

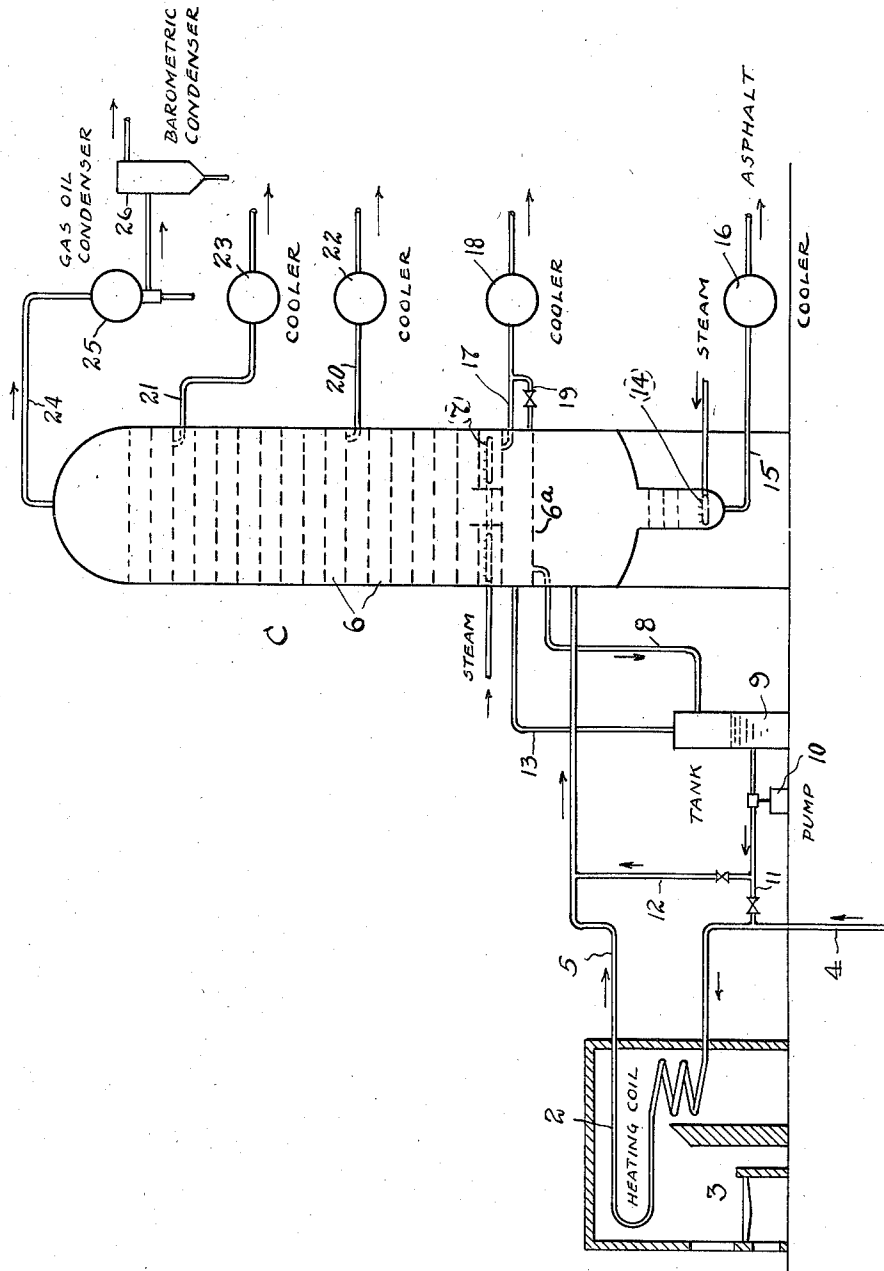
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METHOD FOR FLASH DISTILLING PETROLEUM

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METHOD FOR FLASH-DISTILLING
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6 Claims. (Cl. 196—72)

In the distillation of petroleum, it is a custom-
ary practice to heat the oil in a heating coil and
discharge into a fractionating column. At the
point of discharge, vapors disengaged proceed on
up the column, while liquid gathering on the plate
adjacent the point of feed-in to the tower is usu-
ally allowed to flow down into the liquid at the
bottom of the tower, and be drawn off therewith
as one of the regular side streams. I have found
that the material on this plate contains constitu-
ents which should not properly go into the first
side stream, and other constituents which should
not go into the bottoms. The mixture of these
constituents is due to mechanical entrainment,
there being considerable turbulence in the flash
zone of this type of equipment. In accordance
with the present invention however, it now be-
comes possible to attain a proper separation of
such previously-mixed constituents, and an im-
proved operation of fractionation results corre-
spondingly.

To the accomplishment of the foregoing and
related ends, the invention, then, comprises the
features hereinafter fully described, and particu-
larly pointed out in the claims, the following de-
scription and the annexed drawing setting forth
in detail certain illustrative embodiments of the
invention, these being indicative however, of but
a few of the various ways in which the principle
of the invention may be employed.

In said annexed drawing:—

The sole figure is a semi-diagrammatic vertical
sectional view of an embodiment of apparatus
in accordance with the invention.

In the form shown in the drawing, the appa-
ratus involves a means for heating the petroleum,
as a heating coil 2 in a suitable furnace or heat-
ing chamber 3, and having its inlet connection 4
proceeding from a suitable source of petroleum,
such as reduced crude, and its outlet connection
5 leading to a fractionating column C. The
latter contains plates 6 which may be of conven-
tional bell cap type, or of other detail as desired,
capable of providing countercurrent contact of
vapors and liquid with reflux. The inlet connec-
tion 5 to the fractionating column leads to the
lower portion of the column, below the lowermost
plate. Above the lowermost plate, desirably a
suitable distributor of superheated steam is ar-
ranged, such as a rosette 7. From the lowermost
plate a connection 8 leads to the feed line, a re-
ceiver tank 9 and a pump 10 being interposed, as
desired, and the connection preferably having
branch junctions 11, 12, each valve-controlled,
to the coil feed line 4 and to the coil-discharge

line 5, respectively. Thereby, as readily seen, it
is conveniently possible to return liquid from the
lowermost plate which is in the zone of turbulence
to the intake of the fractionating column, either
anterior to the heating coil, or at a point be-
tween the heating coil and the tower, or both,
according to desired temperature requirements.
A balance line 13 connecting from the top of the
receiver tank 9 to the vapor space above the low-
ermost plate in the fractionating column is ad-
visable if such tank 9 be employed. At the bot-
tom of the fractionating column C, a steam inlet,
as a rosette 14 may be provided, and a drain line
15 leading through a cooler 16 may serve to dis-
charge the bottoms or asphaltic residuum. A
side-stream outlet connection 17 leads from the
plate just below the superheated steam inlet, to
a tank or other point of disposal of the cylinder
stock stream, and preferably through a cooler 18.
A by-pass 19, valve-controlled, connects from the
line 17 back to the lowermost plate. Other side-
stream lines 20, 21, are provided, each leading to
its respective tank or point of disposal, and pre-
ferably through coolers 22, 23. From the top of
the tower, a vapor off-take 24 proceeds through
a preliminary condenser 25 to a barometric con-
denser 26.

In accordance with the process characterizing
the invention, petroleum to be fractionated is
passed through the heating zone or coil 2. For
instance, a reduced Mid-Continent crude supplied
through the feed line 4 is heated to suitable flash
temperature, for example 780–800° F., and is
passed to the lower portion of the fractionating
column C. On discharge into the tower, vapors
disengaging proceed up through the plates, and
unvaporized residue works down countercurrent-
ly to the steam supplied at the point 14, and the
ultimate residuum is drawn off through line 15
and cooler 16. Refluxing condensate collecting
on plate 6a is returned by connection 8 into the
feed stream, as by being pumped from the re-
ceiver tank 9 through the connection 11 into line
4. Where the relative volume of the reflux con-
densate from the plate 6a is rather large, and
application of additional heat is not particularly
required, part or all of it may be passed through
connection 12 into the feed line 5 leading to the
column. From the connection 17 at the side of
the tower, a side-stream of condensate of heavy
character in the range of cylinder stock is taken
off through cooler 18. A side-stream of con-
densate of the character of wax slop is taken off
through connection 20 at the side of the tower
and proceeds through cooler 22 to a receiving tank

or point of disposal, and a side-stream of still lighter distillate, in the range of paraffin distillate, is taken off by connection 21 and proceeds through cooler 23 to a receiving tank or other point of disposal. The vapors which leave the top of the column by vapor outlet 24 are subjected to partial condensation in the condenser 25, a condensate on the order of gas oil being there taken out, and the lighter vapors proceed on to barometric condenser 26 and the remainder of the condensing system. Steam is supplied, generally superheated steam, at the rosette 7, and bottom steam as desired, at the rosette 14.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A process of distilling petroleum which comprises the steps of heating a stream of petroleum oil in a heating zone, discharging such heated stream into a fractionating zone, whereby a zone of turbulence is created adjacent the heated oil inlet, separating the vaporous materials from the heavy unvaporized liquid, passing vapors through and into intimate contact with a body of oil within said zone of turbulence, whereby undesirable color and tarry materials are removed from said vapors, further fractionating the vapors to separate and withdraw from the system a heavy lubricating oil fraction, said fraction being withdrawn from a point adjacent said body of oil and being free of undesirable color and tarry material, removing a portion of said body of oil and recycling said portion, together with the petroleum oil back to said fractionating zone.

2. A process of distilling petroleum which comprises the steps of heating a stream of petroleum oil in a heating zone, discharging such heated stream into a fractionating zone, whereby a zone of turbulence is created adjacent the heated oil inlet, separating the vaporous materials from the heavy unvaporized liquid, passing vapors through and into intimate contact with a body of oil within said zone of turbulence, whereby undesirable color and tarry materials are removed from said vapors, further fractionating the vapors to separate and withdraw from the system a heavy lubricating oil fraction, said fraction being withdrawn from a point adjacent said body of oil and being free of undesirable color and tarry material, removing a portion of said body of oil and recycling said portion, together with the petroleum oil through said heating zone and back to said fractionating zone.

3. A process of distilling petroleum which comprises the steps of heating a stream of petroleum oil in a heating zone, discharging such heated stream into a fractionating zone, whereby a zone of turbulence is created adjacent the heated oil inlet, separating the vaporous materials from the heavy unvaporized liquid, passing vapors through and into intimate contact with a body of oil within said zone of turbulence, whereby undesirable color and tarry materials are removed from said vapors, further fractionating the vapors to separate and withdraw from the system

a heavy lubricating oil fraction, said fraction being withdrawn from a point adjacent said body of oil and being free of undesirable color and tarry material, removing a portion of said body of oil and recycling said portion, together with the petroleum oil from said heating zone and back to said fractionating zone.

4. A process of distilling petroleum which comprises the steps of heating a stream of petroleum oil in a heating zone, discharging such heated stream into a fractionating zone, whereby a zone of turbulence is created adjacent the heated oil inlet, separating the vaporous materials from the heavy unvaporized liquid, passing vapors through and into intimate contact with a body of oil within said zone of turbulence, whereby undesirable color and tarry materials are removed from said vapors, further fractionating the vapors to separate and withdraw from the system a heavy lubricating oil fraction, said fraction being withdrawn from a point adjacent said body of oil and being free of undesirable color and tarry material, removing a portion of said body of oil and recycling said portion, together with the petroleum oil in the initial stream of petroleum and partially with the oil of the heated stream back to said fractionating zone.

5. A process of distilling petroleum which comprises the steps of heating a stream of petroleum oil in a heating zone, discharging such heated stream into a fractionating zone, whereby a zone of turbulence is created adjacent the heated oil inlet, separating the vaporous materials from the heavy unvaporized liquid, passing vapors through and into intimate contact with a body of oil within said zone of turbulence, whereby undesirable color and tarry materials are removed from said vapors, further fractionating the vapors to separate and withdraw from the system a heavy lubricating oil fraction, said fraction being withdrawn from a point adjacent said body of oil and being free of undesirable color and tarry material, removing a portion of said body of oil and recycling said portion, together with the petroleum oil back to said fractionating zone and still further fractionating said vapors in zones above the point of withdrawal of said heavy lubricating oil fraction, to obtain lighter condensates.

6. A process of distilling petroleum which comprises the steps of heating a stream of petroleum oil in a heating zone, to a temperature of from about 780° to about 800° F., discharging such heated stream into a fractionating zone, whereby a zone of turbulence is created adjacent the heated oil inlet, separating the vaporous materials from the heavy unvaporized liquid, passing vapors through and into intimate contact with a body of oil within said zone of turbulence, whereby undesirable color and tarry materials are removed from said vapors, further fractionating the vapors to separate and withdraw from the system a heavy lubricating oil fraction, said fraction being withdrawn from a point adjacent said body of oil and being free of undesirable color and tarry material, removing a portion of said body of oil and recycling said portion, together with the petroleum oil back to said fractionating zone.

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