⑲ **Europäisches Patentamt**
European Patent Office
Office européen des brevets

⑪ Publication number: **0 090 441**
A1

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EUROPEAN PATENT APPLICATION

㉑ Application number: **83200317.2**

(51) Int. Cl.³: **C 10 G 69/06**

㉒ Date of filing: **04.03.83**

㉚ Priority: **25.03.82 NL 8201243**

㊸ Date of publication of application: **05.10.83**
Bulletin 83/40

(84) *Designated Contracting States:* **BE DE FR GB IT SE**

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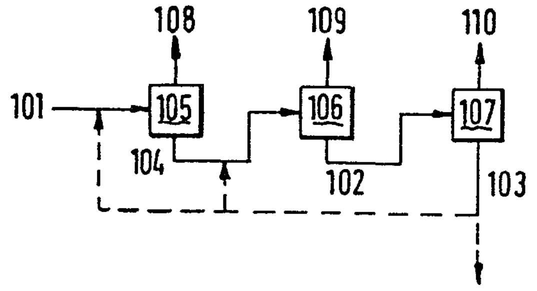
(54) **Process for the production of deasphalted oils and hydrocarbon distillates.**

(57) De asphalted oils and distillates are produced from asphaltenes-rich hydrocarbon mixtures (101; 201) by a process comprising subjecting the feed to thermal cracking (105; 205) and subjecting the resultant-heavy fraction (104; 204) to a combination of a catalytic hydrotreatment (106; 207) and a solvent deasphalting (107; 206).



PROCESS FOR THE PRODUCTION OF DEASPHALTED OILS AND HYDROCARBON OIL DISTILLATES

The invention relates to a process for the production of deasphalted oils and hydrocarbon oil distillates from asphaltenes-containing hydrocarbon mixtures.

The atmospheric distillation of crude mineral oil for the production of light hydrocarbon oil distillates, such as gasoline, kerosine and gas oil yields an asphaltenes-containing residue as a by-product. Originally these residues (which usually in addition to asphaltenes also contain a considerable percentage of sulphur and metals) were used as fuel oil. In view of the growing demand of light hydrocarbon oil distillates and the shrinking reserves of crude mineral oil, several treatments aiming at the production of light hydrocarbon oil distillates from atmospheric residues have already been proposed. For instance, a deasphalted oil may be separated from an atmospheric residue by solvent deasphalting and this deasphalted oil may be subjected to catalytic cracking in the presence or absence of hydrogen. Another option is to separate an atmospheric residue into a vacuum distillate and a vacuum residue by vacuum distillation, to separate a deasphalted oil from the vacuum residue by solvent deasphalting and to subject both the vacuum distillate and the deasphalted oil to catalytic cracking in the presence or absence of hydrogen.

Solvent deasphalting (DA), a process in which an asphaltenes-containing feedstock is converted into a product from which a deasphalted oil can be separated as the desired main product and an asphaltic bitumen as a by-product, has proven in actual practice to be a suitable treatment for the production of deasphalted oils from a variety of asphaltenes-containing hydrocarbon mixtures.

It has now been investigated whether combining the DA treatment with a pretreatment of the asphaltenes-containing feed and/or an aftertreatment of the asphaltic bitumen separated in the DA treatment and using at least part of the asphaltic bitumen that has been subjected to the aftertreatment as the feed for the DA, might yield better results than employing nothing but the DA. In the assessment of the results the yields of deasphalted oil and light product(s) are most important. The qualities of the deasphalted oil and the light product(s) as well as the quality of the heavy by-product are also important. In this context the quality of the deasphalted oil is taken to be its suitability for conversion into hydrocarbon oil distillates by catalytic cracking in the presence or absence of hydrogen. This suitability is greater according as the deasphalted oil has, among other things, lower asphaltenes, metal and sulphur contents. In this context the quality of the light product is taken to be its suitability for processing into a valuable light fuel. This suitability is greater according as the light product has, among other things, lower sulphur and olefins contents. In this context the quality of the heavy product is taken to be its suitability for serving as a fuel oil component. This suitability is greater according as the heavy product has, among other things, lower metal and sulphur contents and lower viscosity and density. For use as pretreatments of the feed for the DA and as aftertreatments of the asphaltic bitumen separated in the DA, the following treatments were investigated: thermal cracking (TC) in which a heavy feed is converted into a product which contains less than 20 %w C_4^- hydrocarbons and from which one or more distillate fractions and a heavy fraction are separated and catalytic hydrotreatment (HT) in which an asphaltenes-containing feed is converted into a product having a reduced asphaltenes content from which one or more distillate fractions and a heavy fraction are separated.

During this investigation a comparison was made between the results that can be obtained when a deasphalted oil and possibly a hydrocarbon oil distillate having a given boiling range as well as a heavy by-product are produced starting from equal quantities of an asphaltenes-containing hydrocarbon mixture by using a) DA only, b) DA in combination with TC, c) DA in combination with HT and d) DA in combination with both TC and HT, the conditions of the various treatments being similar as much as possible. In view of quantity and quality of the deasphalted oil and the hydrocarbon oil distillate to be obtained in each of the procedures and the quality of the heavy by-product, the various procedures may be arranged as follows:

Quantity of deasphalted oil	d = c > b = a
Quality of the deasphalted oil	d = c > b = a
Quantity of hydrocarbon oil distillate	d > c > b
Quality of the hydrocarbon oil distillate	c > d > b
Quality of the heavy product	c > d > a > b

Taking into account the considerable difference in hydrocarbon oil distillate yields obtained according to procedures c) and d) and the no more than minor differences in quality between the hydrocarbon oil distillates and between the heavy by-products obtained according to procedures c) and d) a procedure in which a combination is used of a DA treatment, a TC treatment and a HT, is much preferred.

As regards the order in which the three treatments are carried out, a number of embodiments may be considered. Each of the embodiments may be placed in one of the two following classes.

I. The asphaltenes-containing feed is first subjected to a HT or a DA treatment and the heavy fraction or asphaltic bitumen separated from the respective products obtained is subjected to a combination of a DA treatment and a TC treatment or a combination of a TC treatment and a HT, respectively.

II. The asphaltenes-containing feed is first subjected to a TC treatment and the heavy fraction separated from the product obtained is subjected to a combination of a DA treatment and a HT.

The embodiments belonging to class II constitute the subject matter of the present patent application. The embodiments belonging to class I constitute the subject matter of Netherlands

Patent Application 8201233.

The embodiments to which the present patent application relates, may be subdivided further depending on whether the heavy fraction separated from the product of the TC treatment is used as feed or feed component for the HT (class IIA) or as feed or feed component for the DA treatment (class IIB). In the embodiments belonging to class IIA the heavy fraction separated from the product of the HT is used as the feed for the DA treatment. In the embodiments belonging to class IIB the asphaltic bitumen fraction is used as the feed for the HT and the heavy fraction separated from the product of the HT is used as a feed component for the TC treatment and/or as a feed component for the DA treatment.

The present patent application therefore relates to a process for the production of deasphalted oils and hydrocarbon oil distillates from asphaltenes-containing hydrocarbon mixtures, in which an asphaltenes-containing hydrocarbon mixture (stream 1) is subjected to a thermal cracking treatment (TC) in which a feed is converted into a product which contains less than 20 %w C_4^- hydrocarbons and from which one or more distillate fractions and a heavy fraction (stream 4) are separated, in which stream 4 is subjected to a combination of the following two treatments: a catalytic hydrotreatment (HT) in which an asphaltenes-containing feed is converted into a product which has a reduced asphaltenes content and from which one or more distillate fractions and a heavy fraction (stream 2) are separated and a solvent deasphalting treatment (DA) in which an asphaltenes-containing feed is converted into a product from which a deasphalted oil fraction and an asphaltic bitumen fraction (stream 3) are separated, and in which stream 4 is used either

1) as feed or feed component for the HT with stream 2 being used as the feed for the DA treatment, or
2) as feed or feed component for the DA treatment with stream 3 being used as the feed for the HT and stream 2 as a feed component for the TC treatment and/or as a feed component for the DA treatment.

In the process according to the invention the feed used is an asphaltenes-containing hydrocarbon mixture. A suitable parameter for the assessment of the asphaltenes content of a hydrocarbon mixture as well as of the reduction of the asphaltenes content which appears when an asphaltenes-containing hydrocarbon mixture is subjected to a HT, is the Ramsbottom Carbon Test value (RCT). The higher the asphaltenes content of the hydrocarbon mixture, the higher the RCT. Preferably, the process is applied to hydrocarbon mixtures which boil substantially above 350°C and more than 35 %w of which boils above 520°C and which have an RCT higher than 7.5 %w. Examples of such hydrocarbon mixtures are residues obtained in the distillation of crude mineral oils and also heavy hydrocarbon mixtures obtained from shale and tar sands. If required, the process may also be applied to heavy crude mineral oils, residues obtained in the distillation of products formed in the thermal cracking of hydrocarbon mixtures and asphaltic bitumen obtained in the solvent deasphalting of asphaltenes-containing hydrocarbon mixtures. The process according to the invention can very suitably be applied to residues obtained in the vacuum distillation of atmospheric distillation residues from crude mineral oils. If an atmospheric distillation residue from a crude mineral oil is available as feed for the process according to the invention, it is preferred to separate a vacuum distillate therefrom by vacuum distillation and to subject the resulting vacuum residue to the TC treatment. The separated vacuum distillate may be subjected to thermal cracking or to catalytic cracking in the presence or in the absence of hydrogen to convert it into light hydrocarbon oil distillates.

The process according to the invention is a three-step process in which in the first step an asphaltenes-containing feed (stream 1) is subjected to a TC treatment for the production of a product which contains less than 20 %w C_4^- hydrocarbons and from which one or more distillate fractions and a heavy fraction (stream 4) are separated. In the second and third steps of the process stream 4 is subjected to a combination of a DA treatment and a HT. The distillate fractions separated from the product of the TC treatment may be atmospheric distillates only, but preferably a vacuum distillate should be separated from the product as well. This vacuum distillate may be converted into light hydrocarbon oil distillates in the ways indicated hereinbefore. The TC treatment is preferably carried out at a temperature of from 400-525°C and a space velocity of from 0.01-5 kg fresh feed per litre cracking reactor volume per minute.

In the process according to the invention the second or third step used is a HT in which an asphaltenes-containing feed is converted into a product which has a reduced asphaltenes content and from which one or more distillate fractions and a heavy fraction (stream 2) are separated.

Asphaltenes-containing hydrocarbon mixtures usually include a considerable percentage of metals, particularly vanadium and nickel. When such hydrocarbon mixtures are subjected to a catalytic treatment, for instance a HT for the reduction of the asphaltenes content as is the case in the process according to the invention, these metals are deposited on the catalyst used in the HT and thus shorten its effective life. In view of this, asphaltenes-containing hydrocarbon mixtures having a vanadium + nickel content of more than 50 parts per million by weight (ppmw) should preferably be subjected to a demetallization treatment before they are contacted with the catalyst used in the HT. This demetallization may very suitably be carried out by contacting the asphaltenes-containing hydrocarbon mixture, in the presence of hydrogen, with a catalyst consisting more than 80 %w of silica. Both catalysts consisting entirely of silica and catalysts containing one or more metals having hydrogenating activity - in particular a combination of nickel and vanadium - emplaced on a carrier substantially consisting of silica, are suitable for the purpose. When in the process according to the invention an asphaltenes-containing feed is subjected to a catalytic demetallization treatment in the presence of hydrogen, this demetallization may be carried out in a separate reactor. Since the catalytic demetallization and the HT for the reduction of the asphaltenes content can be carried out under the same conditions, the two processes may very suitably be carried out in the same reactor containing a bed of the demetallization catalyst and a bed of the catalyst used in the HT, successively.

Suitable catalysts for carrying out the HT are those containing at least one metal chosen from the group formed by nickel and cobalt and in addition at least one metal chosen from the group formed by molybdenum and tungsten on a carrier, which carrier consists more than 40 %w of alumina. Catalysts very suitable for use in the HT are those comprising the metal combinations nickel/molybdenum or cobalt/molybdenum on alumina as the carrier. The HT is preferably carried out at a temperature of from 300-500°C and in particular of from 350-450°C, a pressure of from 50-300 bar and in particular of from 75-200 bar, a space velocity of from 0.02-10 $g.g^{-1}.h^{-1}$ and in particular of from 0.1-2 $g.g^{-1}.h^{-1}$ and a H_2/feed ratio of from 100-5000 $Nl.kg^{-1}$ and in particular of from 500-2000 $Nl.kg^{-1}$. The conditions used in a catalytic demetallization treatment in the presence of hydrogen, to be carried out if required, are subject to the same preference as those for the HT for the reduction of the asphaltenes content stated hereinbefore.

The HT is preferably carried out in such a way that it yields a product, the C_5^+ fraction of which meets the following requirements:

a) the RCT of the C_5^+ fraction amounts to 20-70% of the RCT of the feed, and

b) the difference between the percentages by weight of hydrocarbons boiling below 350°C present in the C_5^+ fraction and in the feed is at most 40.

It should be noted that in the catalytic demetallization the reduction of the metal content is accompanied by some reduction of the RCT and some formation of C_5-350°C product. A similar phenomenon occurs in the HT, in which the reduction of the RCT and formation of C_5-350°C product are accompanied by some reduction of the metal content. The requirements mentioned under a) and b) refer to the total RCT reduction and the total formation of C_5-350°C product (viz. including those occurring in a catalytic demetallization treatment that may be carried out).

The HT yields a product having a reduced asphaltenes content from which one or more distillate fractions and a heavy fraction (stream 2) are separated. The distillate fractions separated from the product may be atmospheric distillates only, but it is preferred to separate a vacuum distillate from the product as well. This vacuum distillate may be converted into light hydrocarbon oil distillates in the ways stated hereinbefore.

In the process according to the invention the second or third step used is a DA treatment in which an asphaltenes-containing feed is converted into a product from which a deasphalted oil and an asphaltic bitumen (stream 3) are separated. Suitable solvents for carrying out the DA treatment are paraffinic hydrocarbons having 3-6 carbon atoms per molecule, such as n-butane and mixtures thereof, such as mixtures of propane and n-butane and mixtures of n-butane and n-pentane. Suitable solvent/oil weight ratios lie between 7:1 and 1:1 and in particular between 4:1 and 1:1. The DA treatment is preferably carried out at a pressure in the range of between 20 and 100 bar. When n-butane is used as the solvent, the deasphalting is preferably carried out at a pressure of from 35-45 bar and a temperature of from 100-150°C.

As noted hereinbefore, a subdivision of the embodiments belonging to class II, to which the present patent application relates, may be made depending on whether stream 4 is used as feed or feed component for the HT (class IIA) or as feed or feed component for the DA treatment (class IIB). In the embodiments belonging to class IIA stream 2 is used as the feed for the

DA treatment. In the embodiments belonging to class IIB stream 3 is used as the feed for the HT and stream 2 is used as a feed component for the TC treatment and/or as a feed component for the DA treatment.

The various embodiments belonging to class IIA are represented schematically in Figure I. The various streams, fractions and reaction zones are indicated by three digit numbers, the first of which refers to the Figure concerned. The vacuum residue (302), for instance, refers to vacuum residue 2 in the context of Figure III. According to Figure I the process is carried out in an apparatus comprising a TC zone (105), a HT zone (106) and a DA zone (107), successively. An asphaltenes-containing hydrocarbon mixture (101) is subjected to a TC treatment and the cracked product is separated into one or more distillate fractions (108) and a residual fraction (104). Stream 4 is subjected to a HT and the hydrotreated product is separated into one or more distillate fractions (109) and a residual fraction (102). Stream 2 is subjected to a DA treatment and the product is separated into a deasphalted oil (110) and an asphaltic bitumen (103). In addition to this embodiment(IIA1), in which stream 103 is subjected to no further treatment, Figure I includes the following three embodiments:

IIA2 The use of at least part of stream 103 as a feed component for the TC treatment.

IIA3 The use of at least part of stream 103 as a feed component for the HT.

IIA4 The use of part of stream 103 as a feed component for the TC treatment and as a feed component for the HT.

The various embodiments belonging to class IIB are represented schematically in Figure II. According to this Figure the process is carried out in an apparatus comprising a TC zone (205), a DA zone (206) and a HT zone (207), successively. An asphaltenes-containing hydrocarbon mixture (201) is subjected to a TC treatment and the cracked product is separated into one or more distillate fractions (208) and a residual fraction (204). Stream 204 is subjected to a DA treatment and the product is separated into a deasphalted oil (209) and an asphaltic bitumen (203). Stream 203 is subjected to a HT and the hydrotreated product is separated into one or more distillate fractions (210) and a residual fraction (202). Stream 202 is used either as a feed component for the TC treatment (embodiment IIB1) or as a feed component for the DA treatment (embodiment IIB2) or as a feed component both for the TC treatment and for the DA treatment (embodiment IIB3).

In the embodiments aiming at the completest possible conversion of stream (.01) into deasphalted oil and hydrocarbon oil distillates, what is called a "bleed stream" should preferably be separated from one of the heavy streams of the process. In that way the build-up during the process of undesirably heavy components can be obviated.

Two flow diagrams for the preparation of deasphalted oil and hydrocarbon oil distillates from asphaltenes-containing hydrocarbon mixtures according to the invention will hereinafter be elucidated in more detail with the aid of Figures III and IV.

Flow diagram A (based on embodiment IIB2)

See Figure III.

The process is carried out in an apparatus comprising a TC zone composed of a thermal cracking unit (305), an atmospheric distillation unit (306) and a vacuum distillation unit (307), successively, a HT zone composed of a unit for catalytic hydrotreatment (308), a second atmospheric distillation unit (309) and a second vacuum distillation unit (310) and a DA zone (311). An asphaltenes-containing hydrocarbon mixture (301) is mixed with an asphaltic bitumen stream (312) and the mixture (313) is subjected to thermal cracking. The cracked product (314) is separated by atmospheric distillation into a gas fraction (315), an atmospheric distillate (316) and an atmospheric residue (317). The atmospheric residue (317) is separated by vacuum distillation into a vacuum distillate (318) and a vacuum residue (304). The vacuum residue (304) is subjected together with hydrogen (319) to catalytic hydrotreatment. The hydrotreated product (320) is separated by atmospheric distillation into a gas fraction (321), an atmospheric distillate (322) and an atmospheric residue (323). The atmospheric residue (323) is separated by vacuum distillation into a vacuum distillate (324) and a vacuum residue (302). The vacuum residue (302) is separated by solvent deasphalting into a deasphalted oil (325) and an asphaltic bitumen (303). The asphaltic bitumen (303) is divided into two portions (312) and (326).

Flow diagram B (based on embodiment IIB1)
See Figure IV.
The process is carried out in an apparatus comprising a TC zone composed of a thermal cracking unit (405), an atmospheric distillation unit (406) and a vacuum distillation unit (407), successively, a DA zone (408) and a HT zone composed of a unit for catalytic hydrotreatment (409), a second atmospheric distillation unit (410) and a second vacuum distillation unit (411). An asphaltenes-containing hydrocarbon mixture (401) is mixed with a vacuum residue (402) and the mixture (412) is subjected to thermal cracking. The cracked product (413) is separated by atmospheric distillation into a gas fraction (414), an atmospheric distillate (415) and an atmospheric residue (416). The atmospheric residue (416) is separated by vacuum distillation into a vacuum

distillate (417) and a vacuum residue (418). The vacuum residue (418) is separated by solvent deasphalting into a deasphalted oil (419) and an asphaltic bitumen (403). The asphaltic bitumen (403) is divided into two portions (420) and (421). Portion (421) is subjected together with hydrogen (422) to catalytic hydrotreatment. The hydrotreated product (423) is separated by atmospheric distillation into a gas fraction (424), an atmospheric distillate (425) and an atmospheric residue (426). The atmospheric residue (426) is separated by vacuum distillation into a vacuum distillate (427) and a vacuum residue (402).

The present patent application also includes apparatuses for carrying out the process according to the invention, which correspond substantially with those represented schematically by Figures I- IV.

The invention is now elucidated with the aid of the following Examples.

In the process according to the invention two asphaltenes-containing hydrocarbon mixtures obtained as residues in the vacuum distillation of atmospheric distillation residues from crude mineral oils were used as the starting material. The vacuum residues both boiled substantially above 520°C and they had RCT's of 18.2 and 12.3 %w. The process according to the invention was carried out according to flow diagrams A and B. The conditions used in the various zones were the following.

In both the flow diagrams the units for catalytic hydrotreatment consisted of two reactors, the first of which was filled with a $Ni/V/SiO_2$ catalyst containing 0.5 parts by weight (pbw) nickel and 2.0 pbw vanadium per 100 pbw silica and the second of which was filled with a $Co/Mo/Al_2O_3$ catalyst containing 4 pbw cobalt and 12 pbw molybdenum per 100 pbw alumina. The catalysts were used in a 1:4 volume ratio. The catalytic hydrotreatment was carried out at a hydrogen pressure of 150 bar, a space velocity (measured over the two reactors) of 0.5 kg feed per litre catalyst per hour, a H_2/feed ratio of 1000 Nl per kg and an average temperature of 410°C in the first reactor and of 385°C in the second reactor.

In both the flow diagrams the DA treatment was carried out using n-butane as the solvent, at a temperature of 115°C, a pressure of 40 bar and a solvent/oil weight ratio of 3:1.

In both the flow diagrams the TC treatment was carried out in a cracking coil at a pressure of 10 bar, a space velocity of 0.4 kg fresh feed per litre cracking coil volume per minute and a temperature of 485°C (temperature measured at the outlet of the cracking coil).

Example 1

This Example was carried out according to flow diagram A as represented by Figure III.

100 pbw vacuum residue (301) having an RCT of 18.2 %w yielded the various streams in the following quantities:

115.8 pbw mixture (313),
15.0 " C_5-350°C atmospheric distillate (316),
98.6 " 350°C^+ atmospheric residue (317),
11.8 " 350-520°C vacuum distillate (318),
86.8 " 520°C^+ vacuum residue (304) having an RCT of 34.6 %w,
a product (320), the C_5^+ fraction of which had an RCT of 15.9 %w,
11.6 pbw C_5-350°C atmospheric distillate (322),
71.3 " 350°C^+ atmospheric residue (323),
17.4 " 350-520°C vacuum distillate (324),
53.9 " 520°C^+ vacuum residue (302),
29.1 " deasphalted oil (325),
24.8 " asphaltic bitumen (303),
15.8 " portion (312) and
9.0 " portion (326).

Example 2

This Example was carried out according to flow diagram B as represented by Figure IV.

100 pbw vacuum residue (401) having an RCT of 12.3 %w yielded

the various streams in the following quantities:

113.1 pbw mixture (412),
18.8 " C_5-350°C atmospheric distillate (415),
91.6 " 350°C$^+$ atmospheric residue (416),
14.7 " 350-520°C vacuum distillate (417),
76.9 " 520°C$^+$ vacuum residue (418),
46.1 " deasphalted oil (419),
30.8 " asphaltic bitumen (403),
8.6 " portion (420),
22.2 " portion (421) having an RCT of 50.0 %w,

a product (423), the C_5^+ fraction of which had an RCT of 27.5 %w,

3.2 pbw C_5-350°C atmospheric distillate (425),
17.9 " 350°C$^+$ atmospheric residue (426),
4.8 " 350-520°C vacuum distillate (427), and
13.1 " 520°C$^+$ vacuum residue (402).

CLAIMS

1. A process for the production of deasphalted oils and hydrocarbon oil distillates from asphaltenes-containing hydrocarbon mixtures, characterized in that an asphaltenes-containing hydrocarbon mixture (stream 1) is subjected to a thermal cracking treatment (TC) in which a feed is converted into a product which contains less than 20 %w C_4^- hydrocarbons and from which one or more distillate fraction and a heavy fraction (stream 4) are separated, that stream 4 is subjected to a combination of the following two treatments: a catalytic hydrotreatment (HT) in which an asphaltenes-containing feed is converted into a product which has a reduced asphaltenes content and from which one or more distillate fractions and a heavy fraction (stream 2) are separated and a solvent deasphalting treatment (DA) in which an asphaltenes-containing feed is converted into a product from which a deasphalted oil fraction and an asphaltic bitumen fraction (stream 3) are separated, and that stream 4 is used either

1) as feed or feed component for the HT, with stream 2 being used as the feed for the DA treatment, or
2) as feed or feed component for the DA treatment, with stream 3 being used as the feed for the HT and stream 2 as a feed component for the TC treatment and/or as a feed component for the DA treatment.

2. A process as claimed in claim 1, characterized in that stream 4 is used as feed or feed component for the HT and that at least part of stream 3 is used as a feed component for the TC treatment and/or as a feed component for the HT.

3. A process as claimed in claim 1 or 2, characterized in that a hydrocarbon mixture which boils substantially above 350°C and more than 35 %w of which boils above 520°C and which has an RCT of more than 7.5 %w, such as a residue obtained in the vacuum

distillation of an atmospheric distillation residue from a crude mineral oil is used as stream 1.

4. A process as claimed in any one of claims 1-3, characterized in that one or more vacuum distillates are separated from one or more of streams 1, 2 and 4.

5. A process as claimed in any one of claims 1-4, characterized in that the catalyst used in the HT for the reduction of the asphaltenes content of the feed is a catalyst which comprises at least one metal chosen from the group formed by nickel and cobalt and in addition at least one metal chosen from the group formed by molybdenum and tungsten supported on a carrier, which carrier consists more than 40 %w of alumina.

6. A process as claimed in any one of claims 1-5, characterized in that the HT is carried out at a temperature of from 350-450°C, a pressure of from 75-200 bar, a space velocity of from 0.1- 2 $g.g^{-1}.h^{-1}$ and a H_2/feed ratio of from 500-2000 $Nl.kg^{-1}$.

7. A process as claimed in any one of claims 1-6, characterized in that the HT is carried out in such a way that it yields a product, the C_5^+ fraction of which meets the following requirements: a) the RCT of the C_5^+ fraction amounts to 20-70% of the RCT of the feed and

b) the difference between the percentages by weight of hydrocarbons boiling above 350°C present in the C_5^+ fraction and in the feed is at most 40.

8. A process as claimed in any one of claims 1-7, characterized in that the DA treatment is carried out using n-butane as the solvent at a pressure of from 35-45 bar and a temperature of 100-150°C.

9. A process as claimed in any one of claims 1-8, characterized in that the TC treatment is carried out at a temperature of from 400-525°C and a space velocity of from 0.01-5 kg fresh feed per litre cracking reactor volume per minute.

10. A process for the production of deasphalted oils and hydrocarbon oil distillates from asphaltenes-containing hydrocarbon

mixtures, substantially as described hereinbefore and in particular with reference to the Examples.

11. Deasphalted oils and hydrocarbon oil distillates whenever prepared according to a process as described in any one of claims 1-10.

12. Apparatuses for carrying out the process as claimed in claim 10, characterized in that these apparatuses correspond substantially with those represented schematically in Figures I-IV.

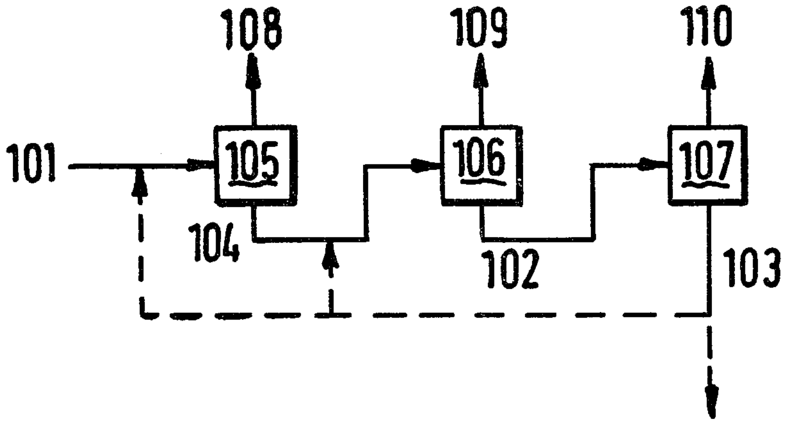

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FIG. I

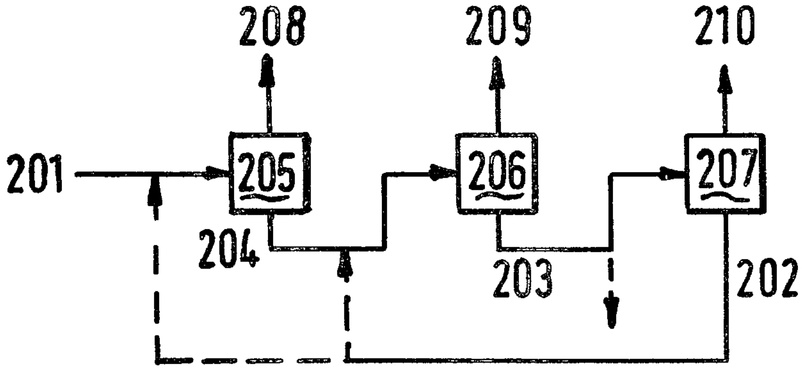
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FIG. II

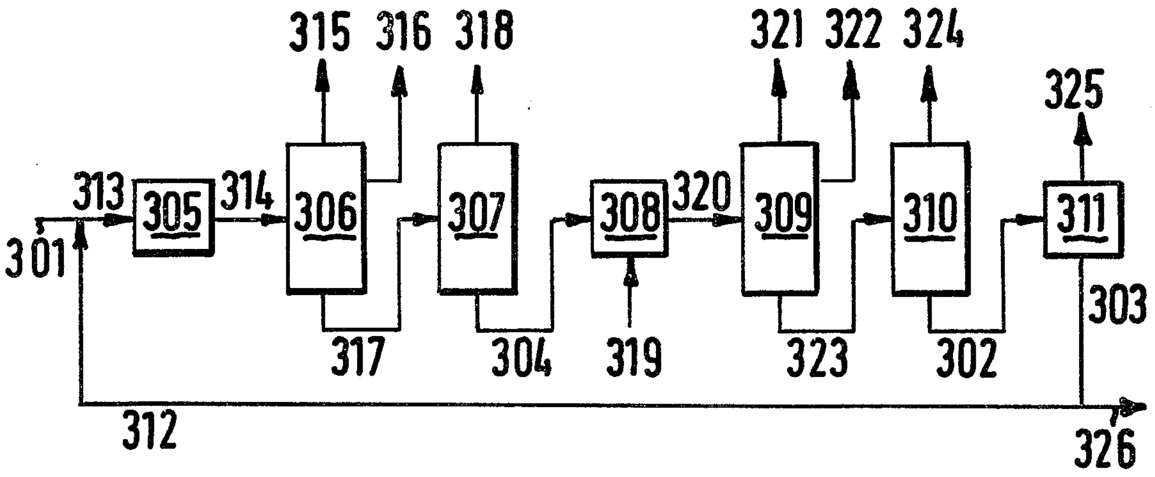

FIG. III

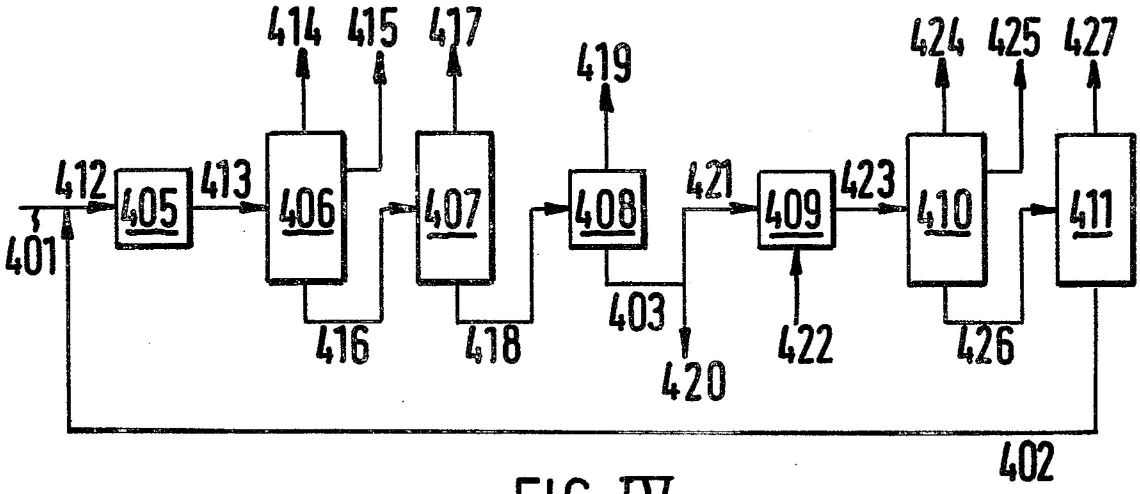

FIG. IV

European Patent
Office

EUROPEAN SEARCH REPORT

0090441
Application number

EP 83 20 0317

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ^{3})
A	GB-A-2 024 850 (SHELL) * Figure; claims 1-11 * ---		C 10 G 69/06
P,A	GB-A-2 093 477 (CHIYODA CHEMICAL ENGINEERING AND CONSTRUCTION) * Figure; claims 1,2,4 * ---		
A	FR-A-2 328 033 (SHELL) * Figures 1-6; claims * -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ^{3})
			C 10 G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05-07-1983	MICHIELS P.

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