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(54) Title: METHANE CONVERSION APPARATUS AND PROCESS USING A SUPERSONIC FLOW REACTOR

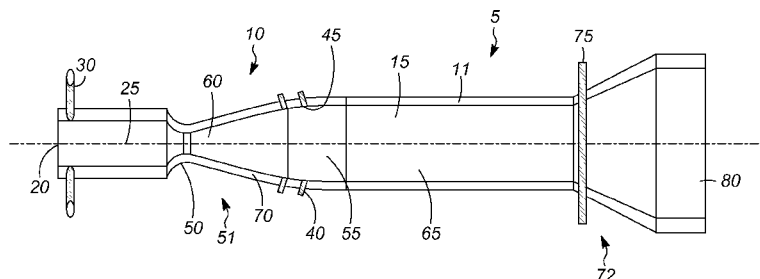


FIG. 1

(57) Abstract: Apparatus and methods are provided for converting methane in a feed stream to acetylene. A hydrocarbon stream is introduced into a supersonic reactor and pyrolyzed to convert at least a portion of the methane to acetylene. The reactor effluent stream may be treated to convert acetylene to another hydrocarbon process.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER		<i>C07C 2/00 (2006.01)</i> <i>C07C 11/24 (2006.01)</i> <i>B01J 19/10 (2006.01)</i>
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)		
B01J 19/10, C07C 2/00, 11/24		
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)		
EAPATIS, Esp@cenet, PAJ, USPTO, CIPO, DEPATISnet, Patentscope, DWPI, Information Retrieval System of FIPS		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4724272 A (ROCKWELL INTERNATIONAL CORPORATION) 09.02.1988, abstract, fig. 1a, col. 4, lines 9-22, col. 5, lines 39-62, p. 6, lines 10-34, claims 1, 8-10	1-14
Y	RU 2438083 C2 (SIMENS AKTSIENGEZELLSCHAFT) 27.12.2011, p. 6, lines 40-53, p. 7, lines 1-8, 18-40, p. 12, lines 18-20	1-14
Y	US 6443354 B1 (PLANSEE AKTIENGESELLSCHAFT) 03.09.2002, abstract, col. 1, lines 6-38, col. 2, lines 40-54, claims	3, 5, 8, 11, 12
Y	US 4426248 A (THE UNITED STATES OF AMERICA AS REPRESENTED BY THE SECRETARY OF THE ARMY) 17.01.1984, abstract	4
Y	US 7000306 B2 (HONEYWELL INTERNATIONAL, INC.) 21.02.2006, col. 1, lines 25-30, 65-67, col. 2, lines 1-10	7
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> 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	"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
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"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 in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2002/0154741 A1 (MARK J. RIGALI et al.) 24.10.2002, abstract, paragraphs [0003], [0010] - [0011], [0019]	9, 10
Y	US 2011/0114285 A1 (ROBERT E. BUXBAUM) 19.05.2011, abstract	14

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2013/055514

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:
(see extra 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.:

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.