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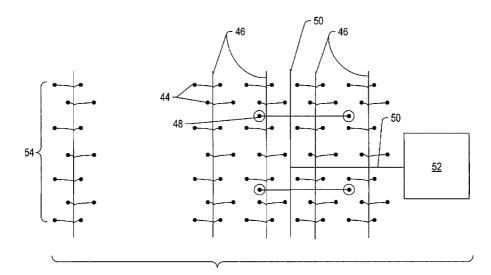
60/337,136	24 October 2001 (24.10.2001)	US
60/334,568	24 October 2001 (24.10.2001)	US
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60/374,970	24 April 2002 (24.04.2002)	US

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[Continued on next page]

(54) Title: IN SITU UPGRADING OF COAL



(57) Abstract: A method for treating a coal formation to alter properties of coal in the formation is provided. In one embodiment, heat from one or more heaters may be provided to at least a portion of the formation. Heat may be allowed to transfer from the one or more heaters to a part of the formation. In certain embodiments, the heat from the one or more heaters may pyrolyze at least some hydrocarbons within the part of the formation. The method may include producing a fluid from the formation. In some embodiments, the produced fluid may include at least some pyrolyzed hydrocarbons from the formation. In an embodiment, coal may be produced from the formation.



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A. CLASSIFICATION OF SUBJECT MATTER IPC 7 E21B43/24 C106 C10G1/00 C10B53/00 E21B43/243 According to International Patent Classification (IPC) or to both national classification and IPC Minimum documentation searched (classification system followed by classification symbols) IPC 7 E21B 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) EPO-Internal, WPI Data C. DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. US 4 455 215 A (JARROTT DAVID M ET AL) 1-7,13X 19 June 1984 (1984-06-19) column 2, line 6 -column 4, line 33; figures 1,2 χ US 4 776 638 A (HAHN OTTFRIED J) 1-3,6,7,11 October 1988 (1988-10-11) column 6, line 40 -column 7, line 28 US 4 537 252 A (PURI RAJEN) 27 August 1985 (1985-08-27) 1-3,6,7, χ the whole document X US 4 793 656 A (SIDDOWAY MARK A ET AL) 27 December 1988 (1988-12-27) the whole document -/--Further documents are listed in the continuation of box C. Patent family members are listed in annex. Special categories of cited documents: "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 "A" document defining the general state of the art which is not considered to be of particular relevance invention "E" earlier document but published on or after the international "X" document of particular relevance; the claimed invention filing date cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone 'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "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 "O" document referring to an oral disclosure, use, exhibition or \*P\* document published prior to the international filing date but later than the priority date claimed \*&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 07/05/2003 31 March 2003 Name and mailing address of the ISA Authorized officer European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, van Berlo, A Fax: (+31-70) 340-3016

# INTERNATIONAL SEARCH REPORT

Intern nal Application No
PCT/US 02/34263

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT  Category Citation of document, with indication, where appropriate, of the relevant passages  Relevant to claim No.					
alegury *	onation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.			
(	US 4 057 293 A (GARRETT DONALD E) 8 November 1977 (1977-11-08) the whole document	1			

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Interronal Application No PCT/US 02/34263

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4455215	Α	19-06-1984	NONE		
US 4776638	Α	11-10-1988	NONE		
US 4537252	Α	27-08-1985	US	4662439 A	05-05-1987
US 4793656	Α	27-12-1988	NONE		
US 4057293	A	08-11-1977	NONE		