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S. H. ALEXANDER ET AL

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PRODUCTION OF PETROLEUM BASE PITCH AND AROMATIC OILS

Filed Oct. 1, 1963

2 Sheets-Sheet 1

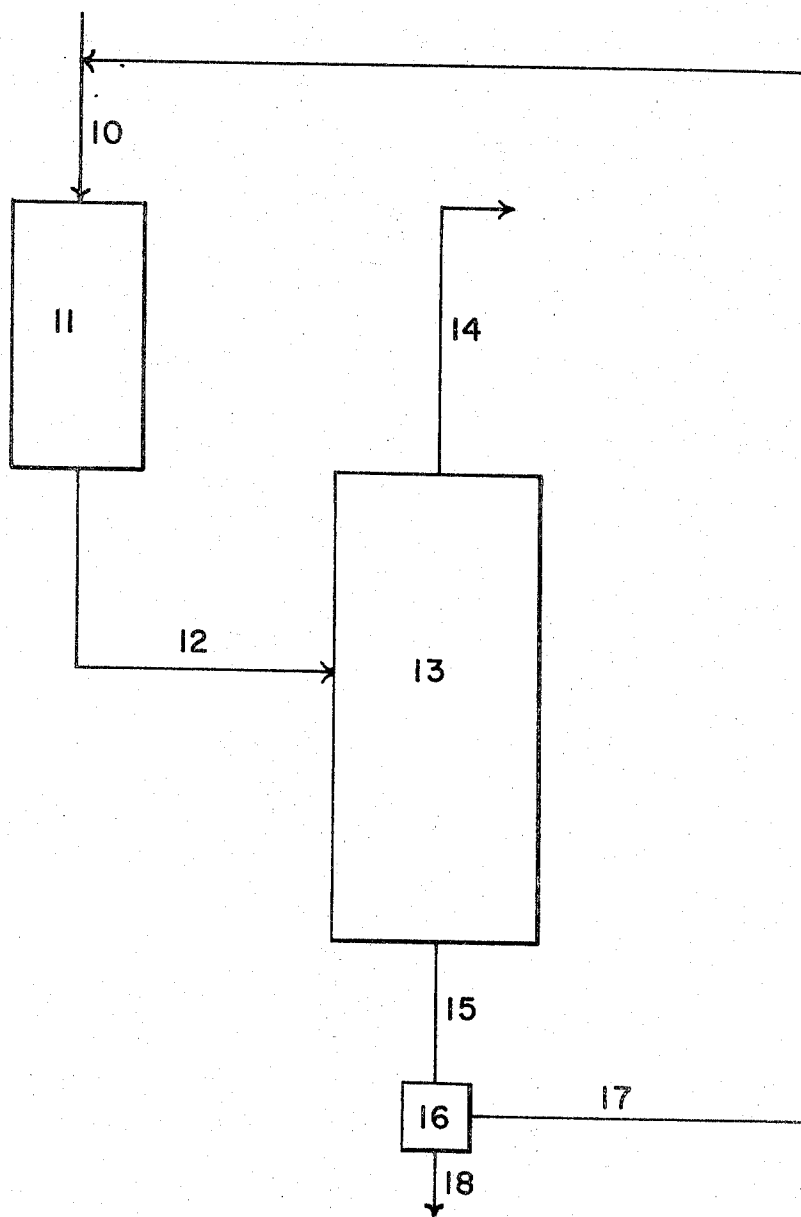


FIGURE 1

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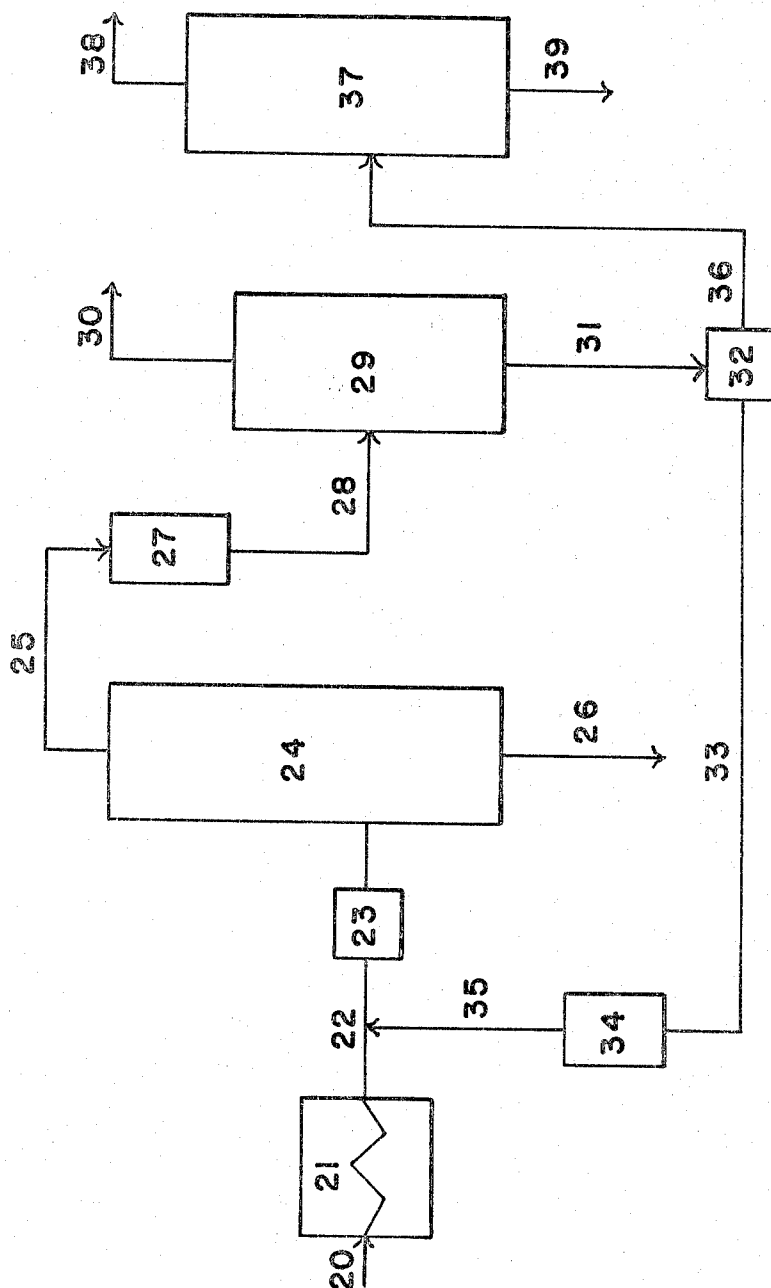


FIGURE 2

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PRODUCTION OF PETROLEUM BASE PITCH
AND AROMATIC OILS

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4 Claims. (Cl. 208—40)

The present invention relates to a process for the recovery of useful and valuable products from the cracked oil residues obtained from the thermal cracking of petroleum and petroleum derived fractions. More particularly, the present invention relates to a process for producing a useful petroleum-base pitch and to the recovery of valuable aromatic oils from the cracked oil residues resulting from the thermal cracking of petroleum and petroleum derived fractions.

When petroleum and petroleum derived fractions are subjected to relatively severe thermal cracking conditions, i.e., 900 to 2000° F. and the resulted cracked oil product fractionated to obtain the saleable products as an overhead, a bottoms or residue fraction is obtained which is of little or no value. This residue fraction, generally referred to as cracked oil residue or thermal pitch, does not possess the desirable properties of asphalts or resins. These cracked oil residues are often sold for the cost of removing them from the plant site and in some instances cannot be sold for even this small value. With the increase in the amount of thermal cracking within recent years, a profitable disposition of this thermal pitch has become an ever increasing problem. Attempts have been made to find utilities for it in its natural state. Other attempts have been directed toward additional distillation, separation by solvent extraction and the like, but such methods either have not been found to produce practical results or to be too costly in relation to the products obtained.

It is an object of the present invention to provide a process for treating the cracked oil residue resulting from the relatively severe thermal cracking of petroleum and petroleum derived fractions. It also is an object of the present invention to provide new and useful pitch compositions by treatment of the cracked oil residues resulting from the relatively severe thermal cracking of petroleum and petroleum derived fractions. A further object of the present invention is to provide a process for the recovery of aromatic hydrocarbons from cracked oil residues. Another object of the present invention is to provide a process for up-grading the cracked oil residue resulting from the relatively severe thermal cracking of petroleum and petroleum derived fractions whereby products of substantially increased value are obtained. Additional objects will become apparent from the following description of the invention herein disclosed.

In fulfillment of these and other objects, it has been found that the cracked oil residue resulting from the relatively severe thermal cracking of petroleum and petroleum derived fractions can be converted into valuable aromatic oils and new and useful pitch compositions by subjecting the cracked oil residue to a temperature of 500 to 950° F. and recovering a fraction comprised of aromatic oils and a fraction comprised of a stabilized pitch. The stabilized pitch possesses properties useful in preparing bituminous impregnated fibre pipes, pipe coatings and the like. The aromatic oils find particular utility as plasticizers, extender oils and the like.

As above indicated, the terms "cracked oil residue" and "thermal pitch" refer to the residue or bottoms fraction remaining after the saleable products have been distilled from the total cracked oil product resulting from the relatively severe thermal cracking of petroleum or petro-

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leum derived fractions. Generally, the cracked oil residues contemplated as feeds to the present process remain as the residue from distillation of the total cracked oil product of the thermal cracking operation to an overhead temperature equivalent to approximately 390 to 750° F. at atmospheric pressure. The distillation may be carried out by steam distillation or at subatmospheric or superatmospheric pressures so long as the overhead temperature is equivalent to those within the above range. These cracked oil residues will usually possess the following properties:

Flash point, ° F. (ASTM D-92) -----	Above 310.
Softening point, ° F. (ASTM D-36) --	60-250.
Specific gravity, 77/77° F. (ASTM D-71) -----	1.13-1.25.
Penetration at 77° F. (ASTM D-5) ---	0 to too soft to measure.
Penetration at 115° F. (ASTM D-5) ---	0 to too soft to measure.
Benzene solubles, weight percent -----	75-99.9.
Pentane solubles, weight percent -----	10-50.
Quinoline solubles, weight percent ----	95-99.9.
Initial boiling point, ° F. -----	Above 390.
Thermal stability index ¹ -----	+10 to +70.
Sulfur, weight percent -----	0 to 1.

¹ The thermal stability index is determined by charging approximately 200 grams of molten pitch of a predetermined softening point into a flask fitted with an air condenser and thermometers for recording the liquid and vapor temperatures. The temperature is slowly increased until distillation begins. Distillation is continued until an approximate 700° F. pot temperature is reached. This temperature is maintained for approximately 1 hour. The distillate from this distillation is collected and the volume determined. The pitch is then cooled to 350 to 500° F. and a softening point is determined. The thermal stability index is then calculated by the following formula.

Thermal stability index = original softening point + 3 (mls. of distillate per 100 grams of charge—the softening point of the residue upon completion of distillation).

A particularly preferred feedstock for use in the present process may be obtained by the steam distillation of a total cracked oil product to an overhead temperature equivalent to approximately 500 to 600° F. at atmospheric pressure, the total cracked oil product being one obtained from thermally cracking a petroleum oil having a boiling range substantially within the range of 80 to 1000° F. at a cracking temperature of 1400 to 1600° F.

By relatively severe thermal cracking, as referred to herein, is meant thermal non-catalytic cracking at temperatures in excess of 900° F., generally, within the range of 900 to 2000° F. Such relatively severe thermal cracking may be further defined as cracking under conditions which produce relatively large quantities of cracked gases such as low molecular weight olefins and diolefins, i.e., ethylene, propylene, butylene, butadiene, etc.

The petroleum and petroleum derived fractions, hereinafter referred to collectively as petroleum, which are thermally cracked to yield the cracked oil residue feedstocks for the present process include crude petroleum and fractions derived from petroleum by distillation, solvent extraction, cracking and other refinery type operations. The crude petroleum range from heavy viscous crudes to light volatile condensate while the petroleum derived fractions range from heavy cycle oils to low molecular weight hydrocarbons such as butane. The thermal cracking of petroleum condensates provides a particularly preferred cracked oil residue feed for the present process.

The present invention is further described by reference to the accompanying drawings, FIGURE 1 and FIGURE 2, which are in the nature of flow charts. FIGURES 1 and 2 represent alternative preferred arrangements of apparatus and modes of operation of the present invention. Other arrangements and modifications of the present process will present themselves to those skilled in the

art and may be practiced without departing from the spirit and scope of the invention herein disclosed.

Referring first to FIGURE 1 of the drawings, a fresh thermal pitch feed is introduced by means of line 10 into preheater 11. This thermal pitch is one such as that described above. The thermal pitch is heated to a temperature of approximately 640 to 790° F. in the preheater 11 and is then continuously passed by means of line 12 into thermal soaking drum 13. Temperatures of approximately 650 to 800° F. and a pressure of atmospheric to 30 p.s.i.g. preferably are maintained within the thermal soaking drum. The thermal pitch remains within the thermal soaking drum for approximately 3 to 90 minutes. An aromatic oil is continuously taken overhead from the thermal soaking drum by means of line 14 while a thermally stabilized pitch is continuously removed from the bottom of the drum by means of line 15. The aromatic oil which is taken overhead by means of line 14 may be fractionated into a light oil and a heavy oil or into several intermediate fractions depending upon subsequent utilization. The method whereby this aromatic oil is subsequently treated is well within the ability of those skilled in the art and regardless of such treatment is within the scope and contemplation of the present invention. The thermally treated pitch which is removed from the drum by means of line 15 passes through proportioning valve 16 whereby it is separated into two fractions. One fraction is recycled from proportioning valve 16 through line 17 back to line 10 wherein it is intermixed and commingled with fresh incoming feed and then introduced into preheater 11. The remainder of the pitch is taken from proportioning valve 16 by means of line 18 to subsequent storage or utilization. The amount of thermally treated pitch returned to the soaking drum as recycle generally will be 0 to 75 percent by weight of the total thermally treated pitch removed by line 15 from the thermal soaking drum.

Referring next to FIGURE 2 of the drawings, a thermal pitch feed passes from storage or other source by means of line 20 into tubular heater 21. Within heater 21, which generally is comprised of a relatively short tube, the pitch is rapidly heated to a temperature of 800 to 950° F. and, in most instances, remains in the heating zone for 2 to 30 minutes. A pressure of approximately 100 p.s.i.g. generally is preferred in the heating zone though pressures of 25 to 250 p.s.i.g. are quite useful. The high temperature pitch passes from heater 21 via line 22 through pressure let-down valve 23 into flash distillation column 24 wherein the pressure is instantly reduced to approximately 5 to 60 p.s.i.g. When the high temperature thermal pitch is passed into flash distillation column 24 at the reduced pressure, aromatic oils are flashed overhead and removed from distillation column 24 through line 25. The heavier stabilized pitch fraction is removed from the bottom of distillation column 24 through line 26. In the preferred operation of this embodiment of the present invention, the aromatic oils which are still at relatively high temperatures pass by line 25 through cooler 27 which reduces the oil temperature to approximately 300° F. The effluent from cooler 27 passes by line 28 into separator tank 29 where non-condensed vapors and gases are separated from liquid aromatic oil and are vented overhead through line 30. The liquid aromatic oil passes by line 31 into proportioning valve 32 by which it is split into two separate portions. A portion of the aromatic oil passes from valve 32 by means of line 33 through heat exchanger 34, where it is heated to a temperature in the range of 100 to 150° F., and then by line 35 into line 22 at a point between heater 21 and let-down valve 23. The purpose of recycling this aromatic oil fraction is to aid in controlling the temperature of the thermally treated pitch leaving the heating unit. In order to operate the present invention under the conditions outlined above for heater 21, extremely high temperatures are necessary. Thus, before reduction in pressure at let-

down valve 23, it is generally preferable to cool to some extent the thermally soaked pitch. By limiting the amount of aromatic oil injected into the heated stream before let-down valve 23, the degree of fractionation in column 24 may be controlled. Thus, the amount of aromatic oil recovered and the physical properties of the pitch may be altered by the amount of cooling of the heated thermally soaked stream exiting heater 21. The amount of aromatic oil recycled to line 22 is generally 25 to 100 percent by weight of the aromatic oil. That part of the aromatic oil not recycled passes from proportioning valve 32 by means of line 36 into distillation column 37. From distillation column 37 a light aromatic oil fraction is distilled overhead through line 38 and a heavy aromatic oil taken as bottoms by means of line 39.

The terms "light oil" and "light aromatic oil" used herein, refer to that portion of the aromatic oil having a boiling range within the temperature range of 175 to 520° F.

In a particularly preferred embodiment of the invention as described in FIGURE 2, distillation column 24 is replaced with a multi-stage, multi-takeoff pipe still. Such a unit will alleviate the need for further fractionation columns such as columns 29 and 37 since several side-streams may be taken off at various trays within the pipe still.

On consideration of the above description of the two embodiments of the present invention contained in FIGURES 1 and 2 of the drawings, it will be readily apparent to those skilled in the art that many additional embodiments, modifications and variations of the present process may be made. Such embodiments, modifications and variations if operated within the limitations hereinafter and hereinbefore defined are within the spirit and scope of the present invention.

The product pitch obtained from the thermal soaking operation after the aromatic oil has been removed therefrom is hereinafter referred to as "residual pitch." This pitch corresponds to the material taken from thermal soaking drum 13 by means of line 15 in FIGURE 1 and the pitch taken from flash distillation column 24 by line 26 in FIGURE 2. The use of the term "residual pitch" is not for the purpose of comparing this pitch with other pitches known to the art or disclosed herein. It is merely a term used for simplification of the following discussion of the present invention.

The residual pitch obtained by the process of the present invention represents a new and novel composition having the following properties:

Flash point, ° F. -----	Above 350.
Softening point, ° F. -----	100 to 275.
Specific gravity, 77/77° F. ----	1.15 to 1.30.
Penetration at 77° F. -----	0 to too soft to measure.
Penetration at 115° F. -----	0 to too soft to measure.
Benzene solubles, weight percent -----	50 to 100.
Pentane solubles, weight percent -----	5 to 60.
Quinoline solubles, weight percent -----	85 to 99.9.
Initial boiling point, ° F. -----	500.
Thermal stability index -----	-5 to +20.
Sulfur, weight percent -----	0 to 1.

The preferred residual pitch compositions of the present invention are those having the following properties:

Flash point, ° F. -----	Above 400
Softening point, ° F. -----	140 to 240
Specific gravity, 77/77° F. -----	1.16 to 1.26
Penetration at 77° F. -----	0 to 20
Penetration at 115° F. -----	0 to 150
Benzene solubles, weight percent -----	70 to 100
Pentane solubles, weight percent -----	15 to 45
Quinoline solubles, weight percent -----	90 to 99.9

Initial boiling point, ° F. ----- 500
 Thermal stability index ----- -5 to +10
 Sulfur, weight percent ----- 0 to 0.75

These compositions have particular utility in the preparation of bituminous impregnated fibre pipes, fibre boards, as pipe coatings, as plasticizers, and other such uses.

The residual pitch obtained by the process of the present invention is substantially more stable than the original thermal pitch. This is apparent from consideration of the thermal stability index of the two pitch fractions. The stability of the residual pitch adds much to its usefulness in the above mentioned utilities.

The aromatic oil produced by the present invention will vary as to its quantity and its composition according to the temperature, pressure of the thermal treating zone, and the residence time of the feed material in the treating zone. The boiling range of the aromatic oil generally will be within the temperature range of approximately 175 to 800° F. at atmospheric pressure. This aromatic oil represents an additional recovery of valuable aromatics from the cracked oil residue which cannot be obtained other than by the process of the present invention. It should be noted that the above defined temperature range of 175 to 800° F. for the aromatic oil falls to a significant extent below the initial boiling point of the cracked oil residue and, thus, if initially present in the cracked oil product would have been removed by the distillation of the cracked oil product from which the thermal pitch is obtained. The fact that these aromatic oils are recovered overhead at this stage of the operation is indicative of the fact that these aromatic oils represent valuable materials which otherwise would not be recoverable except for the process of the present invention.

The present process of thermally treating the cracked oil residues resulting from the relative severe thermal cracking of petroleum, generally is carried out at temperatures within the range of from approximately 500 to 950° F. Temperatures within this range will vary considerably depending upon the precise manner in which the present invention is carried out. Also temperatures will vary in relation to residence time. Higher temperatures are necessary for short residence times. In carrying out the present invention in accordance with the embodiment described in FIGURE 1, temperatures of 650 to 800° F. are most often used with temperatures of 725 to 775° F. being preferred. When operating the present invention in accordance with the embodiment described by FIGURE 2, temperatures of 750 to 950° F. are generally the most useful with temperatures of 850 to 900° F. being preferred.

The effect of pressure on the products obtained from the present invention is negligible. Pressures ranging from atmospheric to as high as 300 p.s.i.g. and higher may be used. The use or non-use of elevated pressures generally will be determined by the mechanical aspects of the operation of the present invention. The use of pressure to aid in carrying out the present invention is amply illustrated by the embodiment of the present invention described in FIGURE 2.

The residence time of the cracked oil residue in the thermal treating zone will vary considerably according to the manner in which the present invention is carried out, but most often will be within the range of from approximately 1 to 90 minutes. The higher the temperatures, the lower are the residence times required. Conversely, the lower the temperature, the higher are the residence times necessary. In operating the present invention in accordance with the embodiment described in FIGURE 1, residence times of 3 to 90 minutes are most often used with 5 to 60 minutes being preferred. If the present invention is operated in the manner described in FIGURE 2, residence times of 1 to 60 minutes are generally used with 1 to 30 minutes being preferred.

The equipment and arrangement of equipment for

carrying out the present invention will vary considerably. As noted from the two embodiments of the present invention contained in FIGURES 1 and 2 of the drawings, the thermal soaking equipment may range from a short tube to a large drum. Also, so long as the conditions of temperature, residence time, feeds and products, as taught herein, are imposed on the present invention, the equipment or arrangement of equipment utilized in actually carrying out the process of the present invention is immaterial.

To further describe and to illustrate the present invention the following examples are presented. These examples are in no manner to be construed as limiting the present invention.

Example I

A cracked oil residue obtained from the thermal cracking of a light gas oil was continuously passed through a preheater and into a thermal soaking drum at a rate of 7.6 pounds per hour. The thermal soaking drum had a capacity of 0.75 gallon. Temperature within the thermal soaking drum was maintained at approximately 675° F. with pressure being maintained at approximately 5 p.s.i.g. Residence time of the feed material in the soaking drum was 75 minutes. A distillate aromatic oil was continuously obtained as an overhead from the soaking drum and a residue pitch fraction was continuously withdrawn from the bottom of the soaking drum. The overhead distillate oil was subjected to fractionation and a light oil and a heavy oil obtained. The yield of total aromatic oil was 9.2 percent by weight, based on charge, and the yield of pitch was approximately 90.7 percent by weight, based on charge. Approximately 22.3 percent by weight of the aromatic oil was obtained as light oil in the distillation of the aromatic oil with the remainder being heavy oil. Properties of the original cracked oil residue, the thermally soaked pitch and the light and heavy oil fractions of the aromatic oil, are presented in the following table:

Property	Cracked Oil Residue	Finished Pitch
Flash Point, ° F. -----	395	395
Softening Point, ° F. -----	124	120
Specific Gravity, 77/77° F. -----	1.1785	1.1865
Penetration at 77° F. -----	28	35
Penetration at 115° F. -----	Too soft	Too soft
Benzene Solubles, weight percent -----	97.7	90.7
Pentane Solubles, weight percent -----	40.8	46.7
Quinoline Solubles, weight percent -----	99.9	99.9
ASTM Distillation (D-20): ¹		
Weight percent, 455-518° F. -----	1.7	0
Weight percent, 518-617° F. -----	7.5	9.8
Weight percent, 617-662° F. -----	20.7	18.1
Weight percent, 662-671° F. -----	5.4	3.4
Total Distillate, Weight percent of charge -----	35.3	31.3
Thermal Stability Index -----	+34	-4
Sulfur, weight percent -----	0.2	0.1

¹ ASTM Distillation D-20 was modified to use the temperature cut points designated above. A true ASTM according to D-20 is found in Example III following.

Aromatic oil properties (heavy oil):

API Gravity -----	4.1
Refractive index, 25/d -----	1.6240
Vacuum distillation range, ° F. -----	408-718
Analysis, weight percent (obtained by gas chromatography)-----	
Dimethyl naphthalenes -----	0.7
Methylbiphenyl-acenaphthenes -----	8.6
Trimethyl naphthalenes -----	5.5
Fluorenes -----	22.0
Alkyl fluorenes -----	14.3
Phenanthrene -----	20.9
Alkyl phenanthrenes -----	24.6
Pyrene and above -----	3.4

Light oil analysis, weight percent (obtained by mass spectrometer analysis):

Alkylbenzenes	18.5
Indan-styrenes	19.7
Indenes	5.1
Naphthalenes	25.0
Biphenyl-acenaphthenes	25.0
Fluorene-acenaphthalenes	5.6
Phenanthrene	1.1

Example II

Two additional runs were made in the same manner as in Example I with the exception that temperature was varied in both runs and residence time charge rates were varied in one of the runs. Table I below presents the operating conditions and basic yield data for the two runs. Table II below presents the property data and analyses of the recovered pitch and heavy and light oil fractions.

TABLE I

Operating Conditions	Run A	Run B
Temperature, ° F	720	745
Residence times, minutes	65.5	75
Charge rate, lbs./hr.	8.7	7.6
Yields, weight percent:		
Pitch	76.3	68.4
Total aromatic oil	23.7	31.6
Light oil, wt. percent of aromatic oil	18.3	18.5
Heavy oil, wt. percent of aromatic oil	81.7	81.5

TABLE II

Property	Run A	Run B
Flash Point, ° F	465	530
Softening Point, ° F	167	203.5
Specific Gravity, 77/77° F	1.222	1.239
Penetration at 77° F	2+	0
Penetration at 115° F	17	2+
Benzene Solubles, weight percent	85.1	75.4
Pentane Solubles, weight percent	29.7	23.1
Quinoline Solubles, weight percent	99.9	99.9
ASTM Distillation D-20*:		
Weight percent, 518-617	4.0	1.8
Weight percent, 617-662	9.9	14+
Weight percent, 662-671	6.3	9.9
Total Distillate, weight percent of charge	20.2	25.9
Thermal Stability Index	-4	-2
Sulfur, weight percent	0.1	0.1
Aromatic Oil Properties, Heavy Oil:		
API Gravity	2.1	1.0
Refractive Index, 25/d	1.6360	1.6434
Distillation range ° F. (ASTM D-86)	455-732	430-722
Analysis, weight percent (obtained by gas chromatography):		
Dimethyl naphthalenes	0.4	1.0
Methylbiphenyl-acenaphthenes	5.3	4.4
Trimethyl naphthalenes	4.2	2.5
Fluorenes	19.0	14.6
Alkyl fluorenes	14.1	11.6
Phenanthrene	21.3	22.3
Alkyl phenanthrenes	29.8	35.2
Pyrene and above	5.9	8.3
Light Oil Analysis, weight percent (obtained by mass spectrometer analysis):		
Alkylbenzenes	13.1	13.9
Indan-styrenes	15.6	13.8
Indenes	6.3	5.5
Naphthalene	25.9	24.0
Biphenyl-Acenaphthenes	30.5	30.4
Fluorene-Acenaphthalenes	7.2	8.4
Phenanthrene	1.4	3.6

*See Example I.

Example III

A cracked oil residue obtained from the thermal cracking of a light petroleum condensate was continuously passed through a preheater and into a 3/8 inch outside diameter coiled heating tube 190 inches in length. The cracked oil residue was heated to a temperature of approximately 850° F. in the heating tube while under a pressure of approximately 100 p.s.i.g. The residence time of the cracked oil residue in the heating tube was approximately one minute. The high temperature residue

fraction was passed out of the heating tube through a short tube into which was continuously introduced an aromatic oil in sufficient quantities and of sufficient temperature to reduce the temperature of the hot cracked oil residue to a temperature of approximately 730° F. in the flash distillation column. The cracked oil residue was passed through a let-down valve prior to entry into the flash distillation column which was maintained at 5 p.s.i.g. The sudden reduction in pressure brought about a separation of an aromatic oil from the thermally soaked pitch. The aromatic oil was taken overhead from the flash distillation column and subjected to separation into a fraction boiling below approximately 550° F. (light oil) and one boiling above this temperature (heavy aromatic oil). A portion of the higher boiling oil, approximately 20 percent by weight, was recycled to the tube exiting the high temperature thermal soaking zone and there was used as a quench liquid as hereinabove described in relation to FIGURE 2. The yield of pitch has approximately 70 percent by weight, based on charge, and the yield of high boiling aromatic oil was approximately 30 percent by weight based on charge. The aromatic oil, on fractionation, produced approximately 18 weight percent light oil with the remainder being a heavy oil. The table below represents the properties and analyses of the cracked oil residue feed, the thermally soaked pitch and the light and heavy oils obtained from fractionation of the aromatic oil.

Property	Cracked Oil Residue	Finished Pitch
Flash Point, ° F	380	380
Softening Point, ° F	123	178
Specific Gravity, 77/77° F	1.1636	1.2143
Penetration at 77° F	30	1
Penetration at 115° F	236	10
Benzene solubles, weight percent	99.6	91.0
Pentane solubles, weight percent	39.1	18.8
Quinoline solubles, weight percent	99.9	99.9
ASTM distillation (D-20):		
Weight percent, 338-454	0	0
Weight percent, 454-518	0	0.4
Weight percent, 518-572	2.3	1.0
Weight percent, 572-671	39.5	27.6
Total distillate, weight percent of charge	41.8	29.0
Thermal stability Index	52	-2
Sulfur, weight percent	0.2	0.2

Aromatic oil properties (heavy oil):

API gravity	0.83
Refractive index, 25/d	1.6612
Distillation range, ° F. (ASTM D-86)	550 to 780

Analysis, weight percent (obtained by gas chromatography):

Dimethyl naphthalenes	1.3
Methylbiphenyl-acenaphthenes	19.4
Trimethyl naphthalenes	3.4
Fluorene	1.5
Alkyl fluorenes	12.4
Phenanthrene	4.3
Alkyl phenanthrenes	12.2
Pyrene and above	45.5

Light oil analysis, weight percent (obtained by mass spectrometer analysis):

Alkylbenzenes	29.1
Indan-styrenes	31.7
Indenes	9.4
Naphthalenes	25.7
Biphenyl-acenaphthenes	4.1

What is claimed is:

1. A process for producing aromatic oils and a stabilized petroleum based pitch from the cracked oil residue resulting from the relatively severe thermal cracking of petroleum which comprises passing said cracked oil residue into a heating zone, said heating zone being maintained at 750 to 900° F. and a pressure of 50 to 250 p.s.i.g., said cracked oil residue remaining in said heating

zone for 1 to 60 minutes, passing the heated cracked oil residue at elevated temperature into a flash distillation zone wherein the pressure is maintained at 5 to 60 p.s.i.g., thereby flashing overhead an aromatic oil, and recycling approximately 25 to 100 percent by weight of said aromatic oil into the hot cracked oil residue at a point between the heating zone and the flash distillation zone, the recycled aromatic oil having been heated to a temperature within the range of 100 to 150° F. prior to being admixed with said hot cracked oil residue and recovering as a bottoms from said flash distillation zone a stabilized residue pitch.

2. The process of claim 1 wherein the craked oil residue is one having the following properties:

Flash point, ° F. (ASTM D-92)	Above 310.
Softening point, ° F.	60-250.
Specific gravity, 77/77° F. (ASTM D-71)	1.13-1.25.
Penetration at 77° F. (ASTM D-5)	0 to too soft to measure.
Penetration at 115° F. (ASTM D-5)	0 to too soft to measure.
Benzene solubles, weight percent	60 to 99.9.
Pentane solubles, weight percent	10-50.
Quinoline solubles, weight percent	95-99.9.
Initial boiling point, ° F.	Above 390.

Thermal stability index ----- +10 to +70.
Sulfur, weight percent ----- 0 to 1.

3. The process of claim 1 wherein the relatively severe thermal cracking from which cracked residue results is one carried out at temperatures of 900 to 2000° F.

4. The process of claim 1 wherein the temperature within the heating zone is maintained at approximately 850 to 900° F., and the residence time of the cracked oil residue in the heating zone is 1 to 30 minutes.

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