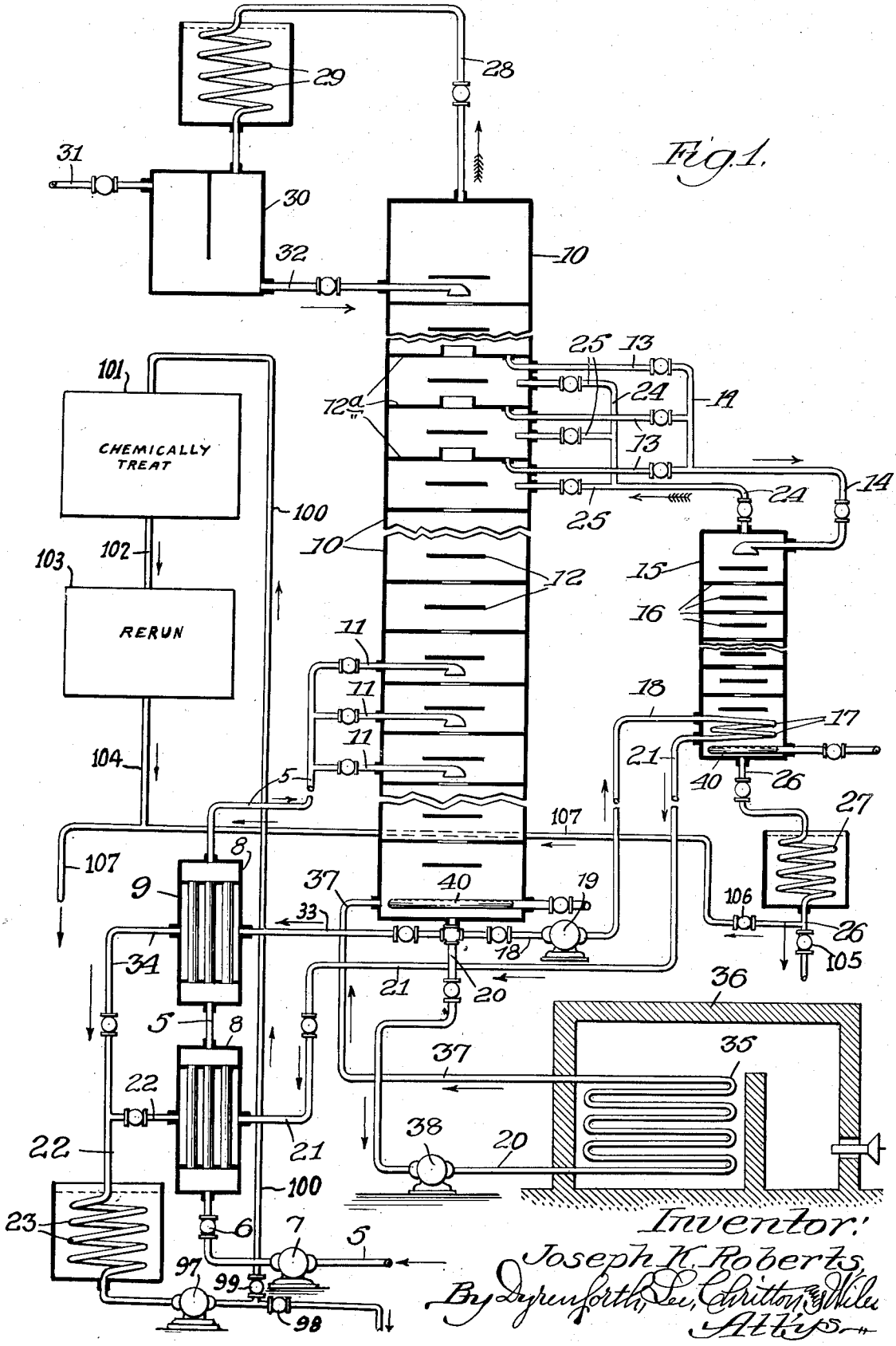
March 3, 1936. J. K. ROBERTS 2,032,666

STABILIZATION OF LIGHT HYDROCARBON OILS AND PARTICULARLY PRESSURE DISTILLATE

Filed Jan. 6, 1930 2 Sheets-Sheet 1



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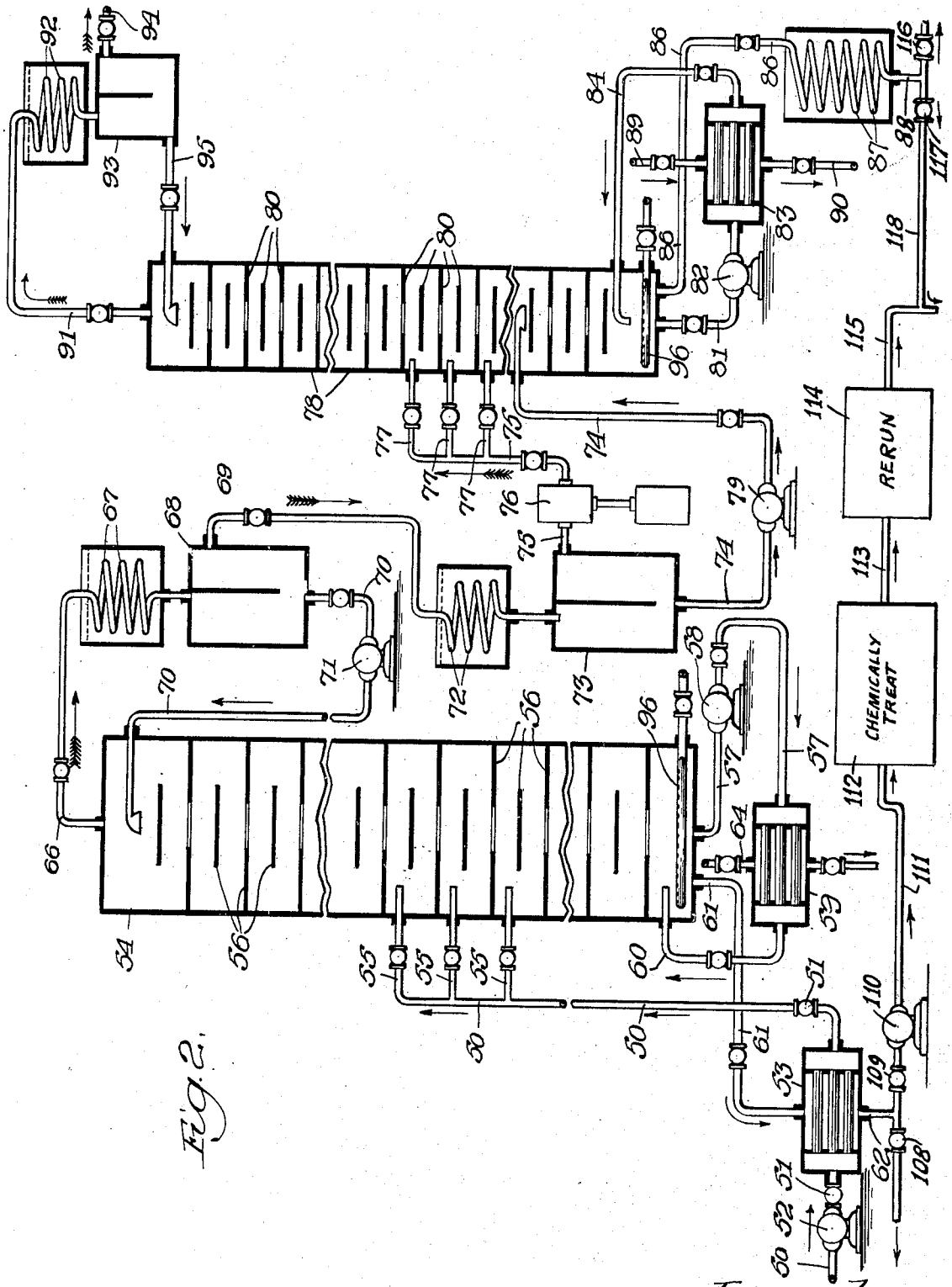


Fig. 2.

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STABILIZATION OF LIGHT HYDROCARBON OILS AND PARTICULARLY PRESSURE DISTILLATE

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11 Claims. (Cl. 196—11)

This invention relates to the stabilization of light hydrocarbon oils, and particularly to the stabilization of pressure distillates of hydrocarbon oils. The invention will be more fully understood by reference to the following description in conjunction with the accompanying drawings, in which:

Figure 1 is an elevational view, somewhat diagrammatic in character, of an apparatus suitable for carrying out the process of the invention; and

Fig. 2 is a similar type of view of a different form of apparatus suitable for carrying out a modification of the process.

Referring more in detail to the drawings, and more particularly to the apparatus shown in Fig. 1, a line 5 provided with valve 6, and a pump 7 is connected to any suitable source of light hydrocarbon oils, for example, pressure distillate. The line 5 is connected in series with heat exchangers 8 and 9 and discharges into a column 10 through one or more valved branch-pipes 11 at an intermediate point of the column.

The column 10 is provided with a plurality of suitable fractionating elements 12 which may comprise a plurality of plates, for example, of the bubble cap or the disk and doughnut type. One or more valved branch-pipes 13 communicate with the column 10 at a point above the feed pipe 11, and are each connected to one of the plates 12a which are adapted to collect any liquid fractions which are condensed in the column at, or above, the said plates 12a. The pipes 13 are connected to a valved line 14 communicating with the upper portion of a smaller column 15. The liquid from the plates 12a may flow to the column by gravity, or a pump (not shown) may be interposed in the line 14.

The column 15 is provided with a plurality of suitable fractionating elements 16, which may comprise a plurality of plates, for example, of the bubble, or the disk and doughnut type. Within the lower end of the column a coil 17 is mounted. A valved line 18, provided with a pump 19 leads from a line 20 connected to the bottom of the column 10 and is connected to the inlet of the coil 17. The outlet of the coil 17 comprises a valved line 21 which communicates with the heat exchanger 8, whereby the fluids from coil 17 impart their heat to the fresh oil being fed through line 5 and the heat exchanger 8.

A valved draw-off line 22 provided with a cooling coil 23 is connected to the heat exchanger 8, whereby the fluid from line 21 may be withdrawn from the system. Instead of withdrawing the stabilized fluid from the system the cool fluid may be pumped through pump 97, thence through line 100 provided with valve 99, thence through a chemical treatment shown diagrammatically as 101, from which it is discharged through line 102 to a re-running operation, also shown diagrammatically as 103, thence discharged through line 104 into line 107. Discharge line 22 is provided with valve 98 in order that the flow of fluid therethrough may be controlled. A valved line 24 leads from the upper end of the column 15 and is connected to one or more valved branch lines 25 which communicate with the interior of the column 10 at points intermediate the top thereof and the feed branch-lines 11, whereby vapors and gases may be passed from column 15 to column 10. A valved line 26 leads from the bottom of the column 15 and is provided with a cooling coil 27, whereby liquid in the bottom of column 15 may be withdrawn from the system. The fluid discharged through line 26 may be passed through valved line 105 or alternatively it may be passed through the branched line 107 provided with valve 106, where it meets with the discharge line 104 in order that the liquids discharged from 104 and 107 may be blended.

A gas and vapor line 28 leads from the top of the column 10 to a cooling coil 29 which discharges into a suitable gas and liquid separator 30. The separator is provided with a valved gas draw-off line 31 and a valved liquid draw-off line 32 which leads into the upper portion of the column 10. Condensate from the separator 30 returns to the top of the column 10 by gravity, or a pump (not shown) may be interposed in the line 32 to force it into the column.

The line 20, leading from the bottom of the column 10 is connected to a valved line 33 which leads to the heat exchanger 9, whereby the fluid withdrawn through line 33 imparts heat to the fresh oil being fed through line 5. A valved draw-off line 34 leads from the heat exchanger 9 to the line 22, whereby the fluid from line 33 may be withdrawn from the system. The valved line 20 leads to the inlet of a heating coil 35 mounted within a suitable furnace setting 36. The outlet of the coil 35 is connected to a valved line 37 which communicates with the lower portion of the column 10. A pump 38 may be interposed in line 20, whereby any desired portion of liquid, withdrawn from the bottom of column 10, may be forced through the coil 35 wherein it may be subjected to heating and then returned to the lower portion of column 10 through the line 37.

Perforated pipes 40 may be provided within the lower portion of the columns 10 and 15 for passing steam through the pools of liquid in the bottoms thereof.

In the operation, in a pressure rectification operation, the lighter liquid portion, including largely butanes, pentanes and hexanes, are separated from the heavier portions and are separately subjected to rectification to remove undesirable light constituents, at a pressure exceeding 75 lbs. The heavier stabilized product removed from the first operation forms the major portion of the final product and, after a suitable ordinary type of refining operation, comprising a chemical treatment and a re-running operation to remove undesired heavy ends, this product may be blended with the liquid product resulting from the second operation to form a stabilized distillate product. By such separate re-running of the heavier fraction, losses on re-running are markedly reduced. The separate lighter fraction derived from the second operation, does not require such re-running or chemical treatment. This lighter fraction may amount, ordinarily, to 5 to 30% of the total blended products, but these proportions may vary widely according to the characteristics of the pressure distillate treated and the conditions of operation.

Referring more in detail to the process and the operation of the apparatus of Fig. 1, the light hydrocarbon oil which is to be stabilized, and which may comprise, for example, a pressure distillate produced in a hydrocarbon oil conversion or cracking process operating under a substantial pressure, is forced through line 5, heat exchangers 8 and 9, and one or more of the branch-pipes 11, into the column 10. The column 10 may be maintained under superatmospheric pressure, say, for example, 185 lbs. Upon being discharged into the column 10, some of the lighter portions of the distillate will separate off as vapors and gas while the portions remaining in liquid phase flow downwardly through the fractionating elements 12. The proportion of vapors formed at this point depends, of course, upon the temperature to which the distillate was preheated and the pressure conditions. The downflowing liquid portions come into intimate contact with vapors and gases, passing upwardly through the column, and thereby are subjected to fractionation. These ascending vapors and gases are given off by the body of liquid in the bottom of column 10, which liquid is heated to the desired stabilizing temperature by passing a predetermined portion of it through the coil 35 by means of lines 20 and 37. Steam may be introduced from the pipe 40 to strip the lighter constituents from the body of liquid in the body of column 10. The column 10 may be operated under a suitable superatmospheric pressure, say for example 185 lbs. When operating at 185 lbs. pressure the body of liquid in the bottom of column 10 is heated to about 450° F. more or less, although it is to be understood that with lower pressure conditions, the temperature of the liquid should be lower and with a higher pressure the temperature of the liquid should be higher, for example, under a pressure of 30 lbs. the temperature of the liquid should be around 285° F., more or less. The descending liquid is fractionated and stripped of its lighter constituents and the heavier ascending vapors are condensed as reflux.

The vapors flowing upwardly through the column come into intimate contact with cooled condensate discharged into the upper end of column 10 from the separator 30 by means of the line 32, whereby the vapors are cooled and reflux formed. This cooler liquid comprises portions of the uncondensed vapors which pass through line 28 to condenser 29 wherein they are condensed. The condensate and uncondensed gases are discharged into the separator 30 and the fixed or uncondensed gases are discharged through line 31. The condensate is withdrawn through line 32 and returned to column 10 as described. The portion of the ascending vapors in the upper portion of the tower which are condensed by these cooler condensed vapors collect as reflux on one or more of the plates 12^a, together with the unvaporized portions of the cooling liquid and are withdrawn by means of one or more of the branch-pipes 13 and passed through line 14 into the upper portion of column 15. However, in the ordinary operation a portion of the liquid on the plates 12^a is permitted to overflow the plates 12^a to form a reflux cooling liquid for the vapors in the column and therebelow.

The reflux discharged into the column 15 passes downwardly through the fractionating elements therein whereby it comes into intimate contact with vapors passing upwardly through the column, and is subjected to fractionation. These ascending vapors are given off by subjecting the body of liquid in the bottom of the column 15 to reheating by heat imparted to them from the hot liquids passed through the coil 17, and the stripping action of steam from the pipe 40. These heat supplying liquids preferably comprise portions of the stabilized liquid withdrawn from the bottom of column 10 through pipe 20, this liquid being circulated through the coil 17 by means of lines 18 and 21.

The uncondensed and fractionated vapors and gases pass out of the upper end of column 15 through line 24 and one or more of branch-lines 25, into the upper portion of column 10, wherein they are subjected to fractionation, in the upper portion thereof, in the manner already described, the uncondensed gas and vapor being passed through the cooling coil whereby all or a portion of the vapor is condensed and separated from the gases in separator 30, the condensed vapor being returned through line 32 to column 10.

In a specific form of operation, operating at 185 lbs. pressure, the liquid in the bottom of columns 10 and 15 may be maintained at about 450° F. and 235° F., respectively. The temperature at the tops of columns 10 and 15 may be 120° F. and 160° F., respectively, while the temperature of the condensed vapors returned through line 32, from separator 30, may be 75° F. The temperature of the preheated pressure distillate may be 300° F. However, it is to be understood that these temperatures may vary depending upon the pressure maintained within the columns, the amount of distillate passed off the columns as vaporous overhead, etc.

With a feed of 1,000 gallons of pressure distillate, under the above conditions, 798 gallons of a heavy stabilized fraction was withdrawn through line 22 while 106 gallons of a light stabilized fraction was withdrawn through line 26. The remainder of the charge comprised gases which were withdrawn through line 31. These gases include some of the butanes, preferably the isobutanes, together with lighter hydrocarbons. The heavier stabilized product after being subjected

to an ordinary chemical treatment and re-running to remove the undesired constituents therein, may be blended with the lighter stabilized product, to form the final desired stabilized product.

Referring now more particularly to the apparatus shown in Fig. 2, a line **50** provided with valves **51** and a pump **52** is connected to any suitable source of light hydrocarbon oils, for example, pressure distillate. The line **50** has a heat exchanger **53** interposed therein and discharges into a column **54** through one or more valved branch-pipes **55**.

The column **54** is provided with a plurality of suitable fractionating elements **56** which may comprise a plurality of plates, for example, of the bubble cap, or the disk and doughnut type. A valved line **57** provided with a pump **58** leads from the bottom of column **54** to a heat exchanger **59**. The heat exchanger **59** is connected to a valved line **60** which leads to the lower portion of the column **54**, whereby regulated portions of liquid may be withdrawn through line **57** and subjected to reheating by means of a suitable fluid passed through exchanger **59**. The heating fluid for the exchanger **59** may comprise, for example, a hot tar withdrawn from the pressure distillation process wherein the pressure distillate, undergoing treatment, was produced. This heating fluid may be passed through exchanger **59** by means of valved lines **64** and **65**.

A valved draw-off line **61** leads from the bottom of column **54** to heat exchanger **53**, whereby the liquid withdrawn from the bottom of column **54** imparts heat to the fresh pressure distillate flowing through line **51**. The heat exchanger **53** is provided with a valved draw-off line **62** for discharging from the system, the liquid withdrawn from the bottom of the column **54**. The line **62** preferably leads to a suitable cooler, not shown in a manner similar to that shown at **23** in Figure 1. Instead of withdrawing the liquid through line **62** which is provided with valve **108**, the liquid may be passed through line **111** provided with valve **109** and pump **110**. The liquid so discharged through line **111** may be chemically treated in apparatus shown diagrammatically as **112**, thence discharged through line **113** to a re-running operation shown diagrammatically as **114** and thence discharged through pipe **115** which meets with pipe **118**.

A valved gas and vapor line **66** leads from the top of the column **54** to a cooling coil **67** which discharges into a suitable gas and liquid separator **68**. The separator **68** is provided with a valved vapor draw-off line **69** and a valved liquid draw-off line **70** which leads into the upper portion of the column **54**. A pump **71** may be interposed in line **70** to force the condensate from separator **68** into column **54**.

The draw-off line **69** leads to a cooling coil **72** the outlet of which discharges into a gas and liquid separator **73**. The separator **73** is provided with a valved liquid draw-off line **74** and a valved vapor draw-off line **75**. The vapor line **75** is provided with a suitable pump **76** and is connected to a plurality of valved branch pipes **77**, communicating with column **78** at different levels at intermediate points thereof. The liquid line **74** is provided with a pump **79** and discharges into the column **78** at a point below the branch-pipes **77**.

The column **78** is provided with a plurality of suitable fractionating elements **80** which may be, for example, of the bubble cap, or the disk and doughnut type. A valved line **81** provided with a pump **82** leads from the bottom of column **78** to a heat exchanger **83**. A valved outlet line **84** leads from the heat exchanger **83** to the lower portion of the column **78**, whereby regulated portions of the reheated liquid, withdrawn from column **78**, may be returned thereto. A valved line **86** leads from the bottom of column **78** to a cooling coil **87** provided with a valved draw-off line **88** through which regulated quantities of liquid in the bottom of column **78** may be withdrawn from the system. The liquid discharged from line **88** may flow through line **88**, provided with valve **116**, or it may flow through the other branch line **118**, provided with valve **117**, at line **118** joining line **115** in order that the fluids contained therein may be blended. The heating medium employed in the exchanger **83** may comprise any suitable fluid, for example, a hot tar withdrawn from the pressure distillation process wherein the pressure distillate, being treated was produced. This heating fluid may be passed through exchanger **83** by means of valved lines **89** and **90**.

A valved gas and vapor line **91** leads from the top of column **78** to a condensing coil **92** which discharges into a suitable gas and liquid separator **93**. The separator **93** is provided with a valved gas draw-off line **94** and a valved liquid draw-off line **95** which leads into the upper portion of the column **78**. The liquid from the separator **93** flows into the column **78** by gravity, or it may be desirable to employ a suitable pump (not shown) in the line **95**.

Suitable perforated pipes **96** may be provided within the lower portion of the columns **54** and **78** for passing steam through the pools of liquid in the bottoms thereof.

In the operation, the light hydrocarbon oil which is to be stabilized and which may comprise, for example, a pressure distillate of the type treated in the apparatus of Fig. 1, is forced through line **50**, heat exchanger **53** and one or more of the branch-pipes **55** into the column **54**. The column **54** may be maintained under a superatmospheric pressure lower than that of column **78**; for example, the column **54** may be maintained under 30 lbs. pressure and the column **78** under 185 lbs. pressure. Upon being discharged into column **54**, some of the lighter portions of the distillate separate off as vapors and gas while the portions remaining in the liquid phase flow downwardly through the fractionating elements **56**. The proportion of vapors formed at this point depends, of course, upon the temperature to which the distillate was preheated and the pressure conditions. The downflowing liquid comes into intimate contact with vapor and gas passing upwardly through the column, and is subjected to fractionation. This ascending vapor and gas is given off by the body of liquid in the bottom of the column 54 which is heated by passing predetermined portions of it through the exchanger **59** by means of lines **57** and **60**. Steam may be passed through this body of liquid, by means of the pipe **96**, to strip the lighter constituents therefrom. Thus, the lighter portions of the descending liquid are vaporized and the heavier portions of the ascending vapors are condensed as reflux.

The uncondensed vapors flow upwardly through column **54** and come into intimate contact with a cooler liquid portion discharged into the upper end of the column **54** from the separator **68**, by means of the line **70**, whereby the necessary cooling required for fractionation is supplied. This

cooler liquid comprises condensed portions of the fractionated vapors which are passed through line 66 to condenser 67. The condensate and cooled uncondensed vapors are discharged into separator 68 wherein the uncondensed vapors together with any gases are separated from the condensed vapor, the vapor and gases being discharged through line 69. The condensate is withdrawn through line 70 and returned to column 54 as hereinbefore described.

The vapor and gases withdrawn through line 69 are passed to coil 72 wherein they are cooled and partially condensed, the condensate together with any uncondensed vapors and gases being passed to separator 73. The condensate is separated from uncondensed vapor and gases within the separator, the condensate being pumped through line 74 into column 78 while the uncondensed vapors and/or gases are pumped through line 75 and one or more of branch-lines 77 into column 78.

The condensate entering column 78 from line 74 flows downwardly through the fractionating elements, coming into intimate contact with warmer vapors and gas passing upwardly through the column 78, whereby the said liquid, vapor and gas are subjected to fractionation. This ascending vapor and gas is given off by the body of liquid in the bottom of column 78 which is heated by passing predetermined portions of it through the exchanger 83, by means of lines 81 and 84. Steam may be passed through this liquid body, by means of the pipe 96, to strip the lighter constituents therefrom. Thus, some of the lighter portions of the descending liquid are vaporized and the heavier portions of the ascending vapors are condensed as reflux.

The uncondensed vapor and gas entering column 78 from line 75 may or may not be partially condensed, depending on the differential of pressure between the columns 54 and 78, which may be from 25 lbs. upwardly. Of course, if any of this vapor is condensed, it will flow downwardly in the column 78 and will be stripped and fractionated. The uncondensed vapor and gas, from line 75, together with the vapor and gas from the lower end of column 78, flow upwardly through the column 78 and come into intimate contact with a cooler liquid discharged into the upper end of the column from the separator 93 by means of the line 95, whereby the ascending vapor and descending liquid are subjected to further fractionation.

This cooling liquid in the upper portion of column 78 may comprise the condensate from the vapor and gas which is passed through line 91 to condenser 92. The condensate formed therein and uncondensed fixed gas are discharged into separator 93 wherein the gas and the condensate are separated, the gas being withdrawn from the system through the line 94 and the condensate being withdrawn through line 95 and returned to the upper end of column 78, to provide reflux cooling therein for the fractionation operation.

The liquid portions withdrawn from the bottom of the column 78 through lines 86 and 88 comprise the light stabilized fraction, while those liquid portions withdrawn from the bottom of the column 54 through lines 61 and 62 comprise the heavier stabilized fraction.

In a specific form of operation the bodies of liquid in the bottom of columns 54 and 78 may be maintained at 285° F. and 235° F., respectively, while the pressure within the columns 54 and 78 may be 30 lbs. and 185 lbs., respectively. The temperature at the tops of columns 54 and 78 may be 115° F. and 120° F., respectively. The temperature at the discharge of cooling coil 72 may be 75° F. and the temperature at the discharge of coil 92 may be 75° F. It will be understood that these temperatures may vary depending, of course, upon the pressure maintained within the columns, the amount of distillate passed off the columns as vaporous overhead, etc.

Under the above outlined conditions, the quantities of light and heavy distillate and gases, were substantially the same per amount of charging stock, as obtained with the apparatus of Fig. 1, which has been already fully described and the heavier stabilized distillate after suitable treatment may be blended with the lighter stabilized distillate to form the final product.

It will be apparent that the apparatus of Fig. 2 may be operated under pressure and temperature conditions similar to those under which Fig. 1 was operated, that is, the columns 54 and 78 may be operated under substantially the same pressure.

It is to be understood that the specific details of apparatus and method hereinbefore set forth are for the purpose of illustration, and are not intended to be regarded as limitations upon the scope of the invention, except as contained in the following claims.

I claim:

1. The method of treating hydrocarbon oil pressure distillate to effect stabilization thereof which comprises, subjecting the distillate to a rectifying operation to vaporize the lower boiling portions thereof including the butanes and pentanes, thereby producing a stabilized heavier portion free from such lower boiling liquid constituents, withdrawing the lower boiling portions from said rectifying operation and subjecting them to a separate rectifying operation out of contact with any part of the stabilized higher boiling portion and under substantial superatmospheric pressure substantially higher than that in the initial rectifying operation to produce a stabilized low boiling liquid portion, and blending said stabilized heavier portion with said stabilized low boiling portion.

2. The method of treating hydrocarbon oil pressure distillates to effect stabilization thereof which comprises, subjecting the distillate to a rectifying operation to vaporize the lower boiling portions thereof desired in the final product including the butanes and hexanes, thereby producing a stabilized heavier portion free from such lower boiling liquid constituents, withdrawing the said lower boiling portions from said rectifying operation and subjecting them to a separate cooling and rectifying operation out of contact with any part of the stabilized higher boiling portion and under substantial superatmospheric pressure substantially higher than that in the initial rectifying operation to produce a stabilized low boiling liquid containing butanes and hexanes, and blending said stabilized low boiling liquid with said stabilized heavier portion.

3. The method of treating hydrocarbon oil pressure distillates to effect stabilization thereof which comprises, subjecting the distillate to a rectifying operation to vaporize the lower boiling portions thereof, thereby producing a stabilized heavier liquid portion free from such lower boiling liquid constituents, withdrawing the lower boiling vapors including butanes from said rectifying operation and subjecting them to a

separate rectifying operation out of contact with any part of the stabilized higher boiling portion and under a superatmospheric pressure above 75 lbs. and substantially higher than that in the initial rectifying operation to produce a stabilized low boiling liquid containing butanes, and blending said low boiling liquid with said stabilized heavier liquid portion.

4. The method of treating hydrocarbon oil pressure distillates to effect stabilization thereof which comprises, subjecting the distillate to a rectifying operation to vaporize and separate therefrom the lower boiling portions thereof desired in the final product including butanes and hexanes, thereby producing a stabilized heavier portion free from such lower boiling liquid constituents, subjecting the separated lower boiling vapors to a condensing operation, and subjecting the condensate to a separate rectifying operation out of contact with any part of the stabilized higher boiling portion and under superatmospheric pressure substantially higher than that in the initial rectifying operation to produce a stabilized low boiling liquid portion containing butanes and hexanes, and blending such stabilized heavier portion with said stabilized low boiling portion.

5. The method of treating hydrocarbon oil pressure distillates to effect stabilization thereof which comprises, subjecting the distillate to a rectifying operation under superatmospheric pressure to vaporize the lower boiling portions thereof desired in the final product including butanes and hexanes, thereby producing a stabilized heavier portion free from such lower boiling liquid constituents, subjecting the said vaporous lower boiling portions to fractionation to condense from them the higher boiling portions and returning the condensate to said stabilizing operation, subjecting the lower boiling vapors including butanes and hexanes to a condensing operation, and passing the condensate from the latter operation to a separate rectifying operation out of contact with any part of the stabilized higher boiling portion and substantially higher than that in the initial rectifying operation under superatmospheric pressure to produce a stabilized low boiling portion containing butanes and hexanes, and blending said stabilized heavier portion with said stabilized low boiling portion.

6. The method of stabilizing hydrocarbon oil pressure distillates which comprises, subjecting the distillate to a rectifying operation in which the lower boiling portions thereof desired in the final product including butane and pentane, together with the undesired lower boiling portions, are vaporized, subjecting said lower boiling portions to a condensing operation, passing the condensate from said condensing operation to a separate rectifying operation out of contact with any part of the stabilized higher boiling portion and maintained under a superatmospheric pressure of at least 75 lbs., and substantially higher than that of the initial rectifying operation, in which the said undesired lower boiling portions are vaporized and thereby separated from the said desired lower boiling portions including butane and pentane, whereby a stabilized heavier liquid product is produced in said first-named rectifying operation and a stabilized lighter liquid product including butane and pentane is produced in said second-named rectifying operation and blending the said stabilized heavier liquid product with said stabilized lighter liquid product.

7. The method of stabilizing hydrocarbon oil pressure distillates which comprises, subjecting the distillate to a rectifying operation in which the lower boiling portions thereof desired in the final product including butane, pentane and hexane, together with the undesired lower boiling portions, are vaporized, condensing said lower boiling portions, removing said lower boiling portions as a liquid from said rectifying operation and passing them to a separate rectifying operation out of contact with any part of the stabilized higher boiling portion and maintained under a superatmospheric pressure of at least 75 lbs. and substantially higher than that in the initial rectifying operation, in which the said undesired lower boiling portions are vaporized, removing said vaporized undesired lower boiling portions from the system, whereby a stabilized lighter liquid product containing butane, pentane and hexane is produced in said last-named rectifying operation and a stabilized heavier liquid product substantially free of butane is produced in said first-named rectifying operation and blending said stabilized lighter liquid product with said stabilized heavier liquid product.

8. The method of stabilizing hydrocarbon oil pressure distillates which comprises, introducing the distillate into a rectifying column maintained under superatmospheric pressure wherein the lower boiling portions thereof desired in the final product including butane, pentane and hexane, together with the undesired lower boiling portions, are vaporized, cooling said lower boiling portions whereby said desired portions together with at least a part of said undesired portions are condensed, removing the condensed portions from said column and passing them to a separate rectifying column, maintained under a substantially higher pressure than said first-named rectifying column, wherein the condensed portion is additionally heated and the undesired lower portions are vaporized out of contact with any part of the stabilized higher boiling portion, returning said vaporized undesired lower boiling portions to said first-named column, withdrawing said undesired vaporous portions from said first-named column, whereby a stabilized heavier product free of butane is produced in said first-named column and a stabilized lighter product containing butane, pentane and hexane is produced in said second-named column and blending the said stabilized heavier product with the said stabilized lighter product.

9. The method of stabilizing hydrocarbon oil pressure distillates which comprises, introducing the distillate into a rectifying column, maintained under superatmospheric pressure, wherein the lower boiling portions thereof desired in the final product including butane, pentane and hexane, together with the undesired lower boiling portions, are vaporized, and a heavier stabilized liquid product is produced in said column, removing both of said vaporous lower boiling portions and subjecting them to cooling whereby at least a part of said lower boiling products are condensed, separately introducing said condensed removed lower boiling products and any remaining vaporous products into a second rectifying column maintained under a pressure of at least 75 lbs. and substantially higher than that in the initial rectifying operation, wherein substantially all of said undesired products are vaporized out of contact with any part of the stabilized

higher boiling portion and the desired products including butane, pentane and hexane are collected in the liquid phase as a stabilized lighter product, removing said vaporous undesired portions from the latter column and from the system and blending the said stabilized desired products from said second column with the said heavier stabilized liquid product produced in the first column.

10. The method of treating pressure distillates to produce a refined stabilized distillate product containing butane, pentane and hexane which comprises subjecting the distillate to a rectifying operation under superatmospheric pressure in which lower boiling portions thereof, desired in the final product, including butane, pentane and hexane are separated from the distillate, whereby a stabilized heavier portion is produced which is free from the said lower boiling liquid constituents desired in the final product, subjecting the separated lower boiling portions to a separate rectifying operation out of contact with any part of the stabilized higher boiling portion and under substantially superatmospheric pressure substantially higher than that in the initial rectifying operation whereby a stabilized lighter portion containing butane, pentane and hexane is produced, subjecting the heavier stabilized portion to a rerunning operation wherein the undesired heavier constituents are separated therefrom as a residue, and blending the rerun stabilized heavier portion with the said stabilized lighter portion to produce a stabilized distillate product containing butane, pentane and hexane.

11. The method of treating pressure distillates to produce a refined stabilized distillate product containing butane, pentane and hexane which comprises subjecting the distillate to a rectifying operation under superatmospheric pressure in which lower boiling portions thereof, desired in the final product, including butane, pentane and hexane are vaporized and thereby separated from the distillate, whereby a stabilized heavier portion is produced which is free from the lower boiling constituents desired in the final product, subjecting the separated lower boiling portions to a separate rectifying operation out of contact with any part of the stabilized higher boiling portion and maintained under superatmospheric pressure substantially higher than that in the initial rectifying operation whereby a stabilized lighter portion containing butane, pentane and hexane is produced, subjecting the heavier stabilized portion to a rerunning operation wherein the undesired heavier constituents are separated as a residue from the said stabilized heavier portion, and blending the rerun stabilized heavier portion with the said stabilized lighter portion to produce a stabilized distillate product containing butane, pentane and hexane.

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