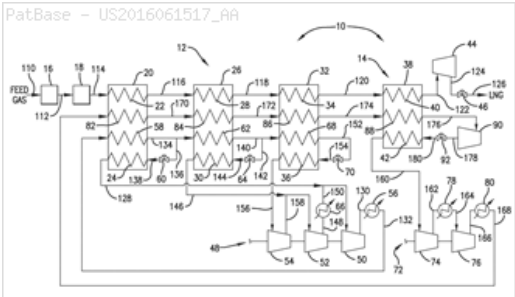


cooling at least a portion of the overhead vapor fraction in the first refrigeration system to form a cooled vapor fraction (g) cooling at least a portion of the cooled vapor fraction in a first cooling pass of the second refrigeration system and the fully condensed second mixed refrigerant in a second cooling pass of the second refrigeration system via indirect heat exchange with an expanded second mixed refrigerant in a single refrigerant warming pass of the second refrigeration system to form a second cooled feed stream, a cooled fully condensed second mixed refrigerant, and a gaseous second mixed refrigerant, wherein the second cooled feed stream from the first cooling pass comprises a liquefied natural gas, wherein the stream exiting the single refrigerant warming pass consists of the gaseous second mixed refrigerant (h) expanding at least a portion of the cooled fully condensed second mixed refrigerant to form the expanded second mixed refrigerant, wherein the cooled fully condensed second mixed refrigerant is not subjected to phase separation prior to the expanding step, wherein the expanded second mixed refrigerant is not subjected to phase separation following the expanding step and (i) driving a compressor with the turboexpander. 24. the process of claim 23, wherein the second refrigeration system consists essentially of a single heat exchange zone, wherein the single heat exchange zone consists of the first cooling pass, the second cooling pass, and the single refrigerant warming pass. 25. the process of claim 23, further comprising subcooling at least a portion of the cooled fully condensed first mixed refrigerant in step (b) to form a subcooled first mixed refrigerant, wherein the cooled fully condensed first mixed refrigerant in step (c) comprises the subcooled first mixed refrigerant. 26. the process of claim 23, further comprising subcooling at least a portion of the cooled fully condensed second mixed refrigerant in step (g) to form a subcooled second mixed refrigerant, wherein the cooled fully condensed second mixed refrigerant in step (h) comprises the subcooled second mixed refrigerant. 27. the process of claim 23, wherein the first mixed refrigerant comprises at least two compounds selected from the group consisting of hydrocarbons containing from 2 to 4 carbon atoms. 28. the process of claim 23, wherein the second mixed refrigerant comprises at least two compounds selected from the group consisting of nitrogen and hydrocarbons containing from 1 to 3 carbon atoms. 29. the process of claim 23, wherein the compressor compresses at least a portion of the overhead vapor fraction prior to the cooling of step (f). (Results 12)

Title: DUAL MIXED REFRIGERANT SYSTEM

Abstract: Processes and systems are provided for recovering a liquefied natural gas (LNG) stream from a hydrocarbon-containing feed gas stream using dual closed-loop mixed refrigerant cycles. In particular, the processes and systems described herein can be used to efficiently and effectively liquefy methane from a hydrocarbon-containing feed gas stream by utilizing a first refrigeration system and a second refrigeration system in fluid communication with a turboexpander and separator.

Classifications:
International (IPC 8-9): F25J1/00 F25J3/06 (Advanced/Invention)
International (IPC 1-7): F25J1/00 F25J3/06
CPC: F25J1/0022 F25J1/0035 F25J1/0042 F25J1/0052 F25J1/0057 F25J1/0214 F25J1/0238 F25J1/0288 F25J1/0292 F25J2220/64 F25J2230/08 F25J2230/30 F25J2230/20
US: 62/612



Family:

Publication number	Publication date	Application number	Application date
AP201709786 A0	20170228	AP20170009786	20150804
AR101557 AA	20161228	AR2015P102619	20150813
AU2015307117 AA	20160303	AU20150307117	20150804
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CA2959119 AA	20170223	CA20152959119	20150804
CN107208962 A	20170926	CN201580059218	20150804
CO20170002301 A2	20170609	CO20170002301	20170308
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SK201700024 A5	20170802	SK20170000024	20150804
US2016061517 AA	20160303	US20140473403	20140829
WO16032700 A1	20160303	WO2015US43537	20150804

Priority:
US20140473403 20140829 WO2015US43537 20150804

Probable Assignee: BLACK AND VEATCH HOLDING CO

Assignee(s): (std): MILLER DAVID DOUGLAS ; MILLER TYSON DOUGLAS ; SEITTER JENNIFER LAUREN
Assignee(s): MILLER DAVID DOUGLAS ; MILLER TYSON DOUGLAS ; SEITTER JENNIFER LAUREN

Inventor(s): (std): DAVID DOUGLAS MILLER ; JENNIFER LAUREN SEITTER ; MILLER DAVID DOUGLAS ; MILLER TYSON DOUGLAS ; SEITTER JENNIFER LAUREN ; TYSON DOUGLAS MILLER

Agent(s): PHILLIPS ORMONDE FITZPATRICK; MBM INTELLECTUAL PROPERTY LAW LLP; JOSE ANDRES RINCON USCATEGUI; GEORGE WIDJOJO SH; LUEBBERING THOMAS B

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: DUAL MIXED REFRIGERANT SYSTEM

Abstract: Processes and systems are provided for recovering a liquefied natural gas (LNG) stream from a hydrocarbon-containing feed gas stream using dual closed-loop mixed refrigerant cycles. In particular, the processes and systems described herein can be used to efficiently and effectively liquefy methane from a hydrocarbon-containing feed gas stream with the use of a first refrigeration system and a second refrigeration system utilizing a first mixed refrigerant and a second mixed refrigerant. Furthermore, the first refrigeration system and second refrigeration system may be in fluid communication with a turboexpander and separator.

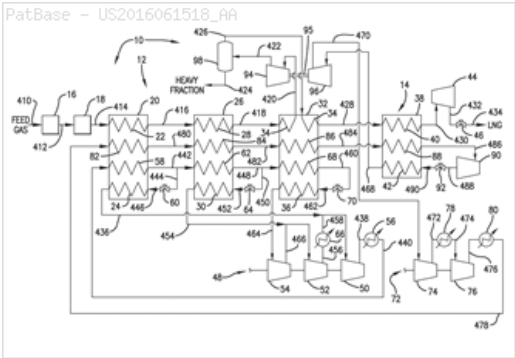
Classifications:

International (IPC 8-9): F25J1/00 F25J1/02 F25J3/06 (Advanced/Invention)

International (IPC 1-7): F25J1/00 F25J3/06

CPC: F25J1/0022 F25J1/0035 F25J1/0042 F25J1/0052 F25J1/0057 F25J1/0214 F25J1/0238 F25J1/0288 F25J1/0292 F25J2220/64 F25J2230/08 F25J2230/30 F25J2230/20

US: 62/613



Family:

Publication number	Publication date	Application number	Application date
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AR101410 AA	20161214	AR2015P102483	20150803
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CA2959140 AA	20170223	CA20152959140	20150804
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ID201802556 A	20180316	ID2017AID01938	20150804
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WO16032701 A1	20160303	WO2015US43541	20150804

Priority:

US20140473473 20140829 WO2015US43541 20150804

Probable Assignee: BLACK AND VEATCH HOLDING CO

Assignee(s): (std): BLACK AND VEATCH HOLDING CO

Assignee(s): MILLER DAVID DOUGLAS ; MILLER TYSON DOUGLAS ; SEITTER JENNIFER LAUREN

Inventor(s): (std): DAVID DOUGLAS MILLER ; JENNIFER LAUREN SEITTER ; MILLER DAVID DOUGLAS ; MILLER TYSON DOUGLAS ; SEITTER JENNIFER LAUREN ; TYSON DOUGLAS MILLER

Agent(s): PHILLIPS ORMONDE FITZPATRICK; MBM INTELLECTUAL PROPERTY LAW LLP; JOSE ANDRES RINCON USCATEGUI; GEORGE WIDJOJO SH; LUEBBERING THOMAS B

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: Closed loop single mixed refrigerant process

Abstract: A closed loop single mixed refrigerant process and system wherein the process efficiency is increased by increasing the temperature of liquefied material produced in a heat exchange refrigeration zone and thereafter cooling the liquefied material by flashing a portion of the liquefied material to produce a cooler liquefied material and a flash gas a portion of which is recycled to the heat exchange refrigerator. The process and system provide increased process efficiency and flexibility.

Classifications:

International (IPC 8-9): F25J1/02 (Advanced/Invention);

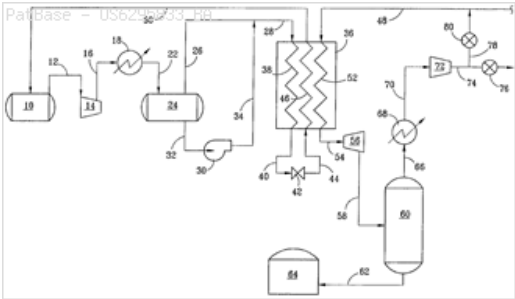
F25J1/00 (Core/Invention)

International (IPC 1-7): F25J1/02

CPC: F25J1/0022 F25J1/0042 F25J1/0052 F25J1/0219 F25J1/0254 F25J1/0262 F25J2220/62 F25J2235/60 F25J2245/02 F25J2290/32

European: F25J1/00A6 F25J1/00C2L F25J1/00C4V F25J1/02D10 F25J1/02Z2T F25J1/02Z4H R25J220/62 R25J235/60 R25J245/02 R25J290/32

US: 62/613



Family:

Publication number	Publication date	Application number	Application date
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AU2001264058 AA	20011217	AU20010264058	20010608
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AU2001264058 BH	20060119	AU20010264058	20010608
AU200164058 A1	20011217	AU20010064058	20010608
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CN1262808 C	20060705	CN20018010895	20010608
CN1451090 A	20031022	CN20018010895	20010608
EG23039 A	20040131	EG20010000612	20010606
MY137706 A	20090227	MY20010002680	20010608
RU2003101322 A	20040810	RU20030101322	20010608
RU2296280 C2	20070327	RU20030101322	20010608
US6295833 BA	20011002	US20000591654	20000609
WO0194865 A1	20011213	WO2001GB02520	20010608

Priority:

US20000591654 20000609 WO2001GB02520 20010608

Probable Assignee: BLACK AND VEATCH HOLDING CO

Assignee(s): (std): BLACK AND VEATCH PRITCHARD INC ; BLEHK EHND VITCH PRITCHARD INK ; HOFFART SHAWN D ; PRICE BRIAN C ; COLMER STEPHEN GARY

Assignee(s): BLACK AND VEATCH HOLDING CO ; BLACK AND VEATCH INC

Inventor(s): (std): HOFFART SHAWN D ; PRICE BRIAN C ; SD HOFFART ; PRICE S D HOFFART B C ; PRICE B C ; HOFFART S D ; BC PRICE ; PRAJS BRAJAN K ; KHOFFART SHON D

Inventor(s): BRIAN C PRICE ; B C PRICE ; SD HOFFART BC PRICE ; S D HOFFART B C PRICE ; S D HOFFART ; SHAWN D HOFFART

Agent(s): SPRUSON AND FERGUSON

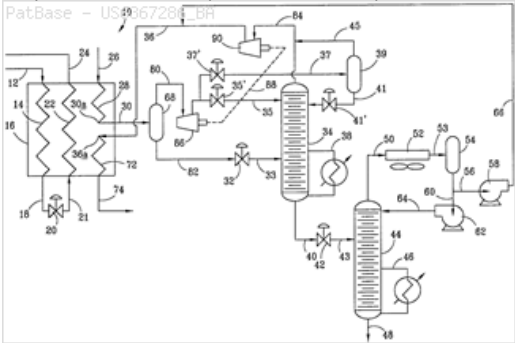
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Title: SYSTEM AND PROCESS FOR LIQUEFYING HIGH PRESSURE NATURAL GAS

Abstract: A system and a method for efficiently removing natural gas liquids from a natural gas stream at an elevated pressure and liquefying the natural gas stream at an elevated pressure by use of a turbo expander and a compressor.

Classifications:

International (ipc 8-9): F25J1/00 F25J1/02 F25J3/00 F25J3/02 (Advanced/Invention); F25J1/00 F25J3/00 F25J3/02 (Core/Invention)
International (ipc 1-7): F25J1/00 F25J1/02 F25J3/02
CPC: F25J1/0022 F25J1/0035 F25J1/0052 F25J1/0212 F25J3/0209 F25J3/0233 F25J3/0242 F25J2200/04 F25J2200/70 F25J2200/72 F25J2205/04 F25J2230/20 F25J2230/22 F25J2230/60 F25J2235/60 F25J2240/02 F25J2245/02 F25J2270/12 F25J2270/66
European: F25J1/02D F25J1/02D2 F25J3/02A2 F25J3/02C2 F25J3/02C6 R25J200/04 R25J200/70 R25J200/72 R25J205/04 R25J230/20 R25J230/22 R25J230/60 R25J235/60 R25J240/02 R25J245/02 R25J270/12 R25J270/66
US: 62/613



Family:

Publication number	Publication date	Application number	Application date
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AU200210701 A1	20020515	AU20020010701	20011023
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AU2002210701 AA	20020515	AU20020210701	20011023
AU2002210701 BB	20051110	AU20020210701	20011023
AU2002210701 BH	20051124	AU20020210701	20011023
CN100445673 C	20081224	CN20018012854	20011023
CN1443295 A	20030917	CN20018012854	20011023
EG23120 A	20040428	EG20010001154	20011030
MY128083 A	20070131	MY20010005051	20011101
RU2002128727 A	20040510	RU20020128727	20011013
RU2298743 C2	20070510	RU20020128727	20011023
US6367286 BA	20020409	US20000704064	20001101
WO0237041 A2	20020510	WO2001GB04710	20011023
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Priority:

US20000704064 20001101 WO2001GB04710 20011013 WO2001GB04710 20011023

Probable Assignee: BLACK AND VEATCH HOLDING CO

Assignee(s): (std): BLACK AND VEATCH PRITCHARD INC ; BLACK AND VEATCHPRITCHARD INC ; PRICE BRIAN C ; COLMER STEPHEN GARY ; BLEHK EHND VITCH PRITCHARD INK

Assignee(s): STEPHEN GARY COLMER ; BLACK AND VEACH PRITCHARD ; BLACK AND VEATCH HOLDING CO

Inventor(s): (std): COLMER STEPHEN GARY ; PRICE BRIAN C ; PRAJS BRAJAN K ; PRICE B C ; BC PRICE

Inventor(s): BRIAN C PRICE ; B C PRICE ; STEPHEN GARY COLMER

Agent(s): SPRUSON AND FERGUSON

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NL NO NZ PH PL PT RO RU SD SE SG SI SK SL SN SZ TD TG TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

Title: LIQUEFACTION METHOD COMPRISING AT LEAST A COOLANT MIXTURE USING BOTH ETHANE AND ETHYLENE

Abstract: The invention concerns a method comprising: (a) a first step whereby natural gas (1) is subjected to a first refrigerating cycle to obtain cooled natural gas (4), and brought to a temperature less than 20 degrees centigrade by a first coolant (201); a second step whereby the cooled natural gas (4) is subjected to a second refrigerating cycle wherein the cooled natural gas (4) is cooled and condensed by a second coolant (103) comprising methane, ethane, propane, and nitrogen. The second coolant (103) further contains ethylene, the total ethane and ethylene content being close to 50 mole percent.

Classifications:

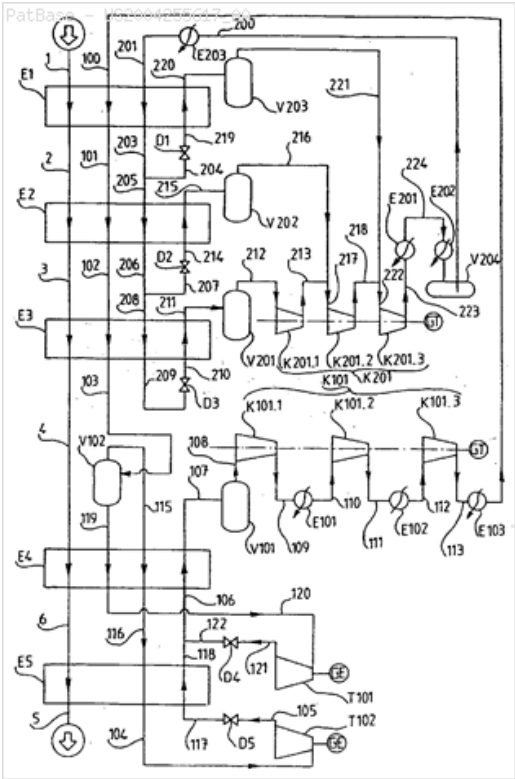
International (ipc 8-9): F25J1/00 F25J1/02 (Advanced/Invention); F25J1/00 (Core/Invention)

International (ipc 1-7): F25J1/00 F25J1/02

CPC: F25J1/0022 F25J1/0052 F25J1/0055 F25J1/0087 F25J1/0092 F25J1/0214 F25J1/0216 F25J1/0283 F25J1/0292 F25J1/0295 F25J2240/30 F25J2280/02

European: F25J1/00A6 F25J1/00C4V F25J1/00C4V2 F25J1/00R6P F25J1/00R6Z F25J1/02D F25J1/02D4 F25J1/02D4P2 F25J1/02Z6A4 F25J1/02Z6L F25J1/02Z6S R25J240/30 R25J280/02

US: 62/611 62/612 62/612P



Family:

Publication number	Publication date	Application number	Application date
FR2829569 A1	20030314	FR20010011869	20010913
FR2829569 B1	20060623	FR20010011869	20010913
US2004255617 AA	20041223	US20040486444	20040315
US7096688 BB	20060829	US20040486444	20040315
WO03023303 A1	20030320	WO2002FR02951	20020828
WO03023303 B1	20031002	WO2002FR02951	20020828

Priority:

FR20010011869 20010913 WO2002FR02951 20020828

Probable Assignee: TECHNIP FRANCE

Assignee(s): (std): PARADOWSKI HENRI ; TECHNIP CIE ; TECHNIP COFLEXIP ; TECHNIP FRANCE

Assignee(s): TECHNIP

Inventor(s): (std): PARADOWSKI HENRI

Agent(s): OSTROLENK FABER GERB AND SOFFEN LLP

Designated states: AE AT AU BE BG BR CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL NO PT RU SE SK TR TT US

Title: NATURAL GAS LIQUEFACTION PROCESS

Abstract: A method of liquefying a hydrocarbon-rich gas, wherein the gas flows through a cascade of three refrigeration stages, each stage comprising a refrigerant circuit and a compressor, wherein at least part of the flow of refrigerant from the second circuit is used for the pre-cooling of the hydrocarbon rich gas in the first refrigeration stage. This balances the load on each of the compressors. By standardizing the drive units and compressors of the three coolant circuits, it is possible to maximize the attainable liquefaction capacity of the liquefaction process using tried-and-trusted drive units and compressors respectively. This method can be applied to mixed refrigerant cascades and circuits with a carbon dioxide pre-cooling circuit. This latter option has benefits for offshore use where large amounts of hydrocarbons are undesirable.

Classifications:**International (IPC 8-9):** F25B7/00 F25B9/00 F25B9/02 F25J1/00 F25J1/02 (Advanced/Invention);

F25B1/10 F25B5/02 F25B9/00 (Advanced/Non-invention);

F25B9/00 F25B9/02 F25J1/00 (Core/Invention);

F25B1/10 F25B5/00 F25B9/00 (Core/Non-invention)

International (IPC 1-7): F25B9/02 F25J1/00 F25J1/02**CPC:** F25J1/0297 F25J1/0052 F25B1/10 F25B5/02 F25B9/008

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F25J1/0295 F25J1/0296 F25J2220/64

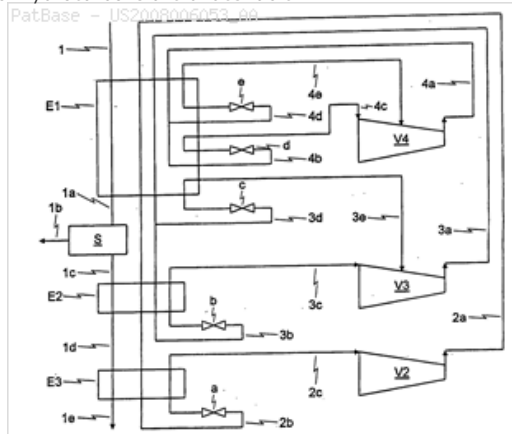
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F25J1/02Z6A4 F25J1/02Z6L F25J1/02Z6S F25J1/02Z6U R25B1/10

R25B309/06 R25B400/13 R25B5/02 R25B9/00B6 R25J220/64

R25J270/12

US: 62/612 62/612P**Family:**

Publication number	Publication date	Application number	Application date
AU2004274706 AA	20050331	AU20040274706	20040923
AU2004274706 BB	20080807	AU20040274706	20040923
DE10344030 A1	20050414	DE20031044030	20030923
GB200409103 A0	20040526	GB20040009103	20040423
NO20061751 A	20060622	NO20060001751	20060420
RU2006113610 A	20071027	RU20060113610	20040923
RU2352877 C2	20090420	RU20060113610	20040923
US2008006053 AA	20080110	US20040573213	20040923
WO05028975 A2	20050331	WO2004GB04047	20040923
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Priority:DE20031044030 20030923
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Probable Assignee: LINDE AG

Assignee(s): (std): BAUER HEINZ ; BOELT MANFRED ; FRANKE HUBERT ; FREDHEIM ARNE OLAV ; JACKSON ROBERT ; LINDE AG ; STATOIL ASA ; SAPPER RAINER ; SCHIER MARC ; PETTERSEN JOSTEIN ; PAUROLA PENTTI ; LINDE AKTIEGESELLSCHAFT ; STATOIL ASA

Assignee(s): LINDE AKTIEGESELLSCHAFT

Inventor(s): (std): BOLT MANFRED ; FREDHEIM ARNE OLAV ; PAUROLA PENTTI ; PETTERSEN JOSTEIN ; SCHIER M ; ZAPPER RAINER ; SHIER MARK ; PEUROLA PENTTI ; PETTERSEN JOSTEIN ; FREDKHEIM ARNE OLAV ; FRANKE HUBERT ; BEL T MANFRED ; BAUEHR KHAJNTS ; SCHIER MARC ; SAPPER RAINER ; FRANKE HUBERT ; BOELT MANFRED ; BAUER HEINZ

Inventor(s): ARNE OLAV FREDHEIM ; BEL T MANFRED ; RAINER SAPPER ; PENTTI PAUROLA ; HEINZ BAUER ; HUBERT FRANKE ; JOSTEIN PETTERSEN ; MANFRED BOLT ; MARC SCHIER

Agent(s): FREEHILLS PATENT ATTORNEYS; HERBERT SMITH FREEHILLS; FREEHILLS PATENT AND TRADE MARK ATTORNEYS; FPA PATENT ATTORNEYS PTY LTD; NEEDLE AND ROSENBERG PC

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

Title: METHOD FOR LIQUEFYING A HYDROCARBON-RICH FLOW

Abstract: The invention relates to a method for liquefying a hydrocarbon-rich flow, particularly a flow of natural gas, wherein liquefaction of the hydrocarbon-rich flow is carried out counter to a cascade consisting of two circuits of coolant mixtures. The first coolant mixture circuit is used for precooling and the second coolant mixture circuit is used for liquefaction and undercooling of the hydrocarbon-rich flow that is to be liquefied. Each coolant mixture circuit comprises at least one single-stepped or multisteped condenser which is driven by at least one gas turbine. Starters, which are used to assist the gas turbines, are associated with the gas turbines. According to the invention, the second coolant mixture circuit is used at least for intermediate cooling (E1) of the hydrocarbon-rich flow that is to be liquefied, whereby the installed capacity of the gas turbines (G1,G2) and starters can be fully used.

Classifications:

International (IPC 8-9): F25J1/02 (Advanced/Invention);
F25J1/00 (Core/Invention)

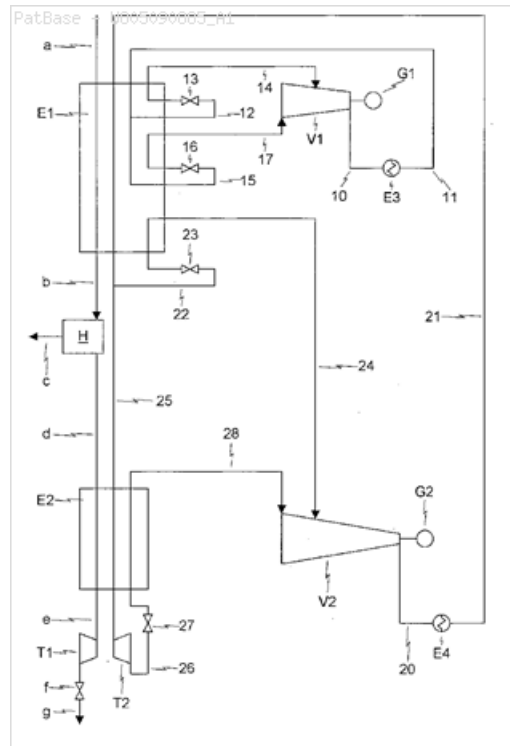
International (IPC 1-7): F25J1/02

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F25J1/0283 F25J1/0287 F25J1/0292 F25J2220/64 F25J2245/02

European: F25J1/00A6 F25J1/00C 4V4 F25J1/02D F25J1/02D4

F25J1/02Z6A4 F25J1/02Z6C2 F25J1/02Z6L F25J1/02Z6S R25J220/64
R25J245/02



Family:

Publication number	Publication date	Application number	Application date
DE102004011481 A1	20050929	DE200410011481	20040309
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WO05090885 A1	20050929	WO2005EP02009	20050225

Priority:

DE200410011481 20040309 WO2005EP02009 20050225

Probable Assignee: LINDE AG

Assignee(s): (std): BAUER HEINZ ; FRANKE HUBERT ; LINDE AG ; SAPPER RAINER ; SCHIER MARC

Assignee(s): LINDE AKTIENGESELLSCHAFT

Inventor(s): (std): BAUER HEINZ ; FRANKE HUBERT ; SAPPER RAINER ; SCHIER MARC

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SM SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

Title: METHOD AND APPARATUS FOR LIQUEFYING A NATURAL GAS STREAM

Abstract: The present invention relates to a method of liquefying a natural gas stream, wherein the natural gas stream (10) is provided at a pressure of 30-80 bar, expanded to a pressure <35 bar, supplied to a gas/liquid separator (31) and therein into a vaporous stream (40) and a liquid stream (30). The pressure of the vaporous stream is increased to a pressure of at least 70 bar and the pressurized vaporous stream (90) is liquefied to obtain a liquefied natural gas stream.

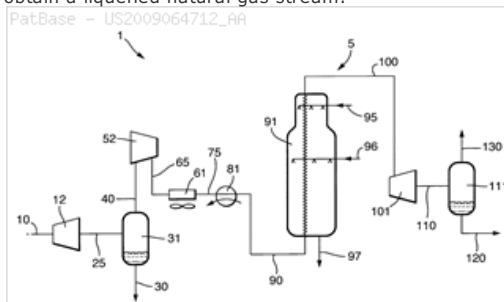
Classifications:

International (IPC 8-9): C10L3/06 F25J1/00 F25J1/02 F25J3/02 F25J3/06 (Advanced/Invention); F25J1/02 (Advanced/Non-invention); C10G2/00 C10L3/00 F25J1/00 F25J1/02 F25J3/06 (Core/Invention)

International (IPC 1-7): C10G 2/00 F25J 1/02 F25J1/02
CPC: F25J1/0238 F25J1/0022 F25J1/0035 F25J1/0042 F25J1/0055 F25J1/0214 F25J1/0216 F25J2205/02 F25J2220/62 F25J2220/64 F25J2230/60

European: F25J1/00A6 F25J1/00C2E F25J1/00C2L F25J1/00C4V2 F25J1/02D4 F25J1/02D4P2 F25J1/02K8D2 R25J205/02 R25J220/62 R25J220/64 R25J230/60

US: 62/613 62/613P



Family:

Publication number	Publication date	Application number	Application date
AU2006233914 AA	20061019	AU20060233914	20060410
AU2006233914 BB	20090903	AU20060233914	20060410
CN101156038 A	20080402	CN200680011841	20060410
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WO06108821 A1	20061019	WO2006EP61470	20060410

Priority:

EP20050102884 20050412 EP20060725670 20060410 EP20060743270 20060410
 WO2006EP61470 20060410 WO2006EP61469 20060410

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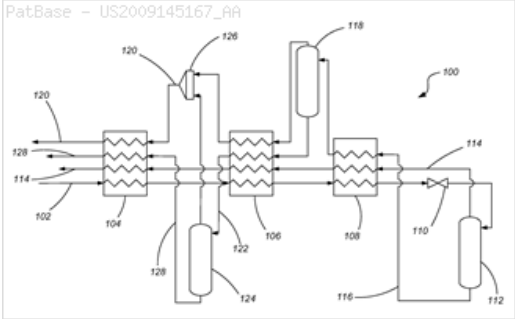
Agent(s): SPRUSON AND FERGUSON; ONO SHINJIRO; HOSHINO OSAMU; TERACHI TAKUMI; TOMITA HIROYUKI; OKIMOTO KAZUAKI; TAGAMI YASUKO; KOBAYASHI YASUSHI; SHELL OIL COMPANY; SHELL OIL CO

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LC LI LK LR LS LT LU LV LY MA MC MD MG MK ML MN MR MW MX MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SM SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

Title: METHODS, APPARATUSES AND SYSTEMS FOR PROCESSING FLUID STREAMS HAVING MULTIPLE CONSTITUENTS

Abstract: Methods, apparatuses and systems for processing fluid streams having multiple constituents are provided including embodiments utilizing ascending temperature separation processes as well as combined ascending and descending temperature separation processes. For example, in one embodiment, a mixed gas stream may be processed by flowing the stream through multiple heat exchangers, expanding the stream, and then separating the stream into a liquid portion and a vapor portion. The vapor portion, having an increased or decreased concentration of an identified constituent may then pass through the heat exchangers again in reverse order and collected. The liquid portion may then be subjected to further, sequential separation acts which each take place at increasing temperatures. In another embodiment, numerous, sequential separation acts take place in, for example, at decreasing temperatures and, subsequently, at increasing temperatures. Such a mixed fluid stream, for example, may include constituents such as hydrogen, carbon monoxide and methane.

Classifications:
International (IPC 8-9): F25J1/00 F25J3/00 F25J3/06 (Advanced/Invention); F25J1/00 F25J3/00 F25J3/06 (Core/Invention)
CPC: F25J3/0625 F25J3/0635 F25J3/064 F25J3/0645 F25J3/0655 F25J3/0665
European: F25J3/06A6 F25J3/06C10 F25J3/06C14 F25J3/06C2 F25J3/06C4 F25J3/06C6
US: 62/606 62/606P 62/617 62/617S



Family:

Publication number	Publication date	Application number	Application date
US2009145167 AA	20090611	US20070951484	20071206
WO09073666 A1	20090611	WO2008US85276	20081202

Priority:

US20070951484 20071206

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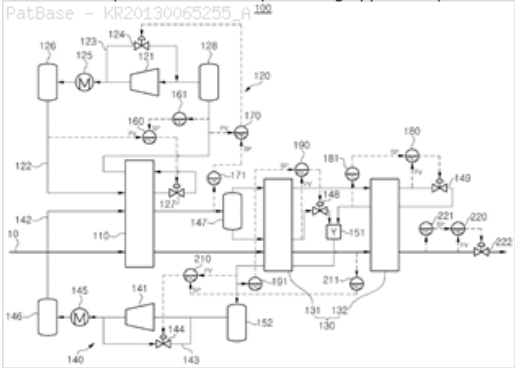
Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG UZ VC VN ZA ZM ZW

Title: NATURAL GAS LIQUEFACTION SYSTEM

Abstract: PURPOSE: A natural gas liquefying system is provided to facilitate compressing a small amount of natural gas at high pressure, and control a liquefying process by enabling the control of the flowing amount of the refrigerant while using a rated capacity of a refrigerant compressor. CONSTITUTION: A natural gas liquefying system comprises: a first heat exchanger(110) installed on a feed line(10), refrigerating natural gas passing through the feed line by heat-exchanging with a first refrigerant; and a first refrigerant circulation-supplying unit(120) circulation-supplying the first refrigerant to the first heat exchanger after refrigerating the first refrigerant, a first compressor compressing the first refrigerant, and controlling the amount of bypass of the first refrigerant to the first compressor. The first compressor is a reciprocating type compressor.

Classifications:

International (IPC 8-9): F25J3/00 F25J3/02 (Advanced/Invention)
CPC: F25J3/0214 F25B41/003 F25B41/04 F25B41/062 F25J1/0235 F25J1/0254 F25J2205/02 F25J2210/60 F25J2280/02 F25J1/0022 F25J1/0052 F25J1/0055 F25J1/0087 F25J1/0216 F25J1/0244 F25J1/0279 F25J1/0292



Title: Method for liquefying natural gas

Abstract: Provided is a method for liquefying natural gas which can be readily adapted to LNG plants of all sizes without requiring expensive and special heat exchangers. The liquefaction of feed gas of natural gas and recycle natural gas is carried out with a single-component refrigerant or a mixed refrigerant in a high temperature stage, and with a substantially isentropic expansion in a low temperature stage, and a non-liquefied part of the recycle gas after the expansion step is pressurized with a compressor and recycled along with a recycle stream of non-liquefied part of the feed natural gas, the liquefied part by the refrigerant exchanging heat with the non-liquefied part stream produced from the substantially isentropic expansion, in a plate-fin heat exchanger or the like. The compressor is driven by the power obtained by the substantially isentropic expansion.

Classifications:

International (IPC 8-9): F25B11/02 F25J1/00

F25J1/02 (Advanced/Invention)

International (IPC 1-7): C01L3/00 F25B11/02 F25J1/00 F25J1/02 F25J3/06

CPC: F25J1/0022 F25J1/0035 F25J1/0037 F25J1/004 F25J1/0055 F25J1/0219 F25J1/0231 F25J1/0278 F25J1/0285 F25J1/0288 F25J1/0291 F25J1/0294 F25J2205/02 F25J2210/06 F25J2220/62 F25J2220/64 F25J2230/60 F25J2235/60 F25J2240/40

European: F25J1/00A6 F25J1/00C2E F25J1/00C2E2 F25J1/00C2F F25J1/00C4V2 F25J1/02D10 F25J1/02K2R F25J1/02Z4U4F F25J1/02Z6C F25J1/02Z6C4 F25J1/02Z6J F25J1/02Z6N R25J205/02 R25J210/06 R25J220/62 R25J220/64 R25J230/60 R25J235/60 R25J240/40

US: 62/613

PatBase - US5363655_A

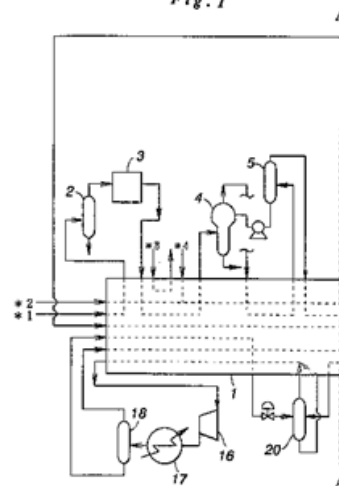
U.S. Patent

Nov. 15, 1994

Sheet 1 of 12

5,363,655

Fig. 1



Family:

Publication number	Publication date	Application number	Application date
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EP0599443 B1	19970917	EP19930301750	19930308
JP6159928 A2	19940607	JP19920335540	19921120
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KR19940011616 A	19940621	KR19930004477	19930323
US5363655 A	19941115	US19930028025	19930308

Priority:

JP19920335540 19921120 CA19932090809 19930302

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Agent(s): GOUDREAU GAGE DUBUC

Designated states: DE FR GB IT NL