

REPORTE GENERAL

1) Family number: 47030022 (DE102009060998A1)

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Title: THERMOELECTRIC GENERATOR FOR USE WITH HEAT PUMP, HAS INTEGRATED SINGLE-OR MULTI-STAGE HEAT PUMP SYSTEM, ON WHICH ELECTRICAL ENERGY IS PRODUCED FROM HIGH TEMPERATURE DIFFERENCE

Abstract: The thermoelectric generator has an integrated single-or multi-stage heat pump system, on which electrical energy (Q10) is produced from a high temperature difference. The electrical energy is obtained from multiple individual interconnected thermoelectric generator-heat pump modules by direct thermal contact energy transfer. Energy portions of a heating side and a cooling side is shared equally by an energy recovery circuit (Q9) in a process cycle.

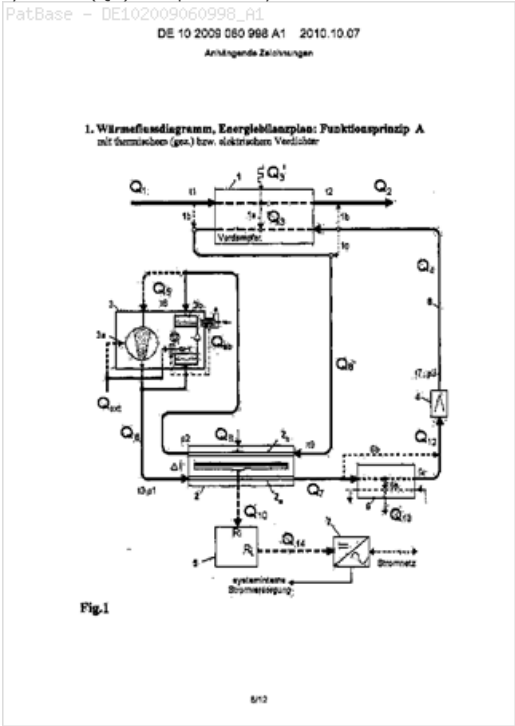
Classifications:

International (ipc 8-9): F25B21/02 F25B30/02

H02N11/00 (Advanced/Invention)

CPC: H01L35/30

European: H01L35/30



Family:

Publication number	Publication date	Application number	Application date
DE102009060998 A1	20101007	DE200910060998	20091121

Priority:

DE200910007472 20090204 DE200910060998 20091121

Probable Assignee:

KRUEGER AXEL

Assignee(s): (std):

KRUEGER AXEL

Inventor(s): (std):

KRUEGER AXEL

2) Family number: 59782028 (US2018135899A)

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Title: AN IMPROVED TEMPERATURE CONTROL SYSTEM

Abstract: Temperature control system and method A temperature control system (10) includes a compressor (1), a condenser (4), an expansion valve (5), and an evaporator (60) all connected in series. At least one heat exchanger (3) is located between the compressor and the condenser and operable to transfer heat energy from an external heat source to the refrigerant. In one variant, an array of heat exchangers is located between the compressor and the condenser. In a further variant (210, Fig. 3), there are one or more heat exchangers located between the compressor and the condenser and flow control means to direct the flow of refrigerant either through at least one heat exchanger or directly from the compressor to the condenser bypassing at least one of the heat exchangers. Methods of heating and cooling an environment using the system are also disclosed.

Classifications:

International (ipc 8-9): B60H1/32 F24F1/02 F24F5/00 F24S90/00

F25B F25B1/00 F25B13/00 F25B27/00 F25B27/02 F25B30/02

F25B41/04 F25B43/02 F25B49/02 F25B5/02 F25B6/02

F25B6/04 (Advanced/Invention);

F25B6/02 (Core/Invention)

CPC: F24F1/02 B60H1/32 F24F5/0007 F24F5/0046 F25B13/00

Y02A30/274 F25B5/02 F25B41/046 F25B30/02 F25B49/022

F25B27/005 F25B6/02 F25B27/02

Family:

Publication number	Publication date	Application number	Application date
US2018116131 AA	20180503	US20170841923	20171214
US2018332786 AA	20181122	US20170600714	20170520
US2018343806 AA	20181206	US20170609472	20170531
US2018343812 AA	20181206	US20180029627	20180708
US2018343900 AA	20181206	US20170784112	20171014
US2018343901 AA	20181206	US20180904044	20180223
US2019000029 AA	20190103	US20170639437	20170630
US2019037792 AA	20190207	US20170667022	20170802

Priority:

US20170600714 20170520 US20170609472 20170531 US20170639437 20170630
US20170667022 20170802 US20170784112 20171014 US20170841923 20171214
US20180904044 20180223 US20180029627 20180708

Probable Assignee: INSECTERGY LLC

Assignee(s): (std): FREITAS SHAWN ROBERT ; INSECTERGY LLC ; LEO DANIEL MICHAEL

Inventor(s): (std): FREITAS SHAWN ROBERT ; LEO DANIEL MICHAEL

4) Family number: 62876043 (US2016320107A)

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Title: TRANSPORTATION REFRIGERATION SYSTEM WITH INTEGRATED POWER GENERATION AND ENERGY STORAGE

Abstract: A thermal energy storage system that enables the discharge of refrigerated air for cooling cargo or passengers in large compartments, such as the trailer of a semi-truck, for a period of time well in excess of several hours. The thermal energy storage system is able to provide refrigeration without operating a conventional VCC unit, the truck engine, or the TRU diesel APU engine during all or a significant portion of the period of the typical range of time that a 53 foot refrigerated truck is traveling over the road. The thermal energy storage system includes a phase change material reservoir, a cooling system-to-working fluid heat exchanger in fluid communication with the phase change material reservoir, and a phase change material-to-target heat exchanger in fluid communication with the phase change material reservoir. The phase change material reservoir contains a phase change material, a working fluid and a working fluid-to-phase change material heat exchanger.

Classifications:

International (IPC 8-9): F25B27/00 F25B27/02 F25B47/02

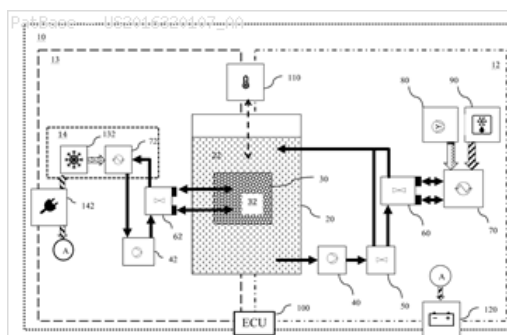
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CPC: F25B27/00 F25B27/002 F25B27/005 F25D11/003 F25D16/00

F25B47/025 H02K7/1846 F25D2700/10 B60P3/20 B60K25/08

B60K2001/005 B60K2001/008

US: 1/1 62/235.1

**Family:**

Publication number	Publication date	Application number	Application date
US2016320107 AA	20161103	US20160204967	20160707
US9389007 BA	20160712	US20140266828	20140501

Priority:

US20130750789P 20130109 US20140151653 20140109 US20140266828 20140501
US20160204967 20160707

Probable Assignee: NEW WEST TECHNOLOGIES LLC

Assignee(s): (std): NEW WEST TECH LLC ; NEW WEST TECHNOLOGIES LLC

Assignee(s): GLOBAL MEDICAL TOURSIM INC

Inventor(s): (std): MCKAY DANIEL LEE

Agent(s): MCGAW LAW PC; MICHAEL M

5) Family number: 50014048 (US2011289953A)

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Title: THERMALLY ENHANCED CASCADE COOLING SYSTEM

Abstract: A cascade cooling system that uses low-grade thermal and other energy input sources to provide refrigeration and air conditioning in stationary and mobile applications. A two-loop embodiment includes a heat-powered first loop incorporating a vapor-jet compressor and a second loop based on a mechanical compressor powered by an electric motor or other source of rotational torque. The system uses waste heat, solar thermal or a fuel-fired heat source to partially or fully offset mechanical/electrical energy input. The system can also operate entirely on thermal, electrical or mechanical input. The ability to use multiple energy sources in any combination maximizes energy efficiency, performance and reliability. The system is well suited to making beneficial use of waste heat in vehicle applications. In stationary applications, solar thermal and/or waste heat from industrial processes can be used to improve the efficiency of conventional cooling systems.

Classifications:

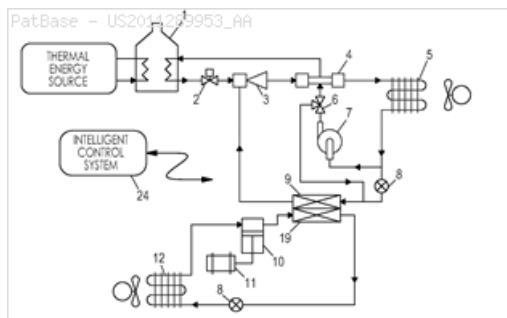
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F25B7/00 (Advanced/Invention)

CPC: F25B1/08 F25B7/00 F25B27/02 B60H1/32 Y02A30/274

Y02A40/966 Y02A40/967

US: 62/238.6 62/238.600P 62/335 62/335S 62/500 62/500S



Family:

Publication number	Publication date	Application number	Application date
US2011289953 AA	20111201	US20100788631	20100527

Priority:

US20100788631 20100527

Probable Assignee: ALSTON GERALD ALLEN

Assignee(s): (std): ALSTON GERALD ALLEN

Inventor(s): (std): ALSTON GERALD ALLEN

6) Family number: 3373075 (US4909044A)

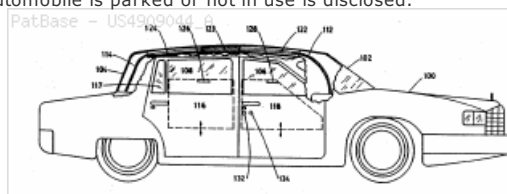
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Title: Parked automobile thermal control system

Abstract: An automobile air conditioning system for controlling the inside temperature of an automobile to maintain the inside temperature in a comfortable range or to protect the contents of the automobile from becoming overheated on excessively hot days or to prevent freezing on cold days when the automobile is parked or not in use is disclosed.

Classifications:

International (IPC 8-9): B60H1/00 B60J11/00
F25B13/00 (Advanced/Invention);
B60H1/00 B60J11/00 F25B13/00 (Core/Invention)
International (IPC 1-7): F25B27/00
CPC: B60H1/00007 B60J11/00 F25B13/00
European: B60H1/00A B60J11/00 F25B13/00
US: 165/43 296/97.8 454/75 62/236 62/244



Family:

Publication number	Publication date	Application number	Application date
US4909044 A	19900320	US19890350131	19890508

Priority:

US19890350131 19890508

Probable Assignee: GUDMUNDSEN RICHARD A

Assignee(s): (std): GUDMUNDSEN RICHARD A

Inventor(s): (std): GUDMUNDSEN RICHARD A

7) Family number: 8499075 (US4316434A)

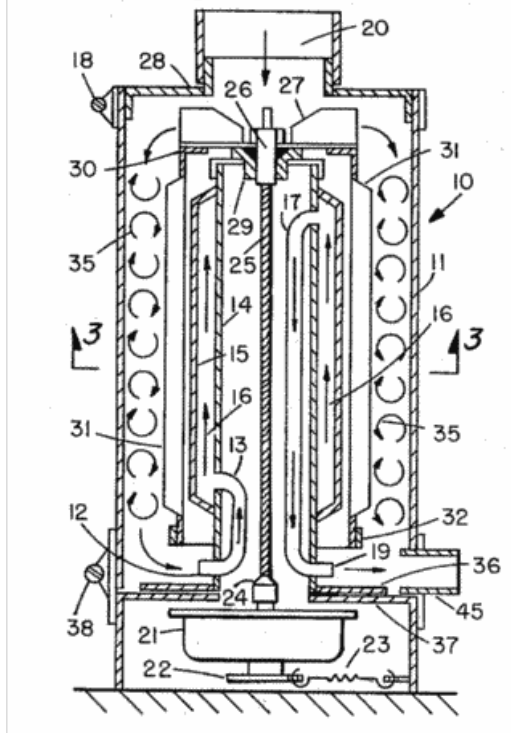
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Title: METHOD AND APPARATUS FOR IMPROVING HEAT TRANSFER

Abstract: Method and apparatus for improving convective heat transfer by mechanically stirring fluid over the outer surface of a heat exchanger. A stirring mechanism is described which revolves rapidly around a heat exchanger surface in a stream undergoing heat transfer. During rotation, the stirring mechanism is supported near an end of the stirred heat exchanger by a central bearing and drive means. It is also supported over an extended length of the stirred heat exchanger surface by the hydrodynamic action of the stirring mechanism relative to the heat exchange surface without need for an additional central support bearing. The stirring mechanism uniformly turbulates the fluid film over the outer surface of the heat exchanger where heat transfer resistance normally occurs without imposing a pressure drop in the fluid stream undergoing augmented heat transfer. Compact and inexpensive heat exchangers are described which may be used in refrigeration, heating-cooling, and energy conservation systems. They offer special advantages where the temperature differential available for convective heat transfer is low and where it is necessary to recover sensible and latent heat energy from combustion products or dirty gaseous streams. Economizer units are described which may retrofit existing heating systems and recover most of the sensible and latent heat energy which these systems now waste in flue products. Special draft control features of these units also allow the adapted heating systems to operate with nearly identical steady-state and seasonal efficiencies.

Classifications:

International (IPC 8-9): F22B27/12 F22D1/00 F25B39/00 F28F13/12
F28F5/00 (Advanced/Invention);
F22B27/00 F22D1/00 F25B39/00 F28F13/00 F28F5/00 (Core/Invention)
International (IPC 1-7): F22B33/00
CPC: F22D1/00 F22B27/12 F25B39/00 F28F5/00 F28F13/125
Y02E10/40 F24S90/00
European: F22B27/12 F22D1/00 F25B39/00 F28F13/12B F28F5/00
US: 122/155.2 122/20B 122/44.2 165/109.1

**Family:**

Publication number	Publication date	Application number	Application date
US4316434 A	19820223	US19800120978	19800213

Priority:

US19800120978 19800213

Probable Assignee:

BAILEY BURNERS INC

Assignee(s): (std):

BAILEY BURNERS INC

Assignee(s):

BAILEY BURNERS INC A CORP OF NJ

Inventor(s): (std):

BAILEY FRANK W

8) Family number: 68077086 (US2018004173A)

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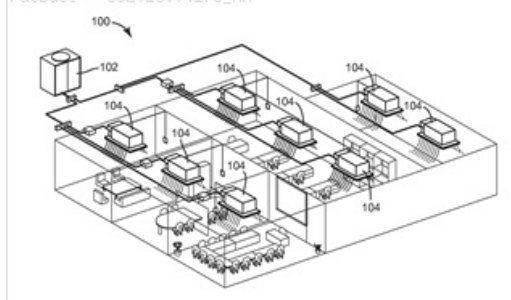
Title: VARIABLE REFRIGERANT FLOW SYSTEM WITH MULTI-LEVEL MODEL PREDICTIVE CONTROL

Abstract: A model predictive control system is used to optimize energy cost in a variable refrigerant flow (VRF) system. The VRF system includes an outdoor subsystem and a plurality of indoor subsystems. The model predictive control system includes a high-level model predictive controller (MPC) and a plurality of low-level indoor MPCs. The high-level MPC performs a high-level optimization to generate an optimal indoor subsystem load profile for each of the plurality of indoor subsystems. The optimal indoor subsystem load profiles optimize energy cost. Each of the low-level indoor MPCs performs a low-level optimization to generate optimal indoor setpoints for one or more indoor VRF units of the corresponding indoor subsystem. The indoor setpoints can include temperature setpoints and/or refrigerant flow setpoints for the indoor VRF units.

Classifications:

International (IPC 8-9): F24F11/00 F24F11/47 F24F11/56 F24F11/64 F24F11/65 F25B27/00 G05B13/02 G05B13/04 G05B15/02 G05B17/02 G05D7/06 G06Q10/00 G06Q50/06 H02J3/00 (Advanced/Invention)
CPC: G05D7/0617 G05B13/041 G05B2219/2642 G06Q10/00 G05B13/048 G05B17/02 F24F11/30 F24F11/46 F24F11/62 H02J7/35 F24F11/47 G05B13/021 G06Q50/06 F24F2130/10 F24F11/64 F24F11/65 F25B27/00 F24F11/56 F24F2140/60 G05B15/02 H02J3/32 H02J2003/003 H02J2003/143

PatBase - US2018004173_AA

**Family:**

Publication number	Publication date	Application number	Application date
US2018004173 AA	20180104	US20170635754	20170628
US2018313563 AA	20181101	US20180963857	20180426
WO18005670 A1	20180104	WO2017US39798	20170628
WO18005760 A1	20180104	WO2017US39937	20170629
WO18200854 A1	20181101	WO2018US29625	20180426

Priority:US20160357338P 20160630
US20170635754 20170628US20170491059P 20170427
US20180963857 20180426

US20170511809P 20170526

Probable Assignee: JOHNSON CONTROLS TECH CO**Assignee(s): (std):** JOHNSON CONTROLS TECH CO

Assignee(s): JOHNSON CONTROLS TECHNOLOGY CO
Inventor(s): (std): ELLIS MATTHEW J ; LENHARDT BRETT M ; PATEL NISHITH R ; TURNEY ROBERT D ; WENZEL MICHAEL J
Agent(s): ZIEBERT JOSEPH N ET AL; ZIEBERT JOSEPH 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

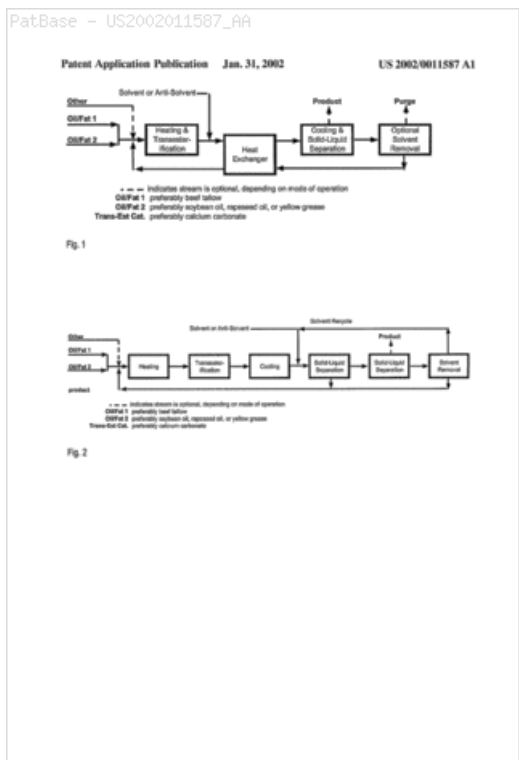
9) Family number: 28160096 (US2002011587A)

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Title: Fatty-acid thermal storage devices, cycle, and chemicals

Abstract: This invention is a method for producing phase change material (PCM) chemicals containing fatty acids or fatty-acid derivatives. These derivatives (1) are renewable, being produced by biomass or livestock such as cattle, (2) can be manufactured at low to moderate prices, and (3) can be manufactured in a variety of ways to produce PCM chemicals effective at several temperatures of interest in climate control and food maintenance. Unlike paraffin PCM chemicals that are largely limited to fractions available in either crude oil or irreversible chemical synthesis processes, the ester bond chemistry of triglycerides (fats and oils) is reversible allowing repeated reaction until the desired PCM chemicals combinations are synthesized and isolated. This method in a process based on contacting of reactants, reversible ester bond chemistry, separation of fractions with the desired latent heat properties, and recycle of those fractions that do not have the desired latent heat properties.

Classifications:
International (ipc 8-9): C09K5/06 F25B30/02 F28D20/02 (Advanced/Invention); C09K5/00 F25B30/00 F28D20/02 (Core/Invention)
International (ipc 1-7): C09K3/18 C09K5/00 F25B13/00 F25D17/02 F25D17/06
CPC: F28D20/02 C09K5/063 F25B30/02 F25B2400/24 Y02E60/145 Y02P20/123 Y02P20/124
European: C09K5/06B F25B30/02 F28D20/02 R25B400/24 Y02E60/14D
US: 252/7 252/70 62/324.1 62/324.100P 62/434 62/434S 62/91 62/910



Family:

Publication number	Publication date	Application number	Application date
US2002011587 AA	20020131	US20010945682	20010905
US2003131623 AA	20030717	US20030351936	20030127
US6574971 BB	20030610	US20010945682	20010905

Priority:

US20000216040P 20000703	US20000234605P 20000922	US20010262397P 20010119
US20010279100P 20010328	US20010945682 20010905	US20020351506P 20020128
US20020364466P 20020318	US20020410325P 20020913	US20020426595P 20021118
US20030351936 20030127		

Probable Assignee: RENEWABLE ALTERNATIVES LLC
Assignee(s): (std): SUPPES GALEN J
Assignee(s): RENEWABLE ALTERNATIVES LLC
Inventor(s): (std): SUPPES GALEN J

10) Family number: 28579114 (WO03048658A1)

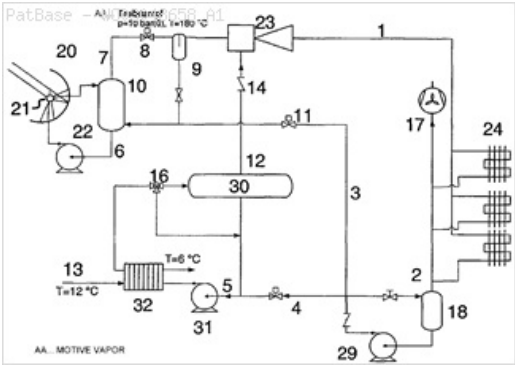
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Title: METHOD AND INSTALLATION FOR SOLAR THERMAL COOLING

Abstract: Disclosed is a method and an installation for solar thermal cooling. The coolant of a jet compressor (23) is vaporized by means of a solar collector (20), and the vapor of the coolant is condensed following compression by the jet compressor (23). The jet compressor (23) operates as a vapor jet compressor, using water as a coolant that vaporizes directly in the solar collector (20) and is fed to the jet compressor (23) as motive vapor. Compared with previously known methods, the inventive method and installation provide for lower investment cost and use of little technical equipment, and they offer a very good dynamic operating performance with short reaction times.

Classifications:

International (IPC 8-9): F25B1/08 F25B27/00 (Advanced/Invention);
F25B9/00 (Advanced/Non-invention);
F25B1/06 F25B27/00 (Core/Invention);
F25B9/00 (Core/Non-invention)
International (IPC 1-7): F25B1/08 F25B23/00 F25B27/00
CPC: F25B1/08 F25B9/002 F25B27/005
European: F25B1/08 F25B27/00B2 R25B9/00B



Family:

Publication number	Publication date	Application number	Application date
AU2002351677 AA	20030617	AU20020351677	20021116
DE10162934 A1	20030618	DE20011062934	20011220
DE10295653 D2	20041111	DE20021095653	20021116
WO03048658 A1	20030612	WO2002DE04240	20021116

Priority:

DE20011058515 20011129 DE20011062934 20011220 DE20021095653 20021116
WO2002DE04240 20021116

Probable Assignee: DEUTSCH ZENTR LUFT AND RAUMFAHRT

Assignee(s): (std): FRAUNHOFER GES FORSCHUNG ; NOERES PETER ; HOELDER DANIEL ; HENNECKE KLAUS ; DEUTSCH ZENTR LUFT AND RAUMFAHRT

Assignee(s): DEUTSCHES ZENTRUM F LUFT U RAUMFAHRT EV ; DEUTSCHES ZENTRUM FUER LUFT UND RAUMFAHRT E V ; FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWAND ; FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG E V ; FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E V ; FRAUNHOFER GES ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG EV ; FRAUNHOFER GES ZUR FORDERUNG DER ANGEWANDTEN FORSC ; FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWAN

Inventor(s): (std): HENNECKE KLAUS ; HOELDER DANIEL ; HOLDER DANIEL ; NOERES PETER

Inventor(s): PETER NOERES ; DANIEL HOLDER ; KLAUS HENNECKE

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

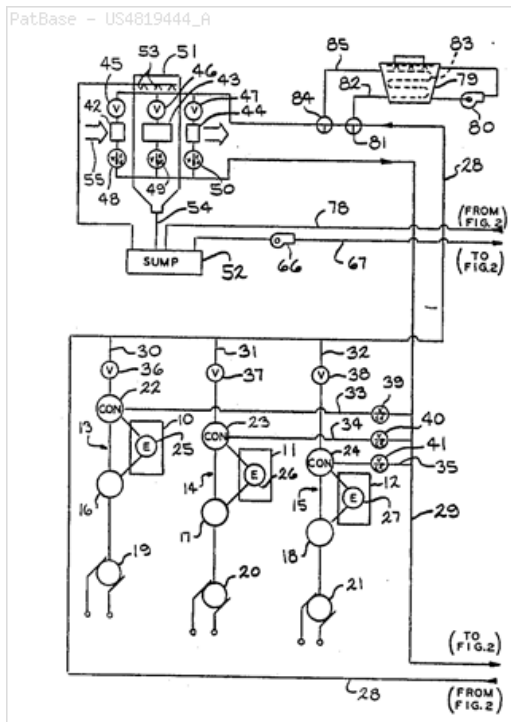
11) Family number: 2930115 (US4819444A) © PatBase

Title: AIR CONDITIONING APPARATUS

Abstract: Apparatus for conditioning the air of a supermarket and for removing heat from refrigerated display cases therein is disclosed. The apparatus includes first and second refrigeration apparatus, a chemical dehumidifier which uses a desiccant, a regenerator for the dehumidifier, means for transferring heat to the regenerator to enable regeneration of the desiccant of said dehumidifier, and means for causing air of flow in dehumidifying relationship with the dehumidifier and then into the space. The apparatus is operable to maintain the temperature of the case below that of the supermarket and to deliver dehumidified air to the supermarket to maintain a humidity ratio therein below about 50 grains of moisture per pound of dry air. The first refrigeration apparatus has a heat rejecting section, a compressor, and a heat absorbing section which is operable to transfer heat from the refrigerated case. The second refrigeration apparatus has a heat absorbing section and a heat rejecting section, and is operable to transfer heat from the condenser of the first refrigeration apparatus to the heat absorbing section of the second refrigeration apparatus.

Classifications:

International (IPC 8-9): F02G1/043 F24F1/00 F24F1/01 F24F3/00 F24F3/044 F24F3/14 F24F5/00 F25B25/02 F25B27/02 F25B39/04 G05D27/02 (Advanced/Invention);
F24F3/044 (Advanced/Non-invention);
F02G1/00 F24F3/00 F24F3/12 F25B25/00 F25B27/02 F25B39/04 (Core/Invention)
International (IPC 1-7): F24F3/044 F24F3/14 F24F5/00 F25B25/00 F25B27/02 F25D17/06 F25D17/08 G05D22/00
CPC: F24F2203/1008 F24F2203/1032 F24F3/1411 F24F3/14 F24F5/0007 F24F5/0089 F24F2203/1072 F24F1/00 F24F1/01 F24F3/1423 F24F5/0035 F24F2203/1016 F24F2203/1028 F24F2203/1036 F24F2203/104 F24F2203/1056 F24F2203/1068 F24F2203/1084 G05D27/02 Y02A30/274 F24F3/1417 F02G1/043 F24F3/00 F24F2003/144 F25B25/02 F25B27/02 F25B39/04 F25B2339/041 F25B2400/06 F25B2400/22
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US: 454/236 454/261 62/176.1 62/238.3 62/238.5 62/238.6 62/271 62/323.1 62/33 62/332 62/335 62/59 62/93

**Family:**

Publication number	Publication date	Application number	Application date
AU198773910 A1	19871009	AU19870073910	19870319
EP0263166 A1	19880413	EP19870902931	19870319
EP0263166 A4	19910731	EP19870902931	19870319
EP0314762 A1	19890510	EP19880904885	19880512
EP0314762 A4	19910911	EP19880904885	19880512
JP2503948 T2	19901115	JP19880504405	19880512
JP63503080 T2	19881110	JP19870502936T	19870319
KR19887001355 A	19880726	KR19877001077	19870319
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US4903503 A	19900227	US19880144300	19880114
US4959970 A	19901002	US19890327980	19890112
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US5181387 A	19930126	US19910644464	19910117
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Priority:

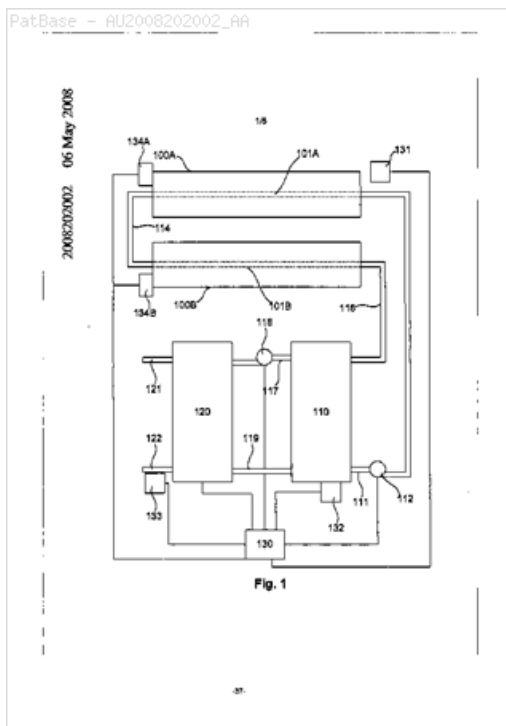
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US19860861058	19860508	US19860883013	19860708	WO1987US00626	19870319
US19870049260	19870512	US19880144300	19880114	US19880151856	19880203
WO1988US01585	19880512	US19890304938	19890202	US19890335910	19890410
US19900484551	19900226	US19900508191	19900412	US19910644464	19910117

Probable Assignee: MANVILLE SALES A CORP OF DE CORP**Assignee(s):** (std): MECKLER G ; MANVILLE SALES CORP ; MECKLER GERSHON ; CAMP DRESSER AND MCKEE ; PURDUE JOHN C ; PURDE JOHN C ; PURDUE JC**Assignee(s):** PURDUE JOHN C 10 PERCENT ; PURDUE JOHN C (10 PERCENT) ; MECKLER GERSHON (45 PERCENT) ; CAMP DRESSER AND MCKEE INC 45 PERCENT A CORP OF MA ; CAMP DRESSER AND MCKEE INC ; CAMP DRESSER AND MCKEE INC (45 PERCENT) ; CAMP DRESSER AND MCKEE INC (45 PERCENT) A CORP OF MA ; CAMP DRESSER AND MCKEE INC 45 PERCENT ; CAMP DRESSER AND MCKEE INC 45 PERCENT A CORP OF ; MECKLER GERSHON HERNDON VA CAMP DRESSER AND MCKEE ; MECKLER GERSHON HERNDON VA ; MANVILLE SALES A CORP OF DE CORP ; MECKLER GERSHON 45 PERCENT ; CAMP DRESSER AND MCKEE INC A CORP OF MASSACHUSETTS**Inventor(s):** (std): MECKLER GERSHON**Inventor(s):** GERSHON MECKLER**Designated states:** AT AU BB BE BG BJ BR CF CG CH CM DE DK FI FR GA GB HU IT JP KP KR LI LK LU MC MG ML MR MW NL NO RO SD SE SN SU TD TG US**12) Family number: 42925152** (AU2008202002A)

© PatBase

Title: AIR CONDITIONING**Abstract:** -33 c-i ABSTRACT Apparatus for conditioning air in a space, the apparatus including at least one solar collector for heating a heat transfer medium, a heat storage vessel for storing heat from the heat transfer medium and an absorption chiller for using heat from the heat transfer medium for Sproviding air conditioning. SFig. 1 c-i 1 34A Fig. 1**Classifications:****International (IPC 8-9):** F24F5/00 F24J2/04 F24J2/14 F24J2/24 F25B15/00 F25B27/00 (Advanced/Invention);

F24F5/00 F24J2/04 F24J2/06 F25B15/00 F25B27/00 (Core/Invention)
CPC: F24F5/0017 F24F2005/0064 F25B15/04 F25B15/06 F25B49/043
 F25B2700/2104 F28D20/0034 Y02B10/24 Y02B30/62 Y02E10/44
 Y02E10/45 Y02E60/142 Y02E60/147 Y02A30/272 Y02A30/277
 F25B27/007 F24S10/45 F24S23/74 F24S40/85
European: F24F5/00C5 F24J2/05B F24J2/14 F25B27/00B4
 F28D20/00C R24F5/00F9 R24J2/46B30 R25B15/04 R25B15/06
 R25B49/04B R25B700/2104 Y02B10/24 Y02E10/44 Y02E10/45
 Y02E60/14B Y02E60/14F



Family:

Publication number	Publication date	Application number	Application date
AU2008202002 AA	20081127	AU20080202002	20080506

Priority:

AU20070902469 20070509 AU20080202002 20080506

Probable Assignee: INFORM ENERGY PTY LTD

Assignee(s): (std): INFORM ENERGY PTY LTD

Agent(s): DAVIES COLLISON CAVE; DAVIES COLLISON CAVE PTY LTD

13) Family number: 57315157 (US2015267923A)

© PatBase

Title: SOLAR HEATING AND CENTRAL AIR CONDITIONING WITH HEAT RECOVERY SYSTEM

Abstract: The present invention discloses a solar heating and cooling central air-conditioning with a heat recovery system. The system includes a solar heating subsystem for providing supplementary energy to a heat pump, a buffer water tank for storing and minimizing energy loss, a domestic water heater for recovering unused heat, and an air handler ventilation and exchanger subsystem. All parts of the system are connected by antifreeze circulation pipes. The present invention combines the solar technology with the heat pump technology, making it work in extreme cold climate. The system is high energy efficient, versatile, safe, reliable, intelligent and flexible in installation.

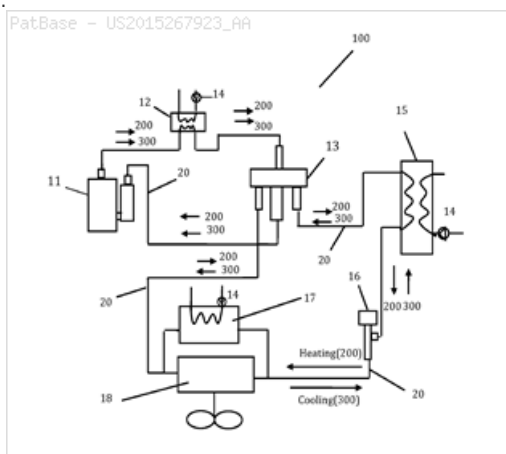
Classifications:

International (IPC 8-9): F24D11/00 F24D11/02 F25B27/00

F25B30/02 F25B49/02 (Advanced/Invention)

CPC: F24D3/08 F24D17/0047 F24D2200/12 F24D2200/14 F24F5/001
 F24F5/0096 F24F2005/0064 G05D23/1917 F24D19/1078 Y02B10/20
 Y02B10/24 Y02B10/70 Y02B30/52 F25B27/005 F25B30/02 F25B49/02
 F24D11/0221 F24D3/18 Y02A30/272 Y02B30/125 Y02B30/12
 Y02B30/18

US: 62/235.1 62/238.7



Family:

Publication number	Publication date	Application number	Application date
US2015267923 AA	20150924	US20140443418	20140228
WO14134405 A1	20140904	WO2014US19288	20140228

Priority:

US20130771547P 20130301 US20140443418 20140228 WO2014US19288 20140228

Probable Assignee: FAN XIN

Assignee(s): (std): FAN XIN

Inventor(s): (std): FAN XIN

Agent(s): MA YUE

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

14) Family number: 5057167 (US4832115A)

© PatBase

Title: METHOD AND APPARATUS FOR SIMULTANEOUS HEAT AND MASS TRANSFER

Abstract: A method and apparatus for heat and mass transfer is described that is applicable to: concentration, crystallization, purification, fractionation, stripping, absorption, and/or heat exchange for liquid media; drying for solid or gel media; and temperature and humidity modification for gas media. Generally, using a moving gas, such as air at a constant and atmospheric pressure, a continual change in a vapor-liquid equilibrium is created between proximate but continually changing gas and liquid temperatures within energy transferring chambers. Chamber wetting, implemented segmentedly, allows mass transfer into and from the moving gas. A forced temperature differential in each chamber causes heat transfer between chambers by means of thermally conductive partitions. This transfer can allow condensation causing further evaporation in the opposite chamber resulting in a recycling of energy. Concurrent with temperature variances, the segmented wetting can further allow wetting substance concentrations caused by evaporation, selective condensation, or absorption to vary between wetted sectors. A migratory movement connecting these wetted sectors generally provides for development of applicable concentration gradients between the wetted sectors along the chamber length.

Classifications:

International (IPC 8-9): B01D1/00 B01D1/14 B01D1/26 B01D1/30 B01D3/00 B01D53/14 B01D53/18 B01D53/26 B01J19/00 C02F1/10 C02F1/14 F24F3/14 F28D21/00 (Advanced/Invention); B01D1/00 B01D3/00 B01D53/14 B01D53/26 B01J19/00 (Advanced/Non-invention);

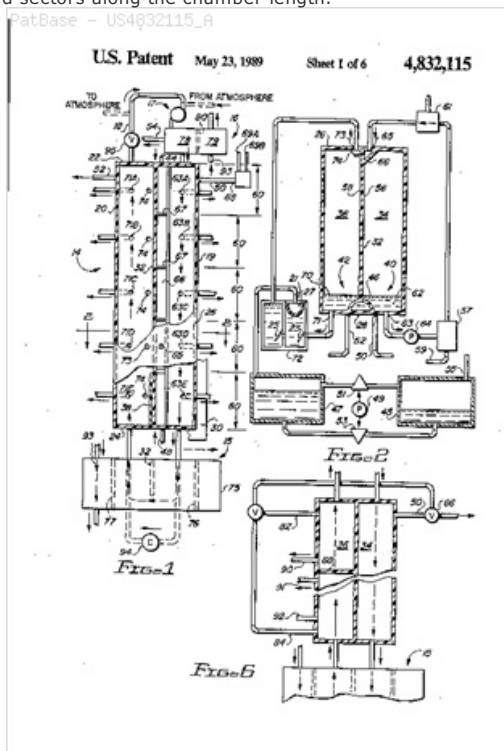
B01D1/00 B01D1/26 B01D3/00 B01D53/14 B01D53/18 B01D53/26 B01J19/00 C02F1/10 C02F1/14 F24F3/12 F28D21/00 (Core/Invention)

International (IPC 1-7): B01D1/00 B01D1/14 B01D3/00 B01D47/12 B01D53/14 B01D53/26 B01F3/04 B01J10/00 B01J19/00 C02F1/10 F23D3/04 F25B17/02 F25D3/04 F28C3/00 F28C3/08 F28D3/04 F28F13/02 F28F3/04

CPC: Y10S165/908 Y10S165/162 C02F1/14 B01D1/14 B01D1/26 B01D1/30 B01D53/18 C02F1/10 F24F3/1417 F24F2003/144 F28D21/0015 Y02W10/37 Y02A20/212

European: B01D1/14 B01D1/26 B01D1/30 B01D53/18 C02F1/10 C02F1/14 F24F3/14C1 F28D21/00D R24F3/14E

US: 165/1 165/104.31 165/109.1 165/111 165/115 165/908 165/DIG.162 261/150 261/153 261/157 261/22 261/23.1 62/121 62/271 62/92 62/94



Family:

Publication number	Publication date	Application number	Application date
AU198775014 A1	19880114	AU19870075014	19870701
AU597679 B2	19900607	AU19870075014	19870701
DE3788760 D1	19940224	DE19873788760	19870708
DE3788760 T2	19941201	DE19873788760T	19870708
EP0258979 A1	19880309	EP19870306044	19870708
EP0258979 B1	19940112	EP19870306044	19870708
IN164940 A	19890708	IN1987BO00220	19870708
JP2597363 B2	19970402	JP19870172022	19870709
JP63100932 A2	19880506	JP19870172022	19870709
US4832115 A	19890523	US19860883734	19860709
US4982782 A	19910108	US19890333571	19890404
US5020335 A	19910604	US19890355766	19890519
US5123481 A	19920623	US19910671015	19910318

Priority:

US19860883734 19860709 US19890333571 19890404 US19890355766 19890519
US19910671015 19910318

Probable Assignee: ALBERS TECHNOLOGIES CORP

Assignee(s): (std): ALBERS TECHNOLOGIES CORP ; ALBERS W F ; ALBERS WALTER F ; ALBERS WALTER FRANK ; UORUTAA EFU ARUBAASU

Assignee(s): WALTER FRANK ALBERS ; ALBERS WALTER FRANK PHOENIX ARIZ ; ALBERS WALTER FRANK PHOENIX ARIZ US ; ALBERS WF ; WALTER F ALBERS ; ALBERS TECHNOLOGIES AN AZ CORP CORP

Inventor(s): (std): JIEEMUSU AARU BETSUKUMAN ; UORUTAA EFU ARUBAASU ; ALBERS WALTER F ; BECKMAN JAMES R ; BACKMAN JAMES R ; ALBERS WALTER FRANK ; BECKMAN JAMES RICHARD

Inventor(s): JAMES R BACKMAN ; WALTER F ALBERS ; WALTER FRANK ALBERS ; JAMES R BECKMAN

Agent(s): SHELSTON IP; SHELSTON IP PTY LTD

Designated states: DE FR GB IT

Title: APPARATUS FOR PROVIDING THERMAL HEAT OR GENERATING COOLING, APPARATUS FOR PROVIDING ELECTRICAL ENERGY, AND METHOD FOR PROVIDING HEATING ENERGY, METHOD FOR GENERATING COOLING ENERGY AND METHOD FOR GENERATING KINETIC ENERGY AND/OR ELECTRICAL ENERGY

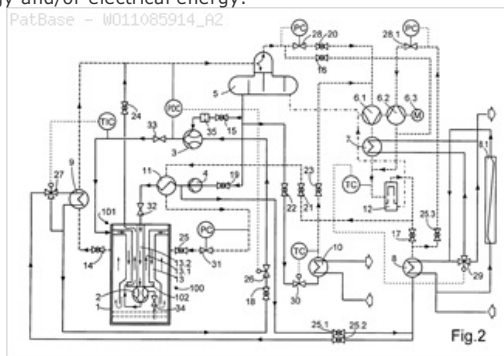
Abstract: The invention relates to an apparatus for providing thermal heat by means of thermal extraction from the earth or for generating cooling by means of thermal input into the earth, comprising at least one probe for introduction into the earth through which a coolant for absorbing or discharging heat from or to the earth can flow, a coolant condenser (8) for at least partially condensing the at least partially evaporated coolant in the probe and diverting the geothermal heat out of the coolant and a coolant evaporator (10) for at least partially evaporating the coolant by means of input of ambient heat into the coolant. According to the invention, the apparatus for providing thermal heat by thermal extraction from the earth or for generating cooling has a first liquid jet pump (3) arranged between the coolant condenser (8) and the head of the probe to introduce condensed coolant into the probe and a second liquid jet pump (2) arranged between the sump of the probe and the coolant evaporator (10) to divert condensed coolant out of the probe. The invention additionally relates to a method for providing heating energy and to a method for generating cooling energy. The invention further comprises an apparatus for providing electrical energy and a method for generating kinetic energy and/or electrical energy.

Classifications:

International (IPC 8-9): F24D11/02 F24D13/00 F24D3/18 F24J3/08 F25B30/06 (Advanced/Invention)

CPC: F24D3/18 F24D12/02 F24D2200/11 F24D2200/12 F24D2200/14 F24H2240/00 F25B30/06 Y02B10/20 Y02B10/40 Y02B10/70 Y02B30/14 Y02B30/12

European: F24D12/02 F24D3/18 F25B30/06 R24D200/11 R24D200/12 R24D200/14 R24H240/00 Y02B10/20 Y02B10/40 Y02B10/70 Y02B30/12 Y02B30/14



Family:

Publication number	Publication date	Application number	Application date
DE102010040765 A1	20110622	DE201010040765	20100914
WO11085914 A2	20110721	WO2010EP70187	20101220
WO11085914 A3	20120202	WO2010EP70187	20101220

Priority:

DE200910055066 20091221 DE201010040765 20100914

Probable Assignee: HOCHSCHULE MAGDEBURG STENDAL FH

Assignee(s): (std): HOCHSCHULE MAGDEBURG STENDAL FH ; PAULUSCH REINER ; WAGNER ROLF

Assignee(s): HOCHSCHULE MAGDEBURG STENDAL

Inventor(s): (std): PAULUSCH REINER ; WAGNER ROLF ; PAULUSCH REINER DIPL ING ; WAGNER ROLF DR

Agent(s): GULDE HENGELHAUPT ZIEBIG AND SCHNEIDER

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 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 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

Title: TEMPERATURE CONTROL SYSTEM

Abstract: Provided is a temperature control system, including a closed refrigerant circuit having an evaporator unit configured for absorbing a heat via the refrigerant, thereby evaporating it, a compressor unit configured for increasing the pressure and temperature of refrigerant within the circuit, and a condenser unit configured for rejecting heat from the refrigerant, thereby liquefying it. The compressor unit includes a mechanical compressor configured for increasing the pressure of the refrigerant and a thermal collector configured for utilizing an external heat source to increase the temperature of the refrigerant.

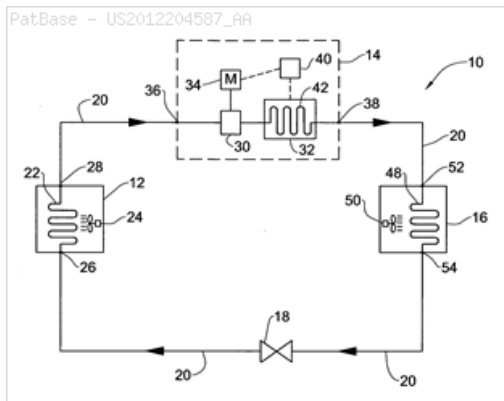
Classifications:

International (IPC 8-9): F16K11/20 F24F3/00 F25B F25B1/00 F25B13/00 F25B27/00 F25B49/02 (Advanced/Invention);

CPC: F25B13/00 F25B27/005 F25B2313/008 F25B2313/0272 F25B2400/04 F25B2600/0253 Y02B30/741 Y10T137/87249 B60H1/00428 Y02T10/88

European: F25B13/00 F25B27/00B2 R25B313/008 R25B313/0272 R25B400/04 R25B600/0253 Y02B30/74B

US: 1/1 137/597 137/597S 62/228.1 62/228.100P 62/235.1 62/235.100S 62/238.6 62/238.600S



Family:

Publication number	Publication date	Application number	Application date
AU2010309437 AA	20110428	AU20100309437	20101020
AU2010309437 BB	20160526	AU20100309437	20101020
EP2491319 A2	20120829	EP20100782414	20101020
IL219146 A0	20120628	IL20100219146	20101020
IL219146 A1	20160229	IL20100219146	20101020
JP2013508663 T2	20130307	JP20120534821T	20101020
JP5911067 B2	20160427	JP20120534821T	20101020
US2012204587 AA	20120816	US20100502923	20101020
US9267713 BB	20160223	US20100502923	20101020
WO11048594 A2	20110428	WO2010IL00863	20101020
WO11048594 A3	20110630	WO2010IL00863	20101020

Priority:

US20090253573P 20091021 WO2010IL00863 20101020 US20100502923 20101020
IL20120219146 20120415

Probable Assignee: DZSOLAR LTD

Assignee(s): (std): DZSOLAR LTD ; ZAMIR OFRI

Inventor(s): (std): ZAMIR OFRI

Agent(s): SHELSTON IP; SHELSTON IP PTY LTD; MINOJA FABRIZIO; REINHOLD COHN AND PARTNERS; KITA AOYAMA INT PATENT BUREAU; VORYS SATER SEYMOUR AND PEASE LLP

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 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 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

17) Family number: 66331225 (US2017261243A)

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Title: ABSORPTION COOLING SYSTEM WITH SOLAR COLLECTOR

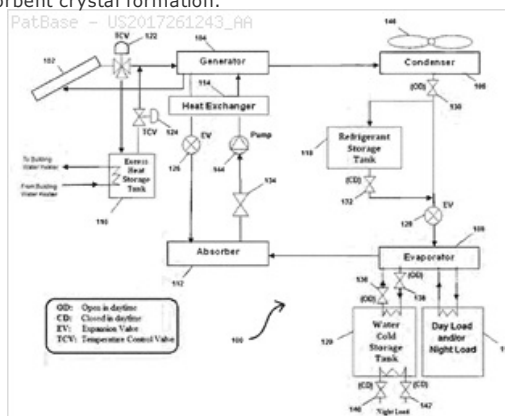
Abstract: A solar powered absorption cooling system employing refrigerant-absorbent solutions such as water and lithium bromide and hybrid storage capabilities, and a method of employing the system in refrigeration and air conditioning units. The system includes a first temperature control valve and second temperature control valve that together regulate the flow of solar heating fluid into the generator and substantially reduce absorbent crystal formation.

Classifications:

International (IPC 8-9): F24F5/00 F25B15/00 F25B15/06 F25B25/00 F25B27/00 F25B49/04 F25B7/00 (Advanced/Invention); F24F5/00 (Advanced/Non-invention)

CPC: F25B27/007 F24F5/0014 F25B49/043 F24F2005/0067

F25B15/002 F25B25/005 F25B2500/29 F25B2600/2507 F25B2700/2111 F24F2005/0064 F25B15/06 F25B2315/001 Y02A30/277 Y02B30/62 Y02A30/272 Y02B10/20 Y02B10/24



Family:

Publication number	Publication date	Application number	Application date
US2017261243 AA	20170914	US20170609424	20170531
US2018003415 AA	20180104	US20170707243	20170918
US2018320939 AA	20181108	US20180032747	20180711
US2018320940 AA	20181108	US20180032823	20180711
US9702597 BA	20170711	US20160046473	20160218
US9784484 BB	20171010	US20170609424	20170531
US10041707 BB	20180807	US20170707243	20170918

Priority:

US20160046473 20160218 US20170609424 20170531 US20170707243 20170918
US20180032747 20180711 US20180032823 20180711

Probable Assignee: KING FAHD UNIV OF PETROLEUM AND MINERALS

Assignee(s): (std): UNIV KING FAHD PET AND MINERALS

Assignee(s): KING FAHD UNIV OF PETROLEUM AND MINERALS

Inventor(s): (std): AL UGLA ALI ABDULAZIZ ; EL SHAARAWI MAGED A I

Inventor(s): EL SHAARAWI MAGED AI

Agent(s): OBLON MCCLELLAND MAIER AND NEUSTADT LLP

18) Family number: 3859258 (US4408468A)

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Title: SYSTEM COMPRISING AT LEAST ONE ABSORPTION HEAT PUMP

Abstract: In a system with at least one absorption heat pump, a working medium is generated in a generator or explosion

unit by the input of heat energy of relatively high temperature, from an absorption material. The generated working medium is condensed in a condenser and then undergoes expansion in an expansion unit. The expanded, condensed working medium is evaporated in an evaporator with the input of heat energy at a relatively low temperature and the evaporated working medium is absorbed again, in an absorber, in the absorption material. The heat energy, used for generation of the working medium from the absorption material, is so stored for the heat pump that the heat energy, as taken from the store, is on hand at a temperature which is high enough for the generation of working medium from the absorption material. The heat store may preferably take the form of a sorption store, comprising a zeolite as sorption material and forming a part of a further discontinuously operated absorption heat pump. Such a heat pump, using zeolite and, preferably H₂O as a working material system, is responsible, when used by itself, for a useful effect on producing useful heat (that is to say heat able to be utilized) at a relatively high temperature, as for example 80 DEG to 100 DEG C. and higher and, if desired, for producing cold as well.

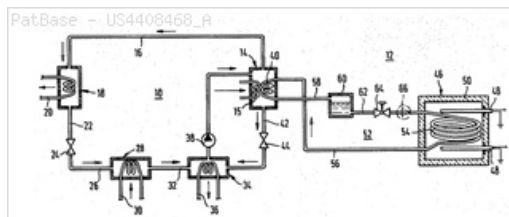
Classifications:

International (IPC 8-9): F24D11/02 F24J3/00 F25B15/06 F25B17/08 F25B27/00 F25B30/04 F25B33/00 (Advanced/Invention); F25B15/06 F25B17/08 (Advanced/Non-invention); F24D11/00 F24J3/00 F25B15/02 F25B17/00 F25B27/00 F25B30/00 F25B33/00 (Core/Invention); F25B15/02 F25B17/00 (Core/Non-invention)

International (IPC 1-7): F24D11/02 F24J3/00 F24J3/04 F25B15/00 F25B15/06 F25B17/08 F25B27/00

CPC: Y02A30/276 Y02A30/277 F25B30/04 F25B15/06 F25B17/08 F25B27/007 Y02B30/62

European: F25B15/06 F25B17/08 F25B27/00B4 F25B30/04 Y02B30/62
US: 62/238.3 62/476 82/476



Family:

Publication number	Publication date	Application number	Application date
AT28929 E	19870815	AT19800102725T	19800516
DE2939423 A1	19810416	DE19792939423	19790928
DE3072006 D1	19870917	DE19803072006	19800516
EP0026257 A2	19810408	EP19800102725	19800516
EP0026257 A3	19820602	EP19800102725	19800516
EP0026257 B1	19870812	EP19800102725	19800516
JP56056567 A2	19810518	JP19800134488	19800929
US4408468 A	19831011	US19800188120	19800917

Priority:

DE19792939423 19790928 DE19803072006 19800516 EP19800102725 19800516

Probable Assignee: ALEFELD GEORG

Assignee(s): (std): ALEFELD GEORG

Assignee(s): ALEFELD GEORG PROF DR ; ALEFELD GEORG PROFDR ; MAIER LAXHUBER PETER SAUMWEBERSTR ; ZEO TECH ; MAIER LAXHUBER PETER ; ZEO TECH (ZEOLITH TECHNOLOGIES GMBH) ; ZEO TECH ZEOLITH TECHNOLOGIES GMBH

Inventor(s): (std): ALEFELD GEORG ; MAIER LAXHUBER PETER ; PEETAA MAIAAARATSUKUSUFUUBAA ; GEORUKU AAREFUERUTO ; MAIER LAXHUBER PETER DIPL PHYS ; ALEFELD GEORG PROF DR ; ALEFELD GEORG DR PROF

Inventor(s): ALEFELD GEORG PROFDR ; MAIER LAXHUBER DIPL PHYS ; MAIER LAXHUBER DIPL PHYS PETER

Designated states: AT BE CH DE FR GB IT LI NL SE

19) Family number: 48264263 (US2011030404A)

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Title: HEAT PUMP WITH INTEGRAL SOLAR COLLECTOR

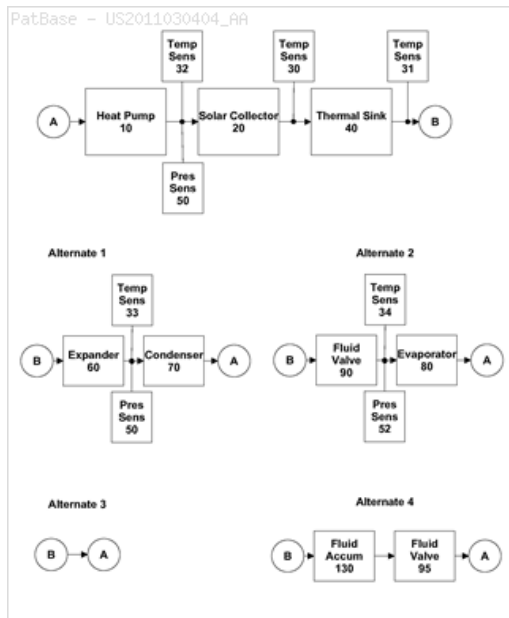
Abstract: The present invention generally relates to heat pumps that utilize at least one thermal source operating with the same working fluids. In one embodiment, the present invention relates to a hybrid solar heat pump comprised of at least one microchannel heat exchanger with integral solar absorber, at least one compression (i.e., mass flow regulator) device as the heat pump for concurrent compression to a higher pressure and mass flow regulator of the working fluid, and at least one working fluid accumulator with the entire system operating with the same working fluid. The present invention also generally relates to heat pump systems that utilize an inventory management system to provide both efficient and safe operation under a wide range of operating conditions.

Classifications:

International (IPC 8-9): F24D11/02 F24J2/00 F24J2/04 F24J2/30 F24J2/44 F24J2/46 F25B13/00 F25B27/00 F25B30/00 F25B30/02 F25B49/00 F25B49/02 F25D17/02 (Advanced/Invention)
CPC: F24D11/0221 Y02B10/24 F24D11/02 F24D2200/14 F25B27/002 Y02B10/20 Y02B10/70 Y02A30/272 Y02B30/125

European: F24D11/02 F24D11/02C2 F25B27/00B R24D200/14 Y02B10/20 Y02B10/24 Y02B10/40 Y02B10/70 Y02B30/12B2

US: 1/1 126/638 126/640 126/641 126/645 126/646 126/678 62/129 62/235.1 62/235.100P 62/324.6 62/324.600S 62/434 62/434S 622/351



Family:

Publication number	Publication date	Application number	Application date
US2011030404 AA	20110210	US20100849841	20100804
US2012247134 AA	20121004	US20100389207	20100804
US2012247455 AA	20121004	US20100389023	20100806
US9316404 BB	20160419	US20100389207	20100804
WO11017450 A2	20110210	WO2010US44447	20100804
WO11017450 A3	20110428	WO2010US44447	20100804
WO11017476 A1	20110210	WO2010US44476	20100804
WO11017599 A1	20110210	WO2010US44681	20100806

Priority:

US20090231238P 20090804 US20090231674P 20090806 US20100849841 20100804
WO2010US44476 20100804 US20100389207 20100804 US20100389023 20100806
WO2010US44681 20100806

Probable Assignee: ECHOGEN POWER SYSTEMS LLC

Assignee(s): (std): ECHOGEN POWER SYSTEMS INC ; ECHOGEN POWER SYSTEMS LLC ; GURIN MICHAEL ; SOL XORCE LLC ; GURIN MICHAEL H ; MILLER JASON D ; HELD TIMOTHY J ; HELD TIMOTHY JAMES

Assignee(s): DRESSER RAND CO

Inventor(s): (std): GURIN MICHAEL ; GURIN MICHAEL H ; HELD TIMOTHY J ; MILLER JASON D ; HELD TIMOTHY JAMES

Agent(s): MICHAEL H GURIN; EDMONDS AND NOLTE PC; ROSENBAUM DAVID G ET AL; CRIMALDI JOSEPH J; SCOTT JAMES C

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 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 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

20) Family number: 36000266 (US2007205298A)

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Title: HYBRID HEATING AND/OR COOLING SYSTEM

Abstract: A hybrid heating and/or cooling system may combine different energy sources (e.g., solar and geothermal) into a single system. The hybrid heating and/or cooling system may include one or more heat pumps, a heat exchanger system, a solar and/or waste energy system, and a delivery system for delivering heat (and/or cool air) to a space such as a building. These systems may be interconnected and controlled using various conduits, pumps, valves and controls. The solar energy system may provide heat (e.g., low grade heat) to the working fluid at the input to the source side of the heat pump and/or may provide heat (e.g., high grade heat) to the delivery system for direct solar and/or waste energy heating.

Classifications:

International (IPC 8-9): F24D11/02 F25B27/00 F25B29/00

G05D23/19 (Advanced/Invention);

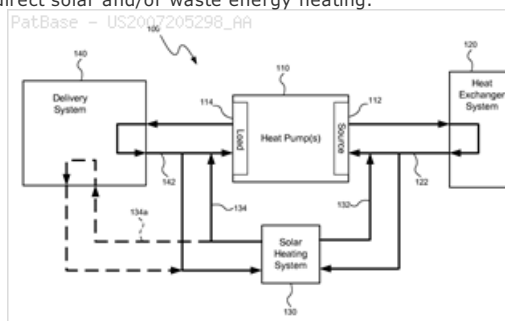
F24D11/00 F25B29/00 G05D23/19 (Core/Invention)

CPC: Y02A30/272 F24D11/0221 F25B27/005 F25B30/06 Y02B10/20 Y02B10/24 Y02B10/40 Y02B10/70

European: F24D11/02C2 F25B30/06 R25B27/00B2 Y02B10/20

Y02B10/24 Y02B10/40 Y02B10/70 Y02B30/12B2

US: 165/240 165/254 165/260 165/45 165/48.1 165/48.2 237/2.00B 237/2.00BP 237/200B 237/2B 62/235.1

**Family:**

Publication number	Publication date	Application number	Application date
US2007205298 AA	20070906	US20070674241	20070213
US8733429 BB	20140527	US20070674241	20070213

Priority:

US20060772759P 20060213 US20070674241 20070213

Probable Assignee: HL TURNER GROUP INC

Assignee(s): (std): H L TURNER GROUP INC ; HARRISON JEFFREY J ; TURNER WILLIAM A

Assignee(s): HL TURNER GROUP INC ; THE H L TURNER GROUP INC

Inventor(s): (std): HARRISON JEFFREY J ; TURNER WILLIAM A

Inventor(s): TURNER WILLIAM ; HARRISON JEFFREY

Agent(s): GROSSMAN TUCKER PERREAULT AND PFLEGER PLLC

21) Family number: 49714285 (US2011247351A)

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Title: MECHANICALLY ENHANCED EJECTOR HVAC AND ELECTRIC POWER GENERATION SYSTEM

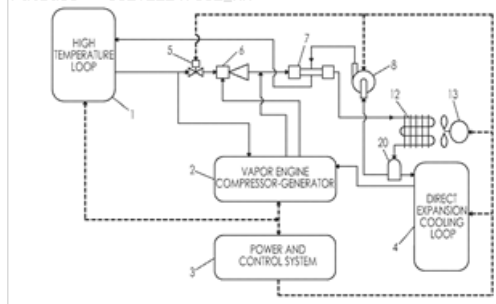
Abstract: An HVAC system that uses a mechanical compressor powered by vaporized refrigerant and/or electric power, to increase efficiency in a jet ejector cooling cycle. The device is further able to convert thermal energy to electric power which may be used to meet internal or external requirements, for example, to activate control a system or charge a battery. Compatible input power includes only thermal energy, only electric energy or a combination of the two. Motive thermal energy may be input at a wide range of temperature and include both waste and non-waste heat sources such as that from an internal combustion engine and fuel-fired heater. Solar thermal and solar photovoltaic may also be used when collected from either concentrated or non-concentrated sources. Embodiments of the device are equally well suited to both mobile and stationary applications.

Classifications:**International (IPC 8-9):** F25B1/06 F25B27/00

F25B27/02 (Advanced/Invention)

CPC: F25B25/00 B60H1/00435 B60H2001/3298 F25B1/06 F25B2400/141**European:** B60H1/00J2 F25B1/06 F25B25/00 L60H1/32Z8 R25B400/141**US:** 62/235.1 62/235.100P 62/238.4 62/238.400S 62/238.6 62/238.600S 62/323.1 62/323.100S 62/500 62/500S

PatBase - US2011247351_AA

**Family:**

Publication number	Publication date	Application number	Application date
US2011247351 AA	20111013	US20100759686	20100413
US8393171 BB	20130312	US20100759686	20100413

Priority:

US20100759686 20100413

Probable Assignee:

ALSTON GERALD ALLEN

Assignee(s): (std):

ALSTON GERALD ALLEN

Inventor(s): (std):

ALSTON GERALD ALLEN

22) Family number: 62067317 (US2016258313A)

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Title: COMBINED ELECTRICITY, HEAT, AND CHILL GENERATION FOR A RANKINE ENGINE

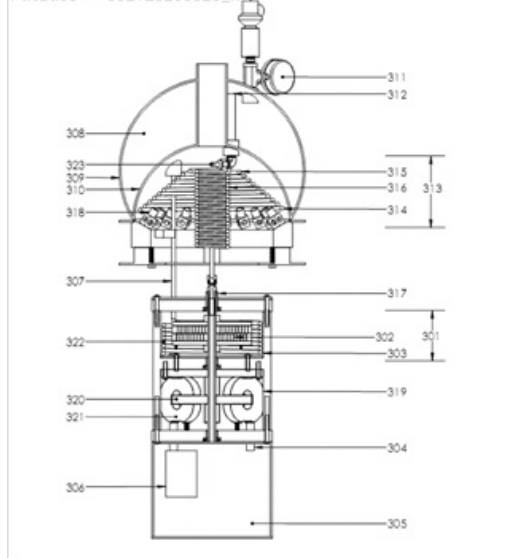
Abstract: A generator uses a working fluid in a single-cycle Rankine engine for up to three purposes: generation of electricity; generation of hot water from heat exchanger; and generation of chill by the evaporation of liquefied working fluid. The working fluid, which may be carbon dioxide, goes through a single Rankine cycle for both heat engine and heat pump. Instead of using a pump to liquefy the working fluid, the working fluid experiences cryogenic liquefaction method under controlled pressure. The Hui turbine is used for electricity generation. Heat source for the combined heat pump and heat engine could come from concentrated solar power or from burning a fossil fuel.

Classifications:**International (IPC 8-9):** F01D15/10 F01K27/02 F01K5/00 F25B13/00 F25B15/02 F25B25/02 F25B27/00 F25B30/02 F25B39/02 F25B39/04 F25B9/00 F25B9/06 H02K9/04 H02K9/18

H02K9/19 (Advanced/Invention)

CPC: F01D15/10 H02K9/19 F25B9/008 F25B9/002 F25B9/06 F25B2309/061 F25B2309/06 F01K5/00 F25B27/00 Y02P80/15**US:** 290/52

PatBase - US2016258313_AA

**Family:**

Publication number	Publication date	Application number	Application date
US2016258313 AA	20160908	US20150888084	20151002
US10001025 BB	20180619	US20150888084	20151002
WO16054595 A2	20160407	WO2015US53864	20151002
WO16054595 A3	20161215	WO2015US53864	20151002

Priority:

US20140059649P 20141003

US20150888084 20151002

WO2015US53864 20151002

Probable Assignee: MONARCH POWER CORP**Assignee(s): (std):** MONARCH POWER CORP**Inventor(s): (std):** HUI JOSEPH Y**Agent(s):** MATTHEW L; VON HELLENS AND BYCER LAW; BYCER MATTHEW L

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

Title: COMPACT REFRIGERATING UNIT

Abstract: The present invention relates to a refrigerating unit for supplying a building with refrigeration or refrigeration and heat, comprising at least one absorption or adsorption refrigerating system (11) and a heat generator (12) which are integrated into a common, mobile housing. Here, the refrigerating unit has at least one connection pair (21) for connection to at least one external heat supply circuit (31), via which the at least one absorption or adsorption refrigerating system is supplied with heat, and at least one connection pair (22) for connection to at least one external cooling outlet circuit (32), via which cooling can be output from the refrigerating unit. Furthermore, the refrigerating unit comprises a controller (40) which controls or regulates the at least one external heat supply circuit and the at least one external cooling output circuit as a function of the instantaneous performance data of the at least one absorption or adsorption refrigerating system and the heat generator.

Classifications:**International (IPC 8-9):** F25B27/00 F25B29/00

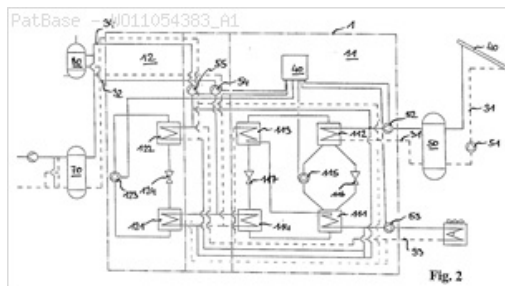
F25B49/04 (Advanced/Invention)

CPC: F25B29/006 F25B27/007 F25B49/04 Y02B10/20 Y02B10/24

Y02B30/62 Y02B30/64 Y02A30/272 Y02A30/277 Y02A30/278

European: F25B27/00B4 F25B29/00C F25B49/04 Y02B10/20

Y02B10/24

**Family:**

Publication number	Publication date	Application number	Application date
EP2496896 A1	20120912	EP20090748776	20091104
WO11054383 A1	20110512	WO2009EP64624	20091104

Priority:

WO2009EP64624 20091104

Probable Assignee: AETEB A GMBH**Assignee(s):** (std): AETEB A GMBH ; KIMMIG GUENTER ; SPORER ELMAR**Inventor(s):** (std): SPORER ELMAR ; KIMMIG GUENTER**Agent(s):** ZECH STEFAN MARKUS ; ZECH STEFAN M

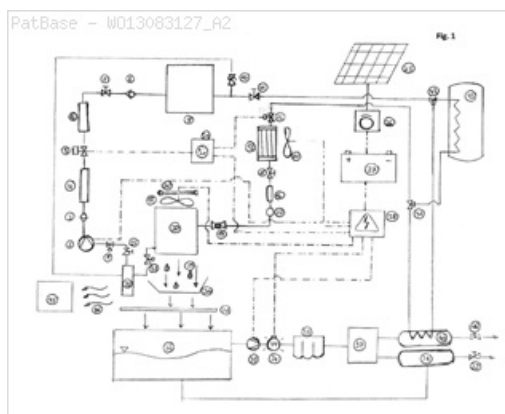
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Title: METHOD AND DEVICE FOR REFRIGERATION ESPECIALLY FOR RECOVERING WATER FROM AIR

Abstract: The invention relates to a device for refrigeration by way of vapor compression refrigeration especially for recovering water from air, comprising the following structural components: a compressor (2), a condenser (11) and an evaporator (18). The invention is characterized in that the device further comprises at least one photovoltaic module for generating the electrical energy required to operate the compressor (2) and other energy-consuming devices and at least one solar collector (25) and/or another module supplying thermal energy for providing an additional thermal compression stage.

Classifications:**International (IPC 8-9):** B01D53/26 E03B3/28

F25B27/00 (Advanced/Invention)

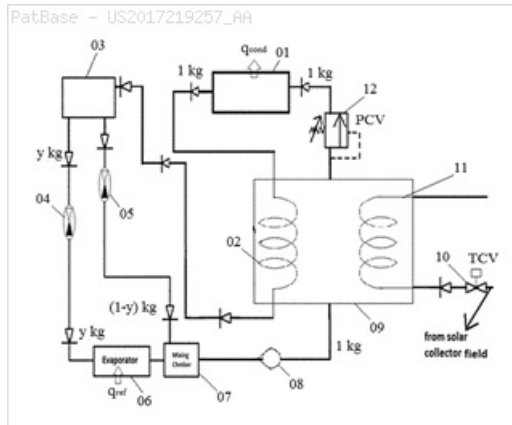
CPC: F25B27/005 B01D53/265 F25B1/10**Family:**

Publication number	Publication date	Application number	Application date
DE102011120419 A1	20130613	DE201110120419	20111208
DE102011120419 B4	20141002	DE201110120419	20111208
DE502012011883 D1	20180125	DE201250011883T	20121210
EP2794068 A2	20141029	EP20120830897	20121210
EP2794068 B1	20171220	EP20120830897	20121210
WO13083127 A2	20130613	WO2012DE200083	20121210
WO13083127 A3	20130815	WO2012DE200083	20121210

Priority:

Probable Assignee: G AND M SYSTEMTECHNIK GMBH**Assignee(s):** (std): G AND M SYSTEMTECHNIK GMBH**Inventor(s):** (std): GOETZ NORBERT ; LABORENZ DIETER ; METZLER HEINER ; METZLER JUTTA ; SHIOMBING MOSES ; SIHOMBING MOSES**Agent(s):** KODRON FELIX; MACKERT ANDREAS**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 PA 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**25) Family number: 65812400 (US2017219257A)**

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Title: SOLAR REFRIGERATION SYSTEM WITH A CLOSED REFRIGERANT LOOP**Abstract:** A solar-thermal refrigerant compression system employing refrigerants, such as R410a and R500, and a method of employing the system in refrigeration and air-conditioning units. The system includes a refrigerant storage tank, an evaporator, a mixing chamber, a condenser and an isochoric thermal compressor comprising a condensate heat exchanger and a heating coil connected to a solar collector field.**Classifications:****International (IPC 8-9):** F25B1/00 F25B27/00 F25B27/02 F25B41/04 F25B43/00 (Advanced/Invention); F25B27/02 F25B31/00 (Advanced/Non-invention) **CPC:** F25B27/005 F25B27/00 F25B27/02 F25B31/006 F25B31/008 F25B2400/16 F25B2400/24 F04B19/24 F25B27/002 F25B41/04 F25B2400/0409 F25B2400/05**Family:**

Publication number	Publication date	Application number	Application date
US2017219257 AA	20170803	US20170487190	20170413
US2018031286 AA	20180201	US20170707353	20170918
US9664421 BA	20170530	US20150984835	20151230
US9791187 BB	20171017	US20170487190	20170413

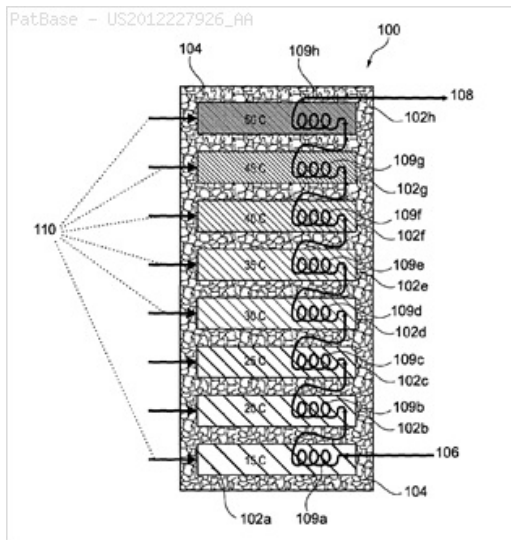
Priority:

US20150984835 20151230 US20170487190 20170413 US20170707353 20170918

Probable Assignee: KING FAHD UNIV OF PETROLEUM AND MINERALS**Assignee(s):** (std): UNIV KING FAHD PET AND MINERALS**Assignee(s):** KING FAHD UNIV OF PETROLEUM AND MINERALS**Inventor(s):** (std): EL SHAARAWI MAGED AHMED**Agent(s):** OBLON MCCLELLAND MAIER AND NEUSTADT LLP**26) Family number: 44279403 (US2012227926A)**

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Title: ENERGY STORAGE SYSTEMS**Abstract:** There is herein described energy storage systems. More particularly, there is herein described thermal energy storage systems and use of energy storable material such as phase change material in the provision of heating and/or cooling systems in, for example, domestic dwellings.**Classifications:****International (IPC 8-9):** B21D53/02 F24D11/00 F24D11/02 F24F11/00 F24H7/00 F24H7/02 F24H7/04 F24H9/20 F24J2/05 F24J2/32 F24J2/34 F24S10/40 F24S10/90 F24S10/95 F24S60/00 F24S60/10 F25B29/00 F25B30/00 F25B30/04 F25B7/00 F28D1/04 F28D15/04 F28D20/00 F28D20/02 H01L21/00 H01M16/00 (Advanced/Invention) **CPC:** F24S10/90 F24S60/00 F24H2250/00 F24J2/055 F24J2/34 F24J2/32 Y02B30/126 F24D11/004 F24D11/003 F24D11/0214 F24D2200/11 F24D2200/12 F24D2200/14 F24D2200/16 F24D2200/20 F24D2220/10 F24H7/04 F24H7/0441 F24H9/20 F24H9/2014 F24H2240/08 F24S10/45 F28D20/02 F28D20/021 Y02B10/22 Y02B10/40 Y02B10/70 Y02B30/125 Y02B30/52 Y02E10/44 Y02E60/145 Y10T29/4935 **European:** F24D11/00C2 F24D11/00C3 F24D11/02C F24H7/04 F24H7/04B3B F24H9/20 F24H9/20A2 F24J2/34 F28D20/02A R24D200/11 R24D200/12 R24D200/14 R24D200/16 R24D200/20 R24H240/08 Y02B10/20 Y02B10/40 Y02B10/70 Y02B30/12B2 Y02E10/40 Y02E60/14D **US:** 165/10 165/104.26 165/151 165/157 29/890.03

**Family:**

Publication number	Publication date	Application number	Application date
■ CN102695924 A	20120926	CN201080060440	20101116
■ CN102695924 B	20160120	CN201080060440	20101116
■ CN105202959 A	20151230	CN201510546201	20101116
■ CN105222204 A	20160106	CN201510546221	20101116
■ CN105222632 A	20160106	CN201510545696	20101116
■ CN105222632 B	20180403	CN201510545696	20101116
■ CN105222633 A	20160106	CN201510546162	20101116
■ CN105222633 B	20180511	CN201510546162	20101116
■ CN105241122 A	20160113	CN201510544494	20101116
■ CN105241122 B	20180911	CN201510544494	20101116
■ DE602010045414 D1	20171102	DE201060045414T	20101116
■ DK2502004 T3	20180102	DK20100782360T	20101116
■ EP2502004 A2	20120926	EP20100782360	20101116
■ EP2502004 B1	20170920	EP20100782360	20101116
■ ES2653566 T3	20180207	ES20100782360T	20101116
■ GB200919934 A0	20091230	GB20090019934	20091116
■ IN04911CN2012 A	20131018	IN2012CN04911	20120605
■ KR101761176 B1	20170725	KR20127015184	20101116
■ KR20120117984 A	20121025	KR20127015184	20101116
■ US2012227926 AA	20120913	US20100509979	20101116
■ US2018195741 AA	20180712	US20180871225	20180115
■ WO11058383 A2	20110519	WO2010GB51910	20101116
■ WO11058383 A3	20120531	WO2010GB51910	20101116

Priority:

GB20090019934 20091116 CN201080060440 20101116 EP20100782360 20101116
 WO2010GB51910 20101116 US20120509979 20120516 US20180871225 20180115

Probable Assignee: SUNAMP LIMITED**Assignee(s):** (std): BISSELL ANDREW ; FIELD JOHN ; SUNAMP LTD**Assignee(s):** SUNAMP LTD MACMERRY ; SUNAMP LIMITED**Inventor(s):** (std): ANDREW BISSELL ; JOHN FIELD ; BISSELL ANDREW ; FIELD JOHN**Agent(s):** HERNANDEZ YORCK DIPL ING; HARRISON GODDARD FOOTE; HGF LTD; SAEZ ANA

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
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 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 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

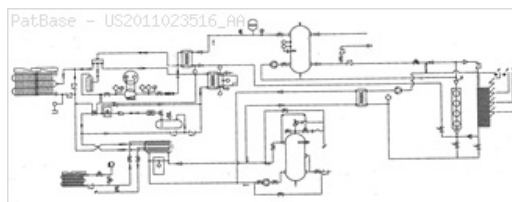
27) Family number: 48239422 (US2011023516A)

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Title: Sistema F.E.E.

Abstract: The invention is a different scheme plant which changes radically the method of conception of all refrigeration systems, conditioning and heat pump. Sistema F.e.e. shocks all previous concepts regarding the disposal of process heat coming from any industrial production. Sistema F.e.e. is an integrated system in an artificial environment which recovers and utilizes each possible source of thermal energy, to the limit of utilizing the thermal energy which comes from scraps of production auxiliary to its own disposal. Sistema F.e.e. has been the beginning of the third great industrial revolution, which is the energetic revolution in respecting nature. Sistema F.e.e. is instead integrated to nature; our system is the point of beginning which marks the end of the oil and petroleum era.

Classifications:**International (IPC 8-9):** F25B13/00 F25B27/00 (Advanced/Invention)**CPC:** F25B29/00**European:** F25B29/00**US:** 62/238.1 62/238.100P 62/324.1 62/324.100S



Family:

Publication number	Publication date	Application number	Application date
US2011023516 AA	20110203	US20100661681	20100319

Priority:

US20100661681 20100319

Probable Assignee:

DAZZA ARTURO

Assignee(s): (std):

DAZZA ARTURO

Inventor(s): (std):

DAZZA ARTURO

Agent(s):

ARTURO DAZZA

28) Family number: 45376427 (EP2196743A3)

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Title: MULTI-ENERGY AND MULTI-SOURCE THERMODYNAMIC DEVICE WITH HOT WATER TANK DISPOSITIF THERMODYNAMIQUE AVEC BALLON D'EAU CHAUDE MULTI-ENERGIES MULTI-SOU

Abstract: Source: EP2196743A3 [FR] Dispositif combine de production d'eau, comprenant une pompe a chaleur (5) et un ballon (1) fractionne en: - Un ballon d'eau chaude sanitaire (2), destine a contenir de l'eau a une temperature T1, dote d'un echangeur de chaleur (8) relie a ladite pompe a chaleur (5), et pourvu d'une resistance electrique (7) pour porter l'eau du ballon (2) a une temperature superieure a 70 degrees centigrade, - Un ballon de desaccouplage (3), destine a contenir un fluide caloporteur a une temperature T2 differente de T1 pour le chauffage ou la climatisation de locaux, relie a ladite pompe a chaleur (5), et a un dispositif de chauffage ou de refroidissement (13, 22, 36), Les ballons (2, 3) sont isoles thermiquement et hydrauliquement l'un de l'autre, et l'echangeur (8) du ballon (2) et le ballon (3) peuvent echanger de la chaleur avec le condenseur ou l'evaporateur de la pompe a chaleur (5).

Classifications:

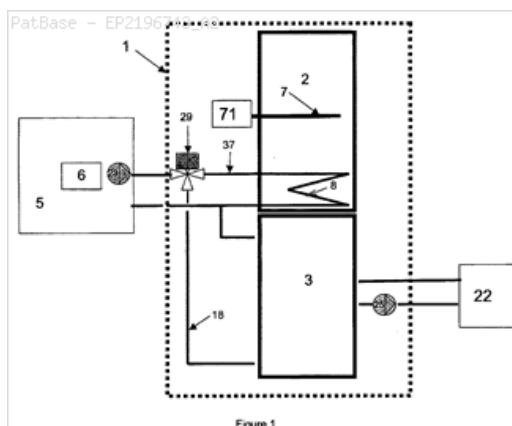
International (IPC 8-9): F24H1/50 F24H4/02 F24H4/04

F25B29/00 (Advanced/Invention);

F24H1/48 F24H4/00 F25B29/00 (Core/Invention)

CPC: F24D2200/08 F24H4/04

European: F24H4/04 R24D200/08



Family:

Publication number	Publication date	Application number	Application date
EP2196743 A2	20100616	EP20090015361	20091211
EP2196743 A3	20160518	EP20090015361	20091211
FR2939874 A1	20100618	FR20080006981	20081212
FR2939874 B1	20101231	FR20080006981	20081212

Priority:

FR20080006981 20081212

Probable Assignee:

MOBILE COMFORT HOLDING

Assignee(s): (std):

MOBILE COMFORT HOLDING

Inventor(s): (std):

MOREAU CHRISTIAN ; RIGAUD FRANCK

Inventor(s):

FRANCK RIGAUD ; CHRISTIAN MOREAU

Agent(s):

SCHMIDT MARTIN PETER; IXAS CONSEIL; GEVERS AND ORES

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 MK MT NL NO PL

PT RO RS SE SI SK SM TR

29) Family number: 1573441 (DE2702489A1)

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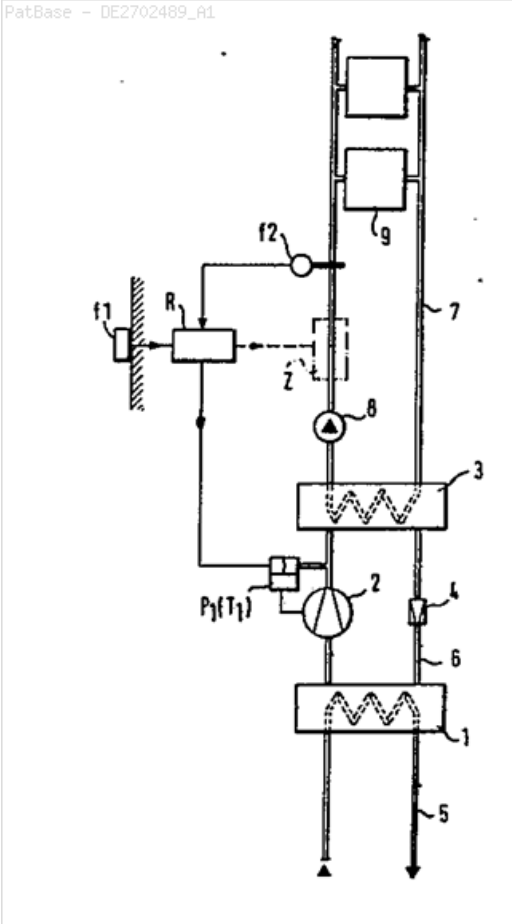
Title: The method serves for the automatic optimisation of the operating point of a heating device, in particular of a heat...

Abstract: The method serves for the automatic optimisation of the operating point of a heating device, in particular of a heat pump, in which the heat energy of the heating medium (7) flowing through a consumer (9) in the circuit is drawn mainly from a natural primary energy carrier (5) by undercooling in an evaporator (1) by means of an intermediate medium (6) flowing in the circuit. The evaporated intermediate medium (6) containing the evaporation heat is brought to a higher heat content by the supply of auxiliary energy and subsequently the increased heat energy of the intermediate medium (6) is delivered to the heating medium (7) serving as secondary energy carrier by liquefaction. In this case, for controlling the auxiliary-energy

supply to the intermediate medium (6), the maximum permitted liquefaction pressure or the maximum permitted liquefaction temperature of a compressor (2) are changed or the volume flow of the heating medium through a liquefier (3) is varied, and in particular via the operating time of the compressor (2).

Classifications:

International (IPC 8-9): F24D19/10 (Advanced/Invention);
F24D19/00 (Core/Invention)
International (IPC 1-7): F24D19/10 F24J3/04 F25B13/00
CPC: F24D19/1039
European: F24D19/10C2P Y02B10/40



Family:

Publication number	Publication date	Application number	Application date
AT372182 B	19830912	AT19780000411	19780120
AT41178 A	19830115	AT19780000411	19780120
CH627257 A	19811231	CH19780000608	19780120
DE2702489 A1	19780727	DE19772702489	19770121
DE2702489 C2	19840209	DE19772702489	19770121

Priority:

DE19772702489 19770121

Probable Assignee: GERBERT HEINZ

Assignee(s): (std): GERBERT HEINZ ; GERBERT HEINZ DIPL ING

Assignee(s): GERBERT HEINZ DIPL ING 7951 ERLENMOOS DE ; GERBERT HEINZ DIPLING

Inventor(s): (std): GERBERT HEINZ DIPL ING ; KIRN ADOLF

Inventor(s): TEILNICHTNENNUNG DES ERFINDERS BEANTRAGT ; ADOLF KIRN ; DIPL ING HEINZ GERBERT

30) Family number: 3122468 (US4856578A)

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Title: Multi-function self-contained heat pump system

Abstract: A heat pump unit capable of producing hot potable water irregardless of the heating or cooling operation of the heat pump. The heat pump for heating or cooling a conditioned space with potable water heating capability. The heat pump unit having a compressor with a service port, an entrance port and a discharge. A three-way valve is provided connected to the discharge and to the service port of the compressor, and reversing valve is connected to the three-way valve and to the compressor entrance port. A refrigerant-air heat exchanger is connected to the reversing valve outlet and an external source-refrigerant heat exchanger is connected to the reversing valve with a refrigerant-potable water heat exchanger connected to the three-way valve. The heat pump unit also includes a refrigerant-control device interposed between the external source-refrigerant heat exchanger and the refrigerant-air heat exchanger, a first bi-flow valve interposed between the refrigerant-control device and the refrigerant-potable water heat exchanger, and a second bi-flow valve interposed between the refrigerant-control device and the refrigerant-potable water heat exchanger produces hot water irregardless of the heating or cooling operation of the heat pump.

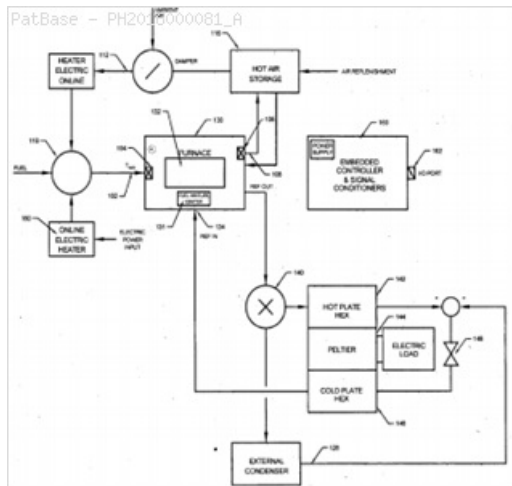
Classifications:

International (IPC 8-9): F24H4/04 F25B13/00
F25B6/00 (Advanced/Invention)
International (IPC 1-7): F25B29/00
CPC: F24H4/04 F25B13/00 F25B2313/004 F25B2313/025
F25B2313/02731 F25B2313/02741
European: F24H4/04 F25B13/00 F25B6/00 R25B313/004
R25B313/025 R25B313/02731 R25B313/02741
US: 165/241 165/29 62/201 62/238.7 62/324.6

Publication number	Publication date	Application number	Application date
US4856578 A	19890815	US19880186231	19880426

Inventor(s): (std): MCCAILL DAVID I

International (IPC 8-9): F25B21/00 F25B21/02 F25B30/00
F25B40/00 (Advanced/Invention)



Publication number	Publication date	Application number	Application date
PH2016000081 A	20170904	PH20160000081	20160224

Agent(s): NONE

PatBase PDF Export - Page: 21 18/02/2019

at the limited operating temperatures of a heat energy collection and storage apparatus. Improved performance may be achieved by employing a two-tank storage system having a control circuit for supplying heat transfer medium from the hotter of the tanks for return to the cooler.

Classifications:

International (IPC 8-9): F24D11/02 F24F5/00 F25B1/06 F25B1/08 F25B27/00 (Advanced/Invention); B60H1/32 (Advanced/Non-invention); F24D11/00 F24F5/00 F25B1/06 F25B27/00 (Core/Invention); B60H1/32 (Core/Non-invention)

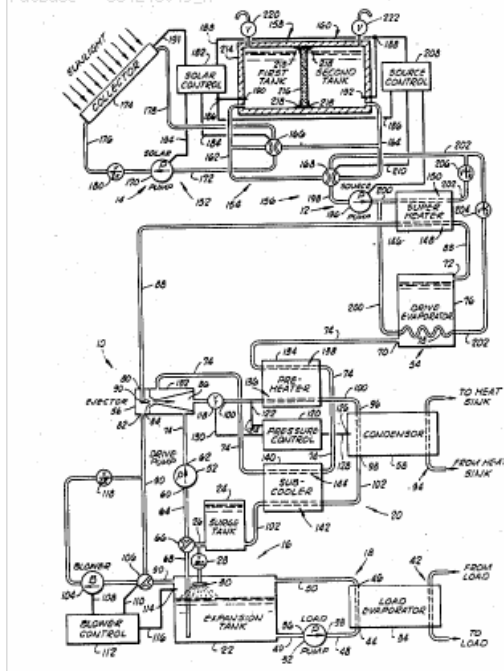
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European: F24D11/02C2 F24F5/00F F25B1/06 F25B1/08 F25B27/00B2 L60H1/32Z6 Y02B10/20 Y02B10/70 Y02B30/12B2

US: 126/640 165/45 237/2.00B 237/2B 62/2 62/235.1 62/238.1 62/238.4 62/500

PatBase - US4248049_A



Family:

Publication number	Publication date	Application number	Application date
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US4374467 A	19830222	US19800196864	19801014
US4523437 A	19850618	US19820341239	19820121

Priority:

US19780948043 19781002 US19790055524 19790709 US19800196864 19801014
US19820341239 19820121

Probable Assignee: HYBRID ENERGY SYSTEMS INC

Assignee(s): (std): HYBRID ENERGY INC ; HYBRID ENERGY SYSTEMS INC

Assignee(s): BRILEY BARBARA J #24 WINDROCK 1000 N STAR STILLWATER OK 74075 ; BRILEY BARBARA J 24 WINDROCK 1000 N STAR STILLWATER OK 74075 ; HYBRID ENERGY SYSTEMS INC OKLAHOMA A CORP ; BRILEY BARBARA J ; BRILEY BARBARA J #24 WINDROCK 1000 N STAR STILLWAT

Inventor(s): (std): BRILEY PATRICK B

33) Family number: 7883512 (US422244A)

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Title: AIR CONDITIONING APPARATUS UTILIZING SOLAR ENERGY AND METHOD

Abstract: An air conditioning apparatus and method are disclosed. The apparatus includes a chemical dehumidifier which employs an aqueous hygroscopic solution of glycol and a solar energy collector for use in regenerating the solution. Air to be conditioned is circulated through a contactor of the chemical dehumidifier, in contact with cooled glycol solution. Concentrated hygroscopic glycol solution is circulated from a regenerator to the contactor, while dilute solution is circulated from the contactor to the regenerator. Energy from the solar collector is transferred to facilitate concentration thereof. In one disclosed embodiment energy from the solar collector is also transferred to the generator of heat-powered refrigeration apparatus, e.g., absorption or rankine engine driven refrigeration apparatus. The condenser of the refrigeration apparatus may operate to absorb the glycol solution in the regenerator of the dehumidifier and the evaporator may cool the concentrated glycol solution in the contactor and/or may supply chilled fluid to a heat exchanger for cooling the dehumidified air. In a modified embodiment, a diesel engine drives the refrigeration apparatus. Waste heat from the diesel engine either augments the solar energy for regenerating the glycol solution or regenerates desiccant from a second stage of dehumidification.

Classifications:

International (IPC 8-9): B01D53/26 F24F3/14 F24F5/00 F25B27/00 (Advanced/Invention); F02B3/06 (Advanced/Non-invention); B01D53/26 F24F3/12 F24F5/00 F25B27/00 (Core/Invention); F02B3/00 (Core/Non-invention)

International (IPC 1-7): F25B27/00 F25D23/00

CPC: F24F3/1417 B01D53/26 F02B3/06 F24F3/1423 F24F5/0046 F24F2003/144 F24F2003/1458 F24F2203/1032 F24F2203/1056 F24F2203/1068 F24F2203/1084 F25B27/00 Y02T10/16 Y02T10/166

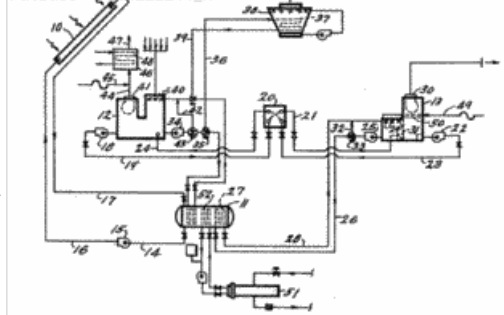
European: B01D53/26 F24F3/14 F24F3/14C1 F24F3/14C2 F24F5/00F

F25B27/00 R02B3/06 R24F203/10H R24F203/10N R24F203/10P

R24F203/10T R24F3/14E R24F3/14F Y02B30/16

US: 62/2 62/235.1 62/271

PatBase - US422244_A



Family:

Publication number	Publication date	Application number	Application date
US422244 A	19800916	US19780958485	19781107

Priority:

Probable Assignee: MANVILLE SALES A CORP OF DE CORP**Assignee(s):** (std): GERSHON MECKLER ASSOCIATES P C**Assignee(s):** MANVILLE SALES CORP ; MECKLER GERSHON ; PURDUE JOHN C ; MANVILLE SALES A CORP OF DE CORP ; MECKLER GERSHON (45 PERCENT) ; PURDUE JOHN C (10 PERCENT) ; MECKLER GERSHON 45 PERCENT ; PURDUE JOHN C 10 PERCENT ; GERSHON MECKLER ASSOCIATES PC ; CAMP DRESSER AND MCKEE INC ; CAMP DRESSER AND MCKEE INC (45 PERCENT) A CORP OF ; CAMP DRESSER AND MCKEE INC (45 PERCENT) A CORP OF MA ; CAMP DRESSER AND MCKEE INC 45 PERCENT A CORP OF MA ; CAMP DRESSER AND MCKEE INC A MA CORP**Inventor(s):** (std): MECKLER GERSHON**34) Family number: 71242556** (US2018266712A)

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Title: SOLAR HEATING FOR REFRIGERATION AND FLUID HEATING DEVICES

Abstract: A fluid-based system for use in heating and/or cooling. In particular, the system may have a fluid heating device, which may be a solar fluid heating device, configured to heat a fluid. Heat from the heated fluid may be transferred to one or more cooling subsystems or heating subsystems. A cooling subsystem may be an absorption cooling subsystem, for example, wherein heat may cause phase change of a refrigerant. A heating subsystem may include a storage tank through which heated fluid may be circulated to heat the storage tank. A system of the present disclosure may include multiple cooling and/or heating subsystems for cooling and/or heating a variety of different environments, objects, or materials.

Classifications:**International (IPC 8-9):** F24D3/00 F24F5/00 F24S90/00

F25B27/00 (Advanced/Invention)

CPC: F24F5/0046 F24D3/005 F25B27/002 F24J2/10 F24D11/003

F24D17/0021 F24D17/0063 F24F2005/0064 F24F2005/0067

F24S20/40 F24S23/70 F24S23/74 F24S30/452 F24S90/00

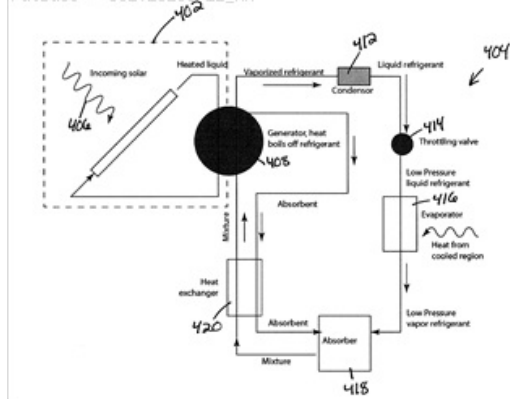
F25B27/007 F28D20/0034 F28D20/0078 F24D19/1051

F24D2200/02 F24D2200/126 F24D2200/14 Y02A30/272 Y02A30/277

Y02B10/20 Y02B10/24 Y02B10/70 Y02B30/62 Y02E10/45 Y02E10/47

Y02E60/142 Y02E70/30

PatBase - US2018266712_RH

**Family:**

Publication number	Publication date	Application number	Application date
US2018266712 AA	20180920	US20180923259	20180316
WO18170376 A1	20180920	WO2018US22826	20180316

Priority:

US20170472030P 20170316

US20180923259 20180316

Probable Assignee: WTS LLC**Assignee(s):** (std): ABRAHAM JOHN ; GIKLING ANDREW ; WTS LLC ; PLOURDE BRIAN ; PAKONEN RICHARD ; PLOURDE DOUGLAS**Inventor(s):** (std): ABRAHAM JOHN ; GIKLING ANDREW ; PAKONEN RICHARD ; PLOURDE BRIAN ; PLOURDE DOUGLAS**Agent(s):** KLEIN BRETT 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 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

35) Family number: 58588584 (US2015052926A)

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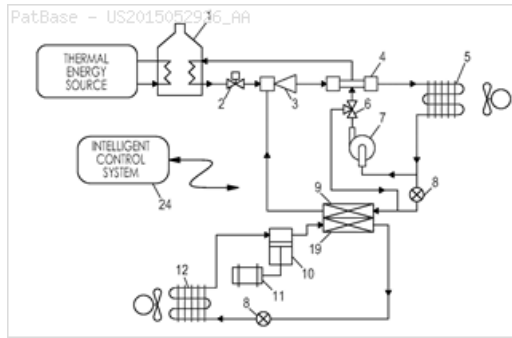
Title: THERMALLY ENHANCED CASCADE COOLING SYSTEM

Abstract: A cascade cooling system that uses low-grade thermal and other energy input sources to provide refrigeration and air conditioning in stationary and mobile applications. A two-loop embodiment includes a heat-powered first loop incorporating a vapor-jet compressor and a second loop based on a mechanical compressor powered by an electric motor or other source of rotational torque. The system uses waste heat, solar thermal or a fuel-fired heat source to partially or fully offset mechanical/electrical energy input. The system can also operate entirely on thermal, electrical or mechanical input. The ability to use multiple energy sources in any combination maximizes energy efficiency, performance and reliability. The system is well suited to making beneficial use of waste heat in vehicle applications. In stationary applications, solar thermal and/or waste heat from industrial processes can be used to improve the efficiency of conventional cooling systems.

Classifications:**International (IPC 8-9):** F25B27/02 (Advanced/Invention)**CPC:** F25B27/02 B60H1/32 F25B1/08 F25B7/00 Y02A30/274

Y02A40/966 Y02A40/967

US: 62/238.6



Family:

Publication number	Publication date	Application number	Application date
US2015052926 AA	20150226	US20130975327	20130824

Priority:

US20100788631 20100527 US20130975327 20130824

Probable Assignee: ALSTON GERALD ALLEN

Assignee(s): (std): ALSTON GERALD ALLEN

Inventor(s): (std): ALSTON GERALD ALLEN

36) Family number: 47930612 (US2010326062A)

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Title: COMPRESSED AIR ENERGY STORAGE SYSTEM UTILIZING TWO-PHASE FLOW TO FACILITATE HEAT EXCHANGE

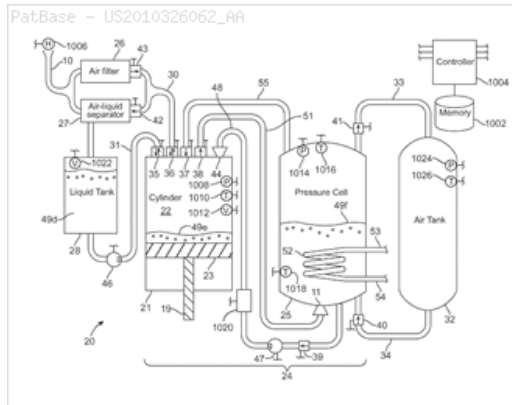
Abstract: A compressed-air energy storage system according to embodiments of the present invention comprises a reversible mechanism to compress and expand air, one or more compressed air storage tanks, a control system, one or more heat exchangers, and, in certain embodiments of the invention, a motor-generator. The reversible air compressor-expander uses mechanical power to compress air (when it is acting as a compressor) and converts the energy stored in compressed air to mechanical power (when it is acting as an expander). In certain embodiments, the compressor-expander comprises one or more stages, each stage consisting of pressure vessel (the "pressure cell") partially filled with water or other liquid. In some embodiments, the pressure vessel communicates with one or more cylinder devices to exchange air and liquid with the cylinder chamber(s) thereof. Suitable valving allows air to enter and leave the pressure cell and cylinder device, if present, under electronic control.

Classifications:

International (IPC 8-9): B05B1/00 B05B1/02 F01B1/00 F01B15/02 F01B17/02 F01B21/02 F01B21/04 F01B23/08 F01B23/10 F01B25/02 F01B25/10 F01B29/04 F01B29/10 F01B31/00 F01B9/02 F01C1/00 F01C1/02 F01C1/16 F01C1/34 F01C13/00 F01D15/10 F01K13/02 F01K21/02 F01K21/04 F01K23/10 F01K25/00 F01K25/06 F01K25/10 F01K27/00 F01K3/02 F02C1/02 F02C1/04 F02C6/16 F02D25/00 F02G1/04 F02G1/043 F02G1/05 F03B11/00 F03C1/00 F03D11/00 F03D11/02 F03D11/04 F03D5/00 F03D9/00 F03D9/02 F03G7/00 F04B17/00 F04B17/02 F04B35/02 F04B39/00 F04B39/06 F04B39/12 F04B41/02 F04B41/04 F04B49/00 F04B49/22 F04B9/123 F04B9/127 F04D29/58 F15B1/00 F15B1/02 F15B1/027 F15B1/08 F15B1/26 F15B11/06 F15B11/08 F15B13/00 F15B13/04 F15B13/042 F15B13/044 F15B13/16 F15B15/00 F15B15/02 F15B15/20 F15B21/04 F15B21/14 F16D25/00 F16D31/02 F16L3/00 F16L53/00 F17C13/02 F17C13/04 F17C5/00 F17D1/02 F24H3/00 F24J3/08 F25B13/00 F25B27/00 F25B9/00 G05B15/02 G05D7/00 G05F3/06 H02J1/00 H02J11/10 H02J15/00 H02K7/18 H02P9/04 (Advanced/Invention); F03C1/00 F15B1/02 F28D20/00 H02J1/10 (Advanced/Non-invention)

CPC: F15B13/00 F05B2260/406 Y02E10/728 F17D1/02 F04B41/02 F15B1/02 F02G1/05 F01C13/00 F01B17/022 H02J15/006 F01K25/10 Y02E50/12 Y02T50/678 F15B15/20 F15B15/02 F15B2015/208 Y02B10/30 F15B1/265 F15B1/00 H02K7/1815 F01B15/02 F01B29/10 F05B2260/40311 Y02E10/725 Y02E10/726 Y02E60/17 Y10T137/0318 Y10T137/0379 Y10T137/6579 F03G2007/00 F01K13/02 F01K25/06 F28D20/00 F15B1/024 Y02E60/74 Y10T137/6416 Y10T137/8593 Y10T307/50 Y10T307/735 F04B17/02 F04B49/22 G05B15/02 F01B17/02 F03D15/00 F17C5/002 F15B1/08 F15B11/08 F15B13/042 F15B13/044 F04B39/0005 F04B39/12 F17C13/026 F17C13/04 F15B2211/50554 F15B2211/20538 H02P9/04 F03D9/001 F03D9/002 F03D9/25 Y10T137/6851 F03D9/28 Y02B10/70 F04B39/06 F16H3/72 F01K7/00 F01K13/00 F01K25/04 F03D15/10 F03D13/20 F03D9/17 F01K27/00 F03G7/00 F01B9/02 F01B23/10 F01D15/10 F02C1/02 F02C6/16 Y02E60/15 Y02E10/722 Y02T50/672

European: F01K13/02 F01K25/06 F01K25/10 F01K27/00 F03D11/04 F03D9/00B F03D9/02D F04B17/02 H02J15/00D R05B260/40311 R05B260/406 Y02B10/30 Y02E10/72 Y02E10/72J Y02E10/72N Y02E50/12 Y02E60/15 Y02E60/17 Y02E70/30 Y05B1/1 137/1 137/12 137/12S 137/334 137/340 137/343 137/343S 137/561R 165/45 165/48.1 239/518 239/589 239/589S 290/1.00RP 290/1R 290/43 290/44 290/4D 290/52 290/52P 290/55 290/55S 290/7 290/7P 307/151 307/43 307/87 415/124.1 417/228 417/237 417/26 417/266 417/280 417/280P 417/321 417/321S 417/330 417/330S 417/334 417/334S 417/398 417/398P 417/438 417/438P 417/438S 417/53 417/53P 417/53S 60/325 60/325P 60/327 60/327P 60/329 60/329P 60/370 60/371 60/375 60/375S 60/398 60/398P 60/407 60/408 60/408P 60/408S 60/412 60/413 60/413P 60/413S 60/415 60/415P 60/415S 60/416 60/416S 60/417 60/418 60/418S 60/456 60/509 60/517 60/517P 60/517S 60/522 60/525 60/525P 60/650 60/650P 60/659 60/659P 60/659S 62/121 62/121S 700/282 91/418 91/418S 91/462 91/462P 91/5 91/5P 92/144 92/144P



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US2013291960 AA	20131107	US20130938656	20130710
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Priority:

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Probable Assignee: LIGHTSAIL ENERGY INC

Assignee(s): (std): CRANE STEPHEN E ; BERLIN EDWIN P JR ; BOWERS TODD ; BERLIN JR EDWIN P ; LIGHTSAIL ENERGY INC ; FONG DANIELLE A ; MAHALATKAR KARTIKEYA ; HOU YONGXI ; LIGHTSALE ENERGY INC ; LIGHSAILE ENERGY INC ; ABKENAR AMIRHOSSEIN POURMOUSA ; POURMOUSA ABKENAR AMIRHOSSEIN ; STAHLKOPF KARL E

Assignee(s): SILICON VALLEY BANK ; BERLIN EDWIN P ; GIBRALTAR BUSINESS CAPITAL LLC ; LIGHTSAIL ENERGY INC OAKLAND

Inventor(s): (std): BERLIN JR EDWIN P ; CRANE STEPHEN E ; FONG DANIELLE A ; BOWERS TODD ; HOU YONGXI ; POURMOUSA ABKENAR AMIRHOSSEIN ; MAHALATKAR KARTIKEYA ; BERLIN EDWIN P ; BERLIN EDWIN P JR ; BOWERS TEDD ; STAHLKOPF KARL E ; FONG DANIELLE ; POURMOUSA ABKENAR AMIR HOSSEIN ; DANIELLE A FONG ; EDWIN P BERLIN JR ; STEPHEN E CRANE ; POURMOUSA ABKENAR AMIRHOSSEIN ; AMIRHOSSEIN POURMOUSA ABKENAR ; YONGXI HOU ; TODD BOWERS ; KARTIKEYA MAHALATKAR ; ABKENAR AMIRHOSSEIN POURMOUSA ; STAHLKOFF KARL E

Agent(s): MBM INTELLECTUAL PROPERTY LAW LLP ; ZENZ PATENTANWALTE PARTNERSCHAFT MBB ; NOBLE

Designated states: NICHOLAS; AMPACC LAW GROUP PLLC; CHO STEVE Y; CHO STEVE
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
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37) Family number: 1375633 (US4011731A)

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Title: AIR CONDITIONING APPARATUS UTILIZING SOLAR ENERGY AND METHOD

Abstract: An air conditioning apparatus and method are disclosed. The apparatus includes a chemical dehumidifier which employs an aqueous hygroscopic solution of a glycol and a solar energy collector for use in regenerating the solution. Air to be conditioned is circulated through a contactor of the chemical dehumidifier, in contact with cooled glycol solution. Concentrated hygroscopic glycol solution is circulated from a regenerator to the contactor, while dilute solution is circulated from the contactor to the regenerator. Energy from the solar collector is transferred to facilitate concentration thereof. In one disclosed embodiment energy from the solar collector is also transferred to the generator of heat-powered refrigeration apparatus, e.g., absorption or rankine engine driven refrigeration apparatus. The condenser of the refrigeration apparatus may operate to heat the glycol solution in the regenerator of the dehumidifier and the evaporator may cool the concentrated glycol solution in the contactor and/or may supply chilled fluid to a heat exchanger for cooling the dehumidified air.

Classifications:

International (IPC 8-9): F24F3/14 F24F5/00

G05D22/00 (Advanced/Invention);

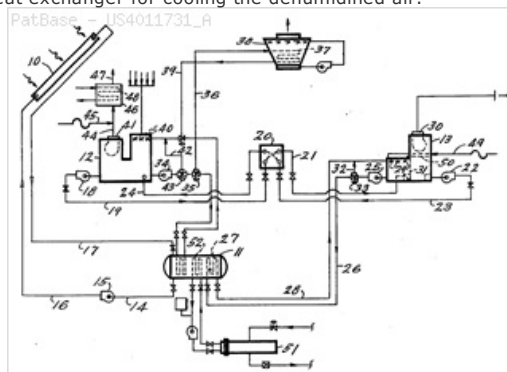
F24F3/12 F24F5/00 G05D22/00 (Core/Invention)

International (IPC 1-7): F24F3/00 F24F3/14 F24F5/00 F24J3/02
F25B27/00

CPC: F24F3/1417 F24F3/1405 F24F5/0046 F24F2003/144
F24F2003/1458

European: F24F3/14 F24F3/14A F24F3/14C1 F24F5/00F R24F3/14E
R24F3/14F Y02B30/16

US: 126/609 126/629 126/643 62/2 62/235.1 62/271



Family:

Publication number	Publication date	Application number	Application date
FR2291457 A1	19760611	FR19750034916	19751114
FR2291457 B3	19780818	FR19750034916	19751114
JP1403359 C3	19871009	JP19750137710	19751115
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US4011731 A	19770315	US19740524255	19741115

Priority:

US19740524255 19741115

Probable Assignee: MECKLER GERSHON ASS

Assignee(s): (std): GAASHON METSUKURAA ASOSHEITSU ; MECKLER GERSHON ; MECKLER GERSHON ASS

Assignee(s): GERSHON MECKLER ASSOCIATES PC ; GAASHON METSUKURAA ASOSHEITSU PUROFUTSUSHONARU
CORP ; CAMP DRESSER AND MCKEE INC ; CAMP DRESSER AND MCKEE INC A MA CORP

Inventor(s): (std): GAASHON METSUKURAA ; MECKLER GERSHON

38) Family number: 56489638 (US2014174080A)

© PatBase

Title: HYBRID TRIGENERATION SYSTEM BASED MICROGRID COMBINED COOLING, HEAT AND POWER PROVIDING HEATING, COOLING, ELECTRICAL GENERATION AND ENERGY STORAGE USING AN INTEGRATED AUTOMATION SYSTEM FOR MONITOR, ANALYSIS AND CONTROL

Abstract: Provided is a consumer to industrial scale energy trigeneration process based microgrid combined cooling, heat and power. The present invention includes conversion, processing, extraction and/or storage systems for electrical, chemical and thermal energy. The invention provides a quintessential renewable energy ecosystem incorporating vital energy generation, thermal heating and cooling processes with integrated components installed to encompass a distributed renewable energy generation, energy storage and integrated automation system. The automation system of the invention provides the ability to view, monitor, analyze, control and interact with system components.

Classifications:

International (IPC 8-9): A01G31/02 A01G7/04 B29C45/17 C04B7/36

C10B53/00 C10B57/00 C10B57/10 C12M1/00 C12M1/34 C12M1/36

C12P7/06 C12P7/10 C21C5/52 C21D1/32 C22C33/08 C25C3/06

D01F9/12 D01F9/32 F01K F01K13/00 F01K13/02 F01K23/10

F01K25/00 F01K25/10 F01K27/02 F01K3/00 F01K3/02 F01K3/12

F02C F02C1/05 F02G1/043 F02G1/044 F02G1/053 F02G1/055

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F24J2/07 F24J2/12 F24J2/14 F24J2/18 F24J2/52 F24J2/54 F24J3/00

F25B15/00 F25B27/00 F25B27/02 F25B9/14 F28D F28D20/00

H01M8/00 H01M8/04 H01M8/0662 H02J3/28 H02J3/38 H02K

H02K7/18 H02S10/10 H02S40/22 H05B37/02 (Advanced/Invention);

F02G1/043 F24J2/46 (Advanced/Non-Invention);

F01K F02C F03G F22B F28D H02K (Subclass/Invention)

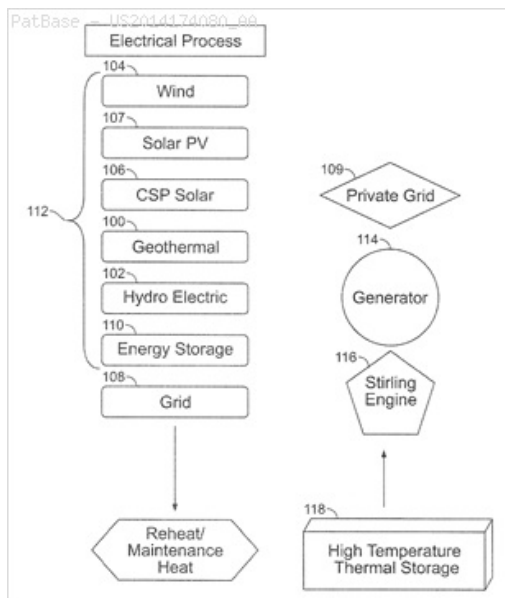
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C12M41/06 C12M41/12 C12M41/48 C12M43/00 Y02P20/59

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 F24J2/18 F24J2/5241 F24J2/541 F24J2/461 F24J2002/5462 F01K3/00
 F01K13/00 F01K13/02 F01K25/00 F02G1/043 F03G6/067 F03G6/068
 F03G7/04 F24S20/20 F24S23/74 F24S23/79 F24S25/50 F24S30/425
 F24S40/20 F24S2030/134 F28D20/0039 Y02E10/41 Y02E10/45
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US: 126/694 220/592.2 315/297 47/58.1LS 47/62R 60/516 60/517
 60/641.1 60/698 62/331



Family:

Publication number	Publication date	Application number	Application date
AU2015203118 AA	20150709	AU20150203118	20150611
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Priority:

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Probable Assignee: FRIESTH KEVIN LEE

Assignee(s): (std): FRIESTH KEVIN ; FRIESTH KEVIN LEE ; KEVIN LEE FRIESTH

Inventor(s): (std): FRIESTH KEVIN ; FRIESTH KEVIN LEE ; KEVIN LEE FRIESTH

Agent(s): SPRUSON AND FERGUSON; BORDEN LADNER GERRAIS LLP; POTTER CLARKSON LLP; WENPING AND CO; HIROE AND ASSOCIATES PATENT PROFESSIONAL CORP; BRIAN J; JESSICA L; BRICK GENTRY PC; LAURENZO BRIAN J; MIKKILINENI SRIKANT

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

39) Family number: 8628646 (US4352272A)

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Title: HEAT PUMP SYSTEM

Abstract: The invention provides a heat pump system employing a refrigerant charged space and including at least two evaporators, one of which is an ambient air head absorber, and the other of which can be of the same type, or of the type obtaining heat from solar insolation, water, ground heat, etc. The coil or coils of an ambient air absorber must be defrosted periodically. In the system of the invention defrost heat is applied to the evaporator coil or coils while the compressor is operating, such defrost heat causing vaporization of the refrigerant therein. The system includes a pressure containment

valve between the evaporator and the compressor that maintains the vapor pressure of the vaporizing liquid in the coil above the value at which the ice will readily melt, the valve releasing excess vapor to the compressor and then to the condenser which discharges the heat to the space to be heated. Thus, the only part of the defrost heat lost from the system is that required to melt the ice. Preferably the evaporator is an ambient air unit paralleled by one or more solar heat absorber evaporators which do not require defrosting, so that the compressor can work efficiently and continuously with the refrigerant from the solar absorber. The system may include heat exchangers enabling the heat obtained to be used for different purposes. The system also works on a cooling cycle when required by suitable change over valve means.

Classifications:

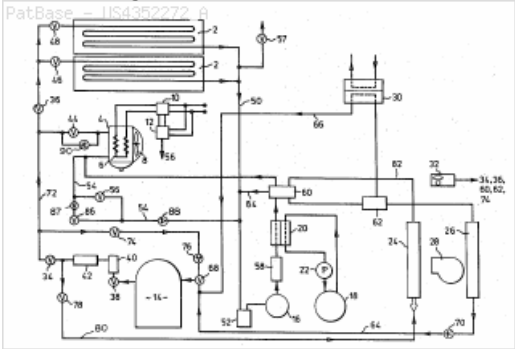
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International (IPC 1-7): F25B27/00 F25B41/04

CPC: F24S40/70 F25D21/08 F25B5/00 F25B13/00 F25B30/06 F25B41/04 F25B2313/002 Y02E10/40

European: F24J2/46B22 F25B13/00 F25B41/04 F25B5/00 F25D21/08 R25B30/06 R25B313/002 Y02E10/40

US: 62/151 62/217 62/235.1 62/276



Family:

Publication number	Publication date	Application number	Application date
US4352272 A	19821005	US19800137036	19800403

Priority:

US19800137036 19800403

Probable Assignee:

TAPLAY JAMES W

Assignee(s): (std):

TAPLAY JAMES W

Inventor(s): (std):

TAPLAY JAMES W

40) Family number: 41858673 (IN01458MU2005A)

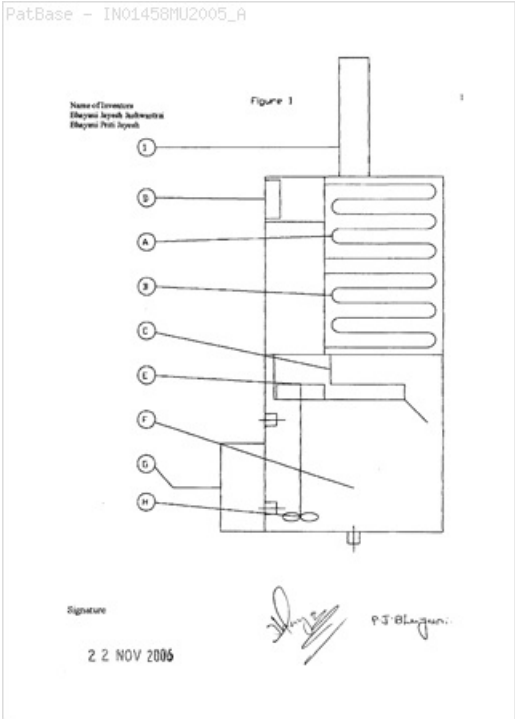
PatBase

Title: AN APPARATUS TO REDUCE THE HEAT LOAD ON CONVENTIONAL AIR CONDITIONERS DUE TO GLOBAL WARMING AND TO REDUCE WATER SOLUBLE POLLUTANTS IN THE SURROUNDING

Abstract: A machine capable to solve the effects of global warming on the pre-installed conventional air conditioners. It conserves energy by reducing the humidity of target room by condensing water without increasing heat load of target room. It allows increasing the room temperature to reduce heat losses to atmosphere. It includes a surface heat-exchanger which pre-cools the ambient air to reduce the heat load on cooling system and reheat the cooled ambient air, before recycling back to the target room. It also reduces the air pollutants of the target room. It gives comfort to asthma patients who do not feel comfortable in the cold humid environment with dust mite, etc. It produces oxygen rich chilled water from ambient air even in air-conditioned room. It can also be used for outdoor applications to produce potable water from atmosphere even at temperature as low as 10 degree centigrade.

Classifications:

International (IPC 1-7): B60H1/00 F24F3/06 F25B43/00 F25F5/00



Family:

Publication number	Publication date	Application number	Application date
IN01458MU2005 A	20070629	IN2005MU01458	20051124

Probable Assignee: BHAYANI PRITI JAYESH

Assignee(s): BHAYANI PRITI JAYESH

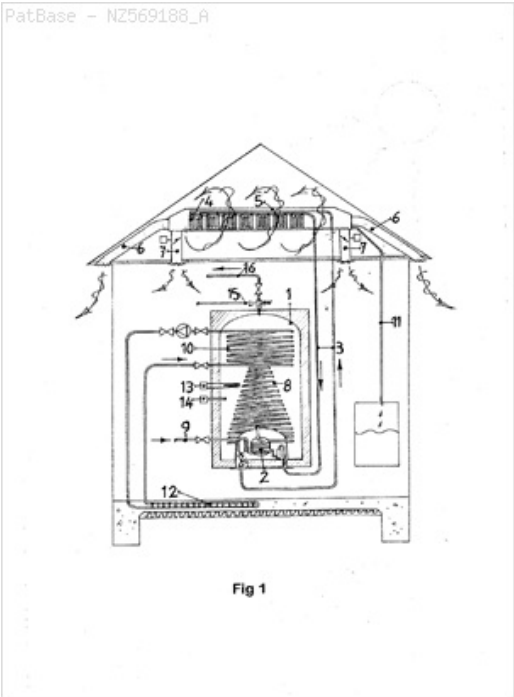
Inventor(s): BHAYANI JAYESH JASHWANTRAI ; BHAYANI PRITI JAYESH

Title: Modular convection air source energy recovery

Abstract: A modular system for recovering low-grade waste solar generated energy in a ceiling space is disclosed. The system uses a vapour compression cycle for transferring roof space air heat to a thermal water storage vessel. A plenum duct (5) warm air scavenging reservoir encloses a series of modular evaporator panels (4) interconnected in parallel to refrigerant header tubes (3) and refrigerator lines in an endless loop through a compressor (2) encapsulated in the base of the vessel and a heat exchanger (8) immersed in the water.

Classifications:

International (IPC 1-7): F24H4/02 F24H4/04 F25B30/02 F28D1/06



Family:

Publication number	Publication date	Application number	Application date
NZ569188 A	20081031	NZ20080569188	20080618

Priority:

NZ20080569188 20080618

Probable Assignee: ANTHONY STEPHEN HILL
Assignee(s): (std): ANTHONY STEPHEN HILL
Inventor(s): (std): HILL ANTHONY STEPHEN

Title: HEAT-POWERED VEHICLE CABIN TEMPERATURE CONTROL SYSTEM

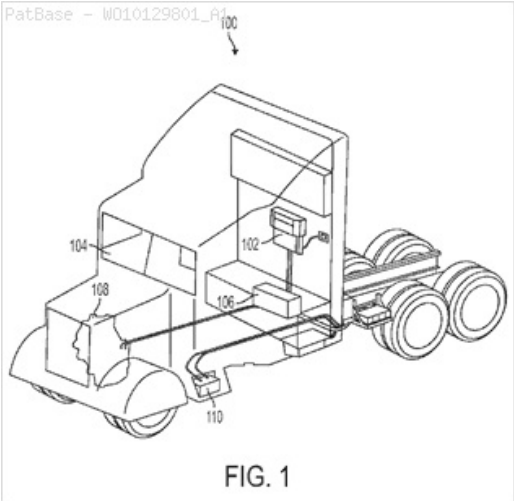
Abstract: An air conditioning system for a vehicle. The system includes a boiler that converts a motive refrigerant from a liquid state to a vapor having a motive pressure and motive temperature. An evaporator positioned to transfer heat from the cabin to a working refrigerant. An ejector is configured to mix the motive refrigerant and the working refrigerant so that the motive refrigerant becomes part of the working refrigerant. A condenser transfers heat from the working refrigerant exiting the ejector to an area outside the cabin. A variable speed electrically powered compressor is provided to raise the pressure of the working refrigerant in order to improve the efficiency of the ejector.

Classifications:

International (IPC 8-9): F25B27/02 (Advanced/Invention)

CPC: F25B1/08 F25B1/10 B60H1/00

European: B60H1/00



Family:

Publication number	Publication date	Application number	Application date
WO10129801 A1	20101111	WO2010US33916	20100506

Priority:

US20090176063P 20090506

Probable Assignee: ALSTON GERALD ALLEN

Assignee(s): (std): ALSTON GERALD ALLEN

Inventor(s): (std): ALSTON GERALD ALLEN

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 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 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

43) Family number: 4292754 (US4439994A)

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Title: THREE PHASE ABSORPTION SYSTEMS AND METHODS FOR REFRIGERATION AND HEAT PUMP CYCLES

Abstract: A three phase absorption system containing two or more reactor systems for binding refrigerant in a thermally reversible chemical reaction to absorbent materials within the reactor systems, means for supplying heat to, and removing heat from the reactor systems, means for recovery of at least part of the sensible heat energy from reactors in each of the reactor systems, and means for conveying, expanding, evaporating and condensing refrigerant gas from the reactor systems. A method for providing continuous cooling and/or refrigeration which includes the steps of desorbing refrigerant in a gas phase from an absorbent in a first reactor using a low temperature heat source, transferring the desorbed refrigerant gas to a condenser, expanding the condensed refrigerant to a lower temperature and pressure liquid, evaporating the low temperature liquid with the heat from the cooling and/or refrigerant load, absorbing vapor from the evaporated refrigerant with an absorbent in a second reactor which is being cooled by a cooler, concurrently preparing two other absorption reactors for the same absorbing and desorbing steps by transferring heat between the two other reactors, and heating one and cooling the other of the two reactors at constant volume thereby pressurizing one and depressurizing the other of the two reactors, and cyclically repeating the steps by alternating the desorbing and absorbing steps between the four reactors. A method for providing continuous heating using a heat pump effect to recover heat energy at a low temperature and deliver heat energy to a heat sink at a higher temperature with such heating method comprising the same steps as used in the above cooling method but with the condensing and evaporating steps occurring at relatively lower temperature and with the condenser and cooler providing the heat energy to the heat sink and the evaporator recovering heat energy from a low temperature heat source to accomplish the heat pump effect.

Classifications:

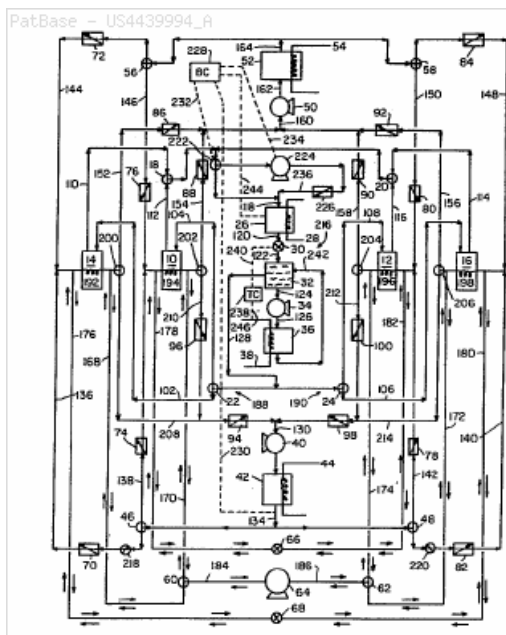
International (IPC 8-9): C09K5/04 F25B17/00 (Advanced/Invention); C09K5/00 F25B17/00 (Core/Invention)

International (IPC 1-7): F25B15/00

CPC: F25B17/00 C09K5/047 Y02B30/62 Y02P20/123 Y02P20/124 Y02A30/277

European: C09K5/04D F25B17/00 Y02B30/62

US: 62/101 62/335 62/476



Family:

Publication number	Publication date	Application number	Application date
US4439994 A	19840403	US19820395357	19820706

Priority:

US19820395357 19820706

Probable Assignee: HYBIRD ENERGY SYSTEMS INC OKLAHOMA OK A OK CORP

Assignee(s): (std): HYBRID ENERGY SYSTEMS INC

Assignee(s): HYBIRD ENERGY SYSTEMS INC OKLAHOMA OK A OK CORP ; BRILEY BARBARA J ; BRILEY BARBARA J #24 WINDROCK 1000 N STAR STILLWAT ; BRILEY BARBARA J #24 WINDROCK 1000 N STAR STILLWATER OK 74075 ; BRILEY BARBARA J 24 WINDROCK 1000 N STAR STILLWATER OK 74075 ; HYBIRD ENERGY SYSTEMS INC

Inventor(s): (std): BRILEY PATRICK B

44) Family number: 52811757 (US2014026594A)

© PatBase

Title: INTEGRATED DEHUMIDIFICATION METHOD AND SYSTEM COMBINING BOUNDARY LAYER CONTROL WITH MAINSTREAM DISTURBANCE ENHANCED HEAT EXCHANGE

Abstract: An integrated dehumidification method and system that combines boundary layer control with mainstream disturbance enhanced heat exchange; a boundary layer flow control device is arranged on the flow boundary layer; and a mainstream disturbance device is arranged on the main runner to realize adequate heat exchange. An integrated dehumidification system that combines boundary layer control with mainstream disturbance enhanced heat exchange, wherein numerous boundary layer flow control devices are longitudinally arranged parallel near the vane on the refrigerating terminal adjacent to all the wall surfaces; a mainstream disturbance device is arranged on the main flow runner; the vane on the heating terminal is in the same arrangement. It achieves integrated, smooth and efficient heat exchange, presenting a novel method and system for enhanced heat transfer. The multi-channel dehumidification can improve the treatment efficiency greatly.

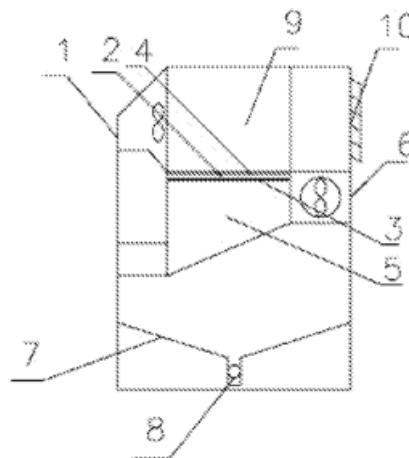
Classifications:

International (IPC 8-9): B01D53/26 F24F13/08 F24F13/22 F24F3/14 F24F5/00 F25B21/04 F26B3/34 (Advanced/Invention)

CPC: B01D2257/80 F24F5/0042 F26B23/04 F25B21/04 F24F13/08 F24F13/222 F24F2221/46 F24F2003/1446 F24F3/1405 B01D53/265

US: 165/61 62/3.3 62/3.4

PatBase - US2014026594_AA



Family:

Publication number	Publication date	Application number	Application date
CN102872686 A	20130116	CN201110197093	20110714
CN102872686 B	20150114	CN201110197093	20110714
US2014026594 AA	20140130	US20120112758	20120128
US2017067657 AA	20170309	US20160353621	20161116
WO13007111 A1	20130117	WO2012CN70727	20120128

Priority:

CN201110197093 20110714 WO2012CN70727 20120128 WO2012CN070727 20120128
US20130112758 20131018 US20160353621 20161116

Probable Assignee: WENLING ANNENG ENERGY EFFICIENCY TECHNOLOGY CO LTD

Assignee(s): (std): WANG XIAOHUA ; WENLING ANNENG ENERGY EFFICIENCY TECH CO LT D ; WENLING ANNENG ENERGY EFFICIENCY TECH CO LTD ; WENLING ANNENG ENERGY EFFICIENCY TECHNOLOGY CO LTD ; WENLING ANNENG ENERGY SAVING TECHNOLOGY CO LTD

Assignee(s): WENLING ANNENG ENERGY SAVING TECHNOLOGY CO ; WENLING ANNENG ENERGY EFFICIENCY TECHNOLOGY CO ; WENLING ANNENG ENERGY EFFICIENCY TECHNOLOGY CO LT D

Inventor(s): (std): CHEN XIAOMIN ; WANG XIAOHUA ; ZHU WENFANG

Agent(s): ZHEJIAING YONGDING 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 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 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

45) Family number: 8572790 (US4295342A)

© PatBase

Title: HEAT EXCHANGE METHOD USING NATURAL FLOW OF HEAT EXCHANGE MEDIUM

Abstract: Heat exchange is effected in a simple and economical manner by allowing natural flow, i.e., without mechanical compressors, pumps, etc., of a heat exchange fluid such as a conventional refrigerant liquid between two heat exchangers which are exposed to air at different temperatures. The two heat exchangers, which may conveniently take the form of fin-tube heat exchangers, for example, are arranged with one end at a higher elevation than the other, the upper ends of the two exchangers being connected in direct communication and the lower ends being likewise connected. As the refrigerant liquid absorbs heat and evaporates in the heat exchanger exposed to the warmer air the vapor travels through the upper connecting line to the other heat exchanger, where it rejects heat and is condensed, the liquid flows through the lower connecting line back to the first heat exchanger, and so on, with heat exchange between the two air streams or masses occurring during the natural, continuous flow of the refrigerant in gaseous and liquid form.

Classifications:

International (IPC 8-9): F24F12/00 F25B23/00 F25B25/00

F28D15/02 (Advanced/Invention); F24F12/00 F25B23/00 F25B25/00 F28D15/02 (Core/Invention)

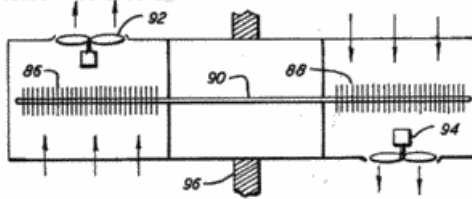
International (IPC 1-7): F23D15/00 F24J3/00 F25D15/00 F25D31/00 F28D15/00

CPC: Y10S165/909 Y02B30/52 Y02B30/563 F24F12/003 F25B23/006 F25B25/00 F25B2400/0401 F28D15/0266 F28F2200/005 F25B2400/0411

European: F24F12/00B1B F25B23/00C F25B25/00 F28D15/02M R25B400/0401 R25B400/0411 R28F200/00C Y02B30/12B Y02B30/16

US: 165/1 165/104.21 165/53 165/909 62/119 62/263 62/333

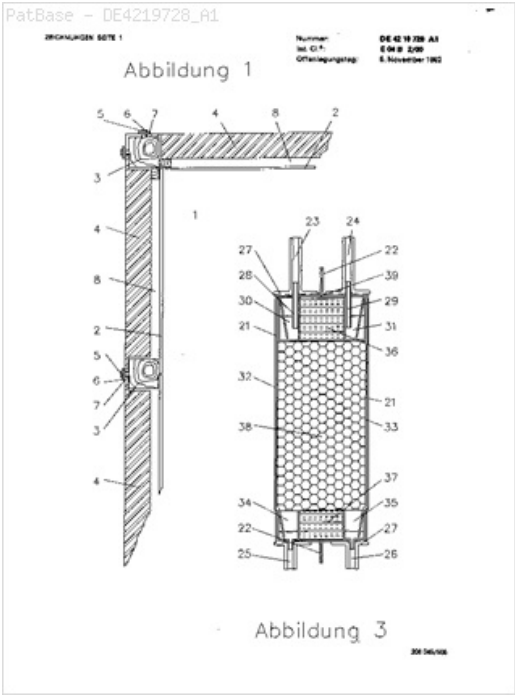
PatBase - US4295342_A



Family:

Publication number	Publication date	Application number	Application date
US4295342 A	19811020	US19790056419	19790710

F24S10/90 F24S20/66 F24S80/60
European: F24D15/04 F24J2/04B10 F24J2/32 F24J2/51
F25B27/00B4 Y02B10/20 Y02B30/12B Y02E10/44



Family:

Publication number	Publication date	Application number	Application date
DE4219728 A1	19921105	DE19924219728	19920612
DE4219728 C2	20010726	DE19924219728	19920612

Priority:

DE19924219728 19920612

Probable Assignee:	NEUMANN MATTHIAS
Assignee(s): (std):	NEUMANN MATTHIAS
Assignee(s):	NEUMANN MATTHIAS 1000 BERLIN DE
Inventor(s): (std):	NEUMANN MATTHIAS
Inventor(s):	NEUMANN MATTHIAS 1000 BERLIN DE

48) Family number: 40992866 (US2010018228A)

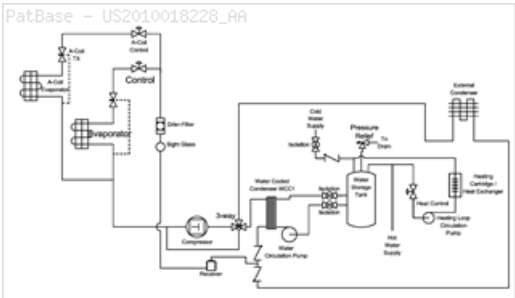
© PatBase

Title: BIO-RENEWABLE THERMAL ENERGY HEATING AND COOLING SYSTEM AND METHOD

Abstract: The present invention is directed towards a bio-renewable thermal energy heating and cooling system which is capable of rejection, reclamation and cogeneration. The refrigeration system of the present invention utilizes one or more evaporators and one or more condensers to transform thermal energy in the form of waste heat in one environment for use in another environment. The hot and cold sides of the refrigeration process may be split for multiple applications for increased utilization of the system energy. The environmental variables are balanced so as to optimize the properties of the refrigerant and the capabilities of the system compressor.

Classifications:

International (IPC 8-9): F24H1/00 F25B1/00 F25B27/00 F25B27/02 F25B29/00 F25B40/02 F25B5/02 F25B6/02 (Advanced/Invention); F24H1/00 F25B1/00 F25B27/00 F25B27/02 F25B29/00 F25B40/00 F25B5/00 F25B6/00 (Core/Invention); F25B (Subclass/Invention)
International (IPC 1-7): F25B27/02
CPC: Y02A30/274 F25B29/003 F25B5/02 F25B6/02 F25B27/02 F25B40/02 F25B2339/047 F25B2400/24 F25B2600/0271
European: F25B27/02 F25B29/00B R25B339/047 R25B40/02 R25B400/24 R25B5/02 R25B6/02 R25B600/0271
US: 62/115 62/115P 62/238.7 62/238.700S



Family:

Publication number	Publication date	Application number	Application date
AU2007258621 AA	20071221	AU20070258621	20070607
BRPI0712184 A2	20120117	BR2007PI12184	20070607
CA2659584 AA	20081204	CA20072659584	20070607
EP2024693 A2	20090218	EP20070809376	20070607
IL195705 A0	20090901	IL20070195705	20070607
IN10124DN2008 A	20090515	IN2008DN10124	20081205
JP2009540258 T2	20091119	JP20090514371T	20070607
KR20090021213 A	20090227	KR20097000279	20070607
MX2008015586 A1	20090211	MX20080015586	20070607
US2010018228 AA	20100128	US20070759435	20070607
WO07146050 A2	20071221	WO2007US13397	20070607
WO07146050 A3	20080515	WO2007US13397	20070607

Priority:

US20060804148P 20060607 US20070759435 20070607 WO2007US13397 20070607

Probable Assignee: WATERS HOT INC

Assignee(s): (std): FLAMMANG KEVIN E ; SEGGERMAN KARL J ; VELTKAMP GENE ; WATERS HOT INC

Inventor(s): (std): FLAMMANG KEVIN E ; SEGGERMAN KARL J ; VELTKAMP GENE

Inventor(s): GENE VELTKAMP ; KARL J SEGGERMAN ; KEVIN E FLAMMANG

Agent(s): DAVIES COLLISON CAVE; DAVIES COLLISON CAVE PTY LTD; OYEN WIGGS GREEN AND MUTALA LLP; TOMKINSON ALEXANDRA; SEKIYA MITSUO; HIRAKI YUSUKE; MCKEE VOORHEES AND SEASE PLC

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 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 ZA ZM ZW

49) Family number: 53491869 (US2013091884A)

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Title: HEAT POWERED RECIPROCATING PISTON ENGINE

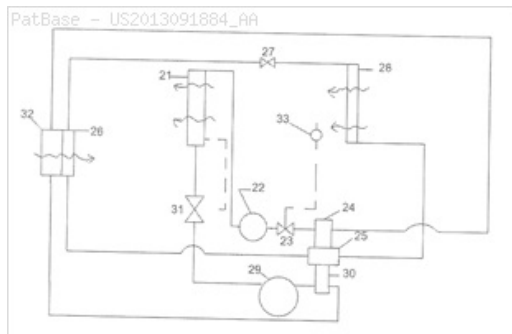
Abstract: A thermodynamic system for powering a reciprocating device includes a refrigerant passing in a closed loop between a refrigerant compressor, a condenser, an expansion valve, and an evaporator. The system includes a heat source for heating the refrigerant, and an engine for receiving the heated refrigerant. The engine includes a housing, a shaft axially movable within the housing, a piston attached to the shaft, a shifter for reversing piston direction, and porting for passing the refrigerant into and out of the engine housing.

Classifications:

International (ipc 8-9): F01K23/10 F22B1/18 F25B27/00 F25B27/02 F25B30/02 (Advanced/Invention)

CPC: F25B30/02 F25B27/005 F25B27/02 F01K23/10 F22B1/1815 Y02A30/274

US: 62/235.1 62/238.7



Family:

Publication number	Publication date	Application number	Application date
US2013091884 AA	20130418	US20120652235	20121015
US9746215 BB	20170829	US20120652235	20121015

Priority:

US20110547105P 20111014 US20120652235 20121015

Probable Assignee: THERMANALYSIS ENGINEERING CORP

Assignee(s): (std): DABELIC IVO M ; HUNT ROBERT A ; THERMANALYSIS ENG CORP

Assignee(s): THERMANALYSIS ENGINEERING CORP

Inventor(s): (std): DABELIC IVO M ; HUNT ROBERT A

Agent(s): PATRICK K

50) Family number: 55718891 (US2014033755A)

© PatBase

Title: GEOTHERMAL RAIL COOLING AND HEATING SYSTEM

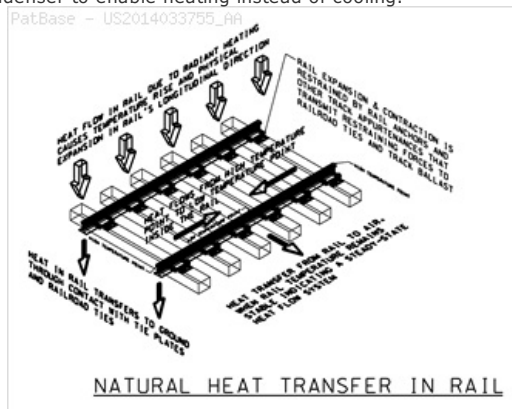
Abstract: A Geothermal Rail Cooling and Heating System is a reversible system process that accelerates heat transfer between the steel rail used in railway track and the adjacent earth. It is comprised of the Rail Heat Exchangers specially shaped to fit tightly inside the rail web, a refrigerant cycling on its physical condensing and evaporative characteristics, a mechanical and power supply system, and an underground tubing loop system for heat dissipation or absorption. When the railroad track undergoes a range of temperature changes that results in rapid rail expansion, it may cause track buckling or sun kink. Upon detection of such occurrence, the system responds with cooling effect to slow down expansion, and simultaneously reduce the risk of track failure. By switching the direction of refrigerant flow utilizing the system built-in reversing valve, the function is alternated for the evaporator and condenser to enable heating instead of cooling.

Classifications:

International (ipc 8-9): F25B27/00 F25B29/00 (Advanced/Invention)

CPC: F25B13/00 E01B19/00 F25B2313/002 E01B7/24 Y02E10/12 F24T10/10

US: 62/235.1 62/238.7 62/260



Family:

Publication number	Publication date	Application number	Application date
US2014033755 AA	20140206	US20120568087	20120806
US8813514 BB	20140826	US20120568087	20120806

Priority:

US20120568087 20120806

Probable Assignee: WONG ROBERT HON SING**Assignee(s):** (std): WONG ROBERT HON SING**Inventor(s):** (std): WONG ROBERT HON SING**51) Family number: 35420894 (EP1821050A2)**

© PatBase

Title: Combined refrigeration and air conditioning system

Abstract: The invention relates to a combined refrigeration and air conditioning system, which simultaneously carries out the functions of an industrial cold and air conditioning system of an installation or premises by means of refrigeration cycles by direct expansion of a refrigerant. To that end, it comprises two or more compressors (10, 20) sending the compressed refrigerant to a common point, a series of expansion valves (12, 22) and several heat exchangers (11, 13, 23), two of which carry out the exchange with the medium to be cooled with the industrial cold system and with the premises or installation to be air conditioned. The operation mode of the air conditioning system is easily changed from heating to refrigeration by means of the action of two series of valves (50, 51).

Classifications:**International (IPC 8-9):** F25B29/00 F25B41/00

F25B41/04 (Advanced/Invention);

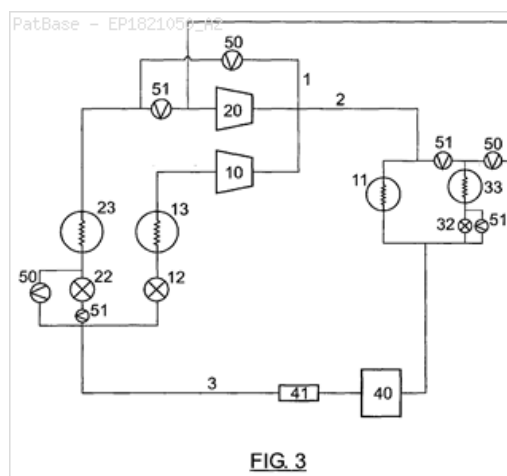
F25B41/00 F25B41/04 (Advanced/Non-invention)

CPC: F25B41/04 F25B13/00 F25B41/00 F25B2400/06 F25B2400/075

F25B2400/16 F25B2400/19 F25B29/003

European: F25B29/00B F25B41/00 F25B41/04 R25B13/00

R25B400/06 R25B400/075 R25B400/16 R25B400/19

**Family:**

Publication number	Publication date	Application number	Application date
EP1821050 A2	20070822	EP20070380048	20070221
EP1821050 A3	20091223	EP20070380048	20070221
ES2318941 AA	20090501	ES20060000412	20060221
ES2318941 BA	20100121	ES20060000412	20060221

Priority:

ES20060000412 20060221

Probable Assignee: APROALIA S L**Assignee(s):** (std): APROALIA S L**Assignee(s):** APROALIA SL**Inventor(s):** (std): FERNANDEZ PAZOS JOSE LUIS ; PUENTE VARELA RAMON FERNANDO**Inventor(s):** RAMON FERNANDO PUENTE VARELA ; JOSE LUIS FERNANDEZ PAZOS**Agent(s):** CARVAJAL Y URQUIJO ISABEL**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 MK NL PL PT RO RS SE SI SK TR YU**52) Family number: 832974 (US3396550A)**

© PatBase

Title: Arrangement for reducing compressor discharge gas temperature**Abstract:** ABSTRACT OF THE DISCLOSURE

Secondary throttling means for effectively reducing discharge gas temperature by introducing refrigerant into the suction gas in response to increase in the suction gas temperature above a predetermined value in order to maintain a substantially constant predetermined super-heat of the suction gas entering the compression mechanism.

Classifications:**International (IPC 8-9):** F25B31/00 F25B41/04

F25B49/02 (Advanced/Invention)

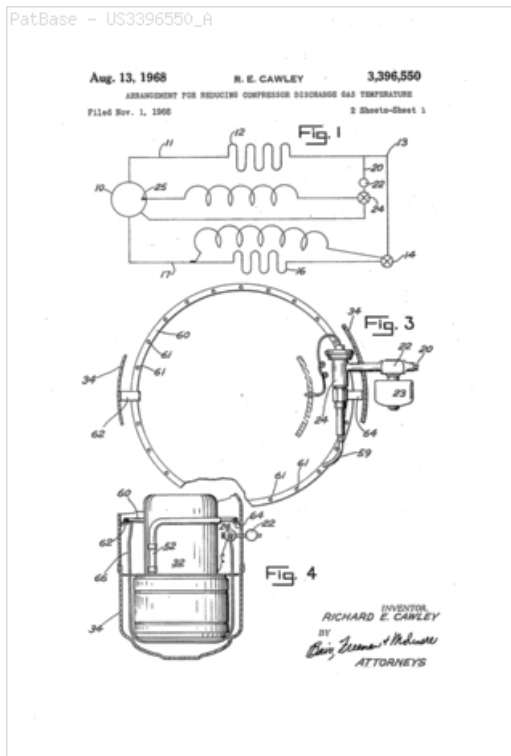
International (IPC 1-7): F25B31/02**CPC:** F25B31/006 F25B41/04 F25B49/02 F25B2400/13

F25B2600/2509

European: F25B31/00C F25B41/04 F25B49/02 R25B400/13

R25B600/2509

US: 62/117 62/196.1 62/505

**Family:**

Publication number	Publication date	Application number	Application date
US3396550 A	19680813	US19660591227	19661101

Priority:

US19660591227 19661101

Probable Assignee:

LENNOX IND INC

Assignee(s): (std):

LENNOX IND INC

Assignee(s):

LENNOX INDUSTRIES INC

Inventor(s): (std):

CAWLEY RICHARD E

53) Family number: 29251991 (US4420947A)

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Title: HEAT PUMP AIR CONDITIONING SYSTEM

Abstract: A heat pump air conditioning system with an active digital control of the refrigeration cycle thereof to improve the coefficient of performance. The system can incorporate solar collectors in parallel with the outdoor heat exchanger and a water storage tank in the system to maximize the utilization of solar heating and nocturnal cooling as an additional heat source or heat sink means when such are available to further improve the coefficient of performance. The system also incorporates individual temperature control mechanisms in each room to circulate an adequate amount of water from the storage tank in accordance with the heat demand of each room, thus contributing to realization of an energy efficient central air conditioning system.

Classifications:

International (IPC 8-9): F24D11/02 F24D19/10 F24F11/02 F24F3/00 F24F5/00 F25B1/00 F25B13/00 F25B29/00 F25B49/02 F25B5/00 G05D23/19 (Advanced/Invention); F25B13/00 F25B25/00 (Advanced/Non-invention); F24D11/00 F24D19/00 F24F11/02 F24F3/00 F24F5/00 F25B1/00 F25B13/00 F25B29/00 F25B49/02 F25B5/00 G05D23/19 (Core/Invention); F25B13/00 F25B25/00 (Core/Non-invention)

International (IPC 1-7): F24D11/02 F24D19/10 F24F11/02 F24F3/00 F24J3/02 F25B1/00 F25B13/00 F25B29/00 F25B5/00 G05D23/19

CPC: Y02B30/125 F24F5/0046 F24D11/0264 F24D19/1093 F25B13/00 F25B25/005 F25B49/02 F25B2600/0253 F25B2600/21 F25B2700/2106 G05D23/1917 Y02B10/20 Y02B10/70 Y02B30/741 Y02B30/13

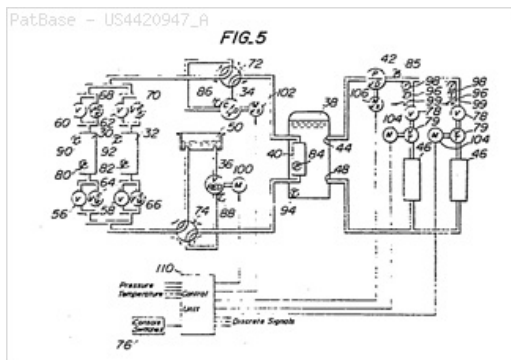
European: F24D11/02D2 F24D19/10D10 F24F5/00F F25B49/02 G05D23/19D R25B13/00 R25B25/00B R25B600/0253 R25B600/21 R25B700/2106 Y02B10/20 Y02B10/40 Y02B10/70 Y02B30/12B2 Y02B30/74B

US: 126/422 126/585 126/591 62/160 62/228.4 62/235.1 62/238.6

Family:

Publication number	Publication date	Application number	Application date
AT17164 E	19860115	AT19820106126T	19820708
DE3268112 D1	19860206	DE19823268112	19820708
EP0069996 A1	19830119	EP19820106126	19820708
EP0069996 B1	19851227	EP19820106126	19820708
JP1689825 C3	19920827	JP19810106893	19810710
JP3055736 B4	19910826	JP19810106893	19810710
JP58008956 A2	19830119	JP19810106893	19810710

PatBase - US4420947_A



Priority:

JP19810106893 19810710 EP19820106126 19820708

Probable Assignee: CORRFLX D AND P LLC

Assignee(s): (std): MITSUBISHI ELECTRIC CORP ; SYSTEM HOMES KK

Assignee(s): SYSTEM HOMES CO LTD 6 2 3 MAENO CHO ITABASHI KU TO ; MITSUBISHI DENKI KK ; FIRST UNION NATIONAL BANK AS ADMINISTRATIVE AGENT ; CORRFLX PACKAGING LLC CORRFLX DISPLAY AND PACKAG ; SYSTEM HOMES COMPANY LTD ; MITSUBISHI DENKI KABUSHIKI KAISHA ; SHISUTEMU HOOMUZU KK ; SYSTEM HOMES CO LTD ; FIRST UNION NATIONAL BANK ADMINISTRATIVE AGENT AS ; CORRFLX PACKAGING LLC CORRFLX DISPLAY AND PACKAGING LLC CORRFLX D AND P LLC ; SYSTEM HOMES CO LTD 6 2 3 MAENO CHO ITABASHI KU TOKYO 174 JAPAN ; ALLIED CAPITAL CORP ; BANK OF AMERICA NA ; CHESAPEAKE DISPLAY AND PACKAGING CO ; CORRFLX D AND P LLC ; CORRFLX GRAPHICS LLC

Inventor(s): (std): YOSHINO HOZO ; YOSHINO NORIKATA ; YOSHINO NORIZOU

Designated states: AT BE CH DE FR GB IT LI LU NL SE