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Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*
— *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))*

[Continued on next page]

(54) Title: METHODS AND APPARATUS FOR PRODUCING ALCOHOLS FROM SYNGAS

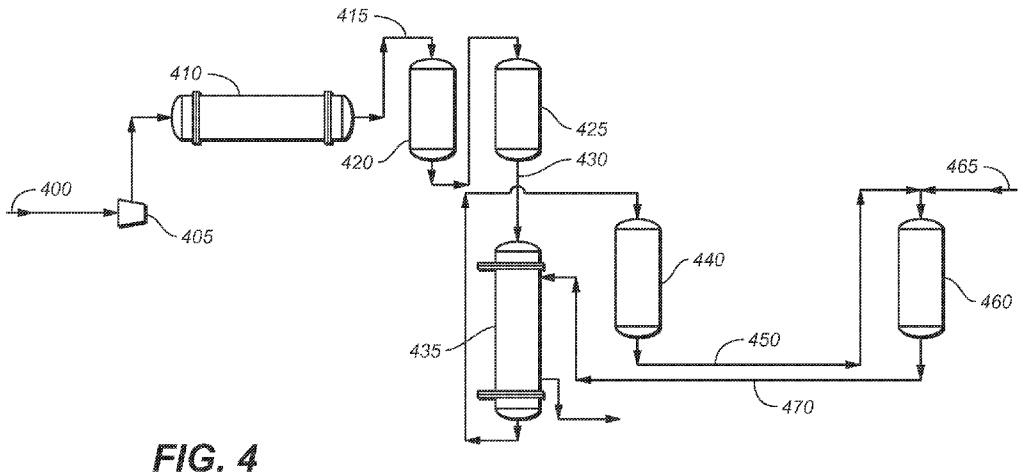


FIG. 4

(57) Abstract: Methods and apparatus for producing alcohols from syngas are disclosed herein. In some variations, syngas is catalytically converted to methanol in a first reaction zone, and residual syngas from the first reaction zone is then catalytically converted to ethanol in a second reaction zone. Also, in some variations, syngas is catalytically converted to methanol in high yield in a first reaction zone, and the methanol is then converted (optionally, with additional syngas) to ethanol in a second reaction zone.

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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 C07C, 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 practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006-0009537 A1(IORDACHE-CAZANA, C. ET AL.) 12 January 2006 See abstract; examples 1-12; and claims 1-47	1-67
A	US 4,725,626 A(GRAHAN, A. M. ET AL.) 16 February 1988 See abstarac; examples; and claims 1-15	1-67
A	US 7,169,821 B2(BRANSON, J. D.) 30 January 2007 See abstract; figures 1-6; and claims 1-14	1-67
A	US 2005-0107482 A1(VAN EGMOND, C. F. ET AL.) 19 May 2005 See abstract; figures 1-4; and examples I-III	1-67
A	US 6,762,332 B2(LANGE, J. P. ET AL.) 13 July 2004 See abstract; detailed description; and claims 1-16	1-67

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

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Information on patent family members

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