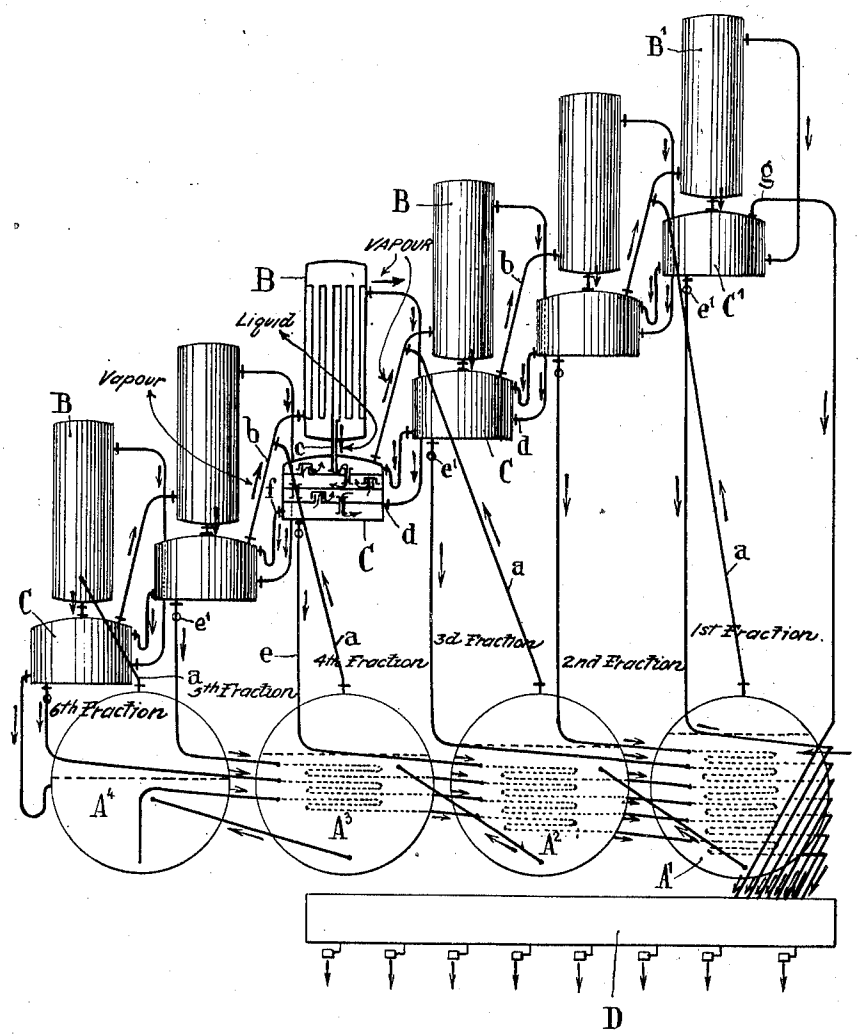
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1,552,980

J. E. BLAISE

APPARATUS FOR THE CONTINUOUS DISTILLATION OF CRUDE PETROLEUMS AND THE LIKE

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Atty's.

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APPARATUS FOR THE CONTINUOUS DISTILLATION OF CRUDE PETROLEUMS AND THE LIKE.

Application filed March 25, 1924. Serial No. 701,803.

To all whom it may concern:

Be it known that I, JOSEPH EMILE BLAISE, subject of the King of Belgium, residing at Blaye, Gironde, France, have invented certain new and useful Improvements in Apparatus for the Continuous Distillation of Crude Petroleums and the like, of which the following is a specification.

The present invention has for object an apparatus allowing the continuous distillation of crude petroleums, coal tars and all other complex mixtures of hydrocarbons to be carried out with simultaneous rectification of the constituents and recovery of the waste heat and also allowing of obtaining economically in a single operation as extended as desired a range of homogeneous cuts or fractions, suitable for delivery to the consumer, the number of these fractions, their quantity and their composition being capable of regulation at any moment.

The apparatus according to the invention, comprises a series of distillation retorts of any desired number less than the number of fractions to be collected. These retorts are heated both by the recovery of the heat carried away after condensation by the products of distillation, and as regards those having the higher temperatures, by means of external furnaces.

The recovery of the heat from the condensed products can be effected either in the retorts themselves by causing the condensed products to pass through these retorts, or in suitable temperature exchangers connected between the retorts in the line of circulation of the products to be distilled.

The retorts, installed in rows or batteries for continuous working, distill products corresponding respectively to the temperatures to which they are raised and deliver their contents from one to another after the liquid has been deprived of the corresponding fraction by being distilled off.

The products of the distillation pass into condenser-rectifier groups, which may be of any desired number but at least equal to the number of cuts or fractions which it is desired to obtain. Each of these groups consists of a rectifying element of the bubbling, trickling or other type, surmounted by a condenser element with a nest of tubes, coils or other refrigeration device with circulation of water or air, the cooling being variable according to the volume to be dealt with.

The annexed drawing represents diagrammatically by way of example a form of apparatus in accordance with the invention. For the clearness of the drawing, the pipes leading the cooling water to and from the condensers have been omitted.

The operation is as follows:

The primary material to be distilled is introduced into the head retort A^1, in which it is maintained at constant level, and from which it passes successively through a series of suitable pipes into the retorts A^2 A^3 A^4, of which the temperature increases from A^1 to A^4. Each retort distills products corresponding to the temperature to which it is raised, and the vapours evolved are directed through the pipes *a* to the corresponding condenser-rectifier group, which also receives through pipes such as *b* the vapours derived from the elements to the left thereof.

Each condensing element B, according to the variable cooling to which it is subjected, condenses a part of the vapours which pass into it, commencing with those of which the vaporizing point is the highest, but also carrying with them a certain part of the vapours of a lower vaporization point. The whole fraction condensed flows through the pipe *c* to the top of the corresponding rectifier C, to the lower part of which there also pass through the pipe *d* the uncondensed vapours from the top of the condenser. By the intimate contact of the vapours and the condensed liquid, which travel in opposite directions, rectification is effected and the distillate collected at the bottom furnishes a homogeneous product which flows through a pipe *e*, delivering the cut or fraction, the volume of which can be regulated by a valve. An overflow orifice *f* returns the excess to the top of the rectifier to the left thereof.

Distillation thus takes place at the same time as rectification as far as the last retort and the last condenser-rectifier group.

The cuts or fractions which escape from the different condenser-rectifiers are directed either into coils passing through the retorts of which the temperature is lower than their own, or through temperature exchangers, so as to allow of recovering the greater part of their heat. On leaving the head retort which is the coldest, they pass into re-

frigerators D which bring them to the temperature suitable for final collection.

The vapours which escape from the last element C^1 may be such as cannot be condensed at the temperature at which it discharges its cut or fraction and they escape at g and pass to the refrigerator which furnishes by condensation a last supplementary fraction.

Under these conditions it will be understood that it is possible to regulate the rate of working in such an apparatus so as to obtain all the fractions which are desired.

The supply to the head retort being maintained constant and corresponding to a fixed output, and the heating of the retorts being itself regulated to supply the heating necessary for the total distillation, it is only necessary to regulate the outputs of the "cut" pipes e, in order that each of them shall allow to flow in a given time the corresponding quantity of each fraction contained in the material submitted to the distillation. The cooling of each condenser-rectifier group will regulate itself so as to supply sufficient condensation to ensure the flow of its "cut" and a slight retro-gradation or return flow towards the element to its left.

It will be noted that it is possible in full working and at any moment whatever, to modify the proportions of the fractions in relation to one another by controlling simultaneously and as required the valves regulating the flow of the cuts and the means for regulating the corresponding refrigeration. Any particular fraction can be increased or reduced in quantity by reducing or increasing one or more of the other fractions by the same total amount.

It is evident that if the number of the fractions to be collected is less than the number of condenser-rectifier groups it will be possible to completely shut down the cut at any one or more elements, which nevertheless will be able to co-operate in the process, by returning the entire product of their condensations purely and simply towards the element to the left and the corresponding fractions will then be submitted to a supplementary rectification which will have for effect to improve their homogeneity.

A device of this kind allows moreover of applying any process of cracking without pressure, that may be judged suitable, without interfering with its satisfactory continuous working it only being necessary to duplicate or triplicate, as the case may be, the retort in which this cracking process is being carried out, so as to allow of it being placed out of circuit for cleaning by means of a by-pass device upon the pipe in which the products to be distilled are circulated.

What I claim is:

1. In an apparatus for continuous distillation of crude petroleums and the like, in combination, a series of retorts, a series of condenser-rectifiers independent in number, of the number of retorts, pipe connections between said retorts, between each retort and the lower part of one of the condensers, between the top of each condenser and the lower part of the corresponding rectifier, and between the top of each rectifier except the first rectifier and the lower part of the preceding condenser and preceding rectifier, a fraction pipe leading away from each rectifier, and means for controlling flow through the fraction pipes.

2. An apparatus for continuous distillation of crude petroleums and the like, comprising, a series of retorts, a series of condenser-rectifiers independent in number of the number of retorts, pipe connections between said retorts, between each retort and the lower part of one of the condensers, between the top of each condenser and the lower part of the corresponding rectifier, and between the top of each rectifier, except the first rectifier, and the lower part of the preceding condenser and preceding rectifier, a fraction pipe leading away from each rectifier and means for cutting out of operation any desired number of the fraction pipes, for the purpose described.

3. An apparatus for continuous distillation of crude petroleums and the like, comprising, a series of retorts, a series of condenser-rectifiers in number equal at least to the number of retorts, pipe connections between said retorts, between each retort and the lower part of one of the condensers, between the top of each condenser and the lower part of the corresponding rectifier, and between the top of each rectifier, except the first rectifier and the lower parts of the preceding condenser and the preceding rectifier, a fraction pipe leading away from each rectifier, and means for controlling flow in each of said fraction pipes, for the purpose described.

In testimony whereof I have signed my name to this specification.

JOSEPH EMILE BLAISE.