

1) Family number: 49461002 (US2013299501A)

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Title: STORAGE CONTAINER FOR LIQUEFIED NATURAL GAS

Abstract: A LNG storage container includes: an inner shell made of a metal withstanding a low temperature of the LNG and configured to store the LNG inside; an outer shell made of a steel withstanding an internal pressure of the inner shell and configured to enclosing the outside of the inner shell such that a space is formed between the inner shell and the outer shell; and a heat insulation layer part installed in the space between the inner shell and the outer shell and configured to reduce a heat transfer.

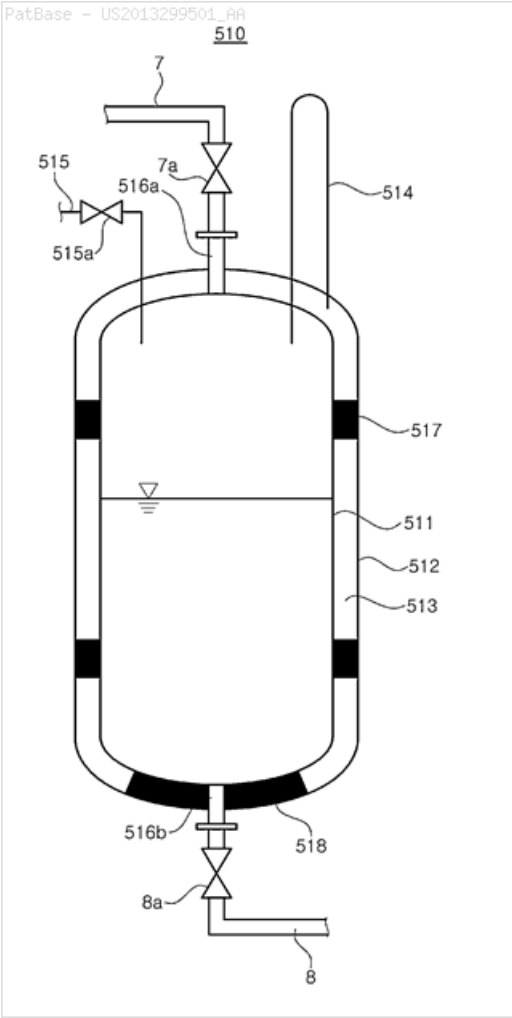
Classifications:

International (IPC 8-9): B63B25/16 F17C1/00 F17C1/12 F17C13/00 F17C13/04 F17C13/08 F17C13/10 F17C3/02 F17C3/04 (Advanced/Invention)

CPC: F17C2201/0109 F17C2201/0138 F17C2201/0147 F17C2203/015 F17C2203/018 F17C2203/0316 F17C2203/0341 F17C2203/0345 F17C2203/0629 F17C2203/0643 F17C2203/0646 F17C2203/0648 F17C2205/0111 F17C2205/0134 F17C2205/0149 F17C2205/0157 F17C2205/0184 F17C2205/0192 F17C2205/0196 F17C2205/0332 F17C2209/221 F17C2209/228 F17C2209/234 F17C2221/033 F17C2223/033 F17C2225/035 F17C2227/0107 F17C2227/0135 F17C2227/0157 F17C2227/0304 F17C2227/0381 F17C2227/0383 F17C2227/04 F17C2250/032 F17C2250/034 F17C2250/043 F17C2250/0439 F17C2250/0443 F17C2250/0491 F17C2250/0495 F17C2260/013 F17C2260/016 F17C2260/025 F17C2265/031 F17C2265/034 F17C2265/05 F17C2265/06 F17C2270/0105 F17C2270/0113 F17C2270/0171 F17C2270/0173 F17C1/005 F17C3/02

European: F17C3/02

US: 220/560.04 220/560.12



Family:

Publication number	Publication date	Application number	Application date
AU2011236082 AA	20120510	AU20110236082	20111024
AU2011236082 BB	20140619	AU20110236082	20111024
CN103221733 A	20130724	CN201180019040	20110316
CN103221733 B	20160309	CN201180019040	20110316
EP2444711 A2	20120425	EP20110186240	20111021
EP2444711 A3	20171227	EP20110186240	20111021
JP2012532302 T2	20121213	JP20120539824T	20110316
JP5568139 B2	20140806	JP20120539824T	20110316
KR101041783 B1	20110617	KR20100103729	20101022
KR101049230 B1	20110714	KR20100103730	20101022
MY166396 A	20180625	MY20120004494	20110316
SG184485 A1	20121129	SG20120074480	20110316
US2013299501 AA	20131114	US20110640475	20110316
WO12053704 A1	20120426	WO2011KR01830	20110316

Priority:

Probable Assignee: DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Assignee(s): (std): DAEWOO SHIPBUILDING AND AMP MARINE ENGINEERING ; DAEWOO SHIPBUILDING AND MARINE ; DAEWOO SHIPBUILDING AND MARINE ENG CO LTD ; LEE JAE YEOL ; LEE JUNG HAN ; KIM KWANG SEOK ; KIM YOO IL ; KANG JOONG KYOO ; PARK SEONG WOO ; KIM YOO II

Assignee(s): DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO ; DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Inventor(s): (std): JIANG ZHONGGUI ; JIN GUANGSHI ; JIN YUYI ; KANG JOONG KYOO ; KIM KWANG SEOK ; KIM YOO IL ; LEE JAE YEOL ; LEE JUNG HAN ; LI ZAILIE ; LI ZHENGHAN ; LIM YOO II ; PARK SEONG WOO ; PIAO CHENGYOU ; KIM YOO II

Agent(s): APT PATENT AND TRADE MARK ATTORNEYS; INTES DIDIER GERARD ANDRE; AIP PATENT AND LAW FIRM

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 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 IS IT JP KE KG KM KN KP KZ LA LC LI 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 PE PG PH PL PT RO RS RU 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

2) Family number: 29185006 (US4765813A)

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Title: HYDROGEN LIQUEFACTION USING A DENSE FLUID EXPANDER AND NEON AS A PRECOOLANT REFRIGERANT

Abstract: The present invention is a process for the liquefaction of hydrogen which utilizes a dense fluid expander and neon as a precoolant refrigerant. In the process, a two phase mixture containing about 85-90 percent liquid of greater than 95 percent para-hydrogen is produced in a dense fluid expander. Most of the refrigeration for liquefaction is supplied by a neon refrigeration system, consisting of a centrifugal compressor, heat exchangers and one or more stages of neon expansion. As an option, further refrigeration may be supplied utilizing liquid nitrogen as another precoolant.

Classifications:

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

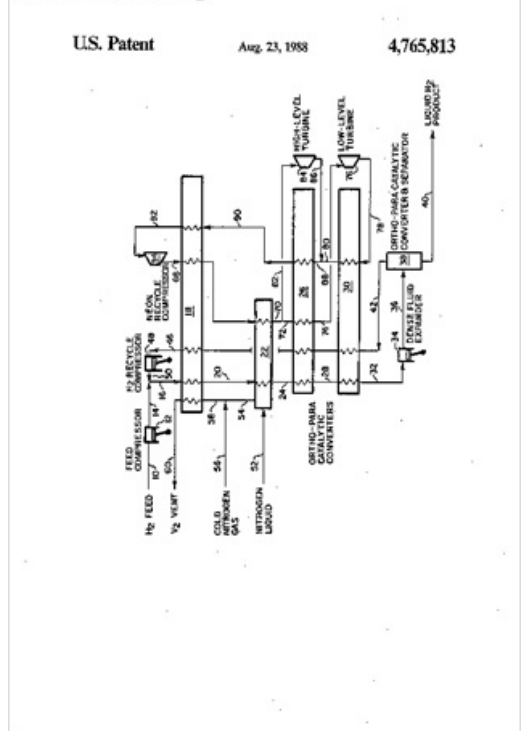
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CPC: Y10S62/912 Y10S62/931 F25J1/004 F25J1/0042 F25J1/005 F25J1/0062 F25J1/0208 F25J1/0221 F25J2210/42 F25J2270/16 F25J1/001

European: F25J1/00A2W F25J1/00C2F F25J1/00C2L F25J1/00C4E F25J1/00R2 F25J1/02 F25J1/02B10 F25J1/02F R25J210/42 R25J270/16

US: 62/20 62/23 62/39 62/40 62/606 62/912 62/931

PatBase - US4765813_A



Family:

Publication number	Publication date	Application number	Application date
CA1298775 A1	19920414	CA19870555727	19871231
DE3877351 D1	19930218	DE19883877351	19880516
DE3877351 T2	19930506	DE19883877351T	19880516
EP0342250 A1	19891123	EP19880107846	19880516
EP0342250 B1	19930107	EP19880107846	19880516
JP1655454 C3	19920413	JP19870331858	19871226
JP3019471 B4	19910315	JP19870331858	19871226
JP63169468 A2	19880713	JP19870331858	19871226
US4765813 A	19880823	US19870001127	19870107

Priority:

US19870001127 19870107 CA19870555727 19871231 EP19880107846 19880516

Probable Assignee: AIR PRODUCTS AND CHEMICALS INC

Assignee(s): (std): AIR PROD AND CHEM

Assignee(s): AIR PROD AND CHEM INC ; AIR PRODUCTS AND CHEMICALS INC ; AIR PRODUCTS AND CHEMICALS INC A CORP OF DE ; AIR PRODUCTS AND CHEMICALS INC ALLENTOWN PA US ; GAUMER LEE STROHL JR ; WINTERS ARTHUR RALPH JR

Inventor(s): (std): AASAA RARUFU UINTAASU JIYUNIA ; AASAA RARUFU UINTAASU JUNIA ; GAUMER LEE S JR ; RII SUTOROORU GAUMAA JIYUNIA ; RII SUTOROORU GAUMAA JUNIA ; WINTERS ARTHUR R JR ; WINTERS JR ARTHUR RALPH ; WINTERS JR ARTHUR R ; GAUMER JR LEE STROHL ; GAUMER JR LEE S

Inventor(s): WINTERS ARTHUR RALPH JR ; GAUMER LEE STROHL JR ; WINTERS JR ARTHUR RALPH COOPERSBURG PA 18036 US ; WINTERS ARTHUR R ; GAUMER LEE S ; GAUMER JR LEE STROHL ALLENTOWN PA 18104 US

Agent(s): OSLER HOSKIN AND HARCOURT LLP

Designated states: CH DE FR LI

3) Family number: 11678023 (US5347819A)

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Title: METHOD AND APPARATUS FOR MANUFACTURING SUPERFLUIDITY HELIUM

Abstract: Method and apparatus for manufacturing superfluidity helium (He II). The method includes the steps of (a) providing 3He gas (b) providing liquid 4He, (c) compressing the 3He gas to produce compressed 3He gas, (d) indirectly cooling the compressed 3He gas with liquid 4He to produce cryogenic 3He gas (e) adiabatically expanding the cryogenic 3He gas to produce cryogenic 3He gas having a temperature of less than about 1.18 DEG K., preferably less than 1.8 DEG K., and (f) indirectly cooling the liquid 4He with the cryogenic 3He gas produced in step (e) to produce superfluidity helium. The apparatus includes a first container for liquid helium and a second container for containing superfluidity helium, and a first line for connecting the first and second containers. A 3He refrigeration circuit is provided to cool the 4He in directly with cryogenic 3He to produce superfluidity helium. The method and apparatus enables superfluidity helium to be produced without the use of a large vacuum pump whose lubricants might contaminate the superfluidity helium. The method and apparatus also allow superfluidity helium at or near standard pressure to be easily produced and maintained.

Classifications:

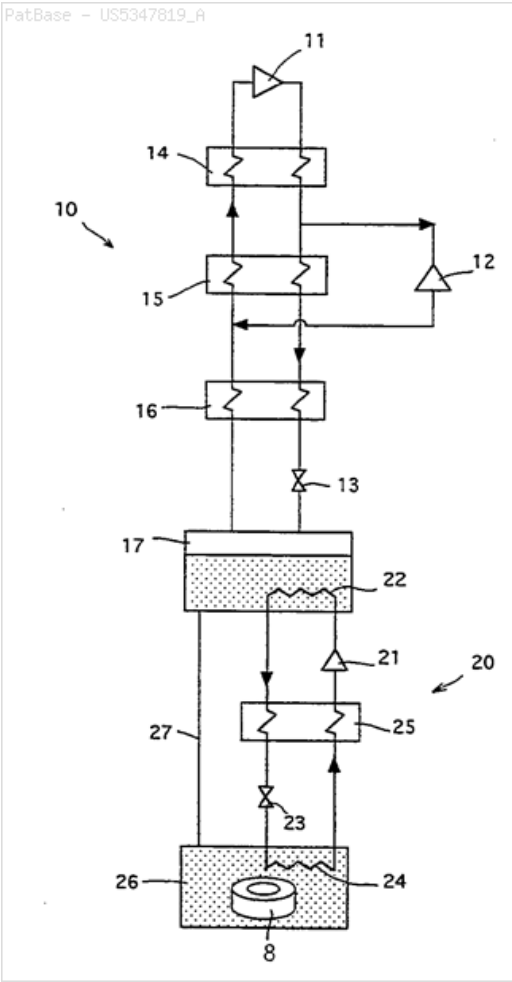
International (IPC 8-9): F17C13/00 F25B9/02 F25B9/10 F25J1/00 (Advanced/Invention); F17C13/00 F25B9/02 F25B9/10 F25J1/00 (Core/Invention)

International (IPC 1-7): F25B19/00 F25B9/02

CPC: F25J1/0276 F25B9/10

European: F17C13/00H2B F25B9/10 F25J1/02Z4U2

US: 62/434 62/51.3 62/610



Family:

Publication number	Publication date	Application number	Application date
JP2666664 B2	19971022	JP19920295538	19921105
JP6042830 A2	19940218	JP19920295538	19921105
US5347819 A	19940920	US19930141742	19931027

Priority:

JP19920137360 19920529 JP19920295538 19921105

Probable Assignee: ISHIKAWAJIMA HARIMA HEAVY IND CO LTD

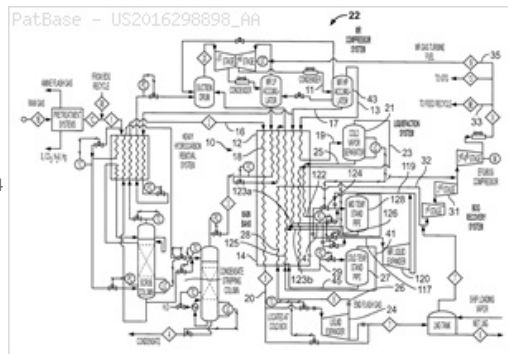
Assignee(s): (std): IHI CORP ; ISHIKAWAJIMA HARIMA HEAVY IND

Assignee(s): ISHIKAWAJIMA HARIMA HEAVY IND CO ; ISHIKAWAJIMA HARIMA HEAVY IND CO LTD ; ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES CO ; ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES CO LTD

Inventor(s): (std): SAJI SHUKO ; OYA HIROSHI ; SAJI NOBUYOSHI ; OHYA HIROSHI ; NAGAI SHUNJI ; ASAKURA HIROSHI

Title: MIXED REFRIGERANT LIQUEFACTION SYSTEM AND METHOD

Abstract: A system for liquefying a gas includes a liquefaction heat exchanger having a feed gas inlet adapted to receive a feed gas and a liquefied gas outlet through which the liquefied gas exits after the gas is liquefied in the liquefying passage of the heat exchanger by heat exchange with a primary refrigeration passage. A mixed refrigerant compressor system is configured to provide refrigerant to the primary refrigeration passage. An expander separator is in communication with the liquefied gas outlet of the liquefaction heat exchanger, and a cold gas line is in fluid communication with the expander separator. A cold recovery heat exchanger receives cold vapor from the cold gas line and liquid refrigerant from the mixed refrigerant compressor system so that the refrigerant is cooled using the cold vapor.

Classifications:**International (IPC 8-9):** F25J1/00 F25J1/02 F25J3/00 F25J3/02 F25J3/08 F25J5/00 (Advanced/Invention)**CPC:** F25J1/0022 F25J1/0035 F25J1/004 F25J1/0042 F25J1/0055 F25J1/0057 F25J1/0219 F25J1/023 F25J1/0238 F25J1/0262 F25J1/0267 F25J1/0279 F25J1/0283 F25J1/0294 F25J2210/04 F25J2220/64 F25J2230/08 F25J2230/24 F25J2230/30 F25J2230/60 F25J2245/02 F25J2245/90 F25J1/0257 F25J2230/20 F25J2230/22 F25J2240/30 F25J3/0209 F25J3/0233 F25J3/0238 F25J3/0242 F25J2200/72 F25J2200/74 F25J2200/76 F25J2200/78**US:** 62/613**Family:**

Publication number	Publication date	Application number	Application date
AR104222 AA	20170705	AR2016P100967	20160408
AU2016246839 AA	20171102	AU20160246839	20160411
BR112017021399 A2	20180703	BR20171121399	20160411
CA2982210 AA	20171006	CA20162982210	20160411
CN107614994 A	20180119	CN201680032085	20160411
EP3280963 A1	20180214	EP20160777478	20160411
EP3280963 A4	20190320	EP20160777478	20160411
ID201804943 A	20180511	ID2017P0006943	20160411
JP2018511024 T2	20180419	JP20170553009T	20160411
KR20180019517 A	20180226	KR20177032391	20160411
MX2017012978 A1	20180212	MX20170012978	20160411
PE08102018 A1	20180509	PE20170001995	20160411
TW201638539 A	20161101	TW20160111143	20160408
US2016298898 AA	20161013	US20160095631	20160411
US2018003430 AA	20180104	US20170702271	20170912
US10060671 BB	20180828	US20160095631	20160411
WO16164893 A1	20161013	WO2016US26924	20160411

Priority:US20150145929P 20150410 US20150215511P 20150908 US20160095631 20160411
WO2016US26924 20160411 US20170702271 20170912**Probable Assignee:** CHART ENERGY AND CHEMICALS INC**Assignee(s):** (std): CHART ENERGY AND CHEMICALS INC**Assignee(s):** DUCOTE DOUGLAS A ; GLANVILLE MARK R ; GUSHANAS TIMOTHY P ; JPMORGAN CHASE BANK NA ADMINISTRATIVE AGENT AS**Inventor(s):** (std): DOUGLAS A DUCOTE ; DOUGLAS A DUCOTE JR ; DUCOTE JR DOUGLAS A ; DUCOTE DOUGLAS A ; GLANVILLE MARK ; GLANVILLE MARK R ; GUSHANAS TIMOTHY P ; MARK GLANVILLE ; TIMOTHY P GUSHANAS ; MARK R GLANVILLE**Inventor(s):** DUCOTE JR**Agent(s):** SPRUSON AND FERGUSON; BLAKE CASSELS AND GRAYDON LLP; STAFFORD JONATHAN ALAN LEWIS; DR BELINDA ROSALINA SH LLM; ONO SHINJIRO; YAMAMOTO OSAMU; MIYAMAE TORU; NAKANISHI MOTOHARU; MATSUYAMA MINAKO; COOK ALEX LTD; JOHNSTON R BLAKE**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 LI 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:** LIQUEFIED NATURAL GAS STORAGE CONTAINER AND METHOD FOR MANUFACTURING THE SAME

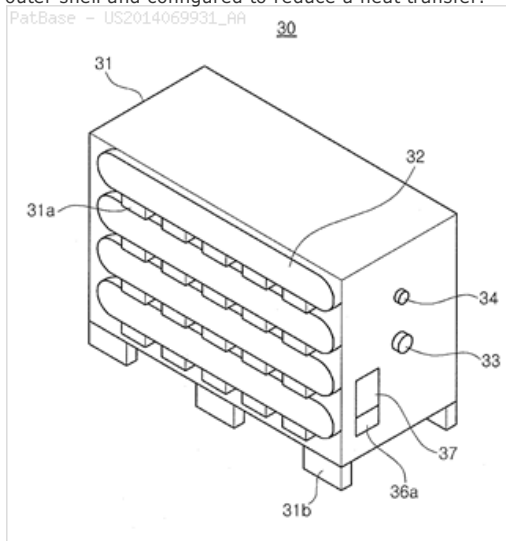
Abstract: Provided are an LNG storage container with an inner shell, which is capable of efficiently storing LNG or pressurized LNG (PLNG) pressurized at a predetermined pressure and supplying the LNG or PLNG to a consumption place, and capable of reducing manufacturing costs by minimizing the use of a metal having excellent low temperature characteristic, and a method for manufacturing the same. The LNG storage container includes: an inner shell configured to store LNG inside; an outer shell

configured to enclose the outside of the inner shell such that a space is formed between the inner shell and the outer shell; a support installed in the space between the inner shell and the outer shell to support the inner shell and the outer shell; and a heat insulation layer part installed in the space between the inner shell and the outer shell and configured to reduce a heat transfer.

Classifications:

International (IPC 8-9): B63B25/16 B65D90/06 F17C1/02 F17C1/08 F17C1/12 F17C1/16 F17C3/02 F17C3/04 F17C5/02 F25J1/00 F25J1/02 (Advanced/Invention); F17C13/00 (Advanced/Non-invention)
CPC: F17C5/02 F17C3/025 F17C2201/0109 F17C2201/0123 F17C2201/0138 F17C2201/032 F17C2201/035 F17C2201/052 F17C2201/054 F17C2203/015 F17C2203/018 F17C2203/0329 F17C2203/0333 F17C2203/0341 F17C2203/035 F17C2203/0629 F17C2203/0643 F17C2203/0646 F17C2203/0648 F17C2205/0111 F17C2205/0192 F17C2205/0305 F17C2209/232 F17C2221/033 F17C2223/0161 F17C2223/035 F17C2227/0107 F17C2227/0376 F17C2227/0383 F17C2260/016 F17C2265/034 F17C2265/05 F17C2270/0105 F17C2270/0113 F25J1/0022 F25J1/005 F25J1/0055 F25J1/0212 F25J1/0254 F25J1/0263 F25J1/0265 F25J1/0272 F25J2205/20 F25J2205/24 F25J2205/84 F25J2220/66 F25J2220/68 F25J2290/44 F25J2290/62
US: 1/1 220/560.1

PatBase - US2014069931_AA



Family:

Publication number	Publication date	Application number	Application date
AU2012254258 AA	20121115	AU20120254258	20120514
AU2012254258 BB	20151022	AU20120254258	20120514
KR101350804 B1	20140115	KR20120048232	20120507
KR101403621 B1	20140605	KR20120045978	20120501
KR101481159 B1	20150108	KR20120050301	20120511
KR101485110 B1	20150122	KR20120045979	20120501
KR20120127223 A	20121121	KR20120045978	20120501
KR20120127224 A	20121121	KR20120045979	20120501
KR20120127244 A	20121121	KR20120048232	20120507
KR20120127311 A	20121121	KR20120050301	20120511
US2014069931 AA	20140313	US20120810885	20120514
US9360160 BB	20160607	US20120810885	20120514
WO12154015 A2	20121115	WO2012KR03767	20120514
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Priority:

KR20110044529 20110512 KR20120045978 20120501 KR20120045979 20120501
KR20120048232 20120507 KR20120050301 20120511 WO2012KR03767 20120514

Probable Assignee: DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Assignee(s): (std): HEO HAENG SUNG ; KIM KWANG SEOK ; KWON YOUNG BIN ; KANG JOONG KYOO ; PARK SEONG WOO ; LEE JUNG HAN ; SHIN JUNG SUB ; KIM YONG TAI ; KIM YOO IL ; DAEWOO SHIPBUILDING AND MARINE

Assignee(s): DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO ; DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD ; CLUSTER LNG CO LTD

Inventor(s): (std): KIM KWANG SEOK ; KWON YOUNG BIN ; HEO HAENG SUNG ; KANG JOONG KYOO ; PARK SEONG WOO ; LEE JUNG HAN ; SHIN JUNG SUB ; KIM YONG TAI ; KIM YOO IL

Agent(s): APT PATENT AND TRADE MARK ATTORNEYS; KNOBBE MARTENS OLSON AND BEAR LLP; AIP PATENT AND LAW FIRM

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 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 IS IT JP KE KG KM KN KP 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 PE PG PH PL PT QA RO RS RU RW 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

6) Family number: 55631050 (US2014290279A)

PatBase

Title: LIQUEFIED GAS TREATMENT SYSTEM FOR VESSEL

Abstract: A liquefied gas treatment system includes: a first stream of boil-off gas, which is generated from the liquefied natural gas in the cargo tank and is discharged from the cargo tank; a second stream of the boil-off gas, which is supplied as fuel to the engine in the first stream; and a third stream of the boil-off gas, which is not supplied to the engine in the first stream. The first stream is compressed in a compressor and is then branched into the second stream and the third stream. The third stream is liquefied by exchanging heat with the first stream in a heat exchanger, so that the boil-off gas is treated without employing a reliquefaction apparatus using a separate refrigerant.

Classifications:

International (IPC 8-9): B63B25/08 B63B25/14 B63B25/16 B63H21/00 B63H21/12 B63H21/14 B63H21/38 F02B3/06 F02B43/00 F02D19/02 F02D19/06 F02D19/08 F02M21/02 F02M21/04 F02M21/06 F02M25/08 F02M31/16 F02M37/00 F02M37/04 F17C1/00 F17C13/00 F17C13/08 F17C13/12 F17C7/02 F17C7/04 F17C9/02 F25J1/00 F25J1/02 F25J3/00 (Advanced/Invention);

CPG: F17C9/02 F17C13/082 F25J1/0025 F17C2221/033 B63B25/08
F02M21/0212 F02M21/0209 F17C7/04 F17C13/004 F02D19/021
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F02M21/0224 Y02T10/36 Y02T70/5263 B63H21/00 B63H21/12 F02M37/04
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B63B9/00 F25J3/00 B63B25/16 Y02T10/126 Y02T10/32 F02D19/022
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Publication number	Publication date	Application number	Application date
■ CN104024100 A	20140903	CN201380003716	20131024
■ CN104024619 A	20140903	CN201380003614	20131024
■ CN104024619 B	20180213	CN201380003614	20131024
■ CN104736829 A	20150624	CN201380055645	20131024
■ CN104736829 B	20170606	CN201380055645	20131024
■ CN104755737 A	20150701	CN201380055569	20131024
■ CN104755737 B	20180213	CN201380055569	20131024
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■ EP2853479 A1	20150401	EP20130844586	20131024
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Probable Assignee: DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Assignee(s): (std): DAEWOO SHIPBUILDING AND MARINE ; DAEWOO SHIPBUILDING AND MARINE ENG CO LTD ; DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD ; DEU SHIPBILDING END MARIN INDZHINIRING KO LTD

Assignee(s): DEU SHIPBILDING END MARIN INDZHINIRING KO ; DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO

Inventor(s): (std): BEEN KWON SOON ; CHAE LEE JOON ; CHAN KIM DONG ; JE CHANG HO ; JEHEON JUNG ; JUNG JEHEON ; JUNG SEUNG KYO ; KYU CHOI DONG ; SIK MOON YOUNG ; SOO KIM NAM ; MOON YOUNG SIK ; MOON JOUNG SIK ; LI DZOON CHAE ; LEE JOON CHAE ; KWON SOON BEEN ; KIM NAM SOO ; KIM IN WOONG ; KIM DONG CHAN ; JUNG JE HEON ; DZUNG SEUNG KIO ; DZUNG DZEKHEON ; CHOJ DONG KIU ; CHOI DONG KYU ; LEE JUN CHAE ; KVON SOON BEEN

Agent(s): INTES DIDIER GERARD ANDRE; KNOBBE MARTENS OLSON AND BEAR LLP; AIP PATENT AND LAW FIRM

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 KZ LA LC LI 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

7) Family number: 68084085 (WO18005626A1)

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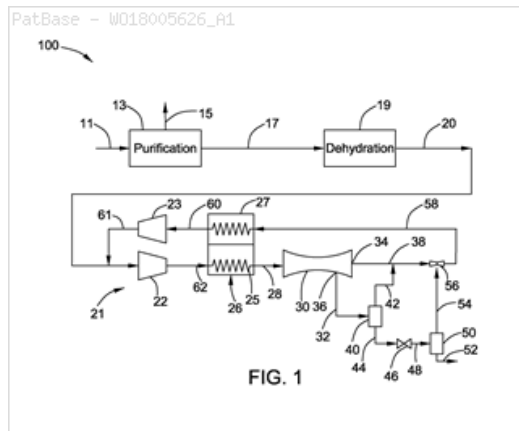
Title: SYSTEM AND METHOD FOR PRODUCING LIQUEFIED NATURAL GAS

Abstract: A system, and a method for producing liquefied natural gas are provided. The system includes a heat exchanger, a first supersonic chiller, and a compression unit. The heat exchanger is for cooling a feed natural gas stream to obtain a cooled natural gas stream. The first supersonic chiller is for chilling the cooled natural gas stream to produce liquefied natural gas and output at least a portion of chilled gaseous natural gas to the heat exchanger to be heated to obtain a heated natural gas stream. The compression unit is for compressing the heated natural gas stream from the heat exchanger and providing a compressed natural gas stream to the heat exchanger to be cooled together with the feed natural gas stream by heat exchanging with the at least a portion of the chilled gaseous natural gas.

Classifications:

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

CPC: F25J1/0022 F25J1/0037 F25J1/004 F25J1/0202 F25J2220/64 F25J2230/30 F25J2240/40 F25J2240/60



Family:

Publication number	Publication date	Application number	Application date
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Priority:

CN201610502505 20160630 WO2017US39711 20170628

Probable Assignee: GEN ELECTRIC

Assignee(s): (std): GEN ELECTRIC

Assignee(s): GENERAL ELECTRIC CO ; HU LISHUN ; ZHANG JIE ; XUE JUNLI ; LV JING ; ACHARYA HARISH RADHAKRISHNA

Inventor(s): (std): ACHARYA HARISH RADHAKRISHNA ; HU LISHUN ; ZHANG JIE ; XUE JUNLI ; LV JING ; LYU JING

Agent(s): CRAIG WILSON AND CO; DOMBROWSKI JOANNA M ET AL

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 DJ 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 JO JP KE KG KH KM KN KP KR KW 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

8) Family number: 55405090 (US2015316208A)

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Title: LIQUEFIED GAS PROCESSING SYSTEM FOR SHIP

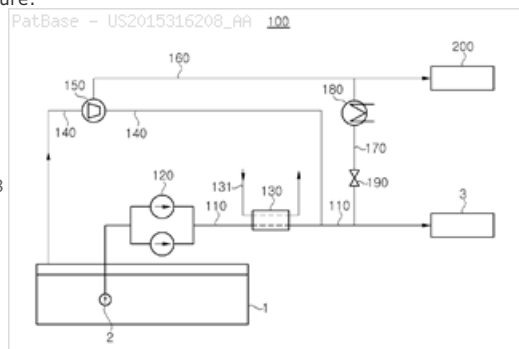
Abstract: Disclosed is a liquefied gas processing system for a ship that includes a storage tank that stores liquefied natural gas, and an engine that uses the liquefied natural gas stored in the storage tank as fuel. The liquefied gas processing system of the present invention comprises: a storage tank that stores liquefied gas; an engine that uses the liquefied gas stored in the storage tank as fuel; and a fuel supply line that can vaporize the liquefied gas and supply the generated gas to the engine as fuel. The engine receives a supply of the fuel gas that is pressurized at a low pressure.

Classifications:

International (IPC 8-9): B63B11/04 B63B25/16 B63H21/14 B63H21/16 B63H21/38 B63J2/12 B63J2/14 F02B3/06 F02B43/00 F02C3/22 F02D19/06 F02D19/08 F02M21/02 F02M21/06 F02M25/08 F02M37/04 F04B53/18 F17C1/00 F17C13/00 F17C13/08 F17C13/12 F17C5/02 F17C6/00 F17C7/02 F17C7/04 F17C9/00 F17C9/02 F25B43/00 F25J1/00 F25J1/02 F25J3/00 F25J5/00 (Advanced/Invention)

CPC: F25J2240/40 Y02T70/72 Y02T70/5218 F17C2223/047 F17C2227/0135 F17C2227/0178 F17C2265/07 F17C2270/0105 F02M25/08 F17C2265/032 F17C1/002 F02M21/0215 F02M21/0224 F02M21/0245 B63J2099/003 F02M21/0221 F02M21/023 Y02E60/321 Y02T70/5263 F02M21/06 F17C13/004 F02C3/22 F17C2260/03 F17C2221/033 F25J1/0025 Y10S220/901 F17C9/02 F17C2223/043 F17C2225/0123 F17C2265/017 F17C2265/033 F17C2265/038 B63B25/08 B63B25/14 B63H21/00 F02M21/0212 F02M21/0248 F02M31/16 F17C7/02 F17C13/082 F25J2230/08 F25J2230/30 F02M21/0287 F17C13/00 F02M21/0209 F02B3/06 F02B7/06 F02D19/021 F02D19/10 F02D41/0027 F17C2201/0157 F17C2201/052 F17C2223/0161 F17C2223/033 F17C2265/034 F17C2265/037 F17C2265/066 F17C2270/0107 F25J1/004 F25J1/0042 F25J1/0202 F25J1/023 F25J1/0277 Y02T70/5209 Y02T90/46 F17C7/04 B63H21/383 Y02T10/126 F25J2245/02 F25J1/0082 F25J1/0201 F25J2215/60 B63B2770/00 F17C6/00 F17C2265/031 Y02T10/32 B63B25/16 B63H21/38 B63J2/12 F17C13/12 F02M21/02 F17C9/00 Y02T10/36 F02D19/06

US: 123/527 60/39.465 62/48.1 62/53.2



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Priority:

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Probable Assignee: DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Assignee(s): (std): DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD ; DEU SHIPBILDING END MARIN
INDZHINIRING KO LTD ; DAEWOO SHIPBUILDING AND MARINE ; DAEWOO SHIPBUILDING AND MARINE
ENG CO LTD

Assignee(s): DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO ; DEU SHIPBILDING END MARIN INDZHINIRING

Inventor(s): (std): BAE HYUN ; BAE JAE RYU ; BEEN KWON SOON ; CHAE LEE JOON ; CHAN KIM DONG ; CHOI DONG KYU ; DZUNG DZE KHEON ; DZUNG DZEKHEON ; DZUNG SEUNG KIO ; GI PARK CHEONG ; HEON JUNG JE ; JANG JAE HO ; JANG UNG KWON ; JEHEON JUNG ; JUNG IN DON ; JUNG JE HEON ; JUNG JEHEON ; JUNG SEUNG KYO ; KANG KIM JIN ; KIM DONG CHAN ; KIM IN SOO ; KIM IN WOONG ; KIM JAE HWEI ; KIM JI EUN ; KIM JIN KANG ; KIM NAM SOO ; KIM SUNG SOO ; KWON SOON BEEN ; KWON SOON BEEN ; KYO JUNG SEUNG ; KYU CHOI DONG ; LEE CHANG WOO ; LEE JOON CHAE ; LEE JUN CHAE ; LEE SANG WOO ; LI DZOON CHAE ; MOON JOUNG SIK ; MOON YOUNG SIK ; CHOI JIN YEOL ; CHOI DONG KIU ; CHOO GYO SIG ; PARK CHEONG GI ; RYU BAE JAE ; SEO JUNG DAE ; SIG CHOO GYO ; SIK MOON YOUNG ; SOO KIM NAM ; SOO KIM SUNG

Inventor(s): SOON BEEN KWON ; YOUNG SIK MOON ; SEUNG KYO JUNG ; DONG CHAN KIM ; DONG KYU CHOI ; MOON YOUNG SIK 423 733 GWANGMYEONG SI ; MOON YOUNG SIK GWANGMYEONG SI ; NAM SOO KIM ; KIM NAM SOO 440 710 SUWON SI ; KIM NAM SOO SUWON SI ; JOON CHAE LEE ; JUN CHAE LEE ; CHOI DONG KYU 463 893 SEONGNAM SI ; CHOI DONG KYU SEONGNAM SI

Agent(s): CBDL PATENTANWAELTE; INTES DIDIER GERARD ANDRE; VEIGA MIKEL; BUDI RAHMAT; BUDI RAHMAT SH; OOO YURIDICHESKAYA GORODISKI I PARTNERY FA; CEMEN KARABAG; MINE MANAP TUEREL; AIP PATENT AND LAW FIRM

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 KZ LA LC LI 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

9) Family number: 33302116 (WO07148122A2)

© PatBase

Title: LNG PRODUCTION

Abstract: A method for producing Liquefied Natural Gas (LNG) at a Pressure Reduction Station (PRS) comprising the steps of: a) expanding an input stream of natural gas from a gas transmission system; b) separating the input stream of gas into a first liquid stream containing heavy hydrocarbons, and a first gas stream that is rich in methane; c) expanding the first gas stream; d) separating the first gas stream into a spent gas stream and a second liquid stream; e) expanding the second liquid stream; f) separating the second liquid stream into second gas stream and a first LNG product stream.

Classifications:**International (IPC 8-9):** F17D1/02 F25J1/00

F25J1/02 (Advanced/Invention);

F17D1/00 F25J1/00 (Core/Invention)

CPC: F25J1/0072 F17D1/04 F25J1/0022 F25J1/0035 F25J1/004

F25J1/0052 F25J1/0201 F25J1/0202 F25J1/0204 F25J1/0212 F25J1/0232

F25J1/0255 F25J2210/06 F25J2215/02 F25J2220/64 F25J2220/66

F25J2230/08 F25J2230/20 F25J2230/60 F25J2245/02

European: F17D1/04 F25J1/00 F25J1/00A6 F25J1/00C2E F25J1/00C2F

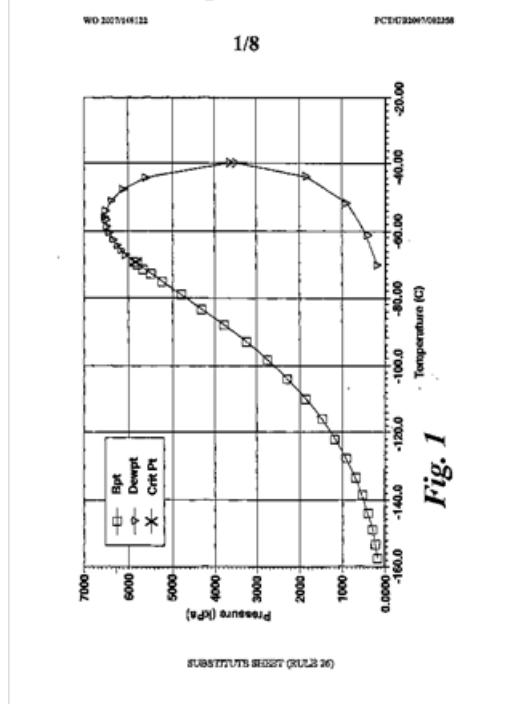
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F25J1/02D F25J1/02D2 F25J1/02K4 F25J1/02Z2T8 R25J210/06

R25J215/02 R25J220/64 R25J220/66 R25J230/08 R25J230/20 R25J230/60

R25J245/02

PatBase - WO07148122_A2

**Family:**

Publication number	Publication date	Application number	Application date
EP2047193 A2	20090415	EP20070733353	20070625
GB200612479 A0	20060802	GB20060012479	20060623
GB200612728 A0	20060809	GB20060012728	20060628
WO07148122 A2	20071227	WO2007GB02358	20070625
WO07148122 A3	20090604	WO2007GB02358	20070625

Priority:

GB20060012479 20060623

GB20060012728 20060628

WO2007GB02358 20070625

Probable Assignee: SADLER JEFFREY D**Assignee(s):** (std): BADEN HARDSTAFF LTD T ; SADLER JEFFREY D ; TILLBROOK CHRIS J ; T BADEN HARDSTAFF LTD ; SADLER JEFFREY DAVID**Assignee(s):** T BADEN HARDSTAFF LIMITED**Inventor(s):** (std): SADLER JEFFREY DAVID

Designated states: AE AG AL AM 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 LI LK LR LS LT LU LV LY MA MC MD MG MK ML MN MR MT 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 SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

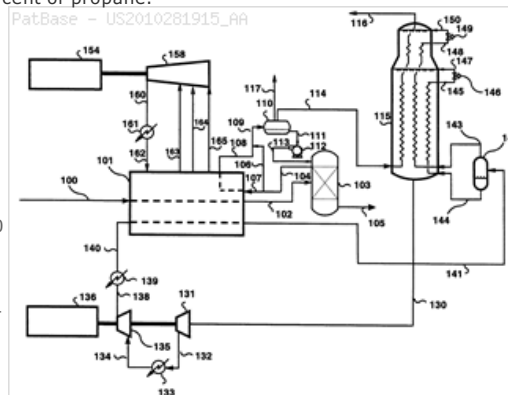
Abstract: A system and method for liquefying a natural gas stream, the method including the steps of providing a dehydrated natural gas stream for liquefaction, pre-cooling the dehydrated natural gas stream in a pre-cooling apparatus, where the pre-cooling is performed by using a pre-coolant that consists essentially of a hydrofluorocarbon (HFC) refrigerant, further cooling the pre-cooled dehydrated natural gas stream in a main heat exchanger through indirect heat exchange against a vaporized hydrocarbon mixed refrigerant coolant to produce a liquefied natural gas product stream, where the mixed refrigerant coolant comprises ethane, methane, nitrogen, and less than or equal to 3 mol percent of propane.

International (IPC 8-9): C09K5/00 C10L3/06 C10L3/10 C10L3/12
F23C1/00 F25B31/02 F25B9/00 F25J1/00 F25J1/02 F25J3/06 F25J5/00
F28F3/00 (Advanced/Invention);
C09K5/00 F25B9/00 (Core/Invention);
C10L3/10 (Core/Non-invention)

CPC: F25J1/025 F25J1/0256 F25J1/0087 F25J1/0215 F25J1/0216

F25J12290/02 F25J11/0298 C09K5/041 F25B9/006 F25J11/0022 F25J11/0052
F25J11/0055 F25J11/0092 F25J11/0097 F25J11/0214 F25J11/0238 F25J11/0241
F25J11/0278 F25J11/0283 F25J11/0284 F25J11/0292 F25J2220/64 F25J2280/10
F25J11/004 F25J11/021

European: C09K5/04B F25B9/00B4 F25J1/00A6 F25J1/00C4V
F25J1/00C4V2 F25J1/00R10 F25J1/00R6P F25J1/00R6Z F25J1/02D
F25J1/02D4 F25J1/02K8D2 F25J1/02K8D4R F25J1/02Z44F F25J1/02Z6A4
F25J1/02Z6A6 F25J1/02Z6L F25J1/02Z6Z R25J220/64 R25J280/10
US: 165/166 165/166S 62/612 62/612 62/612 62/612 62/621S



Publication number	Publication date	Application number	Application date
AR076522 AA	20110615	AR2010P101482	20100430
AU2010201730 AA	20101125	AU20100201730	20100430
AU2010201730 BB	20110825	AU20100201730	20100430
BRPI1001534 A2	20150818	BR2010PI01534	20100430
CA2701981 AA	20101105	CA20102701981	20100428
CN101880560 A	20101110	CN201010176082	20100505
EP2251625 A2	20101117	EP20100161956	20100505
EP2251625 A3	20141126	EP20100161956	20100505
IN01197CH2010 A	20101119	IN2010CH001197	20100429
JP2010261038 A2	20101118	JP20100105774	20100430
JP5502590 B2	20140528	JP20100105774	20100430
KR101223798 B1	20130117	KR20100041978	20100504
KR20100120268 A	20101115	KR20100041978	20100504
KR20120139646 A	20121227	KR20120139550	20121204
MX2010004379 A1	20101123	MX20100004379	20100421
MY148563 A	20130430	MY20100001921	20100429
PE08262010 A1	20101230	PE20100000259	20100503
RU2010117633 A	20111110	RU20100117633	20100504
TW201040253 A	20101116	TW20100114435	20100505
US2010281915 AA	20101111	US20090435869	20090505

US20090425869 20090505 US20090435869 20090505 CA20102701981 20100428

Assignee(s): (std): AIR PROD AND CHEM

Inventor(s): (std): ANANDSWARUP VARMA VISHAL ; JULIAN ROBERTS MARK ; ROBERTS MARK JULIAN ; VARMA VISHAL ANANDSWARUP ; ROBERTS MARK J

Agent(s): PIZZEYS, PIZZEYS PATENT AND TRADE MARK ATTORNEYS PTY LTD; OSLER HOSKIN AND HARCOURT LLP; MUIR BENJAMIN M J; BECK GREENER; AOKI ATSUSHI; ISHIDA TAKASHI; KOGA TETSUJI; AIR PRODUCTS AND CHEMICALS INC PATENT DEPARTMENT

Designated states: AL AT BA BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT
RO RS SE SI SK SM TR

Title: LIQUEFIED NATURAL GAS PRODUCTION SYSTEM AND METHOD WITH GREENHOUSE GAS REMOVAL

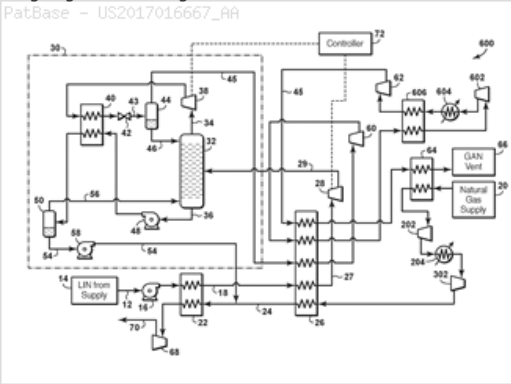
Abstract: Described herein are systems and processes to produce liquefied natural gas (LNG) using liquefied nitrogen (LIN) as the refrigerant. Greenhouse gas contaminants are removed from the LIN using a greenhouse gas removal unit.

Classifications:

International (IPC 8-9): C10L3/10 F25J1/00 F25J1/02 F25J3/02 F25J3/06 F25J3/08 (Advanced/Invention)

CPC: F25J1/0072 F25J2210/60 F25J2270/904 F25J2205/02 F25J2200/76 F25J2240/44 F25J2280/02 F25J1/0035 F25J1/0042 F25J1/0221 F25J1/023 F25J1/025 F25J3/0233 F25J2200/74 F25J2210/42 F25J2215/02 F25J2215/04 F25J2215/42 F25J2230/08 F25J2230/60 F25J2235/42 F25J2240/02 F25J2245/02 F25J2260/20 F25J2270/14 F25J2270/16 F25J2270/58 F25J3/08 F25J1/0022 F25J3/0257 F25J2200/02 F25J2200/40 F25J2220/44 F25J2230/30 F25J2230/42

US: 62/614



Family:

Publication number	Publication date	Application number	Application date
AU2016294175 AA	20180208	AU20160294175	20160614
AU2016294175 AA	20170119	AU20160294175	20160614
AU2016294175 BB	20181213	AU20160294175	20160614
AU2019200234 AA	20190131	AU20190200234	20190114
CA2991940 AA	20180109	CA20162991940	20160614
EA201890309 A1	20180531	EA20180090309	20160614
EP3322950 A1	20180523	EP20160732156	20160614
EP3396283 A1	20181031	EP20180177726	20160614
ID201807516 A	20180727	ID2018P0000711	20160614
JP2018522194 T2	20180809	JP20180501311T	20160614
KR20180030116 A	20180321	KR20187004247	20160614
TW201713909 A	20170416	TW20160117989	20160607
TWI606221 B	20171121	TW20160117989	20160607
US2017016667 AA	20170119	US20160182035	20160614
WO17011123 A1	20170119	WO2016US37375	20160614

Priority:

US20150192654P 20150715 AU20160294175 20160614 US20160182035 20160614
WO2016US37375 20160614 EP20160732156 20160614 AU20190200234 20190114

Probable Assignee: EXXON MOBIL CORP

Assignee(s): (std): DENTON ROBERT D ; EXXON MOBIL CORP ; EXXONMOBIL UPSTREAM RES CO ; HUNTINGTON RICHARD A ; GUPTA PARAG A ; PIERRE JR FRITZ ; PIERRE FRITZ JR

Assignee(s): EXXONMOBIL UPSTREAM RESEARCH CO

Inventor(s): (std): DENTON ROBERT ; DENTON ROBERT D ; DENTON ROBERT DEAN ; GUPTA PARAG ; GUPTA PARAG A ; HUNTINGTON RICHARD ; HUNTINGTON RICHARD A ; PIERRE FRITZ ; PIERRE FRITZ JR ; PIERRE JR FRITZ ; PIERRE JR ; FRITZ JR PIERRE

Inventor(s): FRITZ JR

Agent(s): WATERMARK INTELLECTUAL PROPERTY PTY LTD; BORDEN LADNER GERVAS LLP; EXXONMOBIL CHEMICAL EUROPE INC; UEXKUELL AND STOLBERG; GATOT SANYOTO WAHYU ADI SH; DESHIMARU TAKESHI; MATSUSHITA MITSURU; KURASAWA ICHIRO; JENSEN NATHAN O ET AL

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 LI 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

12) Family number: 64695167 (US2017016668A)

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Title: INCREASING EFFICIENCY IN AN LNG PRODUCTION SYSTEM BY PRE-COOLING A NATURAL GAS FEED STREAM

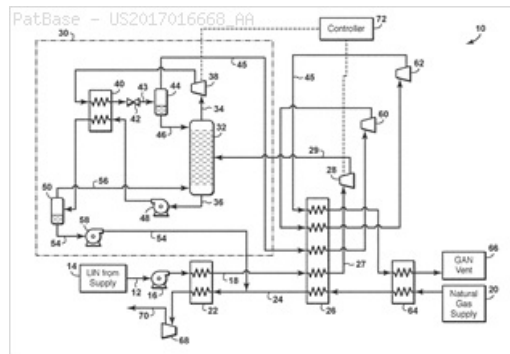
Abstract: Described herein are systems and processes to produce liquefied natural gas (LNG) using liquefied nitrogen (LIN) as the refrigerant. Greenhouse gas contaminants are removed from the LIN using a greenhouse gas removal unit. The LNG is compressed prior to being cooled by the LIN.

Classifications:

International (IPC 8-9): F25J1/00 F25J1/02 F25J3/02 F25J3/08 (Advanced/Invention)

CPC: F25J1/0072 F25J2210/60 F25J2270/904 F25J2205/02 F25J2200/76 F25J2240/44 F25J1/0035 F25J1/0042 F25J1/0221 F25J1/023 F25J1/025 F25J3/0233 F25J2200/40 F25J2200/74 F25J2210/42 F25J2215/02 F25J2215/04 F25J2215/42 F25J2230/08 F25J2230/60 F25J2235/42 F25J2240/02 F25J2245/02 F25J2260/20 F25J2270/14 F25J2270/16 F25J2270/58 F25J3/08 F25J1/0022 F25J3/0257 F25J2200/02 F25J2220/44 F25J2230/30 F25J2230/42

US: 62/614



Family:

Publication number	Publication date	Application number	Application date
AU2016292348 AA	20170119	AU20160292348	20160614
AU2016292348 AA	20180208	AU20160292348	20160614
AU2016292348 BB	20190404	AU20160292348	20160614
CA2991290 AA	20180103	CA20162991290	20160614
EP3322946 A1	20180523	EP20160732157	20160614
ID201807571 A	20180727	ID2018P0000710	20160614
JP2018529916 T2	20181011	JP20180501312T	20160614
KR20180030643 A	20180323	KR20187004248	20160614
TW201715189 A	20170501	TW20160117991	20160607
TWI608206 B	20171211	TW20160117991	20160607
US2017016668 AA	20170119	US20160182050	20160614
WO17011124 A1	20170119	WO2016US37377	20160614

Priority:

US20150192657P 20150715 US20160182050 20160614 WO2016US37377 20160614

Probable Assignee: EXXON MOBIL CORP

Assignee(s): (std): DENTON ROBERT D ; EXXON MOBIL CORP ; EXXONMOBIL UPSTREAM RES CO ; PIERRE JR FRITZ ; GUPTA PARAG A ; HUNTINGTON RICHARD A ; PIERRE FRITZ

Assignee(s): EXXONMOBIL UPSTREAM RESEARCH CO

Inventor(s): (std): DENTON ROBERT D ; PIERRE JR FRITZ ; GUPTA PARAG A ; HUNTINGTON RICHARD A ; DENTON ROBERT DEAN ; PIERRE JR ; PIERRE FRITZ

Agent(s): WATERMARK INTELLECTUAL PROPERTY PTY LTD; BORDEN LADNER GERVAIS LLP; EXXONMOBIL CHEMICAL EUROPE INC; GATOT SANYOTO WAHYU ADI SH; DESHIMARU TAKESHI; MATSUSHITA MITSURU; KURASAWA ICHIRO; JENSEN NATHAN O ET AL

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 LI 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

13) Family number: 29188189 (US5791160A)

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Title: METHOD AND APPARATUS FOR REGULATORY CONTROL OF PRODUCTION AND TEMPERATURE IN A MIXED REFRIGERANT LIQUEFIED NATURAL GAS FACILITY

Abstract: A control system for a process of liquefied natural gas production (LNG) from natural gas using a heat exchanger and a closed loop refrigeration cycle employs independent, direct control of both production and temperature by adjusting refrigeration to match a set production. The control system sets and controls LNG production at a required production value, and independently controls LNG temperature by adjusting the refrigeration provided to the natural gas stream. One exemplary method employs compressor speed, for example, as a key manipulated variable (MV) to achieve fast and stable LNG temperature regulation. Other compressor variables rather than speed may be key MVs, depending on the type of MR compressors employed, and may be the guidevane angle in a centrifugal compressor or the stator blade angle in an axial compressor. The second exemplary method employs a ratio of total recirculating refrigerant flow to LNG flow as the key manipulated variable to effectively control the LNG temperature.

Classifications:

International (IPC 8-9): C10G5/06 F25J1/00

F25J1/02 (Advanced/Invention);

F25J1/00 G06Q50/00 (Advanced/Non-invention);

C10G5/00 F25J1/00 F25J1/02 (Core/Invention)

International (IPC 1-7): C10G5/06 F25B49/02 F25J001/00 F25J1/00

F25J1/02 G05D23/00 G05D7/00 G05D7/06 G06F17/60

CPC: F25J1/0022 F25J1/0052 F25J1/0055 F25J1/0057 F25J1/0212

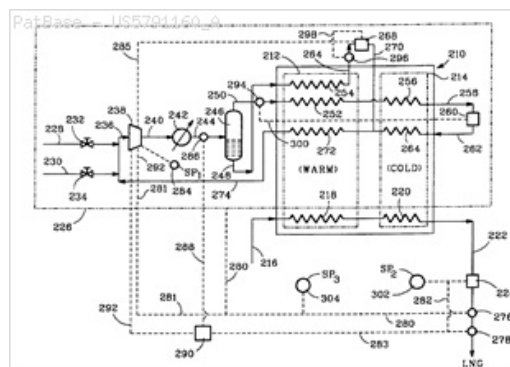
F25J1/0245 F25J1/0249 F25J2290/10 F25J1/0216

European: F25J1/00A6 F25J1/00C4V F25J1/00C4V2 F25J1/00C4V4

F25J1/00R6P F25J1/02D F25J1/02D2 F25J1/02D4P F25J1/02Z2M

F25J1/02Z2M8 R25J290/10

US: 62/611 62/657



Family:

Publication number	Publication date	Application number	Application date
AU699073 B1	19981119	AU19980077421	19980721
CA2243837 AA	19990124	CA19982243837	19980717
CA2243837 C	20010327	CA19982243837	19980717
CN1220385 A	19990623	CN19981016383	19980723
DE69809651 D1	20030109	DE19986009651	19980721
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DE69809651 T2	20030925	DE19986009651T	19980721
EP0893665 A2	19990127	EP19980113583	19980721
EP0893665 A3	19990609	EP19980113583	19980721
EP0893665 B1	20021127	EP19980113583	19980721
ID20619 A	19990128	ID19980001020	19980717
IN00957MA1998 A	20070601	IN1998MA00957	19980504
IN218445 B	20080523	IN1998MA00957	19980504
JP11092770 A2	19990406	JP19980204950	19980721
JP3016479 B2	20000306	JP19980204950	19980721
KR100282788 B1	20010302	KR19980029843	19980724
KR19990014147 A	19990225	KR19980029843	19980724
MY117162 A	20040531	MY19980003301	19980720
NO317035 B1	20040726	NO19980003358	19980721
NO983358 A	19990125	NO19980003358	19980721
NO983358 A0	19980721	NO19980003358	19980721
RU2142605 C1	19991210	RU19980114480	19980723
TH19394 B	20060130	TH19981002813	19980722
TH37661 A	20000313	TH19981002813	19980722
TW383358 B	20000301	TW19980112069	19980723
US5791160 A	19980811	US19970899899	19970724

Priority:

US19970899899 19970724 CA19982243837 19980717 CA19982243837 19980717
KR19980029843 19980724

Probable Assignee: AIR PRODUCTS AND CHEMICALS INC

Assignee(s): (std): AIR PROD AND CHEM ; AIR PRODUCTS AND CHEMICALS INC ; EHR PRODAKTS EHND KEMIKALZ INK

Assignee(s): HAMILTON JAMES R JR ; MANDLER JORGE ANIBAL ; BROCHU PHILIP A ; AIR PROD AND CHEM INC

Inventor(s): (std): BROCHU PHILIP A ; BROCHU PHILIP ALBERT ; BROCHU PHILLIP A ; DZHEHJMS ROBERT GAMIL TON ; FILIP ABROCHU ; FUJITSUPU EE BUROOSHIYU ; HAMILTON JAMES R JR ; HAMILTON JAMES ROBERT ; HAMILTON JAMES ROBERT JR ; HAMILTON JR ; HAMILTON JR JAMES ROBERT ; DZHORDZH ANIBAL MEHNDLER ; FILIP A BROCHU ; JIEEMUZU ROBAATO HAMIRUTON JIY ; JIYOOJI ANIBARU MANDORAA ; MANDLER JORGE ANIBAL

Inventor(s): PHILIP A BROCHU ; Philip Albert ; PHILLIP A BROCHU ; Brochu ; Jorge Anibal ; JORGE ANIBAL MANDLER ; JR ; Mandler ; JIEEMUZU ROBAATO HAMIRUTON JIYUNIA ; James Robert ; JAMES ROBERT HAMILTON ; JAMES ROBERT HAMILTON JR ; HAMILTON JAMES R ; DZHEHJMS ROBERT GAMIL'TON (MLADSHIJ)

Agent(s): PIZZEYS ; PIZZEYS PATENT AND TRADE MARK ATTORNEYS PTY LTD ; MCFADDEN FINCHAM ; OSLER HOSKIN AND HARCOURT LLP ; NISHIYAMA MASAYA ; HIGUCHI SOTOJI ; ISHIDA TAKASHI

Designated states: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

14) Family number: 68332211 (US2018023889A)

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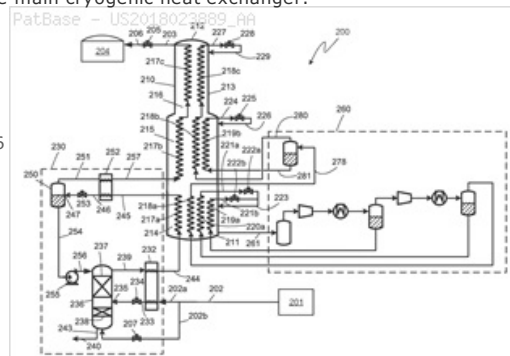
Title: HEAVY HYDROCARBON REMOVAL SYSTEM FOR LEAN NATURAL GAS LIQUEFACTION

Abstract: A system and method for integrated heavy hydrocarbon removal in a liquefaction system having a lean natural gas source. An economizer located between a main cryogenic heat exchanger and a reflux drum is provided to cool an overhead vapor stream against a partially condensed stream. In addition, pressure of the natural gas feed stream is maintained into a scrub column. A pressure drop is provided by a valve located between the economizer and the reflux drum on a partially condensed stream withdrawn from the cold end of the warm section of the main cryogenic heat exchanger.

Classifications:

International (IPC 8-9): C10L3/10 F25J1/00 F25J1/02 F25J3/00 F25J3/02 F25J3/06 F25J3/08 F25J5/00 (Advanced/Invention)

CPC: F25J3/0238 F25J3/0209 F25J2205/02 F25J2200/72 F25J2210/60 F25J2215/60 F25J2235/02 F25J2240/40 F25J2270/02 F25J2230/60 F25J1/0052 F25J1/0055 F25J1/0087 F25J1/0212 F25J1/0216 F25J1/0238 F25J1/0241 F25J1/0262 F25J2245/02 F25J1/0022 F25J1/0045 F25J2210/06 F25J2220/64 F25J3/08 C10L3/10 F25J1/0205 F25J1/0214 F25J1/0252 F25J2215/04

**Family:**

Publication number	Publication date	Application number	Application date
AU2017204908 AA	20180208	AU20170204908	20170717
CA2973842 AA	20180121	CA20172973842	20170718

CN107642949 A	20180130	CN201710604359	20170721
CN207335282 U	20180508	CN201720896162U	20170721
EP3273194 A1	20180124	EP20170182662	20170721
ID201803981 A	20180420	ID2017P0004758	20170719
JP2018013326 A2	20180125	JP20170138879	20170718
KR101943743 B1	20190129	KR20170085836	20170706
KR20180010980 A	20180131	KR20170085836	20170706
RU2017126023 A	20190121	RU20170126023	20170720
US2018023889 AA	20180125	US20160216318	20160721

US20160216318 20160721 KR20170085836 20170706 JP20170138879 20170718

Assignee(s): (std): AIR PROD AND CHEM ; AIR PRODUCTS AND CHEMICALS INC

Assignee(s): CHEN FEI ; ER PRODAKTS END KEMIKALZ INK ; WEIST ANNEMARIE OTT ; ROBERTS MARK JULIAN ; OTT CHRISTOPHER MICHAEL

Inventor(s): OTT VEJST ANNEMARI : OTT KRISTIFER MAJKL : CHEN FEJ : ROBERTS MARK DZHULIAN

Agent(s): PIZZEYS PATENT AND TRADE MARK ATTORNEYS PTY LTD; SMART AND BIGGAR; GOWLING WLG CANADA LLP; BECK GREENER; IRMIGNI MYRIASANDRA NOERHADI MIP MSEL; AOKI ATSUSHI; YURIDICHESKAYA GORODISSKI I PARTNERY OOO FA

Designated states: AL AT BA BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT
RO RS SE SI SK SM TR

15) Family number: 49941256 (US2014245756A)

Title: METHOD AND APPARATUS FOR POWER STORAGE

Abstract: Cryogenic energy storage systems, and particularly methods for capturing cold energy and re-using that captured cold energy, are disclosed. The systems allow cold thermal energy from the power recovery process of a cryogenic energy storage system to be captured effectively, to be stored, and to be effectively utilised. The captured cold energy could be reused in any co-located process, for example to enhance the efficiency of production of the cryogen, to enhance the efficiency of production of liquid natural gas, and/or to provide refrigeration. The systems are such that the cold energy can be stored at very low pressures, cold energy can be recovered from various components of the system, and/or cold energy can be stored in more than one thermal store.

Classifications:

International (IPC 8-9): F01K25/10 F01K3/00 F02C1/04 F02C6/14

F02C6/16 F02C7/10 F17C F17C7/02 F17C7/04 F25J1/00

F25J1/02 (Advanced/Invention)

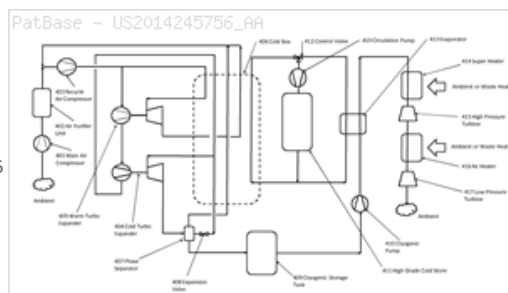
CPC: F01K25/10 F02C6/16 F02C6/14 F02C7/10 Y02E60/142 Y02E60/145

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F25J1/0012 F25J1/0035 F25J1/0037 F25J1/004 F25J1/0045 F25J1/0202

F25J1/0228 F25J1/0251 F25J1/0264 F25J1/0288 F2

F25J2235/02



Family:

Publication number	Publication date	Application number	Application date
CL2014000481 A1	20141010	CL20140000481	20140226
CL56388 B	20180803	CL20140000481	20140226
DE602012046949 D1	20180628	DE201260046949T	20120906
DK2753861 T3	20180813	DK20120775277T	20120906
EP2753861 A2	20140716	EP20120775277	20120906
EP2753861 B1	20180530	EP20120775277	20120906
ES2673976 T3	20180626	ES20120775277T	20120906
GB201115336 A0	20111019	GB20110015336	20110906
GB2494400 A1	20130313	GB20110015336	20110906
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IN00411KN2014 A	20140502	IN2014KN00411	20140225
PL2753861 T3	20181031	PL20120775277T	20120906
US2014245756 AA	20140904	US20120343180	20120906
US2018128171 AA	20180510	US20180863081	20180105
US9890712 BB	20180213	US20120343180	20120906
US10138810 BB	20181127	US20180863081	20180105
WO13034908 A2	20130314	WO2012GB52189	20120906
WO13034908 A3	20131003	WO2012GB52189	20120906
ZA201401383 A	20151125	ZA20140001383	20120906

GB20110015336	20110906	GB20010015336	20110906	EP20120775277	20120906
WO2012GB52189	20120906	CL20140000481	20140226	US20140343180	20140423
US20180863081	20180105				

Probable Assignee: HIGHVIEW ENTERPRISES LTD

Assignee(s): (std): HIGHVIEW ENTERPRISES LTD ; HIGHVIEW ENTPR LTD ; MORGAN ROBERT ; NELMES STUART ; BRETT STEPHEN GARETH ; CASTELLUCCI NICOLA

Assignee(s): HIGHVIEW ENTERPRISES LIMITED

Inventor(s): (std): STEPHEN GARETH BRETT ; STUART NELMES ; ROBERT MORGAN ; NICOLA CASTELLUCCI ; BRETT STEPHEN GARETH ; CASTELLUCCI NICOLA ; NELMES STUART ; MORGAN ROBERT

Agent(s): LUIS FELIPE CLARO SWINBURN; MUELLER BORE AND PARTNER PATENTANWAELTE PARTG MBB; CARPMAELS AND RANSFORD LLP; IZQUIERDO MARIA ALICIA; THOMAS B; HARTER SECREST AND EMERY LLP; RYAN THOMAS B; JACKSON RICHARD ERIC ET AL

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 IS IT JP KE KG KM KN KP KR KZ LA LC LI 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 PE PG PH PL PT QA RO RS RU RW 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

16) Family number: 55673268 (US2014075986A)

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Title: PRODUCTION OF ETHANE FOR START-UP OF AN LNG TRAIN

Abstract: A process is described herein for the production of a selected quantity of ethane as a component of a production inventory of mixed refrigerant for an LNG production plant prior to start-up of the LNG production plant.

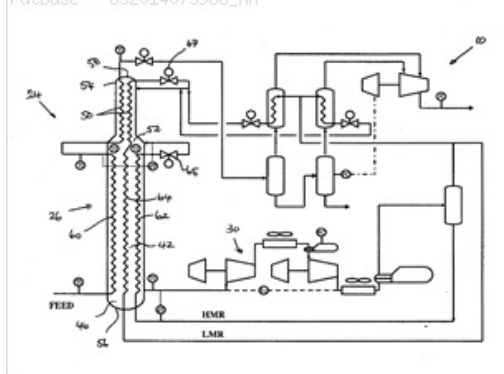
Classifications:

International (IPC 8-9): B01J B01J2/00 C07C6/00 C09K5/04 C10L3/10
F25J1/00 F25J1/02 F25J3/00 F25J3/06 F25J5/00 (Advanced/Invention);
C07C6/00 (Core/Invention);
B01J F25J (Subclass/Invention)

CPC: F25J3/0615 F25J1/0022 F25J1/0052 F25J1/0055 F25J1/0216
F25J1/0247 F25J1/025 F25J3/061 F25J3/0635 F25J3/064 F25J2215/62
F25J2220/64 F25J2260/20 F25J2270/12 F25J2270/60

US: 62/619

PatBase - US2014075986_AA



Family:

Publication number	Publication date	Application number	Application date
AP201307122 A0	20130930	AP20130007122	20130918
AP3543 A	20160113	AP20130007122	20130918
AU2013203120 AA	20140403	AU20130203120	20130409
AU2013203120 BB	20140904	AU20130203120	20130409
BR102013023663 A2	20150804	BR20131023663	20130916
CA2826707 AA	20140318	CA20132826707	20130911
IL228424 A0	20140930	IL20130228424	20130912
IL228424 A1	20160531	IL20130228424	20130912
US2014075986 AA	20140320	US20130027726	20130916
US10060674 BB	20180828	US20130027726	20130916

Priority:

AU20120904065 20120918 AU20130203120 20130409

Probable Assignee: WOODSIDE ENERGY TECHNOLOGIES PTY LTD

Assignee(s): (std): DEREK WILLIAM HODGES ; WOODSIDE ENERGY TECH PTY LTD ; WOODSIDE ENERGY TECHNOLOGIES PTY LTD

Assignee(s): HODGES DEREK WILLIAM

Inventor(s): (std): DEREK WILLIAM HODGES ; HODGES DEREK WILLIAM

Agent(s): MCCARTHY PORT PATENT AND TRADE MARK ATTORNEYS; GRIFFITH HACK; BENNETT JONES LLP; GE EHRlich 1995 LTD; EDELL SHAPIRO AND FINNAN LLC

17) Family number: 70782321 (US2018231305A)

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Title: INCREASING EFFICIENCY IN AN LNG PRODUCTION SYSTEM BY PRE-COOLING A NATURAL GAS FEED STREAM

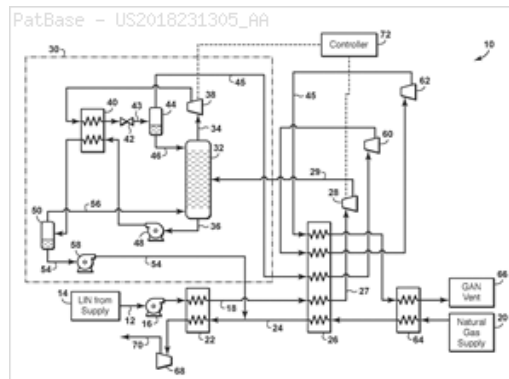
Abstract: Described herein are systems and processes to produce liquefied natural gas (LNG) using liquefied nitrogen (LIN) as the refrigerant. Greenhouse gas contaminants are removed from the LIN using a greenhouse gas removal unit. The LNG is compressed prior to being cooled by the LIN.

Classifications:

International (IPC 8-9): F25J1/00 F25J1/02 F25J3/02
F25J3/08 (Advanced/Invention)

CPC: F25J1/0072 F25J1/0022 F25J1/0224 F25J1/0241 F25J1/0035
F25J1/0242 F25J1/0042 F25J1/0221 F25J1/023 F25J1/025 F25J3/0233
F25J3/0257 F25J3/08 F25J2200/02 F25J2200/40 F25J2200/74 F25J2210/42

F25J2215/02 F25J2215/04 F25J2215/42 F25J2220/44 F25J2230/08
F25J2230/30 F25J2230/42 F25J2230/60 F25J2235/42 F25J2240/02
F25J2245/02 F25J2260/20 F25J2270/14 F25J2270/16 F25J2270/58



Family:

Publication number	Publication date	Application number	Application date
US2018231305 AA	20180816	US20180871276	20180115
WO18147974 A1	20180816	WO2018US13702	20180115

Priority:

US20170458131P 20170213 US20180871276 20180115

Probable Assignee: EXXON MOBIL CORP

Assignee(s): (std): EXXONMOBIL UPSTREAM RES CO ; PIERRE JR FRITZ ; PIERRE FRITZ

Assignee(s): EXXONMOBIL UPSTREAM RESEARCH CO ; EXXON MOBIL CORP

Inventor(s): (std): PIERRE JR FRITZ ; PIERRE FRITZ

Agent(s): JENSEN NATHAN O ET AL

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 DJ 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 JO JP KE KG KH KM KN KP KR KW 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

18) Family number: 68798399 (US2018066889A)

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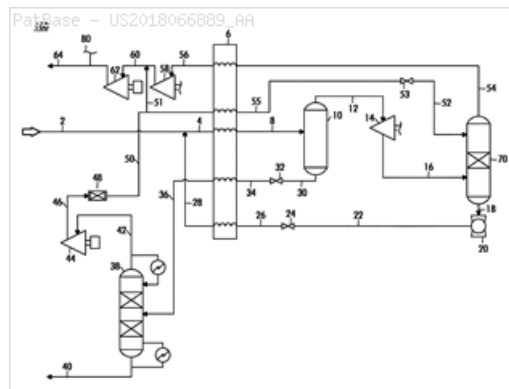
Title: PRETREATMENT OF NATURAL GAS PRIOR TO LIQUEFACTION

Abstract: Method and system for removing high freeze point components from natural gas. Feed gas is cooled in a heat exchanger and separated into a first vapor portion and a first liquid portion. The first liquid portion is reheated using the heat exchanger and separated into a high freeze point components stream and a non-freezing components stream. A portion of the non-freezing components stream may be at least partially liquefied and received by an absorber tower. The first vapor portion may be cooled and received by the absorber tower. An overhead vapor product which is substantially free of high freeze point freeze components and a bottoms product liquid stream including freeze components and non-freeze components are produced using the absorber tower.

Classifications:

International (IPC 8-9): C10L3/10 F25J3/02 F25J3/08 (Advanced/Invention)

CPC: F25J3/08 F25J2290/12 F25J3/0295 F25J3/0247 F25J3/0233 F25J3/0238 F25J3/0242 F25J2205/04 F25J2205/50 F25J2210/60 F25J2215/04 F25J2220/64 F25J2230/32 F25J2230/60 F25J2240/02 F25J2240/40 F25J2245/02 F25J2210/04 F25J3/0209 F25J2200/04 F25J2200/76 F25J2200/78 F25J2215/02 F25J2220/60 F25J2260/20 F25J2280/10



Family:

Publication number	Publication date	Application number	Application date
AU2017324000 AA	20180315	AU20170324000	20170406
AU2017324000 AA	20190321	AU20170324000	20170406
CA3035873 AA	20190305	CA20173035873	20170406
US2018066889 AA	20180308	US20160257100	20160906
WO18048478 A1	20180315	WO2017US26464	20170406

Priority:

US20160257100 20160906 WO2017US26464 20170406

Probable Assignee: LUMMUS TECHNOLOGY INC

Assignee(s): (std): LUMMUS TECHNOLOGY INC

Assignee(s): PALACIOS VANESSA ; YAMIN FEREIDOUN ; GASKIN THOMAS K ; GUVELIOGLU GALIP

Inventor(s): (std): GASKIN THOMAS K ; GUVELIOGLU GALIP ; GUVELIOGLU GALIP H ; PALACIOS VANESSA ; PALACIOS VANESSA M ; YAMIN FEREDOUN

Agent(s): PIZZEYS PATENT AND TRADE MARK ATTORNEYS PTY LTD; BORDEN LADNER GERVAIS LLP; LEE JOSEPHINE ET AL

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 DJ 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 KH KM KN KP KR KW 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

19) Family number: 61685425 (US2016102908A)

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Title: REFRIGERANT RECOVERY IN NATURAL GAS LIQUEFACTION PROCESSES

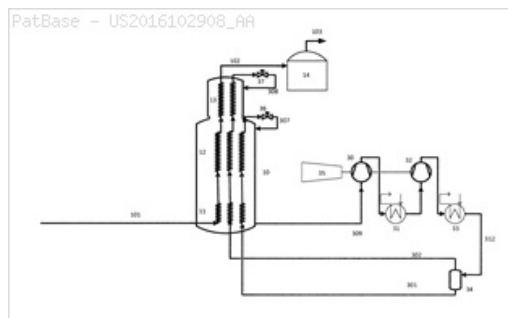
Abstract: Described herein is a method of removing refrigerant from a natural gas liquefaction system in which vaporized mixed refrigerant is withdrawn from the closed-loop refrigeration circuit and introduced into a distillation column so as to be separated into an overhead vapor enriched in methane and a bottoms liquid enriched in heavier components. Overhead vapor is withdrawn from the distillation column to form a methane enriched stream that is removed from the liquefaction system, and bottoms liquid is reintroduced from the distillation column into the closed-loop refrigeration circuit. Also described are methods of altering the rate of production in a natural gas liquefaction system in which refrigerant is removed as described above, and a natural gas liquefaction systems in which such methods can be carried out.

Classifications:

International (IPC 8-9): C10L3/06 C10L3/10 F25B45/00 F25D15/00 F25J1/00 F25J1/02 F25J3/00 F25J3/02 (Advanced/Invention)

CPC: F25J1/0242 F25J3/0214 F25J2200/38 F25J2215/04 F25J2215/60 F25J2270/912 F25J1/0022 F25J2270/902 F25J1/0055 F25J1/0092 F25J1/0097 F25J1/0212 F25J1/0214 F25J1/0216 F25J1/0245 F25J1/0248 F25J1/0249 F25J1/025 F25J3/0209 F25J3/0233 F25J3/0238 F25J2200/02 F25J2200/74 F25J2205/30 F25J2210/62 F25J2245/02 F25J2260/20 F25J2270/904 F25J2290/62

US: 62/613



Family:

Publication number	Publication date	Application number	Application date
AU2015238780 AA	20160428	AU20150238780	20151008
AU2015238780 BB	20160707	AU20150238780	20151008
CA2908328 AA	20160410	CA20152908328	20151007
CA2908328 C	20180313	CA20152908328	20151007
CN105509383 A	20160420	CN201510647465	20151009
CN105509383 B	20180925	CN201510647465	20151009
CN205037679 U	20160217	CN201520777820U	20151009
DE602015022572 D1	20190124	DE201560022572T	20151006
EP3006874 A1	20160413	EP20150002857	20151006
EP3006874 B1	20190102	EP20150002857	20151006
GC8646 A	20180919	GC2015P030185	20151010
ID201707933 A	20170728	ID2015P0006308	20151007
JP2016080344 A2	20160516	JP20150197408	20151005
JP6110453 B2	20170405	JP20150197408	20151005
KR101757985 B1	20170713	KR20150140951	20151007
KR20160042778 A	20160420	KR20150140951	20151007
PE05182016 A1	20160521	PE20150002131	20151007
RU2015143167 A	20170420	RU20150143167	20151009
US2016102908 AA	20160414	US20140511774	20141010
US2018058752 AA	20180301	US20170671622	20170808
US9759480 BB	20170912	US20140511774	20141010

Priority:

US20140511774 20141010 JP20150197408 20151005 EP20150002857 20151006
KR20150140951 20151007 CN201520777820U 20151009 US20170671622 20170808

Probable Assignee: AIR PRODUCTS AND CHEMICALS INC

Assignee(s): (std): AIR PROD AND CHEM ; AIR PRODUCTS AND CHEMICALS INC

Assignee(s): AIR PRODUCTS AND CHEMICALS INC ALLENTOWN ; JOHNSTON BRIAN KEITH ; KRISHNAMURTHY GOWRI ; ROBERTS MARK JULIAN

Inventor(s): (std): JOHNSTON BRIAN KEITH ; KRISHNAMURTHY GOWRI ; M J ROBERTS ; GOWRI KRISHNAMURTHY ; JOHNSON BRIAN KEITH ; B K JOHNSTON ; G KRISHNA MURPHY ; BRIAN KEITH JOHNSTON ; ROBERTS MARK JULIAN ; ROBERTS MARK J

Inventor(s): ROBERTS MARK JULIAN KEMPTON ; MJROBERTS ; GOWRI KHRISNAMURTY ; GKRISHNA MURPHY ; BKJOHNSTON ; MARK JULIAN ROBERTS ; JOHNSTON BRIAN KEITH SCHNECKSVILLE ; KRISHNAMURTHY GOWRI SELLERSVILLE

Agent(s): PIZZEYS PATENT AND TRADE MARK ATTORNEYS PTY LTD; SMART AND BIGGAR; GOWLING WLG CANADA LLP; KADOR AND PARTNER PARTG MBB PATENTANWALTE; KADOR AND PARTNER; KADOR AND PARTNER PARTG MBB; SULEIMAN I AL AMMAR LAW OFFICE; IR MIGNI MYRIASANDRA SH MIP MSEL; AOKI ATSUSHI; KOGA TETSUJI; ISHIDA TAKASHI; ERIC J

Designated states: AL AT BA BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT

20) Family number: 63506466 (US2016313057A)

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Title: INTEGRATED METHANE REFRIGERATION SYSTEM FOR LIQUEFYING NATURAL GAS

Abstract: Described herein is a method and system for liquefying a natural gas feed stream to produce an LNG product. The natural gas feed stream is liquefied, by indirect heat exchange with a gaseous methane or natural gas refrigerant circulating in a gaseous expander cycle, to produce a first LNG stream. The first LNG stream is expanded, and the resulting vapor and liquid phases are separated to produce a first flash gas stream and a second LNG stream. The second LNG stream is then expanded, with the resulting vapor and liquid phases being separated to produce the second flash gas stream and a third LNG stream, all or a portion of which forms the LNG product. Refrigeration is recovered from the second flash gas by using said stream to sub-cool the second LNG stream or a supplementary LNG stream.

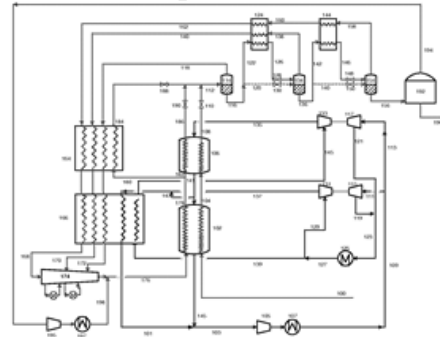
Classifications:**International (IPC 8-9):** F25J1/00 F25J1/02 F25J3/04

F25J5/00 (Advanced/Invention)

CPC: F25J1/0082 F25J1/0022 F25J1/008 F25J3/04787 F25J2215/60
 F25J1/0042 F25J2210/60 F25J1/0037 F25J1/004 F25J1/005 F25J1/0085
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 F25J2245/90 F25J2270/06 F25J2270/16

US: 62/614

PatBase - US2016313057_AA

**Family:**

Publication number	Publication date	Application number	Application date
AU2016202430 AA	20161110	AU20160202430	20160418
AU2016202430 BB	20170720	AU20160202430	20160418
BR102016008821 A2	20161101	BR20161008821	20160420
CA2927347 AA	20161024	CA20162927347	20160418
CA2927347 C	20180626	CA20162927347	20160418
CN106066116 A	20161102	CN201610253124	20160422
CN205561414 U	20160907	CN201620342870U	20160422
EP3118548 A2	20170118	EP20160001311	20160610
EP3118548 A3	20170503	EP20160001311	20160610
ID201705941 A	20170602	ID2016P0002722	20160422
KR101827100 B1	20180207	KR20160049463	20160422
KR20160126909 A	20161102	KR20160049463	20160422
MA38978 A1	20171229	MA20160038978	20160415
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PE14112016 A1	20170106	PE20160000526	20160419
RU2016114530 A	20171020	RU20160114530	20160415
US2016313057 AA	20161027	US20150695521	20150424
US9863697 BB	20180109	US20150695521	20150424

Priority:

US20150695521 20150424

CN201620342870U 20160422

KR20160049463 20160422

Probable Assignee: AIR PRODUCTS AND CHEMICALS INC**Assignee(s):** (std): AIR PROD AND CHEM ; AIR PRODUCTS AND CHEMICALS INC**Assignee(s):** CHEN FEI ; LIU YANG ; ROBERTS MARK JULIAN**Inventor(s):** (std): CHEN FEI ; LIU YANG ; ROBERTS MARK JULIAN ; YANG LIU ; MARK JULIAN ROBERTS ; FEI CHEN**Agent(s):** PIZZEYS PATENT AND TRADE MARK ATTORNEYS PTY LTD; SMART AND BIGGAR; GOWLING WLG CANADA LLP; KADOR AND PARTNER; IR MIGNI MYRIASANDRA SH MIP MSEL; ERIC J**Designated states:** AL AT BA BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR**21) Family number: 49466511** (US2013133362A)

© PatBase

Title: NATURAL GAS LIQUEFACTION PROCESS

Abstract: Disclosed herein is a natural gas liquefaction process using a single refrigeration cycle adopting a mixed refrigerant, and therefore having a simple structure and thus a compact system which is easy to operate, and further, after the mixed refrigerant is separated into two refrigerant parts, the two refrigerant parts are not mixed with each other but go through condensing (cooling), expanding, heat-exchanging, and compressing stages individually, and thus, optimal temperature and pressure conditions are applied to each of the separated refrigerant parts to increase efficiency of the liquefaction process.

Classifications:**International (IPC 8-9):** F25J1/00 F25J1/02 F25J3/02 (Advanced/Invention);

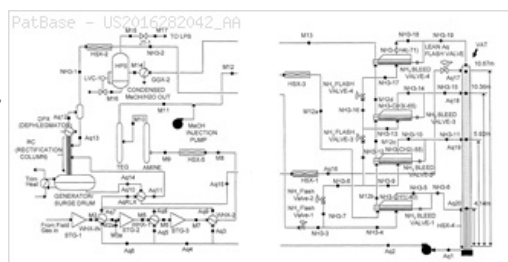
F25J1/00 F25J3/02 (Advanced/Non-invention)

The circuit diagram shows a differential signal processing system. It includes two input signals, NG and LMG, which are connected to a network of resistors and capacitors. The resistors are arranged in a grid-like pattern, with labels such as 176, 175, 172, 173, 174, 171, 170, 169, 168, 167, 166, 165, 164, 163, 162, 161, 160, 159, 158, 157, 156, 155, 154, 153, 152, 151, 150, 149, 148, 147, 146, 145, 144, 143, 142, 141, 140, 139, 138, 137, 136, 135, 134, 133, 132, 131, 130, 129, 128, 127, 126, 125, 124, 123, 122, 121, 120, 119, 118, 117, 116, 115, 114, 113, 112, 111, 110, 109, 108, 107, 106, 105, 104, 103, 102, 101, 100, 99, 98, 97, 96, 95, 94, 93, 92, 91, 90, 89, 88, 87, 86, 85, 84, 83, 82, 81, 80, 79, 78, 77, 76, 75, 74, 73, 72, 71, 70, 69, 68, 67, 66, 65, 64, 63, 62, 61, 60, 59, 58, 57, 56, 55, 54, 53, 52, 51, 50, 49, 48, 47, 46, 45, 44, 43, 42, 41, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0.

Publication number	Publication date	Application number	Application date
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AU20111292831 BB	20141002	AU20110292831	20110811
CN103038587 A	20130410	CN201180034767	20110811
CN103038587 B	20150610	CN201180034767	20110811
KR101037249 B1	20110526	KR20100078902	20100816
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KR101153156 B1	20120604	KR20100116590	20101123
KR20120016568 A	20120224	KR20100116590	20101123
US2013133362 AA	20130530	US20110806372	20110811
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WO12023752 A3	20120503	WO2011KR05889	20110811

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Publication number	Publication date	Application number	Application date
AU2016236744 AA	20171019	AU20160236744	20160323
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CO20170010728 A2	20180320	CO20170010728	20171020
EA201792086 A1	20180430	EA20170092086	20160323
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Priority:

US20150136839P 20150323 US20160078585 20160323 WO2016CA50342 20160323

Probable Assignee: PTX TECHNOLOGIES INC

Assignee(s): (std): NIKIFORUK COLIN ; NIKIFORUK COLIN F ; PTX TECH INC

Assignee(s): PTX TECHNOLOGIES INC

Inventor(s): (std): COLIN F NIKIFORUK ; NIKIFORUK COLIN ; NIKIFORUK COLIN F

Agent(s): MADDERNS PATENT AND TRADE MARK ATTORNEYS; MADDERNS PTY LTD; BENNETT JONES LLP; CLAUDIA LUCIA CARO RAMIREZ; WILSON GUNN; DESHIMARU TAKESHI; MATSUSHITA MITSURU; KURASAWA ICHIRO; WATANABE MAKOTO; YOO EDWARD

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 LI 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

23) Family number: 50932568 (US2013192510A)

PatBase

Title: SHIP FOR TRANSPORTING A LIQUEFIED NATURAL GAS STORAGE CONTAINER

Abstract: An LNG storage container carrier includes: one or more cargo holds provided on a hull such that upper portions thereof are opened; a plurality of first and second upper supports installed on the cargo holds in a width direction and a length direction to partition the upper portions of the cargo holds into a plurality of openings, wherein storage containers are vertically inserted into the openings and supported; and a lower support installed under the cargo holds and supporting the bottoms of the storage containers inserted into the openings. Accordingly, it is possible to efficiently and stably transport the storage containers storing LNG or PLNG pressurized at a predetermined pressure. Such storage containers may be transported through simple modification of the existing container carrier.

Classifications:

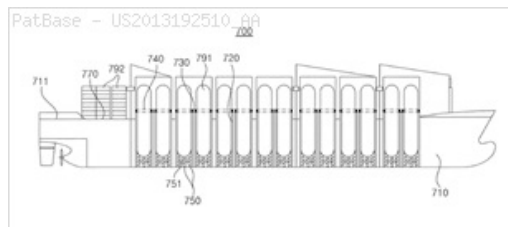
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International (IPC 1-7): B63B11/02 B63B25/00 B63B25/16 B63B27/24

CPC: B63B25/12 B63B25/08 B63B2025/087 B63B25/14 F17C1/002 F17C13/082 B63B11/02 B63B25/16

European: B63B25/12

US: 1/1 114/74R



Family:

Publication number	Publication date	Application number	Application date
AU2011236086 AA	20120503	AU20110236086	20111018
AU2011236086 BB	20140130	AU20110236086	20111018
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JP2013505173 T2	20130214	JP20120539825T	20110316
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US2013192510 AA	20130801	US20110640477	20110316
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Priority:

KR20100101569 20101018 WO2011KR01832 20110316 EP20110185601 20111018

Probable Assignee: DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Assignee(s): (std): DAEWOO SHIPBUILDING AND MARINE ; JANG IN HO ; PARK SUNG GUN ; LEE JUNG HAN ; KANG JOONG KYOO

Assignee(s): DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO ; DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD ; CLUSTER LNG CO ; CLUSTER LNG CO LTD

Inventor(s): (std): PARK SUNG GUN ; JANG IN HO ; LEE JUNG HAN ; KANG JOONG KYOO

Inventor(s): PARK SUNG GUN GEOJE SI ; LEE JUNG HAN GEOJE SI

Agent(s): APT PATENT AND TRADE MARK ATTORNEYS; INTES DIDIER GERARD ANDRE; AIP PATENT AND LAW FIRM

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 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 IS IT JP KE KG KM KN KP KZ LA LC LI LR 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 PE PG PH PL PT RO RS RU 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

24) Family number: 28273594 (US2002174678A) © PatBase

Title: APPARATUS FOR THE LIQUEFACTION OF NATURAL GAS AND METHODS RELATED TO SAME

Abstract: An apparatus and method for producing liquefied natural gas. A liquefaction plant may be coupled to a source of unpurified natural gas, such as a natural gas pipeline at a pressure letdown station. A portion of the gas is drawn off and split into a process stream and a cooling stream. The cooling stream passes through a turbo expander creating work output. A compressor is driven by the work output and compresses the process stream. The compressed process stream is cooled, such as by the expanded cooling stream. The cooled, compressed process stream is divided into first and second portions with the first portion being expanded to liquefy the natural gas. A gas-liquid separator separates the vapor from the liquid natural gas. The second portion of the cooled, compressed process stream is also expanded and used to cool the compressed process stream. Additional features and techniques may be integrated with the liquefaction process including a water clean-up cycle and a carbon dioxide (CO2) clean-up cycle.

Classifications:

International (IPC 8-9): B01D21/26 B01D36/04 B01D53/52 B01D9/04 C01B31/20 C01B32/50 C02F1/22 C10L3/06 C10L3/10 F17C F17C5/00 F25B11/02 F25D5/00 F25J F25J1/00 F25J1/02 F25J3/00 F25J3/06 F25J3/08 F25J5/00 F28D7/04 F28D7/10 F28F27/02 (Advanced/Invention); F25J1/00 F25J3/00 (Advanced/Non-invention); B01D21/26 B01D36/00 B01D9/00 C01B31/00 C02F1/22 C10L3/00 F25D5/00 F25J1/00 F25J3/00 F25J3/06 F25J3/08 F25J5/00 F28D7/10 F28F27/00 (Core/Invention); F17C F25J (Subclass/Invention); F25J (Subclass/Non-invention)

International (IPC 1-7): B01D21/26 B01D36/04 B01D9/04 C02F1/22 C10L3/10 F17C3/00 F17C5/00 F25J1/00 F25J1/02 F25J3/00 F25J3/08 F25J5/00 F25L3/00 F28F27/02 F28F7/00 F28F9/22 F28J1/00 F28J3/00 **CPC:** F25J3/061 F25J3/0635 F25J3/0655 F25J1/0052 F25J1/0245 F25J1/0269 F25J2215/60 F25J2230/30 F25J2230/32 F25J1/0259 Y10S62/904 Y10S62/929 F25J2270/90 F25J2280/30 F25J2290/50

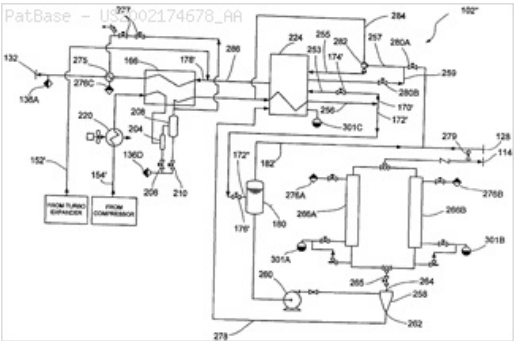
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European: F25J1/00 F25J1/00A6 F25J1/00C2F F25J1/00C2V F25J1/02 F25J1/02A F25J1/02B2 F25J1/02D F25J1/02D2 F25J1/02F F25J1/02F10 F25J1/02K4 F25J1/02Z2 F25J1/02Z2M10 F25J1/02Z2M2 F25J1/02Z4H F25J1/02Z4U F25J3/06A2 F25J3/06C10 F25J3/06C2 F25J3/08 F25J5/00B F28D7/00K F28D7/00K4C F28D7/02F F28D7/04 F28F13/06 R25J205/20 R25J205/60 R25J205/84 R25J210/60 R25J220/62 R25J220/66 R25J220/68 R25J230/60 R25J240/02 R25J245/90 R25J260/10 R25J270/02 R25J270/08 R25J270/14 R25J270/90 R25J280/02 R25J280/10 R25J280/30 R25J290/42 R25J290/44 R25J290/50 R25J290/62 R25J290/70 R28F19/01 Y02C10/12

US: 165/103 165/139 165/145 62/4 62/4P 62/532 62/532S 62/537 62/541 62/544 62/544S 62/602 62/602P 62/611 62/611P 62/612 62/612S 62/613 62/613P 62/613S 62/617 62/618 62/618S 62/619 62/620 62/620P 62/629 62/629S 62/637 62/637S 62/904 62/929 62/929S

Family:

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Probable Assignee: BATTELLE ENERGY ALLIANCE LLC

Assignee(s): (std): BATTELLE ENERGY ALLIANCE LLC ; BECHTEL BWXT IDAHO ; BECHTEL BWXT IDAHO LLC ; WILDING BRUCE M ; TURNER TERRY D

Assignee(s): US DEPARTMENT OF ENERGY ; UNITED STATES DEPARTMENT OF ENERGY ; MCKELLAR MICHAEL G ; VRANICAR JOHN J ; RATERMAN KEVIN T ; PALMER GARY L ; UNITED STATE DEPARTMENT OF ENERGY ;

BECHTEL BWXT IDAHO LLC PO BOX ; BINGHAM DENNIS N ; ENERGY UNITED STATES DEPARTMENT OF ;
KLINGER KERRY M ; KLINGLER KERRY M

Inventor(s): (std): BINGHAM DENNIS N ; BINGHAM DENNOS N ; BRUCE M WILDING ; DENNIS N BINGHAM ; GARY L PALMER ;
JOHN J VRANICAR ; KERRY M KLINGER ; KEVIN T RATERMAN ; KLINGLER KERRY M ; MCKELLAR MICHAEL G ;
MCKELLAR MICHAEL ; MCKELLAR MICHAEL G ; MICHAEL G MCKELLAR ; PALMER GARY L ; PATERMAN
KEVIN T ; RATERMAN KEVIN T ; TERRY D TURNER ; TURNER TERRY D ; VRANICAR JOHN J ; WILDING
BRUCE M ; WILDING BRUCE M BINGHAM DENNIS ; KERRY M KLINGLER ; RATERMAN KEVIN T ; MCKELLAR
MICHAEL ; KLINGER KERRY M ; HOFFMAN LISA R ; CARNEY FRANCIS H

Inventor(s): BRUCE M ; BINGHAM ; GARY L ; DENNIS N ; MCKELLAR ; KLIN ; KEVIN T RATERMAN ; KEVIN T ; MICHAEL G ;
PALMER ; HOFFMAN LISA ; CARNEY FRANCIS ; BINGHAM DENNIS ; WILDING BRUCE ; WILDING ; TURNER
TERRY ; TURNER ; TERRY D ; RATERMAN ; WILDING BRUCE M BINGHAM DENNIS N MCKELLAR MICHAEL ;
WILDING BRUCE M BINGHAM DENNIS N MCKELLAR... ; WILDING BRUCE M BINGHAM DENNIS N MCKELLAR
MICHAEL G TURNER TERRY D RATERMAN KEVIN T PALMER GARY L KLINGER KERRY M ; WILDING BRUCE M
BINGHAM DENNIS N MCKELLAR MICHAEL G TURNER TERRY D RATERMAN KEVIN T PALMER GARY L KLIN

Agent(s): PHILLIPS ORMONDE FITZPATRICK; OYEN WIGGS GREEN AND MUTALA LLP; CLARKE; EVENS PAUL
JONATHAN; VEIGA MIKEL; SHANGHAI PATENT AND TRADEMARK OFFICE; SHAMOTO ICHIO; CHIBA AKIO;
MASUI CHUJI; KOBAYASHI YASUSHI; TOMITA HIROYUKI; MIYAMAE TORU; ONO SHINJIRO; HANDE
MUMCUOGLU; FILIZ ARK; BATTELLE ENERGY ALLIANCE LLC; JOHN E ALTHOUSE; TRASKBRITT BATTELLE
ENERGY ALLIANCE LLC; TRASK BRITT PC; TRASKBRITT; CHRISTIAN STEPHEN R

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 LI 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 PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SV SY SZ TD TG TJ TM TN
TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

25) Family number: 44322686 (US2010024475A)

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Title: NATURAL GAS LIQUEFACTION SYSTEM WITH TURBINE EXPANDER AND LIQUEFACTION METHOD THEREOF

Abstract: A natural gas liquefaction system with a turbine expander is provided that can improve the efficiency of the whole refrigeration cycle by using the turbine expander, instead of the throttling process that uses the conventional Joule-Thomson throttling valve that is used as a final throttling means in a conventional natural gas liquefaction system, and a liquefaction method thereof. The natural gas liquefaction cycle provided with the turbine expander of the present invention comprises a compressor **100**, at least one vapor-liquid separator **300** or **310**, a plurality of heat exchangers **200**, **210**, **220**, **230** and **240**, at least one Joule-Thomson throttling valves (below to be called JT valve) **400** and **410**, a turbine expander **500**, and connecting lines composed of plurality of pipes **P1**, **P2**, **P3**, **P4**, **P5**, **P6** and **P7** to connect these components.

Classifications:

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

F25J1/02 F25J3/00 (Advanced/Non-invention);

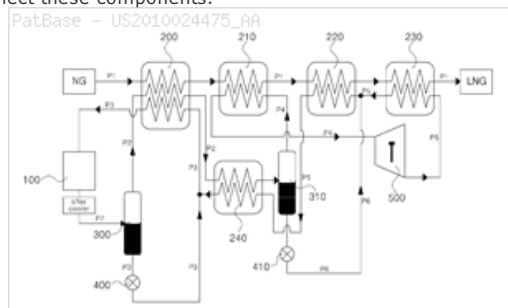
F25J1/00 F25J3/00 (Core/Invention)

CPC: F25J1/0022 F25J1/005 F25J1/0055 F25J1/0212 F25J1/0265

European: F25J1/00A6 F25J1/00C4E F25J1/00C4V2 F25J1/02D2

F25J1/02Z4H4R

US: 62/612 62/612P 62/613 62/613S



Family:

Publication number	Publication date	Application number	Application date
KR100965204 B1	20100624	KR20080075165	20080731
KR20100013579 A	20100210	KR20080075165	20080731
US2010024475 AA	20100204	US20090533357	20090731
US8418499 BB	20130416	US20090533357	20090731

Priority:

KR20080075165 20080731

Probable Assignee: KOREA ADVANCED INST OF SCIENCE AND TECHNOLOGY

Assignee(s): (std): BAEK SEUNG WHAN ; HWANG GYU WAN ; JEONG SANG KWON ; KOREA ADVANCED INST SCI AND TECH

Assignee(s): KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY ; KOREA ADVANCED INST OF SCIENCE AND TECHNOLOGY

Inventor(s): (std): BAEK SEUNG WHAN ; HWANG GYU WAN ; JEONG SANG KWON

Agent(s): A; LUCIANO FUSCO; BAKER AND HOSTETLER LLP

26) Family number: 58177721 (US2016131115A)

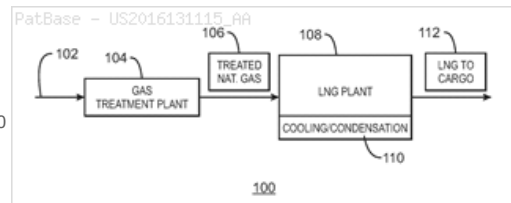
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Title: SYSTEMS AND METHODS OF UTILIZING AXIAL FLOW EXPANDERS

Abstract: An exemplary embodiment of the present techniques provides a system for decreasing a temperature of a fluid. The system includes an axial flow expander for expanding gas flowed in a direction along an axis thereof. The axial flow expander includes: an outer casing made as a unified structure having an inlet port and an outlet port. An inner casing is fixed inside the outer casing. A rotor shaft is accommodated inside the inner casing, and is aligned with the axis. A number of bearings allow the rotor shaft to rotate around the axis. Moving blades protrude from the rotor shaft and are arranged inside the gas passage in an alternating fashion with a number of stator vanes. The inner casing, the rotor shaft, the bearings, the stator vanes, and the moving blades are integrally assembled, and inserted into the outer casing in the direction along the axis.

Classifications:

International (IPC 8-9): F01D25/00 F01D25/16 F01D25/24 F01D25/26 F01K23/10 F02C1/02 F02C3/04 F02C7/28 F03G7/04 F25J1/00 F25J1/02 F25J3/00 F25J3/02 (Advanced/Invention)
CPC: F05D2220/62 F25J1/004 F25J1/0042 F25J1/005 F25J1/0072 F25J1/0082 F25J1/0205 F25J1/0257 F25J1/0288 F25J2230/20 F25J2235/60 F25J2240/02 F25J2240/30 F03G7/04 F02C1/02 F25J1/0022 F25J1/025 F01D25/24 F05D2230/60
US: 60/398 62/611

**Family:**

Publication number	Publication date	Application number	Application date
CN105579686 A	20160511	CN201480037096	20140627
CN105579686 B	20180223	CN201480037096	20140627
EP3014086 A1	20160504	EP20140818484	20140627
EP3014086 A4	20170301	EP20140818484	20140627
JP2016530431 T2	20160929	JP20160524226T	20140627
JP6483106 B2	20190313	JP20160524226T	20140627
US2016131115 AA	20160512	US20140900552	20140627
WO14210409 A1	20141231	WO2014US44485	20140627

Priority:

US20130840792P 20130628 US20140900552 20140627 WO2014US44485 20140627

Probable Assignee: MITSUBISHI HEAVY IND COMPRESSOR CORP

Assignee(s): (std): CALAFELL II DAG O ; EXXONMOBIL UPSTREAM RES CO ; EXXONMOBIL UPSTREAM RES COMPNAV ; NAGAO HIDEKI ; MITSUBISHI HEAVY IND COMPRESSOR CORP ; UPTIGROVE STAN O ; RASMUSSEN PETER C ; MORI KAZUSHI

Assignee(s): EXXONMOBIL UPSTREAM RESEARCH COMPNAV ; EXXONMOBIL UPSTREAM RESEARCH CO

Inventor(s): (std): CALAFELL II DAG O ; CALAFELL OAG O ; MORI KAZUSHI ; NAGAO HIDEKI ; RASMUSSEN PETER C ; UPTIGROVE STAN O

Agent(s): DENNESS JAMES EDWARD; INO SARI; NISHIJIMA TAKAKI; MATSUSHITA MITSURU; KURASAWA ICHIRO; DESHIMARU TAKESHI; STACY NATHAN E ET AL

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 LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY NZ 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

27) Family number: 50001772 (US2013219955A)

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Title: METHOD FOR PRODUCING PRESSURIZED LIQUEFIED NATURAL GAS, AND PRODUCTION SYSTEM USED IN SAME

Abstract: A method for producing pressurized liquefied natural gas and a production system therefor are provided. The method for producing pressurized liquefied natural gas includes: performing a dehydration process to remove water from natural gas supplied from a natural gas field, without a process of removing acid gas from the natural gas; and performing a liquefaction process to produce pressurized liquefied natural gas by liquefying the natural gas, which has undergone the dehydration process, at a pressure of 13 to 25 bar and a temperature of -120 to -95 degrees centigrade, without a process of fractionating natural gas liquid (NGL). Accordingly, it is possible to reduce plant construction costs and maintenance expenses and reduce LNG production costs. In addition, it is possible to guarantee high economic profit and reduce payback period in small and medium-sized gas fields, from which economic feasibility could not be ensured by the use of a conventional method.

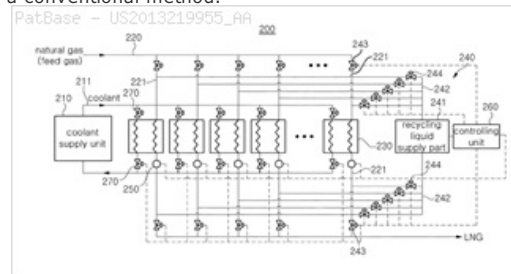
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CPC: Y02C10/12 C10L3/106 C10L3/104 F25J3/08 F17C1/00 F25J1/0055 F25J1/005 F25J1/0254 F25J1/0263 F25J1/0265 F25J1/0272 F25J2205/20 F25J2205/24 F25J2205/84 F25J2220/66 F25J2220/68 F25J2290/44 F25J2290/62 F17C2201/0109 F17C2201/032 F17C2201/054 F17C2203/015 F17C2203/035 F17C2203/0631 F17C2203/0636 F17C2203/0643 F17C2203/0646 F17C2205/0111 F17C2205/0146 F17C2205/0323 F17C2205/0326 F17C2205/0341 F17C2205/0397 F17C2209/221 F17C2209/228 F17C2209/234 F17C2221/033 F17C2223/0161 F17C2223/035 F17C2223/045 F17C2227/0121 F17C2227/0341 F17C2227/036 F17C2227/0393 F17C2250/032 F17C2250/0439 F17C2265/012 F17C2265/03 F17C2265/037 F17C2265/05 F17C2270/0105 F17C2270/0113 F17C5/02 F17C2201/0138 F17C2201/0147 F17C2201/035 F17C2201/052 F17C2203/013 F17C2203/0341 F17C2203/0629 F17C2205/013 F17C2209/232 F17C2223/0153 F17C2250/043 F17C2265/031 F25J1/0257 C10L1/02 F25J1/0235 F25J2210/60 F25J1/02 C10L3/08 B63B25/16 B63B35/44 C10K1/005 C10L2290/08 C10L2290/30 F25J1/0022

European: C10L3/10B2D F25J1/00A6 F25J1/00C4E F25J1/00C4V2 F25J1/02Z2T F25J1/02Z4H2 F25J1/02Z4H4R F25J1/02Z4N4H R25J205/20 R25J205/24 R25J205/84 R25J220/66 R25J220/68 R25J290/44 R25J290/62

US: 62/45.1 62/602 62/611 62/614

**Family:**

Publication number	Publication date	Application number	Application date
AU2011236067 AA	20120503	AU20110236067	20111017
AU2011236067 BB	20130207	AU20110236067	20111017
CN103140574 A	20130605	CN201180019010	20110316
CN103140574 B	20150128	CN201180019010	20110316
EP2442056 A2	20120418	EP20110185499	20111017

EP2442056 A3	20180307	EP20110185499	20111017
JP2013525509 T2	20130620	JP20120538780T	20110316
JP5796907 B2	20151021	JP20120538780T	20110316
KR101064576 B1	20110915	KR20100103733	20101022
KR101076271 B1	20111026	KR20100100937	20101015
KR101090235 B1	20111206	KR20100103736	20101022
KR101115465 B1	20120227	KR20100107089	20101029
MY162635 A	20170630	MY20120004496	20110316
SG184493 A1	20121129	SG20120074563	20110316
US2013219955 AA	20130829	US20110640472	20110316
WO12050273 A1	20120419	WO2011KR01828	20110316

Priority:

KR20100100937 20101015 KR20100103733 20101022 KR20100103736 20101022
KR20100107089 20101029 WO2011KR01828 20110316

Probable Assignee: DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Assignee(s): (std): DAEWOO SHIPBUILDING AND AMP MARINE ENGINEERING ; DAEWOO SHIPBUILDING AND MARINE ; JUNG JE HEON ; MOON YOUNG SIK ; YOO SEONG JIN ; LEE JUNG HAN ; LEE JAE YEOL ; YU JIN YEOL ; DAEWOO SHIPBUILDING AND MARINE ENG CO LTD ; CHOI DONG KYU

Assignee(s): CLUSTER LNG CO ; CLUSTER LNG CO LTD ; DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO ; DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO LTD

Inventor(s): (std): YU JIN YEOL ; MOON YOUNG SIK ; LEE JUNG HAN ; JUNG JE HEON ; CHOI DONG KYU ; YOO SEONG JIN ; LEE JAE YEOL

Agent(s): APT PATENT AND TRADE MARK ATTORNEYS; INTES DIDIER GERARD ANDRE; AIP PATENT AND LAW FIRM

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 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 IS IT JP KE KG KM KN KP KZ LA LC LI 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 PE PG PH PL PT RO RS RU 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

28) Family number: 65316796 (US2017089638A)

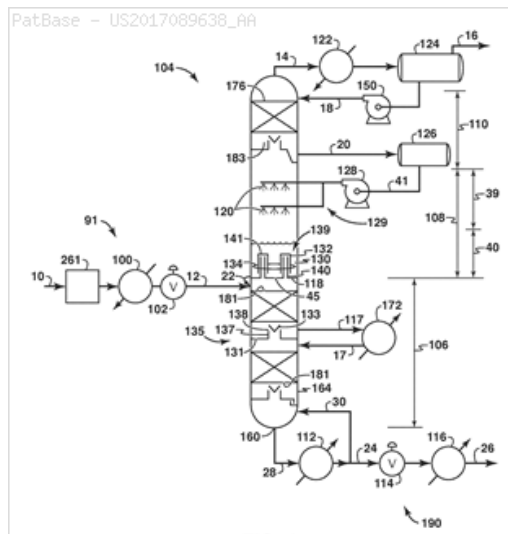
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Title: TREATMENT PLANT FOR HYDROCARBON GAS HAVING VARIABLE CONTAMINANT LEVELS

Abstract: A method of designing, constructing, and operating a hydrocarbon gas treatment plant is disclosed. A target hydrocarbon production range for a hydrocarbon gas meeting a required product specification is established. A cryogenic distillation column is designed and constructed with a vapor capacity to meet the target hydrocarbon production range. A variable feed refrigeration system is incorporated to cool an inlet feed of the hydrocarbon gas. The variable feed refrigeration system is designed to handle the target hydrocarbon production range and a wide range of contaminant concentrations in the inlet feed. A variable bottoms heating system is incorporated to handle heating duties associated with the wide range of contaminant concentrations in the inlet feed. A variable bottoms pumping system is incorporated to handle liquid flows associated with the wide range of contaminant concentrations in the inlet feed.

Classifications:

International (IPC 8-9): F25J3/02 F25J3/08 (Advanced/Invention)
CPC: F25J3/0266 F25J3/0295 F25J2200/02 F25J2205/04 F25J2205/20 F25J2210/06 F25J2220/66 F25J2270/12 F25J2280/40 F25J3/0233 F25J3/0209 F25J2200/30 F25J2200/74 F25J2235/60 F25J2290/40 F25J2290/50 Y02C10/12
US: 62/629



Family:

Publication number	Publication date	Application number	Application date
AU2016327820 AA	20180222	AU20160327820	20160824
CA2998466 AA	20180312	CA20162998466	20160824
ID201808733 A	20180810	ID2018P0002941	20160824
US2017089638 AA	20170330	US20160245965	20160824
WO17052922 A2	20170330	WO2016US48404	20160824
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Priority:

US20150232149P 20150924 US20160245965 20160824 WO2016US48404 20160824

Probable Assignee: EXXON MOBIL CORP

Assignee(s): (std): DENTON ROBERT D ; EXXON MOBIL CORP ; EXXONMOBIL UPSTREAM RES CO ; MAHER DAVID W ; VALENCIA JAIME A

Assignee(s): EXXONMOBIL UPSTREAM RESEARCH CO

Inventor(s): (std): DENTON ROBERT D ; MAHER DAVID W ; VALENCIA JAIME A

Agent(s): WATERMARK INTELLECTUAL PROPERTY PTY LTD; BORDEN LADNER GERVAIS LLP; GATOT SANYOTO WAHYU ADI SH; SCHMIDT JENNIFER A ET AL

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

29) Family number: 43215822 (US2009113928A)

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Title: METHOD AND SYSTEM FOR THE SMALL-SCALE PRODUCTION OF LIQUIFIED NATURAL GAS (LNG) FROM LOW-PRESSURE GAS

Abstract: A method and system for the small-scale production of LNG. The method comprising: configuring a prime mover to be operable communication with a multi-stage compressor; configuring the prime mover to be in fluid communication with an ammonia absorption chiller; configuring the ammonia absorption chiller to be in fluid communication with the multi-stage compressor; operating the ammonia absorption chiller using waste heat from a prime mover; pre-cooling a first stream of natural gas using cooled fluid from the ammonia absorption chiller; cooling a first portion of the first stream of natural gas, using an expansion valve, into a two-phase stream; cooling a second portion of the first stream to liquefied natural gas, using the two-phase stream as a cooling fluid; delivering the second portion of the first stream as LNG to a low-pressure LNG tank; cooling a third portion of the first stream of natural gas in a turbo-expander; separating liquid heavies out of the third portion of the first stream of natural gas; and delivering the liquid heavies to a pressure tank.

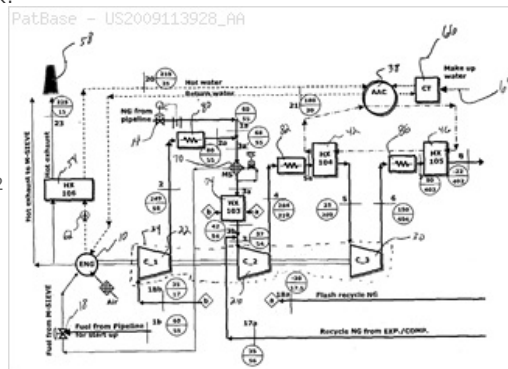
Classifications:

International (IPC 8-9): C10G5/06 C10L3/10 C10L3/12 F17C13/00 F17C7/00 F25J1/00 F25J1/02 F25J5/00 (Advanced/Invention); F17C1/00 (Advanced/Non-invention); C10G5/00 C10L3/00 F25J1/00 (Core/Invention)

CPC: F25J1/0042 F25J1/0245 F25J1/0284 F25J2235/60 F25J1/0035 F25J1/0202 F25J1/0227 F25J1/0022 F25J1/0025 F25J1/0037 F25J1/004 F25J1/0045 F25J1/023 F25J1/0231 F25J1/0242 F25J1/0254 F25J1/0277 F25J1/0278 F25J1/0281 F25J1/0283 F25J1/0288 F25J2230/04 F25J2230/22 F25J2245/02 F25J2245/90 F25J2270/906 F25J2290/62 F17C2223/0115 F17C2225/0123 F17C2225/036 F17C2227/0135 F17C2265/065 F17C2270/0139 F25J1/0279 F25J2290/12 F25J2230/30

European: F25J1/00A6 F25J1/00A6B F25J1/00C2E2 F25J1/00C2F F25J1/00C2L F25J1/00C2V F25J1/02 F25J1/02A2 F25J1/02H F25J1/02H2 F25J1/02K2C F25J1/02K2R F25J1/02K8W F25J1/02Z2M F25J1/02Z2T F25J1/02Z4U4 F25J1/02Z4U4F F25J1/02Z6 F25J1/02Z6A F25J1/02Z6A4 F25J1/02Z6A6 F25J1/02Z6C4 R25J220/64 R25J230/04 R25J230/20 R25J230/22 R25J230/30 R25J235/60 R25J245/02 R25J245/90 R25J270/906 R25J290/62

US: 220/560.04 220/560.040S 222/1 222/1S 62/611 62/612 62/612P 62/613 62/613P 62/613S 62/619



Family:

Publication number	Publication date	Application number	Application date
AU2008324849 AA	20090514	AU20080324849	20081105
AU2008324849 BB	20120614	AU20080324849	20081105
AU2012216336 AA	20130314	AU20120216336	20120821
AU2012216336 BB	20150129	AU20120216336	20120821
CA2704811 AA	20100504	CA20082704811	20081105
CA2704811 C	20130730	CA20082704811	20081105
CA2787375 AA	20130224	CA20122787375	20120822
CA2787375 C	20151027	CA20122787375	20120822
EP2212402 A1	20100804	EP20080847848	20081105
EP2212402 A4	20140423	EP20080847848	20081105
EP2212402 B1	20170426	EP20080847848	20081105
EP2562501 A2	20130227	EP20120181224	20120821
EP2562501 A3	20150506	EP20120181224	20120821
EP3032205 A2	20160615	EP20150193552	20120821
EP3032205 A3	20161221	EP20150193552	20120821
MY154703 A	20150715	MY20100002041	20081105
US2009113928 AA	20090507	US20070934845	20071105
US2012036888 AA	20120216	US20110216803	20110824
US2013263624 AA	20131010	US20130909827	20130604
US8020406 BB	20110920	US20070934845	20071105
WO09061777 A1	20090514	WO2008US82423	20081105

Priority:

US20070934845 20071105 AU20080324849 20081105 WO2008US82423 20081105
US20110216803 20110824 AU20120216336 20120821 EP20120181224 20120821
CA20122787375 20120822 US20130909827 20130604

Probable Assignee: EXPANSION ENERGY LLC

Assignee(s): (std): EXPANSION ENERGY LLC ; GREENBERG RALPH ; VANDOR DAVID ; DAVID VANDOR

Assignee(s): DRESSER RAND CO ; RALPH GREENBERG

Inventor(s): (std): DAVID VANDOR ; GREENBERG RALPH ; VANDOR DAVID

Inventor(s): RALPH GREENBERG

Agent(s): SHELSTON IP; SHELSTON IP PTY LTD; BORDEN LADNER GERVAIS LLP; MAGGS MICHAEL NORMAN; COPSEY TIMOTHY GRAHAM; LAW OFFICE OF MICHAEL A BLAKE LLC; MICHAEL A; BLAKE MICHAEL A

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 LI 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 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 US UZ VC VN ZA ZM ZW

30) Family number: 60356900 (US2017176099A) © PatBase

Title: PROCESS AND APPARATUS FOR HEAVY HYDROCARBON REMOVAL FROM LEAN NATURAL GAS BEFORE LIQUEFACTION

Abstract: A process is described herein for removing high freeze point hydrocarbons, including benzene compounds, from a mixed feed gas stream. The process involves cooling process streams in one or more heat exchangers and separating condensed compounds in multiple separators to form a methane-rich product gas stream. Select solvent streams from a fractionation train and/or separate solvent streams are employed to lower the freeze point of one or more streams that contain high freeze point hydrocarbons. A corresponding system also is disclosed.

Classifications:

International (IPC 8-9): C10L3/10 F25J3/02 F25J3/06

F25J3/08 (Advanced/Invention);

F25J3/08 (Core/Invention)

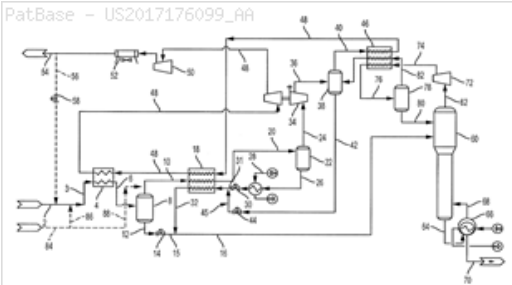
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F25J2210/04 F25J2215/62 F25J2215/64 F25J2215/66 F25J2220/64

F25J2230/08 F25J2240/02 F25J2245/02 F25J2260/20 F25J2280/10



Family:

Publication number	Publication date	Application number	Application date
AU2015229221 AA	20161027	AU20150229221	20150313
BR112016021197 A2	20170815	BR20161121197	20150313
CA2942675 AA	20160913	CA20152942675	20150313
CN106537072 A	20170322	CN201580025053	20150313
EP3117163 A1	20170118	EP20150760874	20150313
EP3117163 A4	20180418	EP20150760874	20150313
JP2017510787 T2	20170413	JP20160575628T	20150313
KR20160143684 A	20161214	KR20167028218	20150313
MX2016011957 A1	20170413	MX20160011957	20150313
PE14922016 A1	20170129	PE20160001612	20150313
TH165899 A	20170810	TH20161005324	20150313
US2017176099 AA	20170622	US20150127304	20150313
WO15138846 A1	20150917	WO2015US20360	20150313

Priority:

US20140953355P 20140314 US20150127304 20150313 WO2015US20360 20150313

Probable Assignee: LUMMUS TECHNOLOGY INC

Assignee(s): (std): LUMMUS TECH INC ; LUMMUS TECHNOLOGY INC

Assignee(s): PATEL SANJIV N ; YAMIN FEREIDOUN ; BALKO CATHERINE L ; GASKIN THOMAS K

Inventor(s): (std): BALKO CATHERINE L ; CATHERINE L BALKO ; FEREIDOUN YAMIN ; GASKIN THOMAS K ; PATEL SANJIV N ; SANJIV N PATEL ; THOMAS K GASKIN ; YAMIN FEREIDOUN

Agent(s): DAVIES COLLISON CAVE PTY LTD; GOWLING WLG CANADA LLP; PRUEFER AND PARTNER MBB
PATENTANWALTE RECHTSANWALTE; ASAMURA PATENT OFFICE PC; COVELLO DIANE F ET AL

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 LI 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

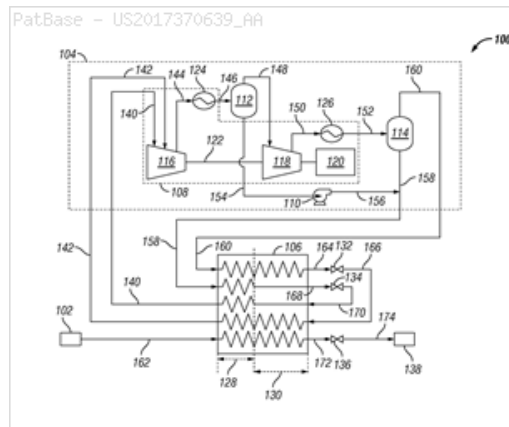
31) Family number: 62659900 (US2017370639A) © PatBase

Title: SYSTEM AND METHOD FOR LIQUEFACTION OF NATURAL GAS

Abstract: A liquefaction system and method for producing liquefied natural gas (LNG) is provided. The liquefaction system may include a heat exchanger to cool natural gas to LNG, a first compressor to compress and combine first and second portions of a single mixed refrigerant from the heat exchanger, a first cooler to cool the single mixed refrigerant from the first compressor to a first liquid phase and a gaseous phase, and a first liquid separator to separate the first liquid phase from the gaseous phase. The liquefaction system may also include a second compressor to compress the gaseous phase, a second cooler to cool the compressed gaseous phase to a second liquid phase and the second portion of the single mixed refrigerant, a second liquid separator to separate the second liquid phase from the second portion of the single mixed refrigerant, and a pump to pressurize the first liquid phase.

Classifications:

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

**Family:**

Publication number	Publication date	Application number	Application date
EP3230669 A1	20171018	EP20150866547	20151203
EP3230669 A4	20180801	EP20150866547	20151203
JP2018505374 T2	20180222	JP20170531549T	20151203
US2017370639 AA	20171228	US20150533409	20151203
WO16094168 A1	20160616	WO2015US63631	20151203

Priority:

US20140090942P 20141212 US20150533409 20151203 WO2015US63631 20151203

Probable Assignee: DRESSER RAND CO

Assignee(s): (std): BARDON PATRICE ; DRESSER RAND CO ; KIM HONGPYO ; ROMEIKE MATTHEW

Inventor(s): (std): BARDON PATRICE ; KIM HONGPYO ; ROMEIKE MATTHEW

Agent(s): ISARPATENT; MORITA HIROSHI; NOLTE N ALEXANDER ET AL

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 LI 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

32) Family number: 43835906 (US2011056238A)

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Title: METHODS AND CONFIGURATIONS OF BOIL-OFF GAS HANDLING IN LNG REGASIFICATION TERMINALS

Abstract: A LNG storage and regasification plant includes a reliquefaction unit in which boil-off vapors from the storage tanks are re liquefied and recycled back to the LNG storage tanks for tank pressure and Wobbe index control. Preferably, LNG cold is used for reliquefaction and operational flexibility is achieved by feeding a portion of the pressurized boil-off gas to a fuel gas header and/or to be recomended by the sendout LNG.

Classifications:

International (IPC 8-9): F17C13/00 F17C3/10 F17C7/00 F17C7/04

F17C9/02 F17C9/04 F17D1/04 F17D3/00 F25J1/00 F25J1/02

F25J3/02 (Advanced/Invention);

F17C7/00 (Core/Invention)

CPC: F17C9/02 F17C9/04 F17C2221/014 F17C2221/033 F17C2223/0161

F17C2223/033 F17C2227/0135 F17C2227/0157 F17C2227/0185

F17C2227/0344 F17C2227/0348 F17C2227/036 F17C2227/0362

F17C2227/0393 F17C2260/046 F17C2265/015 F17C2265/034

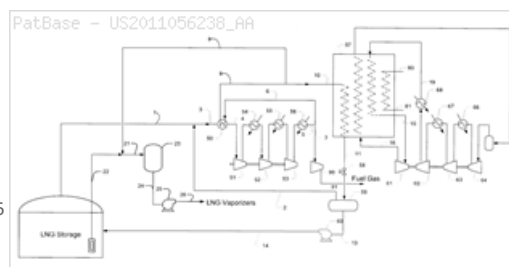
F17C2265/036 F17C2265/037 F17C2265/05 F17C2265/07 F17C2270/0136

F25J1/0025 F25J1/004 F25J1/0045 F25J1/005 F25J1/0072 F25J1/0204

F25J1/0221 F25J1/0222 F25J1/023 F25J1/0255 F25J1/0288 F25J2210/62

European: F17C9/04 R17C265/05

US: 62/48.1 62/48.100S 62/48.2 62/48.200S 62/50.2 62/614 62/614P 62/619 62/619S

**Family:**

Publication number	Publication date	Application number	Application date
CA2718840 AA	20091015	CA20092718840	20090407
CN102084171 A	20110601	CN200980115754	20090407
CN102084171 B	20121010	CN200980115754	20090407
EP2265854 A1	20101229	EP20090730115	20090407
EP2265854 A4	20171115	EP20090730115	20090407
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US2011056238 AA	20110310	US20090936070	20090407
US8893515 BB	20141125	US20090936070	20090407
WO09126604 A1	20091015	WO2009US39740	20090407

Priority:

US20080044302P 20080411 US20090936070 20090407 WO2009US39740 20090407

Probable Assignee: FLUOR TECHNOLOGIES CORP

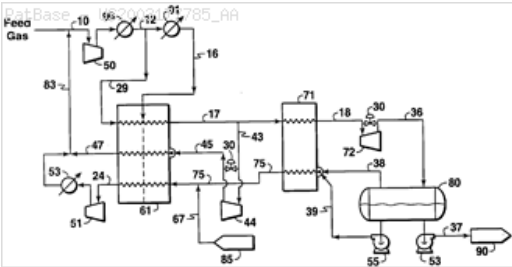
Assignee(s): (std): FLUOR TECH CORP ; MAK JOHN
Assignee(s): FLOUR TECHNOLOGIES CORP ; FLUOR TECHNOLOGIES CORP
Inventor(s): (std): JOHN MAK ; MAK JOHN
Agent(s): DR GRAF AND PARTNER AG; FISH AND TSANG LLP; FESSENMAIER MARTIN ET AL
Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY 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 LI 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 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 US UZ VC VN ZA ZM ZW

33) Family number: 29084994 (US2003177785A) © PatBase

Title: PROCESS FOR PRODUCING A PRESSURIZED LIQUEFIED GAS PRODUCT BY COOLING AND EXPANSION OF A GAS STREAM IN THE SUPERCRITICAL STATE

Abstract: This invention is a method and apparatus for production of pressurized liquefied gas. First, a gas stream is cooled and expanded to liquefy the gas stream. The liquefied gas stream is then withdrawn as pressurized gas product and a portion is recycled through the heat exchanger to provide at least part of the cooling and is returned to the stream. Recycling the pressurized liquefied gas product helps keep the cooling and compression of the gas stream in the supercritical region of the phase diagram. J-T valves in parallel with the expander permits running the system until the stream is in the supercritical region of its phase diagram and the hydraulic expander can operate. This process is suitable for natural gas streams containing methane to form a pressurized liquefied natural gas (PLNG) product.

Classifications:
International (IPC 8-9): F25J1/00 F25J1/02 (Advanced/Invention); F25J1/00 (Core/Invention)
International (IPC 1-7): F25J1/00
CPC: F25J1/0022 F25J1/0037 F25J1/004 F25J1/0042 F25J1/0045 F25J1/0202 F25J1/0208 F25J1/0247 F25J1/0254 F25J2210/06 F25J2220/62 F25J2235/60 F25J2240/40 F25J2245/90 F25J2290/32 F25J2290/62
European: F25J1/00A6 F25J1/00C2E2 F25J1/00C2F F25J1/00C2L F25J1/00C2V F25J1/02A2 F25J1/02B10 F25J1/02B10C F25J1/02Z2M2 F25J1/02Z2T R25J210/06 R25J220/62 R25J235/60 R25J240/40 R25J245/90 R25J290/32 R25J290/62
US: 62/613 62/613P



Family:

Publication number	Publication date	Application number	Application date
 AU2003214242 AA	20031008	AU20030214242	20030320
 EP1490639 A1	20041229	EP20030711651	20030320
 US2003177785 AA	20030925	US20030391724	20030319
 US6751985 BB	20040622	US20030391724	20030319
 WO03081154 A1	20031002	WO2003US08515	20030320

Priority:

US20020365888P 20020320 US20030391724 20030319 WO2003US08515 20030320

Probable Assignee: EXXON MOBIL CORP

Assignee(s): (std): EXXONMOBIL UPSTREAM RES CO ; EXXONMOBIL UPSTREAM RES COMPAN
Assignee(s): EXXONMOBIL UPSTREAM RESEARCH CO ; EXXONMOBIL UPSTREAM RESEARCH COMPANY ; KIMBLE E LAWRENCE ; WINNINGHAM H GARY ; MINTA MOSES ; BOWEN RONALD R ; EXXON MOBIL CORP
Inventor(s): (std): BOWEN RONALD R ; KIMBLE E LAWRENCE ; KIMBLE LAWRENCE E ; MINTA MOSES ; WINNINGHAM GARY H ; WINNINGHAM H GARY
Inventor(s): MOSES MINTA ; RONALD R BOWEN ; LAWRENCE E KIMBLE ; GARY H WINNINGHAM
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 HU HR ID IE IL IN IS IT JP KE KG KP KR KZ LC LI LK LR LS LT LU LV MA MC MD ME MG MK ML MN MR MW MX MZ NE NI NL NO NZ OM PH PL PT RO RU SC SD SE SG SI SK SL SN SZ TD TG TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW