Title: METHODS AND SYSTEMS FOR REDUCING PRESSURE OF NATURAL GAS AND METHODS AND SYSTEMS OF DELIVERING NATURAL GAS

Abstract: Methods and systems for reducing a pressure of compressed natural gas and for delivering natural gas are disclosed. A regulator comprising a vortex tube may be used to reduce the pressure of compressed natural gas while a temperature thereof is also reduced. The temperature reduction associated with a pressure drop in the compressed natural gas is achieved by throttling the gas at constant enthalpy from about 206.8 bar (about 3,000 PSIG) to 10.3 bar (150 PSIG) through the regulator. At least one heat exchanger may be utilized to increase the temperature of the compressed natural gas to a temperature suitable for injection delivery. A pressure-reducing regulator may be used to further reduce a pressure of the gas to about 3.1 bar (about 45 PSIG) for delivery to an end-user.
A. CLASSIFICATION OF SUBJECT MATTER

F17D 1/04(2006.01)i, F17C 9/04(2006.01)I, F02M 21/02(2006.01)I, F02M 21/04(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)

F17D 1/04; F25B 9/02; F17C 7/00; F17C 5/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: vortex tube, heat exchanger, pressure reducing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>US 60822116A A (TUNKEL; LEV et al.) 04 July 2000 See the column 2,3 and fig 2</td>
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<td>JP 2007-064473 A (TOHO GAS CO LTD) 15 March 2007 See the abs</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
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**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

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**&** document member of the same patent family

Date of the actual completion of the international search 30 JUNE 2011 (30.06.2011)

Date of mailing of the international search report 30 JUNE 2011 (30.06.2011)

Name and mailing address of the ISA/KR

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