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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

(88) Date of publication of the international search report:
18 February 2016

(54) Title: DISPATCHABLE POWER PLANT AND METHOD FOR USING THE SAME

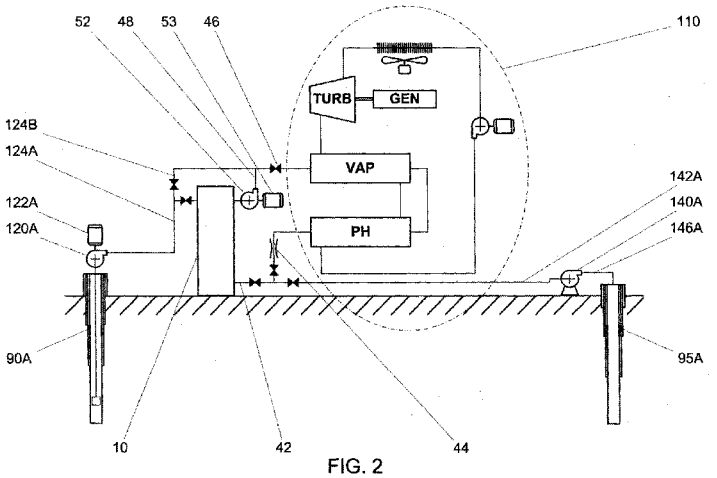


FIG. 2

(57) Abstract: The present invention provides a method for producing load-following power using low to medium temperature heat source fluid comprising the steps of reducing the power level produced by a Rankine cycle power plant producing load-following power operating on a low to medium temperature heat source fluid during one period of time.' storing heat not used during the first period of time; and using the heat stored for producing power during a second period of time.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB15/00304

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - F03G 6/00; F03G 7/04 (2015.01)
CPC - F03G 6/005; F03G 7/04
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(8) Classifications: F03G 6/00; F03G 7/04, 7/06 (2015.01)
CPC Classifications: F03G 6/005; F03G 7/04, 7/06; Y02E 10/46

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 practicable, search terms used)
PatSeer (US, EP, WO, JP, DE, GB, CN, FR, KR, ES, AU, IN, CA, INPADOC Data); Google/Google Scholar; ProQuest; EBSCO host; KEYWORDS: Rankine cycle, heat storage, geothermal, solar, temperature, organic, power, base load, store, save, saving, use heat, using heat. reduce, decrease, lessen, capture, continuous power, later, subsequent, second, next, cycle, period, load following

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,192,144 (PIERCE, B) 11 March 1980; figure 2; columns 2, 4, 6-7	1
A	WO 2008/022407 A1 (COMMONWEALTH INDUSTRIAL AND SCIENTIFIC RESEARCH ORGANISATION et al.) 28 February 2008; entire document	1
A	US 2012/0291433 A1 (MENG, N et al.) 22 November 2012; entire document	1
A	US 8,087,245 B2 (QUERO, V et al.) 03 January 2012; entire document	1

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* 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

Date of the actual completion of the international search	Date of mailing of the international search report
30 October 2015 (30.10.2015)	02 DEC 2015
Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB15/00304

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:
-***-Please See Supplemental Page-***-

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.:
Group I: claim 1;

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/IB15/00304

-***-Continued from Box No. III Observations where unity of invention is lacking-***-

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: claim 1 is directed toward a method for producing load-following power using a Rankine cycle.

Group II: claims 2-40 are directed toward a load-following power plant using a heat storage and means for using the heat stored.

Group III: claims 41-43 are directed toward a power plant comprising means for increasing the power level produced by said power plant using low to medium temperature heat source fluid during a first period of time.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons.

The special technical features of Group I include a method for producing load-following power using low to medium temperature heat source fluid comprising the steps of. (a) reducing the power level produced by a Rankine cycle power plant (which is not present in Groups II, III) producing load-following power operating on a low to medium temperature heat source fluid during one period of time; and (c) using the heat stored for producing power during a second period of time (which is not present in Group III).

The special technical features of Group II include a load-following power plant using low to medium temperature heat source fluid comprising: (a) means for reducing the power level produced by said load following power plant using low to medium temperature heat source fluid during a first period of time; (b) a heat storage for storing heat not used during said first period of time; and (c) means for using the heat stored in said heat storage for producing power during a second period of time (which is not present in Groups I, III).

The special technical features of Group III include means for increasing the power level produced by said power plant using low to medium temperature heat source fluid during a first period of time (which is not present in Groups I, II).

The common technical features of Groups I-III include a power plant using low to medium temperature heat source fluid comprising reducing the power level produced by said power plant using low to medium temperature heat source fluid during a first period of time; storing heat not used during said first period of time; using the heat stored in said heat storage for producing power during a second period of time.

These common technical features are disclosed by US 4,192,144 A (PIERCE): a power plant using low to medium temperature heat source fluid comprising reducing the power level produced (when occurring simultaneously with energy supply from heat source 56 to turbine 52 and associated generator 58 (i.e., power producer), energy storage in heat exchanger 10 would decrease the amount of energy available to turbine 52 and associated generator 58 (i.e., reducing the power level produced); figure 2; column 6, lines 31-32, 44-46) by said power plant (direct Rankine type cycle; figure 2; column 6, lines 28-29) using low to medium temperature heat source fluid (organic working fluid (heat source fluid) has a boiling point of 563°F (i.e., low to medium temperature relative to the sun); column 4, lines 40-43) during a first period of time (simultaneous energy supply to turbine 52 and storage in heat exchanger 10 would occur when heat source 56 can supply sufficient energy to both (i.e., a first period of time); column 6; lines 57-58); storing heat not used during said first period of time (heat is stored in heat exchanger 10 when heat source 56 can supply sufficient energy to both the turbine 52 and heat exchanger 10 (i.e., a first period of time); column 6, lines 57-58); and using the heat stored for producing power during a second period of time (when heat source 56 is shutdown, such as during the dark of night (i.e., a second period of time), heat exchanger 10 can provide sufficient steam flow (i.e., stored heat) to drive turbine 52 and associated electrical generator 58 (i.e., producing power); column 6, lines 31-32; column 7, lines 14-19).

Because the common technical features are disclosed by PIERCE, the inventions are not so linked as to form a single general inventive concept. Therefore, Groups I-III lack unity.