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[Continued on next page]

(54) Title: SYSTEMS, METHODS, AND PROCESSES FOR USE IN TREATING SUBSURFACE FORMATIONS

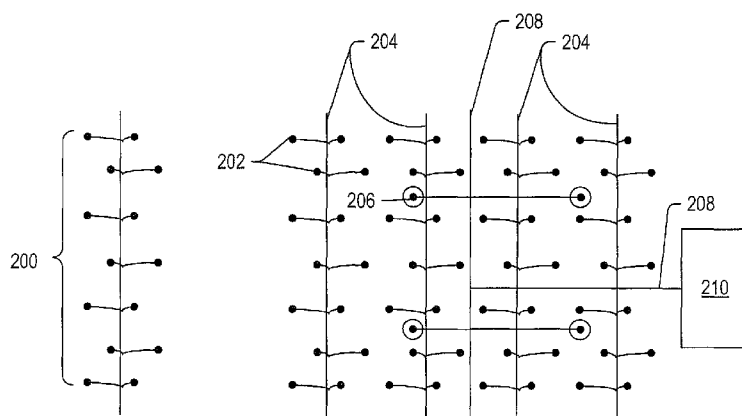


FIG. 2

(57) Abstract: Systems, methods, and/or heaters for treating a subsurface formation are described herein. Some embodiments also generally relate to heaters that have novel components therein. Such heaters may be obtained by using the systems and methods described.

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14 January 2010

INTERNATIONAL SEARCH REPORT

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PCT/US 08/60811

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - E21B 36/00 (2008.04)

USPC - 166/302

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)

USPC - 166/302

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 166/268, 272.1, 302; 405/129.65, 130, 128.4; search terms belowElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWest (PGPB,USPT,EPAB,JPAB); Google Web

Search Terms Used: tar sands, subsurface formations, shell oil, solvation, karsted, viscosity, aromatic, naphtha, visbroken, hydrocarbon isomer shift,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/0155111 A1 (Vinegar et al.) 21 August 2003 (21.08.2003), entire document especially abstract, claim 8, claim 6543, para [0030]-[0034], [0059], [0633]-[0634], [0677], [0690]-[0692], [0694]-[0695], [0722], [0728], [0730]-[0732], [0788], [0900], [0998], [1009], [1297], [1306], [1324], [1339], [1348], [1459], [1461], [1516], 1518]-[1522], [1526], [1539], [1542], [1544], [1548], [1575], [1603]-[1605], [1617], [1936], [2063], [2181], [2261], [2263], [2493]	1-62, 106, 206-227, 391-455, 486-497, 509-556, 895-914, 919-931, 974-984, 995-1007, 1030-1124 and 1291-1305
A	US 4,384,613 A (Owen et al.) 24 May 1983 (24.05.1983), entire document.	1-62, 106, 206-227, 391-455, 486-497, 509-556, 895-914, 919-931, 974-984, 995-1007, 1030-1124 and 1291-1305
A	US 6,725,920 B2 (Zhang et al.) 27 April 2004 (27.04.2004), entire document.	1-62, 106, 206-227, 391-455, 486-497, 509-556, 895-914, 919-931, 974-984, 995-1007, 1030-1124 and 1291-1305

 Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/60811

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

- Group I: claims 1-62, 106, 206-227, 391-455, 486-497, 509-556, 895-914, 919-931, 974-984, 995-1007, 1030-1124, 1291-1305 : directed to a method of treating a tar sands formation.
- Group II: claims 63-105, 353-361, 1125-1160, 1166-1199, 1412-1459: directed to a heating system for a subsurface formation.
- Group III: claims 107-111, 942, 1212-1230: directed to a method for treating nahcolite.
- Group IV: claims 112-147, 245-257, 261-272, 276-278, 306-310, 332, 338, 346-348, 630-644, 844-848, 854, 879-885, 915-918, 932-941, 985-994, 1008-1029, 1231-1245, 1326-1331, 1337, 1345-1354, 1358-1369, : directed to an in-situ heat treatment system for producing hydrocarbons using oxidizers.
- Group V: claims 148-151: directed to a method of suspending heaters in a well.
- Group VI: claims 152-156: directed to a method of producing hydrogen.
- Group VII: claims 157-196, 1251-1270: directed to a method of making coiled tubing and transporting coiled tubing to a well.

-- Please See Continuation 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 additional fees, this Authority did not invite payment of additional fees.
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.:
1-62, 106, 206-227, 391-455, 486-497, 509-556, 895-914, 919-931, 974-984, 995-1007, 1030-1124, 1291-1305

- Remark on Protest**
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US 08/60811

Box III. Observations where unity of invention is lacking - continued:

Group VIII: claims 197-205: directed to a system for removing protrusions from a well.
Group IX: claims 228-244: directed to a method for providing acidic gas to a subsurface formation.
Group X: claims 258-260, 273-275, 279-305, 311-331, 333-337, 33
Group XI: claims 362-368: directed to a system for a subsurface formation.
Group XII: claims 369-384, 610-629: directed to a method of providing a barrier for a subsurface formation.
Group XIII: claims 385-390: directed to a method of forming a wellbore through at least two permeable zones.
Group XIV: claims 456-485, 498-508, 886-894, 1311: directed to a method for treating Karsted and dolomite formations
Group XV: claims 557-570: directed to a method for treating a hydrocarbon containing formation using a checkerboard pattern.
Group XVI: claims 571-589: directed to a method for treating a hydrocarbon containing formation in zones.
Group XVII: claims 590-609: directed to a method of using geothermal energy to treat a subsurface treatment area.
Group XVIII: claims 645-651: directed to a method of heating a subsurface formation using a liquid heat transfer fluid from a vessel to a heat exchanger.
Group XIX: claims 673-706: directed to a method for forming two or more wellbores using directional drilling and sensors.
Group XX: claims 707-722 directed to a system for forming wellbores using a particle jet drilling nozzle and inertial navigation system.
Group XXI: claims 723-728: directed to a method comprising coupling a robot to coiled tubing positioned in a wellbore and using the robot to perform a task in the wellbore.
Group XXII: claims 729-743, 1161-1165: directed to a method for forming a wellbore in a heated formation comprising flowing liquid drilling fluid and vaporizing it.
Group XXIII: claims 744-749: directed to a system for forming a wellbore in a heated formation comprising a drilling fluid, drill string, and a pressure activated valve coupled to the drilling pipe.
Group XXIV: claims 750-759: directed to a conduit for flowing a refrigerant in a wellbore and a freeze well for forming a low temperature zone.
Group XXV: claims 760-765: directed to a method for installing a horizontal or inclined subsurface heater.
Group XXVI: claims 766-776: directed to an electrical insulation system for a subsurface electrical conductor.
Group XXVII: claims 777-785: directed to a method for assessing one or more temperatures of an electrically powered subsurface heater by assessing an impedance profile.
Group XXVIII: claims 786-809: directed to a longitudinal subsurface heater and method for forming a longitudinal subsurface heater
Group XXIX: claims 810-836: directed to a heating system for a subsurface formation comprising three substantially u-shaped heaters that enter the formation through a first common wellbore and exit the formation through a second common wellbore so that the magnetic fields of the three heaters at least partially cancel out in the common wellbores.
Group XXX: claims 855-873, 943-953: directed to a system and method of treating a formation fluid comprising producing formation fluid and separating the formation fluid.
Group XXXI: claims 874-878, 1246-1250: directed to a method of heating a portion of a formation comprising placing fuel on a train, initiating combustion, and pulling the train through a u-shaped opening.
Group XXXII: claims 954-973: directed to a method of treating a subsurface hydrocarbon formation comprising providing a catalyst system in a carrier fluid.
Group XXXIII: claims 1200-1211: directed to a method comprising forming a first wellbore, positioning an electrical conductor in the first wellbore, forming at least two additional wellbores, placing a heater section in at least one of the additional wellbores, and coupling the heater section to the conductor.
Group XXXIV: claims 1271-1290: directed to a system and method for forming a wellbore.
Group XXXV: claims 1306-1309: directed to a hydrocarbon composition having an API gravity between 19? and 25?, a viscosity of at most 350 cp at 5?C, and a P-value of at least 1.1.
Group XXXVI: claims 1310, : directed to a method for treating a hydrocarbon formation, comprising introducing a hydrogen donating solvation fluid.
Group XXXVII: claims 1460-1667 : directed to a method for heating a subsurface formation, comprising providing time-varying electrical current, inducing electrical current flow in a ferromagnetic conductor, and resistively heating the ferromagnetic conductor.
Group XXXVIII: claims 1668- 1722: directed to a heating system for a subsurface formation comprising an electrical conductor, a ferromagnetic conductor at least partially surrounding the electrical conductor wherein the ferromagnetic conductor comprises a plurality of straight, angled, or longitudinally spiral grooves reduce induction resistance heating in the ferromagnetic conductor.
Group XXXIX: claims 1723-1788: directed to a variable voltage transformer.
Group XL: claims 1789-1848: directed to a method for controlling voltage provided to an electrical heater.
Group XLI: claims 1849, 1850: directed to a system for forming a subsurface wellbore, comprising: a drilling string configured to rotate at a first speed, a drill bit, first and second motors
Group XLII: claims 1851-1875, 1880-1894: directed to a system for treating a subsurface hydrocarbon containing formation, comprising one or more tunnels having an average diameter of at least 1 m and two or more wellbores.
Group XLIII: claims 1876-1879: directed to a method for installing heaters in a subsurface hydrocarbon containing formation using shafts.
Group XLIV: claims 1895-1916: directed to a method for producing one or more crude products, comprising producing formation fluid, separating the formation fluid, providing at least a portion of the liquid stream to a nanofiltration system.
Group XLV: claims 1917-1936: directed to method of treating a formation fluid, comprising providing formation fluid, separating the form formation fluid, and cryogenic separation.