



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : C10G 9/16	A3	(11) International Publication Number: WO 98/55563						
		(43) International Publication Date: 10 December 1998 (10.12.98)						
(21) International Application Number: PCT/US98/11698 (22) International Filing Date: 5 June 1998 (05.06.98) (30) Priority Data: <table border="0"> <tr> <td>08/870,070</td> <td>5 June 1997 (05.06.97)</td> <td>US</td> </tr> <tr> <td>09/027,943</td> <td>23 February 1998 (23.02.98)</td> <td>US</td> </tr> </table> (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 08/870,070 (CIP) Filed on 5 June 1997 (05.06.97) (71) Applicant (for all designated States except US): ATF RESOURCES, INC. [US/US]; Suite 401, 15 Phoenicia Avenue, Coral Gables, FL 33134 (US). (71)(72) Applicant and Inventor: GANDMAN, Zalman [BY/US]; 1770 East 14th Street #6-L, Brooklyn, NY 11229 (US). (74) Agents: TRIPP, Karen, B.; Winstead Sechrest & Minick P.C., Suite 2400, 910 Travis, Houston, TX 77002 (US) et al.		08/870,070	5 June 1997 (05.06.97)	US	09/027,943	23 February 1998 (23.02.98)	US	(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 18 March 1999 (18.03.99)
08/870,070	5 June 1997 (05.06.97)	US						
09/027,943	23 February 1998 (23.02.98)	US						
(54) Title: METHOD AND APPARATUS FOR REMOVING AND SUPPRESSING COKE FORMATION DURING PYROLYSIS								
(57) Abstract								
A method and apparatus for decoking and suppressing coke formation during pyrolysis has been discovered that does not require complete shut down of the pyrolyses furnace. For the decoking step, the hydrocarbon feed is cut off to one or more coils for usually less than about three hours during which a decoking additive is added to the steam flow in that coil. This additive is comprised of an aqueous solution of a group IA metal salt and a group IIA metal salt and catalyzes the coke removal. The hydrocarbon feed continues in the other coils during this procedure. After decoking, a suppression additive also comprising group IA and IIA metals is added to the steam and hydrocarbon feed. This suppression additive will melt onto the inner surfaces of the pyrolysis furnace coils, coating the coils with a glass layer which inhibits coke formation. The apparatus of the invention is particularly suited for introducing the additives of the invention into the steam flow at a desired drop size without touching the sides of the coil.								

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/11698

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C10G9/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C10G B01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BE 687 073 A (ESSO RESEARCH AND ENGINEERING COMPANY) 20 March 1967 see the whole document ---	1-27
A	FR 1 145 288 A (ESSO RESEARCH AND ENGINEERING COMPANY) 24 October 1957 see the whole document ---	1-27
A	FR 2 408 644 A (STOLYAR GENRIKH) 8 June 1979 see claims 1-8 ---	1-27
A	WO 94 06889 A (GANDMAN ZALMAN) 31 March 1994 see claims 1-17 ---	1-27
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

11 January 1999

Date of mailing of the international search report

21. 01. 99

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INTERNATIONAL SEARCH REPORT

In: International Application No
PCT/US 98/11698

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 267 674 A (PETROLITE CORP) 18 May 1988 see the whole document ---	1-27
P,X	WO 98 11174 A (JO HONG K) 19 March 1998 see the whole document ---	22
A	US 5 435 904 A (REED LARRY E ET AL) 25 July 1995 see the whole document ---	1-64
A	US 5 284 994 A (BROWN RONALD E ET AL) 8 February 1994 see the whole document ---	28-62,64
A	EP 0 617 112 A (KELLOGG M W CO) 28 September 1994 see the whole document -----	28-62,64

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 98/11698

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-27 and 63-64

Removal and prevention of coke formation during thermal cracking of hydrocarbon feed by taking some of the tubes off-stream and while maintaining the flow of steam introducing an antifouling amount of group IA and/or IIA metal salts.

2. Claims: 28-62

Apparatus and method for injecting a liquid solution into a hot gaseous stream in a thermal cracking furnace for inhibiting the formation and for removing the formation of coke.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/11698

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