainment eliminator **25** extends across the path of flow of vapor passing through passage **24''**, which eliminator, as shown in Figs. 2 and 5, comprises a plurality of slots **25'** extending in two rows disposed one above the other and projecting across passage **24''**. The slots of each row are spaced from one another axially of the shell, the slots of one row being inclined toward one end of the shell while the slots of the other row are inclined toward the opposite end thereof. The entrainment eliminator is substantially horizontal and supported by angle irons welded to shell **10'**, side **22** and inverted L-shaped baffle **22'** fastened to end **12** of the shell. The eliminator extends longitudinally from partition **20** to baffle **22'** (Fig. 2) in the bulk overhead zone B. After flowing through the eliminator, vapor passes into an upper space **26** (Fig. 5) whence it flows outwardly of the shell through outlet **27**.

A plurality of trays or baffles **28**, **29**, **30** and **31** are located in the upper portion of the light-end distilling section A of the shell (Figs. 2–4, 6) above trough **13** and reboiler tube bundle **16**. The trays or baffles **28**, **29**, **30** and **31** extend in vertically spaced horizontal planes, the uppermost tray **28** (Figs. 3, 6) extending transversely of shell **10'** and overlapping at one end thereof the next lower tray **29** which extends axially of the shell. The tray **29** overlaps at the end thereof away from tray **28** an adjacent lower tray **30** which extends transversely of the shell and substantially parallel to the uppermost tray **28** and overlaps a lowermost tray **31** which extends in the same direction as, but in a lower horizontal plane than, the above mentioned adjacent lower tray **30**. The trays or baffles are connected by tierods not numbered but clearly illustrated in broken lines in Fig. 2 and spacers or the like (Fig. 2) and have downspouts **32** in the overlapping portions thereof communicating with the next lower tray in series. The last or lowest tray **31** of the series extends over a container **33** comprising end wall **34**, side wall **35**, and bottom **36**. The inner periphery of shell **10'** and end **11** form the opposite side and end walls respectively of the container. The lowermost tray **31** communicates with container **33** through its downspout **32**. Container **33** communicates with the extension **14'** of heater trough **13** outside shell **10'** by conduit **37**, one end of the conduit communicating with container **33** and the other end communicating with extension **14'** of trough **13** outside the shell. A sparger steam feed pipe **38** enters the lower portion of heater trough **13** in section A and extends horizontally therein to a point short of wall **20**, while sparger steam feed pipe **39** enters the lower portion of heater trough **13** in section B and extends therein to a point short of wall **20**. As shown in Figs. 8 and 9, steam is fed into the sections by a series of small openings in the sides of the pipe.

A light-ends condenser **40** is in communication with shell **10'** in the light-ends section A through a receiver **41** open at the top thereof and comprising an end wall **42**, a side wall **43**, and a bottom **44**. Partition **20** forms an opposite end wall of the receiver while shell **10'** forms an opposite side wall. It will be noted that uppermost tray **28** is mounted on and supported by side wall **43** of receiver **41**. Condenser **40** is located outside and adjacent shell **10'** and in spaced relationship with light-ends section A thereof. The condenser extends substantially horizontally and has a head **45** with a water inlet pipe **46**, a water outlet pipe **47** and a flow division baffle **48**. Tube sheet **50** therein supports a U-shaped tube bundle **49**, the opposite legs of which are in communication with inlet **46** and outlet **47** of the condenser. A vapor outlet **51** is located in the side of the condenser,

said outlet extending substantially horizontally and 90° from the direction of vapor flow in the condenser. In the bottom of the condenser is located a vertical condensate outlet **52**.

Feed enters the unit through a vertical feed pipe **53** in the top of light-ends section A directly over tray **28** so that it discharges into said tray. Vapor outlet conduit **27** in the top of bulk overhead section B discharges the distilled fatty acid vapors from the unit to a fatty acid condenser **58** (Fig. 1). In the lower portion of the unit is located a bottoms receiver space **55** defined by the periphery of shell **10'** and below trough **13**. In section A space **55** is covered at one side of trough **13** by a horizontal partition **55'** (Fig. 6) which projects laterally from the trough to the inner periphery of the shell and longitudinally of section A from end **11** of the shell to partition **20**. From receiver space **55** the residue remaining after distillation is discharged from the unit through a bottoms outlet drain **56**. Residue to receiver **55** is discharged through the bulk overhead bottoms overflow drain **57** located in side **21** of trough **13**.

In operation, a heating medium such as steam or diphenyl, diphenyl oxide (Dowtherm) is heated in a vaporizer **58'** (Fig. 1) and is passed through line **59** to fluid-heating inlet pipe **23'** of tube bundle **16** in the portion of trough **13** in section A and through lines **59** and **60** to fluid-heating inlet pipe **23** of tube bundle **15** in the portion of trough **13** in section B. After flowing through the tubes of bundles **15** and **16** wherein it is used for heating liquid in said trough, as will hereinafter be described, the heating medium is returned to vaporizer **58'** through fluid-heating outlet pipes **24** and **24'** through lines **61** and **62** respectively. Steam for sparger steam pipes **39** and **38** is fed to said pipes through steam lines **63** and **64** respectively. Feed enters light-ends section A of the still through feed pipe **53**, falling onto the highest tray **28** of the series of trays or baffles in the vapor space of section A (Figs. 2, 4, 6). The liquid then flows across tray **28** to tray **29**, across tray **29** to tray **30**, across tray **30** to tray **31**, and across tray **31** to container **33**, the liquid cascading from tray to tray. During such flow the liquid is contacted by the hot vapors rising from the lower portion of section A and is thereby heated considerably, substantially deaerating and dewatering the feed before it reaches the hot surfaces of the reboiler bundle **16**, as hereinafter described. This minimizes salting out on the heat transfer surfaces of the reboiler. After leaving the last of the trays or baffles, the dehydrated feed discharges into container **33** and leaves section A by conduit **37** which conducts the liquid into the portion of heater trough **13** in extension **14'**. In the heater trough **13**, which contains reboiler bundle **16** and sparger steam feed pipe **38**, the balance of the preheat is supplied to the feed liquid arriving from the trays plus an additional amount of heat sufficient to distill overhead to the condenser, for example, 1–15% of the feed. The vapor rises into the upper part of section A where it contacts liquid flowing through the trays, while residual uncondensed vapor, being a result of partial vaporization and partial condensation of the feed, which contains the light ends and particularly dark-colored odor bodies, leaves the section through receiver **41** in communication with condenser **40** adjacent the light ends section of the shell. The vapor flows in heat exchange relationship with tubes **49** of condenser **40**, the condensate flowing through outlet **52** into line **65** (Fig. 1) where it is conducted to a light-ends receiver. By this step not only is the final product made somewhat lighter than would otherwise be the case, but a more color-stable product is obtained.

The hot fatty acids in the portion of heater trough **13** in section A will gradually increase in level and be forced under the portion **20'** of partition **20** extending in said trough (Fig. 4) through opening **13'** (Fig. 2) into the portion of heater trough **13** in section B. Here, steam from sparger steam feed pipe **39** and reboiler bundle **15** in the trough will vaporize the bulk of the feed, the fatty acids remaining, and the bottoms so heated will overflow to bottoms receiver space **55** through overflow drain **57** located in side **21** of trough **13** (Figs. 2, 5). The amount of heat to this section of the still will be preferably so regulated that the residue amounts to approximately 1–25% of the feed, in order that high-boiling color bodies will be left behind in the bottoms to the extent they are present in the feed.

Bottoms from bottoms space **55** flow outwardly of said space through bottoms outlet **56** and to a bottoms accumulator **68** through line **69** (Fig. 1). The bulk overhead vapors rise from the portion of trough **13** in section B, impinging upon trough side **22** which, with its horizontal extension, is so shaped as to deflect the vapor in a generally downward direction through vapor opening **26'** and into circular passage **24''** between the inner periphery of shell **10'** and trough **13**, thence upwardly through entrainment eliminators **25**. The substantially 360° change in vapor flow direction after the vapor leaves trough **13** centrifuges entrained liquid from the vapor, while the change of direction of flow of vapor through eliminator slots **25'** eliminates substantially the remainder of said entrained vapor. Separated vapor enters space **26** of section B whence it flows into outlet **27** (Fig. 5), thereafter to pass into condenser **58** (Fig. 1).

Inasmuch as various modifications may be made in the form of the apparatus herein disclosed and in the location and relative arrangement of the several parts of the invention without departing from the principles thereof, it will be understood that the invention is not to be limited excepting by the scope of the appended claims.

What is claimed is:

1. Apparatus of the character described comprising a substantially horizontally extending shell, partition means dividing said shell into laterally adjacent prestripping and bulk overhead distilling compartments, heating means in the lower part of said prestripping compartment, other heating means in the lower part of said bulk overhead compartment, said compartments being in communication with one another in the lower part thereof so that heated liquid will pass from said heating means in the prestripping compartment to said heating means in the bulk overhead compartment, feed stock conducting means in communication with said prestripping compartment in the upper part thereof and conducting unheated feed stock into said prestripping compartment for heat exchange relationship with the heating means in said last mentioned compartment, the prestripping compartment having a vapor outlet in the upper portion thereof, baffle means in said prestripping compartment above the heating means for receiving and intercepting the unheated feed stock passing to the heating means for heat exchange relationship therewith, the baffle means comprising a plurality of open trays positioned at an elevation below the vapor outlet for the prestripping compartment, said trays communicating with one another in series to form a liquid path of flow for said feed liquid, each tray being disposed in a substantially horizontal plane at a different vertical level above the heating means in said compartment, the uppermost tray extending transversely of the longitudinal axis of the shell, one end of the uppermost tray being in communication with the feed stock conduit while the opposite end communicates with a lower tray adjacent one end of said lower tray, said lower tray extending substantially parallel to the longitudinal axis of the shell, the lowermost tray and trays intermediate said lower and lowermost trays communicating with one another adjacent the adjoining ends thereof and extending transversely of said longitudinal axis of the shell, said lowermost tray communicating at one end thereof with said heating means and at the opposite end with the tray next above the lowermost tray, vapor outlet means in

communication with the upper portion of said bulk overhead distilling compartment, vapor and liquid separating means in the bulk overhead distilling compartment in the path of flow of vapor from said other heating means to said vapor outlet means, and a separated liquid outlet in communication with the bulk overhead distilling compartment.

2. Apparatus of the character described comprising a cylindrically shaped substantially horizontally extending shell, partition means dividing said shell into laterally adjacent prestripping and bulk overhead distilling compartments, heating means in the lower part of said prestripping compartment, other heating means in the lower part of said bulk overhead compartment, said heating means and said other heating means being positioned in spaced relationship with the bottom of the shell, said compartments also being in communication with one another in the lower part thereof so that heated liquid will pass from said heating means in the prestripping compartment to said heating means in the bulk overhead compartment, feed conducting means in communication with said prestripping compartment in the upper part thereof and conducting unheated feed stock into said prestripping compartment for heat exchange relationship with the heating means in said last mentioned compartment, the prestripping compartment having a vapor outlet in the upper portion thereof, baffle means in said prestripping compartment above the heating means for receiving and intercepting the unheated feed stock passing to the heating means for heat exchange relationship therewith, the baffle means comprising a plurality of open trays positioned at an elevation below the vapor outlet for the prestripping compartment, said trays communicating with one another in series to form a liquid path of flow for said feed liquid, each tray being disposed in a substantially horizontal plane at a different vertical level above the heating means in said compartment, the uppermost tray extending transversely of the longitudinal axis of the shell, one end of the uppermost tray being in communication with the feed stock conduit while the opposite end communicates with a lower tray adjacent one end of said lower tray, said lower tray extending substantially parallel to the longitudinal axis of the shell, the lowermost tray and trays intermediate said lower and lowermost trays communicating with one another adjacent the adjoining ends thereof and extending transversely of said longitudinal axis of the shell, said lowermost tray communicating at one end thereof with said heating means and at the opposite end with the tray next above the lowermost tray, vapor outlet means in communication with the upper portion of said bulk overhead distilling compartment, vapor and liquid separating means in the bulk overhead distilling compartment in the path of flow of vapor from said other heating means to said vapor outlet means, and a separated liquid outlet in communication with the bulk overhead distilling compartment.

3. The apparatus of claim 2 wherein the heating means in the bulk overhead compartment is in spaced relationship with the opposite sides and bottom of the shell so as to form a vapor passage between the heating means and the inner periphery of the shell and wherein the vapor and liquid separating means comprises deflecting means above said heating means in the path of vapors flowing upwardly therefrom and so shaped as to direct the vapors into the passage and at one side of said shell only, and the vapor outlet means is in communication with said passage so as to receive vapor after flow thereof in the passage.

4. The apparatus of claim 3 wherein the heating means comprises a substantially semicircular trough member extending longitudinally of the bulk overhead compartment and positioned with the opening of said trough facing upwardly in the compartment, said trough member having heating elements therein, and wherein the deflecting means comprises a plate extending upwardly from one side of the trough thence over said trough in the path of vapors rising therefrom and into engagement with the inner periphery of the shell at one side thereof, the deflecting plate being curved to direct vapors downwardly into said passage and at one side of said shell only.

5. The apparatus of claim 4 wherein means for removing entrained liquid from said vapor is positioned in the path of flow of vapor through said passage to the vapor outlet means.

6. Apparatus of the character described comprising a cylindrically shaped substantially horizontally extending shell, partition means dividing said shell into laterally adjacent prestripping and bulk overhead distilling compartments, heating means in the lower part of said prestripping compartment, other heating means in the lower part of said bulk overhead compartment, said heating means and said other heating means comprising a trough member positioned in spaced relationship with the bottom of the shell and the opposite sides thereof and so as to open upwardly into the prestripping and bulk overhead compartments respectively, a heating element disposed in the trough member in said prestripping compartment, another heating element disposed in the trough member in the bulk overhead compartment, said heating element and said other heating element being separately controlled, said trough means in the prestripping and bulk overhead compartments also being in communication with one another so that heated liquid will pass from said portion of the trough prestripping compartment to said portion of the trough bulk overhead compartment, feed stock conducting means in communication with said prestripping compartment in the upper part thereof, the prestripping compartment having a vapor outlet in the upper portion thereof, baffle means in said prestripping compartment above the heating means and at an elevation below said vapor outlet, the baffle means comprising a sequence of baffles arranged adjacent to one another for series flow of liquid, said baffles being shaped for liquid flow longitudinally thereof, adjacent baffles being disposed in horizontal planes arranged in vertical series, the uppermost baffle communicating with the feed stock conducting means adjacent one end of said uppermost baffle and with the next adjacent lower baffle adjacent the opposite end of said uppermost baffle, the lowermost baffle being in communication adjacent one end thereof with the baffle next above to receive liquid from said baffle next above and in communication with the lower part of said prestripping compartment adjacent the opposite end of the lowermost baffle to discharge said liquid into the compartment, the baffles intermediate said uppermost and lowermost baffles communicating adjacent one end thereof with the baffle next above adjacent one end of said next above baffle to receive liquid therefrom and adjacent the opposite end thereof with the baffle next below adjacent one end of said baffle next below to discharge liquid thereinto, the adjacent baffles extending in different directions in the compartment in the path of flow of vapor passing from the lower part of the compartment to said compartment vapor outlet, the baffles being so positioned that the flow path of liquid between the opposite ends of any one of the baffles is out of vertical alignment with the other baffles of said sequence, vapor outlet means in communication with the upper portion of said bulk overhead distilling compartment, vapor and liquid separating means in the bulk overhead distilling compartment in the path of flow of vapor from said other heating means to said vapor outlet means, and a separated liquid outlet in communication with the bulk overhead distilling compartment.

7. The apparatus of claim 6 wherein a sparger tube is disposed in the portion of the trough member in said prestripping compartment and another sparger tube is disposed in the portion of said trough member in the

bulk overhead compartment, said sparger tubes being located to inject steam into liquid in said trough members.

8. The apparatus of claim 6 wherein the heating means in the bulk overhead compartment is in spaced relationship with the opposite sides and bottom of the shell so as to form a vapor passage between the heating means and the inner periphery of the shell and wherein the vapor and liquid separating means comprises deflecting means above said heating means in the path of vapors flowing upwardly therefrom and so shaped as to direct the vapors into the passage and at one side of said shell only, and the vapor outlet means is in communication with said passage so as to receive vapor after flow thereof in the passage.

9. Apparatus of the character described comprising a cylindrically shaped substantially horizontally extending shell, partition means dividing said shell into laterally adjacent prestripping and bulk overhead distilling compartments, heating means in the lower part of said prestripping compartment, other heating means in the lower part of said bulk overhead compartment, the heating means in the bulk overhead distilling compartment being in spaced relationship with the bottom and the opposite sides of the shell so as to form a vapor passage between the heating means in said compartment and the inner periphery of the shell, said compartments also being in communication with one another in the lower part thereof so that heated liquid will pass from said heating means in the prestripping compartment to said heating means in the bulk overhead compartment, feed stock conducting means in communication with said prestripping compartment in the upper part thereof, the prestripping compartment having a vapor outlet in the upper portion thereof, baffle means in said prestripping compartment and at an elevation below said vapor outlet, the baffle means comprising a sequence of baffles arranged adjacent to one another for series flow of liquid, said baffles being shaped for liquid flow longitudinally thereof, adjacent baffles being disposed in horizontal planes arranged in vertical series, the uppermost baffle communicating with the feed stock conducting means adjacent one end of said uppermost baffle and with the next adjacent lower baffle adjacent the opposite end of said uppermost baffle, the lowermost baffle being in communication adjacent one end thereof with the baffle next above to receive liquid from said baffle next above and in communication with the lower part of said prestripping compartment adjacent the opposite end of the lowermost baffle to discharge said liquid into the compartment, the baffles intermediate said uppermost and lowermost baffles communicating adjacent one end thereof with the baffle next above adjacent one end of said next above baffle to receive liquid therefrom and adjacent the opposite end thereof with the baffle next below adjacent one end of said baffle next below to discharge liquid thereinto, the adjacent baffles extending in different directions in the compartment in the path of flow of vapor passing from the lower part of the compartment to said compartment vapor outlet, the baffles being so positioned that the flow path of liquid between the opposite ends of any one of the baffles is out of vertical alignment with the other baffles of said sequence, vapor outlet means in communication with the upper portion of said bulk overhead distilling compartment, vapor and liquid separating means in the bulk

overhead distilling compartment in the path of flow of vapor from said other heating means to said vapor outlet means, the vapor and liquid separating means comprising deflecting means above said heating means in the path of vapors flowing upwardly therefrom and so shaped as to direct the vapors into the passage and at one side of said shell only, and a separated liquid outlet in communication with said passage so as to receive vapor after flow thereof in the passage.

10. The apparatus of claim 9 wherein the baffle means in the prestripping compartment comprises a plurality of open trays positioned at an elevation below the vapor outlet for the prestripping compartment, said trays communicating with one another in series to form a liquid path of flow for said feed liquid, each tray being disposed in a substantially horizontal plane at a different vertical level above the heating means in said compartment, the uppermost tray extending transversely of the longitudinal axis of the shell, one end of the uppermost tray being in communication with the feed stock conduit while the opposite end communicates with a lower tray adjacent one end of said lower tray, said lower tray extending substantially parallel to the longitudinal axis of the shell, the lowermost tray and trays intermediate said lower and lowermost trays communicating with one another adjacent the adjoining ends thereof and extending transversely of said longitudinal axis of the shell, said lowermost tray communicating at one end thereof with said heating means and at the opposite end with the tray next above the lowermost tray, and wherein the heating means comprises a substantially semicircular trough member extending longitudinally of the bulk overhead compartment and positioned with the opening of said trough facing upwardly in the compartment, said trough member having heating elements therein, and wherein the deflecting means comprises a plate extending upwardly from one side of the trough thence over said trough in the path of vapors rising therefrom and into engagement with the inner periphery of the shell at one side thereof, the deflecting plate being curved to direct vapors downwardly into said passage and at one side of said shell only.

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