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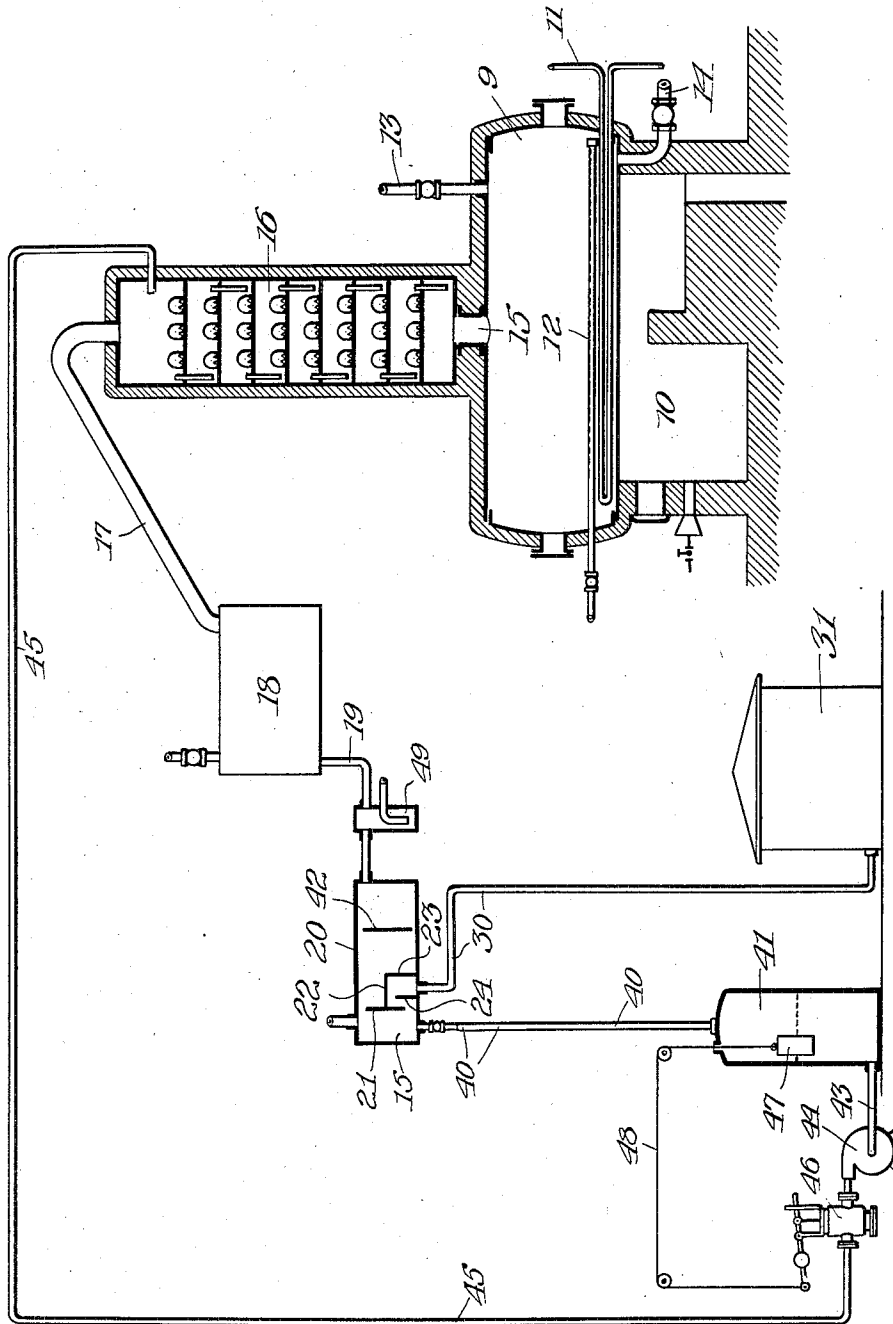
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APPARATUS FOR DISTILLING HYDROCARBON OILS

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2 Sheets-Sheet 1

Fig. 1.



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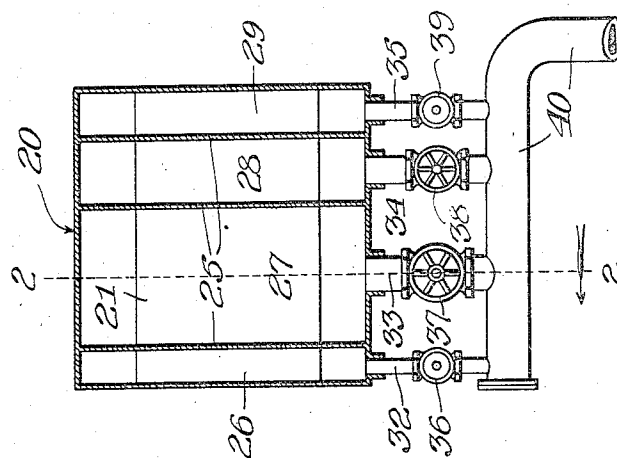
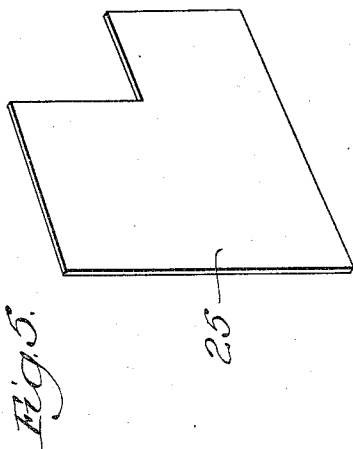
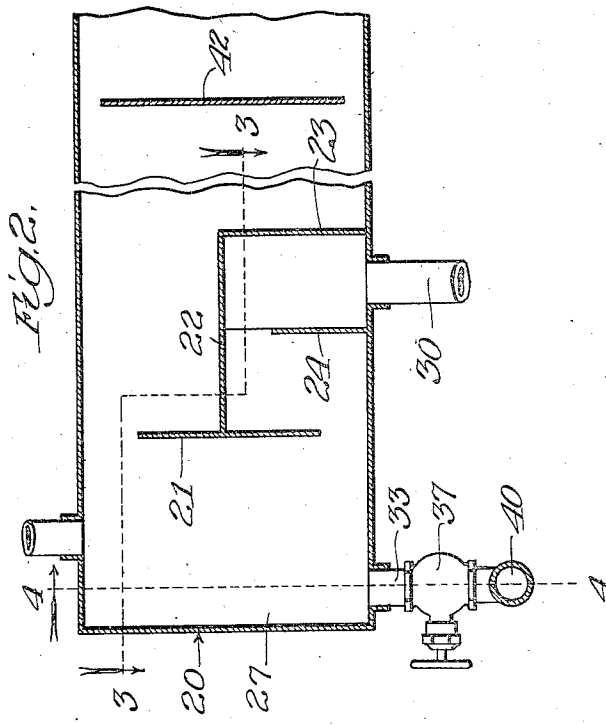
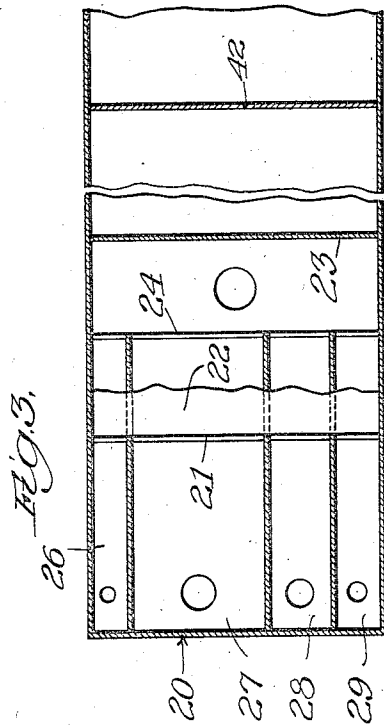
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UNITED STATES PATENT OFFICE

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APPARATUS FOR DISTILLING HYDROCARBON OILS

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This invention relates to an apparatus for distilling hydrocarbon oils and particularly to a distillation apparatus comprising a fractionating column and means for returning a part of the condensate to serve as reflux therein.

The invention will readily be understood from the following description of the preferred embodiment illustrated in the accompanying drawings, in which,—

Figure 1 is an elevation partly in section of the general apparatus,

Fig. 2 is a sectional elevation of the distributing box on the line 2—2 of Fig. 4,

Fig. 3 is a sectional plan on the broken line 3—3 of Fig. 2,

Fig. 4 is a sectional elevation on the line 4—4 of Fig. 2, and

Fig. 5 is a perspective view on one of the partitions 25.

Referring to the drawings, 9 is a still provided with suitable means for heating, such as the furnace 10 or the closed steam pipe 11 or both. The still may also be provided with open steam pipes 12. The still is provided with an oil supply pipe 13, a draw-off pipe 14, and a vapor outlet 15 which leads into a fractionating column 16 which may suitably be of the bubble-cap type. The upper part of the still 9 and the column 16 are preferably heavily lagged. From the top of the fractionating column 16 a vapor outlet 17 leads to a condenser 18, from which a liquid outlet 19 leads to a distributing box 20.

The box 20 is preferably elongated and near its rear end is provided with a weir or partition 21 leaving a clearance between it and the top and bottom of the box. From an intermediate point of the partition 21 a horizontal partition 22 extends forwardly and between the forward end of the partition 22 and the bottom of the box is a vertical partition 23. The partitions 21, 22 and 23 extend across the box and divide it into two parts which communicate only through the clearance

above the top partition 21. The upper edge of the weir or partition 21 is horizontal so that the flow of liquid thereover is uniform. Between the partitions 21 and 23 is located a weir or partition 24 which extends across the box and from the bottom of the box to a height somewhat below the horizontal partition 22. The box 20 is provided with longitudinal partitions 25, of the form illustrated in Fig. 5, located to cooperate with the walls of the box and the partitions 21, 22 and 24 so as to divide the box rearwardly of partitions 21 and 24 into a plurality of separate compartments designated 26, 27, 28 and 29 on the drawings. The partitions 25 are preferably spaced apart by predetermined amounts so that the compartments 26, 27, 28 and 29 will receive correspondingly predetermined proportions of the liquid passing over the weir 21. For example, as illustrated, the widths of the compartments 26, 27, 28 and 29 are in the proportions 2:8:4:3, so that compartment 26 receives 2/17 of the liquid passing over the weir 21, compartment 27 receives 8/17, compartment 28 receives 4/17 and compartment 29 receives 3/17. A pipe 30 leads from the bottom of the box, between partitions 23 and 24, to a storage tank 31. From each of the compartments 26, 27, 28 and 29, pipes 32, 33, 34 and 35, respectively, provided with valves 36, 37, 38 and 39 lead to a manifold 40 which leads to a tank 41. In the forward part of the box 20 is provided a baffle 42 which extends across the box and above the liquid level therein, leaving a clearance below its lower edge, so that the condensate fed in by pipe 19 is presented to the weir 21 in an orderly flow.

From the lower part of tank 41, a pipe 43 leads to a pump 44, which feeds into a pipe 45 which leads into the upper part of column 16. A balanced valve 46 is provided in pipe 45 and is adapted to be controlled by a float 47 in tank 41, said float being connected to the valve by a cord 48. In place of the pump 44, any other suitable means may

be provided for supplying reflux to the fractionating column 16. For example, the vapors may be condensed at an elevated position and a part may be allowed to flow to the column 16 by gravity.

The numeral 45 designates a water trap which is provided with a water drawoff pipe. Steam which is introduced into the still through pipe 12 and condensed in condenser 18 may be removed through trap 49.

The operation is as follows: The still being supplied with naphtha to be rerun for the production of a close-cut naphtha, steam is supplied to both the closed and open steam pipes 11 and 12. The vapors pass upwardly through the fractionating column 16, being intimately contacted therein with reflux supplied by pipe 45 as hereinafter described. The vapors issuing from the top of the column 16 are condensed in condenser 18 and the condensate is supplied to box 20 by pipe 19. The condensate passes under the baffle 42 and then in a stream of uniform thickness over the weir 21, being thereby divided and supplied to the compartments 26, 27, 28 and 29 in proportions depending upon the spacing of the partitions 25 as hereinbefore described.

The amount of the condensate to be returned as reflux is determined by opening one or more of valves 36, 37, 38, 39. For example, if compartment 27 receives 8/17 of the condensate and if valve 37 is opened, that amount passes through pipe 33 and manifold 40 to tank 41 for use as reflux. If, however, the valve 37 is closed the condensate collects in compartment 27 until it overflows weir 24 and passes to the storage tank 31. The condensate passing into compartments 26, 28 and 29 can be supplied either to the storage tank 31 or reflux tank 41 at will. The amount of reflux supplied is capable of very accurate automatic control. For example, with the specific proportions given it is possible to return as reflux the following fractions of the condensate:

0.2/17.3/17.4/17.5/17 ... 14/17.15/17.1

It is preferred to operate pump 44 continuously allowing the flow through pipe 45 to be controlled by valve 46 which is automatically operated from the float 47.

While certain definite proportions have been mentioned in regard to the spacing of the partitions 25 it must be understood that these proportions are by way of example only and that any other desired proportions, and any desired number of partitions may be employed.

Although the present invention has been described in connection with the details of a specific embodiment thereof, it is not intended that such details shall be regarded as limitations upon the scope of the invention, except

in so far as included in the accompanying claims.

I claim:

1. An apparatus for dividing a liquid in definite proportions comprising a horizontal weir over which the liquid is adapted to flow and a plurality of partitions adjacent said weir and spaced at predetermined distances to divide the flow over said weir and means for regulating the withdrawal of said divided flow of liquid.

2. An apparatus for dividing a liquid in definite proportions comprising a weir adapted to maintain a pool of liquid on one side and having a horizontal upper edge over which the liquid is adapted to flow, a partition on the other side of said weir and located so as to divide the flow over said weir in predetermined proportions and means for regulating the flow from said divided flow of liquid.

3. An apparatus for dividing a liquid in definite proportions comprising a weir adapted to maintain a pool of liquid on one side and having a horizontal upper edge over which the liquid is adapted to flow a plurality of partitions on the other side of said weir and spaced at predetermined distances to divide the flow over said weir and means for controlling the withdrawal of liquid from said divided flow.

4. An apparatus for dividing a liquid in definite proportions comprising a horizontal weir over which the liquid is adapted to flow, partitions adjacent said weir and spaced at predetermined distances to divide the flow over said weir, said partitions defining a plurality of separate compartments, a plurality of conduit means adapted to be supplied with liquid from a compartment and means for regulating the flow through said conduits.

5. An apparatus for dividing a liquid in definite proportions comprising a horizontal weir over which the liquid is adapted to flow, partitions adjacent said weir and spaced at predetermined distances to divide the flow over said weir, said partitions defining a plurality of separate compartments, a weir at a lower level than first said weir forming one side of said compartments, valved conduits from the bottom of said compartments and conduit means for the liquid passing over second said weir.

6. An apparatus for dividing a liquid in definite proportions comprising a horizontal weir over which the liquid is adapted to flow, partitions adjacent said weir and spaced at predetermined distances to divide the flow, conduit means for each part of the divided flow and regulatable means for diverting each said divided flow into other conduit means.

7. An apparatus for dividing a liquid in definite proportions comprising a chamber, means for supplying liquid to said chamber, a horizontal weir across said chamber over

which said liquid is adapted to pass, a plurality of partitions located behind said weir and extending thereabove to divide the flow thereover in accordance with the spacing of said partitions, a weir lower than first said
5 weir forming with said partitions a plurality of compartments, valved conduit means from each of said compartments, a compartment adapted to receive liquid passing over second
10 said weir and conduit means from last said compartment.

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