



New connection on: : 21-09-2018 : 04:33:09 - Last disconnection on: : 20-09-2018 : 23:26:13

V 4.0.0.44358(LP,U,linux) (Rev:43856 2017-04-27 09:03:29 +0200#(D201802)) (RPM D201802)

Welcome to EPOQUE Rebuild under the Production Environment

[EPODOC: SS 6] ..fiepodoc

 Database: EPODOC

[EPODOC: SS 6] B60H1/C/LOW

Results in EPODOC 72.856

[SS 7] * and ((cold or cool+ or refrigerator) 5d (chamber or cylinder)

An opening or closing bracket is missing. *ERROR(-101304)*

[SS 7] * and ((cold or cool+ or refrigerator) 5d (chamber or cylinder))

Results in EPODOC 384

[SS 8] * and (expansion 5d valve)

Results in EPODOC 13

[SS 9] 7 and ((spiral+ or coil+) 5d cool+)

Results in EPODOC 1

[SS 10] ..li



1/1 © EPODOC / EPO

PN - [JPS5787710](#) A 19820601

PR - JP19800164358 19801121

AP - JP19800164358 19801121

DT - I

CCI - [B60H1/032](#)

FI - B60H1/03&B; F24H1/28&B



FT	- 3L027/BA12; 3L027/CA03; 3L027/DA03; 3L027/DA05; 3L027/DB06
PA	- NISSAN MOTOR
TI	- COMBUSTION TYPE HEATER FOR HEATING VEHICLE
AB	- PURPOSE:To improve the heating performance of a heater by heating engine coolant by a single tube arranged spirally between a heat transmission cylinder and a combustion cylinder, thereby feeding it as wet steam. CONSTITUTION: Combustion gas is inverted at the rear end of a combustion cylinder 10 to heat engine coolant passed between the cylinder 10 and a heat transmission cylinder 11 through a coolant passage 14 between an outer cylinder 13 and the cylinder 11 with a spiral sole tube 20 arranged at the combustion gas passage, and the combustion gas is then exhausted from an outlet 12. Water from a passage 14 reheated by the tube 20 is fed as wet steam to a heater core 4, and is heat exchanged with air intaked by a blower 5. The coolant after heat exchange cools the outer wall of a cylinder liner in wet steam state with good heat transfer property and can also accelerate the warming-up of the engine at the start in winter.

[SS 10] ((cold or cool+ or refrigerator) 5d (chamber or cylinder))

Results in EPODOC **90.475**

[SS 11] * and (expansion 5d valve)

Results in EPODOC **496**

[SS 12] * and compressor

Results in EPODOC 304

[SS 13] * and ((spiral+ or coil+) 5d cool+)

Results in EPODOC 19

[SS 14] * and PD<20170713

Results in EPODOC 18

[SS 15] ..li



1/18 © EPODOC / EPO

PN - [CN203823939U](#) U 20140910

PR - CN20142179749U 20140415

AP - CN20142179749U 20140415

DT - I

PA - SINOPHARM CHONGQING PHARMACEUTICAL AND MEDICAL INDUSTRY DESIGN INST

TI - Refrigerating unit for environment at low temperatures

AB - The utility model relates to a refrigerating unit for the environment at low temperatures. According to the refrigerating unit, a **compressor**, a condenser, an **expansion valve** and an evaporator form a refrigerating circuit; the condenser comprises a shell and a heat exchange pipe arranged inside the shell; an inner cavity of the shell comprises an evaporative **cooling chamber** and an air **cooling chamber**; the **coil** pipe-shaped front half part of the heat exchange pipe is arranged in the evaporative **cooling chamber**; an evaporative heat exchanger is arranged on the heat exchange pipe positioned in the evaporative **cooling chamber**; the **coil** pipe-shaped rear half part of the heat exchange pipe is arranged in the air **cooling chamber**; a finned heat exchanger is arranged on the heat exchange pipe in the air **cooling chamber**; air inlets are formed in the side walls of the shell; air outlets are formed in the top end of the shell; air outlet machines are arranged at the air outlets; the evaporative **cooling chamber** performs the evaporative **cooling** by arranging a water collector, a spraying water segregator, a water collecting tank and a water pump, and the air **cooling chamber** performs the air **cooling**, so that the integrated refrigerating unit having the evaporative cooling and air cooling functions is formed. The refrigerating unit realizes the evaporative refrigeration of spray water at high temperatures and the air cooling refrigeration at low temperatures, and has the advantages of being high in energy efficiency ratio, energy-saving and freeze-proof.

2/18 © EPODOC / EPO

PN - [KR100887280B](#) B1 20090306

PR - KR20070104345 20071017

AP - KR20070104345 20071017

DT - I

CT - [KR19980064936](#) A []; [KR19990073128](#) A [];
[JPH1192258](#) A []; [KR20040035667](#) A []

PA - PAN KOREA ENGINEERING CO LTD [KR]

TI - REUSE EQUIPMENT OF WASTE THERMAL ENERGY BY USE OF HEAT PUMP IN HIGH CONCENTRATION WASTE WATER TREATMENT PLANT

AB - A waste heat recycling apparatus for high concentration wastewater treatment plant is provided to collect the thermal energy of exhaust air using refrigerant and generate high temperature water or gas with the thermal energy. A waste heat recycling apparatus for high concentration wastewater treatment plant comprises a heat pump (1) comprising a closed circuit with a **cooling coil**(1-4), a **compressor**(1-1), a heat radiation coil(1-2), and an **expansion valve**(1-3) and using carbon dioxide as refrigerant; a heat absorbing unit comprising the **cooling coil** and a pressure **cooling chamber**(5) and absorbing the heat from high temperature compressed air leaving a blower(3) through insulation-expansion of the refrigerant compressed in the **compressor** of the heat pump so that the compressed air is cooled; a radiation unit comprising the heat radiation coil and a pressure heating chamber(10), passing the compressed and heated refrigerant through the heat dissipation coil, and passing the water through the pressure heating chamber so that the water is heated over 90 DEG C with the high temperature heat radiation coil; a bioreactor(8) which is supplied with the compressed air cooled to the room temperature in the pressure **cooling chamber**; and a hot water supply apparatus(14) or a hot water boiler(15) supplying the warm water heated in the radiation unit through the connection pipe.

3/18 © EPODOC / EPO

PN - [US6715312](#) B1 20040406

PR - US20020280233 20021025

AP - US20020280233 20021025

DT - *

CT - [US5411078](#) A []; [US5724828](#) A [];
[US5816318](#) A []

CCI - [F28F19/00](#) ; [F25B40/04](#) ; [F28D5/02](#)

CCA - [F25B2339/041](#) ; [F28D2021/007](#)

PA - AAON INC [US]

TI - De-superheater for evaporative air conditioning

AB - An evaporative condensing air conditioning system employing a de-superheater and mist eliminator located between the air fan on an evaporative cooler and a spray tree that delivers water 20 as a coolant on the exterior surfaces of a condenser **coil**. The de-superheater receives superheated **coolant** gas from the **compressor** of the air conditioning system where air traveling on the outside of the de-superheater **coil** removes heat from the **coolant** gas located within the de-superheater **coil** to the point where the **coolant** is still a gas but is no longer superheated. The coolant gas then exits the de-superheater and flows into the evaporatively **cooled** condenser **coil** where the **coolant** is further **cooled** and condenses into a liquid before finishing the air conditioning circuit by consecutively moving through an optional **coolant** receiving **chamber**, a thermal **expansion valve**, an evaporator, and returning to

the **compressor**.

4/18 © EPODOC / EPO

- PN - [JP2004293831](#) A 20041021
- PNFP - JP3957652B B2 20070815
- PR - JP20030083954 20030326
- AP - JP20030083954 20030326
- DT - I
- CCA - [Y02W30/82](#) ; [Y02W30/824](#)
- FI - B01D53/26&A; B01D53/26&100; B09B3/00&Z; B09B3/00&303M; C02F11/12&B; F26B17/08&B; F26B21/04&C; F26B21/10&Z
- FT - 3L113/AA08; 3L113/AB02; 3L113/AC59; 3L113/AC67; 3L113/BA37; 3L113/CB14; 3L113/DA02; 3L113/DA07; 4D004/AA02; 4D004/AA03; 4D004/CA04; 4D004/CA22; 4D004/CA42; 4D004/CB13; 4D004/CB36; 4D004/CB46; 4D004/CC02; 4D052/AA10; 4D052/BA04; 4D052/FA06; 4D059/AA01; 4D059/AA05; 4D059/AA07; 4D059/BD01; 4D059/BD33; 4D059/BK11; 4D059/CA04; 4D059/CB04
- PA - (A)
KUBOTA KK; KUBOTA KANKYO SERVICE KK
- TI - (A)
INDUSTRIAL DEHUMIDIFICATION DRYING MACHINE
- AB - (A)
PROBLEM TO BE SOLVED: To provide an industrial dehumidification drying machine capable of inhibiting the heat load fluctuation given to a refrigerating machine.
- SOLUTION: An air conditioner comprises a conditioning **chamber** 19 provided with a **cooling** dehumidifying **coil** 20 and a reheating coil 21, and a blower 22 supplying the circulated air having passed through the conditioning chamber 19 to a drying machine main body 1. A ventilation port 23 of the conditioning chamber 19 is communicated with an air discharge port 11 of the drying machine main body 1 through a ventilation passage 24, and an air opening 26 of a blower 22 is communicated with an air supply port 10 of the drying machine main body 1 through an air passage 27. The cold/hot water supply device 8 comprises a hot water storage tank 28 storing the hot water and forming a hot water circulating passage 7 with a reheating coil 21 of the air conditioner 5, a cold water storage tank 29 storing the cold water and forming a cold water circulating passage 6 with a **cooling** dehumidifying **coil** 20 of the air conditioner, and the refrigerating machine 30. The refrigerating machine 30 constitutes a refrigerating cycle by a condenser 31 mounted in the hot water storage tank 28, an evaporator 32 mounted in the cold water storage tank 29, and a **compressor** and an **expansion valve** mounted in a refrigerating machine main body 33.
- COPYRIGHT: (C)2005,JPO&NCIPI

5/18 © EPODOC / EPO

- PN - [JP2003047949](#) A 20030218
- PNFP - JP3504931B B2 20040308
- PR - JP20010236102 20010803
- AP - JP20010236102 20010803

DT - I

FI - B01D1/00&D; C02F1/04&D; C02F1/04&C+ZAB

FT - 4D034/AA19; 4D034/AA26; 4D034/AA27; 4D034/BA01; 4D034/CA12; 4D034/CA21; 4D076/AA02; 4D076/AA03; 4D076/AA22; 4D076/BA03; 4D076/BB01; 4D076/BB30; 4D076/BC03; 4D076/DA08; 4D076/DA32; 4D076/EA06; 4D076/FA31; 4D076/FA34; 4D076/HA07; 4D076/JA04

PA - (A)
TAKAGI REIKI KK

TI - (A)
WASTE LIQUID DEHYDRATION APPARATUS

AB - (A)
PROBLEM TO BE SOLVED: To provide a waste liquid dehydration apparatus capable of concentrating a waste liquid up to a tar-like or solid state and high in energy efficiency. SOLUTION: The dehydration apparatus for heating the waste liquid under reduced pressure to concentrate or solidify the same has a vacuum chamber (16), a treatment tank (12) provided in the vacuum chamber to house the waste liquid to be dehydrated, a heating means (13) provided to the outside of the treatment tank, a condensation chamber (28) communicating with the vacuum chamber to receive vapor of the liquid component in the waste liquid evaporated in the vacuum chamber, a vacuum means (44) for evacuating the vacuum chamber and the condensation chamber, a condensation coil (30) arranged in the condensation chamber to condensation vapor in the condensation **chamber** and a **cooling** means including a **compressor**, an **expansion valve** and a waste heat unit to allow a cooling medium to flow through the condensation **coil** to **cool** the condensation **coil**. The heating by the heating means and the cooling by the cooling means can be regulated independently.

6/18 © EPODOC / EPO

PN - [JPS6269034](#) A 19870330

PR - JP19850208615 19850924

AP - JP19850208615 19850924

DT - I

FI - F24F5/00&101Z; G05D23/00&A

FT - 3L054/BF02; 5H323/AA12; 5H323/BB11; 5H323/BB20; 5H323/CA02; 5H323/CB23; 5H323/CB33; 5H323/DA04; 5H323/DB04; 5H323/DB15; 5H323/EE01; 5H323/FF01; 5H323/FF04; 5H323/HH07; 5H323/KK07

PA - HITACHI LTD

TI - TEMPERATURE REGULATOR

AB - PURPOSE:To make it possible to control rigorously with a simple construction and to prevent the back-flow of liquid to a **compressor** by providing a mechanism which regulates voltage applied to a heater which is installed to the heat-sensing cylinder of an **expansion valve**. CONSTITUTION:An **expansion valve** 4 to regulate the flow rate of a coolant, uniform pressure pipe 5 which detects the outlet pressure of a heat exchanger and transmits it to the **expansion valve**, and a heat-sensing **cylinder** 6 which detects the **coolant** temperature in the piping or the temperature of a micro-heater 7 and determines the opening circle of the **expansion valve**. On the basis of the temperature detected by an thermometer 10 installed in a room, the voltage passing through an

Triac 8 by a controller 11 is regulated. Since a micro-heater 7 changes its heat generation according to the intensity of the voltage, the amount of heat generation is detected by a heat-sensing cylinder 6 to control the **expansion valve** 4 and also adjusts the amount of **coolant** flowing into a **cooling coil** 2. Further, since a uniform pressure pipe 5 and a heat-sensing cylinder 6 are provided, it is possible to prevent the back-flow of liquid to a **compressor**. Further, a temperature sensor 10, controller 11 and Triac 8 can be commonly used with a plurality of coils by using a resistance 9 for voltage minute adjustment.

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PN - [JPH01225871](#) A 19890908

PNFP - JPH0549909B B2 19930727

PR - JP19880048696 19880303

AP - JP19880048696 19880303

DT - I

CT - || STSE (A)
[JPS62152173U](#) U 19870926 [];
[JPS578481U](#) U 19820116 [];
[JPS572531U](#) U 19820107 [];
[JPS3817100Y](#) Y1 00000000 []

CCA - [Y02A40/268](#)

FI - A01G7/00&601Z; A01G9/24&R;
F25B39/02&Q; F25D11/00&102Z

FT - 2B022/AB15; 2B022/DA17;
2B029/AB01; 2B029/AB09;
2B029/AB10; 2B029/MA01;
2B029/SA02; 2B029/SE01;
3L045/AA02; 3L045/AA03;
3L045/AA04; 3L045/BA01;
3L045/CA01; 3L045/CA02;
3L045/DA02; 3L045/EA01;
3L045/EA03; 3L045/FA02;
3L045/GA04; 3L045/HA01;
3L045/JA13; 3L045/JA14;
3L045/KA00; 3L045/LA00;
3L045/MA00; 3L045/MA01;
3L045/NA00; 3L045/PA04;
3L045/PA05

PA - (A B2)
HITACHI REINETSU KK

TI - (A)
REFRIGERATING DEVICE FOR
MANUFACTURING BOTH OF COLD
AIR AND COLD WATER

AB - (A)
PURPOSE:To permit low-



temperature room cooling in nighttime and cold water seedling cultivation in daytime, by a method wherein cooling in a house is effected by employing a fan coil type heat exchanger as a cold airflow generating device while cold water in a cold water tank is circulated through a water cultivation bed.

CONSTITUTION:Refrigerant, discharged out of a **compressor** 1, enters into a fan **coil** type **cooler** 5 through a condenser 2, a solenoid **valve** 7 and an **expansion valve** 6 after the temperature thereof is measured to cool water in a cold water tank 13, sent from a circulating pump 12, then, produces cold airflow by a fan 6 and is returned into the **compressor** 1. The low-temperature **cooling** in a seeding cultivation **chamber** is effected by the **cold** airflow from the fan 6 in nighttime while cold water is supplied into a water cultivation bed from a water tank 13 in daytime to effect cold water seedling cultivation. Thus, the title refrigerating device may be utilized for seeding cultivation facilities for promoting the differentiation of the flower-bud of fruits and vegetables while the low-temperature room cooling in nighttime and the cold water supply to a water cultivation bed in daytime may be effected by one set of the title device.

PN - [GB1031107](#) A 19660525

PR - FR19630948348 19630923

AP - GB19640037160 19640910

DT - **

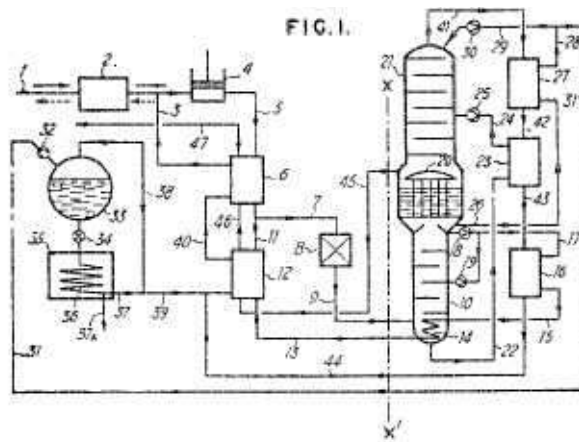
CCI - [F25J3/04812](#) ; [F27B1/18](#) ;
[F25J3/04296](#) ; [F25J3/044](#) ;
[F25J3/04412](#) ; [F25J3/04496](#) ;
[F25J3/04563](#) ; [F25J3/04612](#)

CCA - [F25J2200/50](#) ; [F25J2200/52](#) ;
[F25J2210/42](#) ; [F25J2245/42](#) ;
[F25J2245/90](#) ; [F25J2250/42](#) ;
[F25J2260/44](#) ; [F25J2290/62](#) ;
[Y10S62/94](#) ; [Y02P10/122](#)

PA - AIR LIQUIDE

TI - Improvements in or relating to
the production of low
temperatures

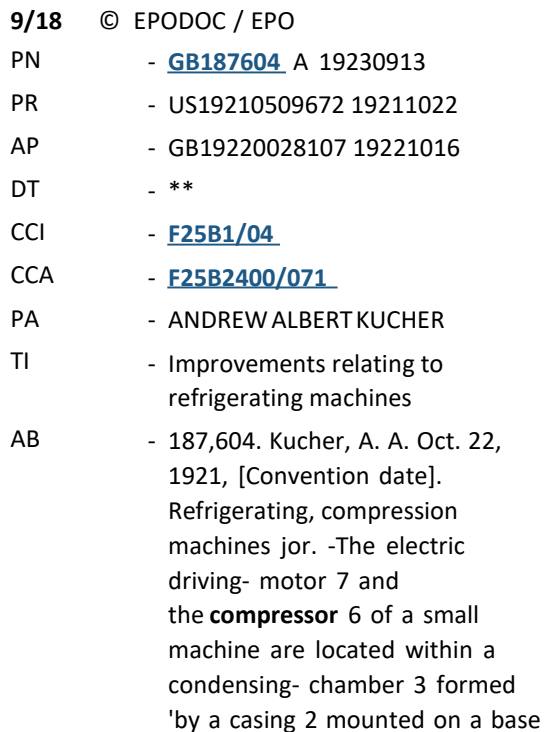
AB - 1,031,107. Refrigerating. L'AIR
LIQUIDE S.A. POUR L'ETUDE ET
L'EXPLOITATION DES PROCEDES
GEORGES CLAUDE. Sept. 10, 1964
[Sept. 23, 1963], No. 37160/64.
Heading F4H. In a process for the
production of cold by the
vaporization of liquid nitrogen,
the nitrogen vapour is heat
exchanged with a gas which has
a high nitrogen content and from
which the liquid nitrogen is to be
produced by liquefaction and
rectification, said gas having a
high nitrogen content being
formed by the admixture of air,
gaseous nitrogen separated from
the gas having a high nitrogen
content and gaseous nitrogen
obtained from the vaporization
of liquid nitrogen to produce
cold. As shown, atmospheric air
introduced through line 1 has
moisture and carbon dioxide
removed therefrom at 2 and
gaseous nitrogen added thereto
from line 3, the mixture being
compressed at 4 and passed
through heat exchangers 6, 12
which are cooled by the gaseous



nitrogen in line 3. Part of the mixture is tapped off from between heat exchangers 6 and 12, expanded in an expansion machine 8 and passed into the bottom of a high pressure rectification column 10, the remainder of the mixture from heat exchanger 12 being passed through a coil 14 in the sump of column 10, through a heat exchanger 16 and then expanded through valves 18, 19 into column 10. Liquid oxygen from the bottom of the latter is withdrawn through line 22 and heat exchanger 23 and expanded through valve 25 into a lowpressure column 21 which communicates with column 10 through a condenser-vaporizer 20. Liquid nitrogen is withdrawn from the top of column 10 through line 26 and heat exchanger 27 and part is refluxed through line 29 and valve 30 to column 21, the remainder being supplied via line 31 and **expansion valve** 32 to a storage reservoir 33 communicating with a coil 36 in a **chamber** to be **cooled**. Vapour from **coil** 36 and from the vapour space of reservoir 33 is returned via lines 37, 38, 39 to line 3 for recycling to the **compressor** 4. Gaseous nitrogen from column 21 is supplied via lines 41-44 and heat exchangers 27, 23, 16 to line 39 and thence to **compressor** 4. Gaseous oxygen from column 21 passes to waste via lines 45-47 and heat exchangers 6, 12. In operation, at zero cold consumption the air only has added thereto gaseous nitrogen from column 21 and reservoir 33, but as the cold consumption increases vapour

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PN	- GB187604 A 19230913
PR	- US19210509672 19211022
AP	- GB19220028107 19221016
DT	- **
CCI	- F25B1/04
CCA	- F25B2400/071
PA	- ANDREW ALBERT KUCHER
TI	- Improvements relating to refrigerating machines
AB	- 187,604. Kucher, A. A. Oct. 22, 1921, [Convention date]. Refrigerating, compression machines jor. -The electric driving- motor 7 and the compressor 6 of a small machine are located within a condensing- chamber 3 formed 'by a casing 2 mounted on a base



1, the electric and fluid connections being disposed in the base so that the casing 2 may be readily removed and rendered fluid-tight when in place.

The **compressor** is of the rotary type and is supported on an inner casing 15 enclosing the motor. Provision is made for discharging lubricant and refrigerant which may collect in the motor casing, for controlling the **expansion valve** by a float member, and for separating the lubricant from the refrigerant. The casings 2, 15 are bolted to the base member 1, rubber packing rings 19, 18 being located in grooves in the base to secure tight joints. The **cooling-coil** 10 in the gas **chamber** 3 is connected to radial passages in the base through which water or other cooling- liquid is supplied and discharged, and similar radial passages 49 are provided for the motor leads 50, which are connected to terminals 53 carried by screwed plugs 54, and are passed through insulating material 60 in a recess 58 in the base. The laminated field magnet structure 74, of the motor, supporting the field winding 75, is forced into position within longitudinal ribs 77 integral with the casing 15, the winding 75 being impregnated with or embedded in a body of insulating material 76 such as bakelite to protect it from the action of the refrigerant or lubricant. The evaporator comprises a coil 39, connected at 40 to the **expansion valve** 9, and a chamber 177 formed of two parts bolted together. The upper part 176 of this chamber is attached to a T-piece 184, one

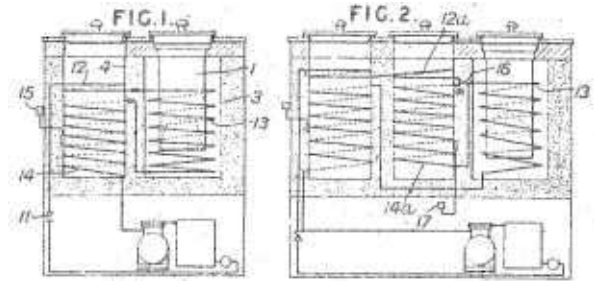
branch of which is screwed into the base for support, while the other branch is connected to a passage 45 in the base in communication with the **compressor** inlet 88 by a pipe 42. The passage 45 also communicates with the interior of the motor casing through a non-return valve 48 comprising a spring pressed ball seating in an aperture in a cap 35. When the **compressor** is working it withdraws any fluid in the motor casing through this valve into the inlet pipe 42, while when the **compressor** is stopped the pressure set up in the evaporator closes the valve to prevent entrance of fluid into the motor casing. The **expansion valve** stem 145 is pivoted to a lever 137 attached to a hollow ring 135 floating in the liquid in the outer casing, the valve thus being controlled automatically. The separator comprises a serpentine tube 150, Fig. 5, set concentrically with the float ring 135 and having one end 151 open below the normal level B-B of the condensed refrigerant and the other end connected with the valve casing. The lower bends of the tube are connected by branches 157 to a tube 159 sloping to one end 160 open below the normal level A-A of the lubricant and the upper bends are provided with apertures 156 to equalize the pressure. The refrigerant flows through the serpentine tube to the valve while the lubricant descends through the branches to the tube 159. The arrangement described is suitable when ethyl chloride is used as the refrigerant and a heavier substance such as

glycerine is used as the lubricant. When the lubricant is lighter than the refrigerant the serpentine tube is arranged with its open end downwards, and the lubricant passes upwards through branch pipes at the top bends. The **compressor** comprises a rotor 63, Figs. 8, 9, keyed to the motor shaft 62 and provided with radially movable vanes 107, 108, the vane 107 being pivotally connected or keyed by a pin 112 to a ported sleeve 97 which thus rotates with the member 63. The cylinder casting is provided with inlet and outlet passages 88, 91 separated longitudinally and communicating with the interior of the sleeve by elongated ports, 94, 95 in the casting and ports 99, 100 in the sleeve. A check valve 8, Fig. 1, fitted at the outlet of the **compressor**, comprises two valve members 128, Fig. 2, connected by a spring 131. The motor shaft 62 has a reduced lower end 65 and is provided with a step bearing comprising a collar 70 attached to the shaft and a loose collar 71. An intermediate bearing in the upper part 81 of the motor casing is provided with packing 82, and a deflector 85 is attached to the shaft above the motor to deflect oil on to the wall of the casing away from the motor. The upper bearing is formed by an extension 164, Fig. 9 of the **compressor** casting. Oil is supplied under the pressure of the condenser chamber to a pocket 171 above the upper bearing by means of a pipe 168, Fig. 1, whose open end dips into the oil in the condenser chamber. From the pocket 171

the oil flows through passages 172, 173, Fig. 9, to the **compressor**, and then through a groove 190 and inclined passage 196 in the shaft 62 to a cup 72 around the bottom bearing, whence it escapes into the motor casing and is exhausted through the valve 48. The machine may be fitted to the top of a refrigerator, and may be controlled thermostatically.

10/18 © EPODOC / EPO

- PN - [GB503621](#) A 19390412
- PR - GB19370027837 19371013
- AP - GB19370027837 19371013
- DT - *
- CCI - [F25D11/04](#)
- CCA - [F25D2400/10](#)
- PA - LIGHTFOOT REFRIGERATION COMPAN; MAX ENGEL; CLIFFORD EDGAR GARROD
- TI - Improvements relating to combined refrigerating and storage apparatus
- AB - 503,621. Refrigerators. LIGHTFOOT REFRIGERATION CO., Ltd., ENGEL, M., and GARROD, C. E. Oct. 13, 1937, No. 27837. [Class 29] A cabinet for making and storing ice-cream &c. is formed with a brine compartment 3 into which depends a cream freezer 1, and a storage compartment 4 for the frozen cream, the cabinet being cooled by a compression refrigerating machine the refrigerant from which is circulated first through one or two pipe coils 12 around the storage compartment, then through a coil 13 in the brine, and finally through a coil 14 around the storage compartment back to the machine. The



refrigerant flow to the coils is controlled by an automatic **expansion valve** 11, and the temperature of the storage compartment is controlled by a thermostat 15 'which controls the **compressor** motor switch. In a modification, a second storage **chamber** is provided having a **cooling coil** 12a, Fig. 2, connected through a three-way valve 16 either directly with the coil 13 or indirectly therewith through the coil 14a. The valve may be of the magnetic type and controlled by a thermostat 17 subject to the temperature in the second storage chamber.

11/18 © EPODOC / EPO

PN - [GB263922](#) A 19270103

PR - GB19250024686 19251003

AP - GB19250024686 19251003

DT - *; Rep

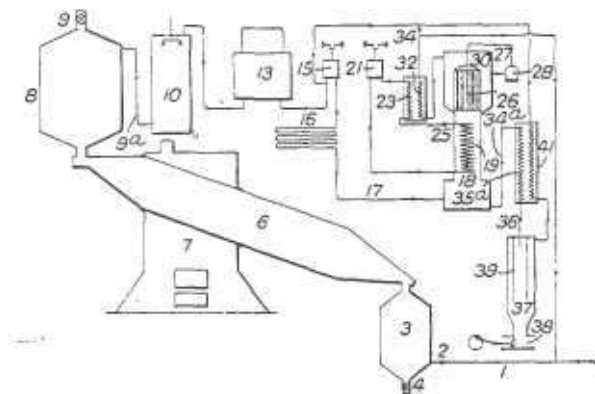
CCI - [F25J3/0266](#) ; [C01B32/50](#)

CCA - [Y02C10/12](#) ; [F25J2200/02](#) ; [F25J2200/80](#) ; [F25J2210/70](#) ; [F25J2245/02](#) ; [F25J2270/04](#) ; [F25J2270/12](#) ; [Y02P20/152](#)

PA - PIERREEVAN HAYNES

TI - Improved manufacture of carbon dioxide

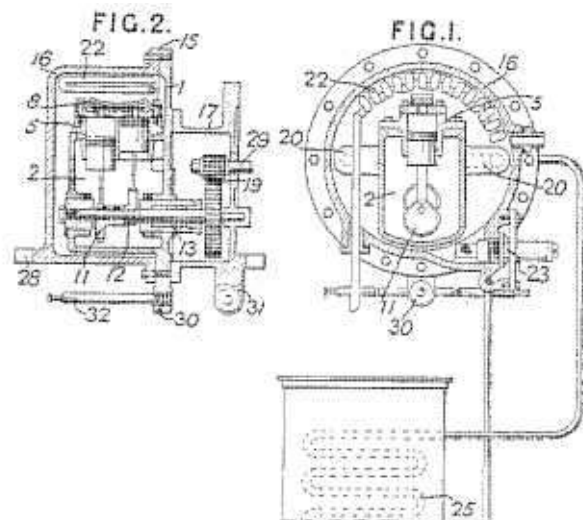
AB - 263.922. Haynes, P. E. Oct. 3, 1925. Liquefying and solidifying.
 - Carbon dioxide, after leaving a gas washer 10, and holder 13 is highly compressed by a **compressor** 15 and is passed through a **cooling coil** 16 to a condensing tower 18. Here it meets a coil 19 containing an expanded refrigerant which is circulated through a **compressor** 21, heat exchanging coil 23 and **expansion valve** 25. Meeting coil M, the carbon dioxide



entering the tower 18 is partly condensed and the uncondensed portion on rising is further cooled by pipes 26. Condensation occurs, and the residual gases, after leaving by pipe 27 are expanded in a turbine &c. 28. The expanded gases enter a **chamber** 30 to **cool** the pipes 26, and after passing through the heat exchanging coil 32 are returned to pipe 1 or discharged through a valve 34. Liquid carbon dioxide leaving the tower 18 by pipe 34a is **cooled** in a heat exchanging **coil** 35<a> and on passing through **expansion valve** 36 is partly solidified in a snow tower 37. The solid falls into a press 38 and is compressed into blocks or ejected. The gaseous residue passes through the porous walls 39 and is introduced into a heat exchanging coil 41, whence it is returned to the **compressor** 13.

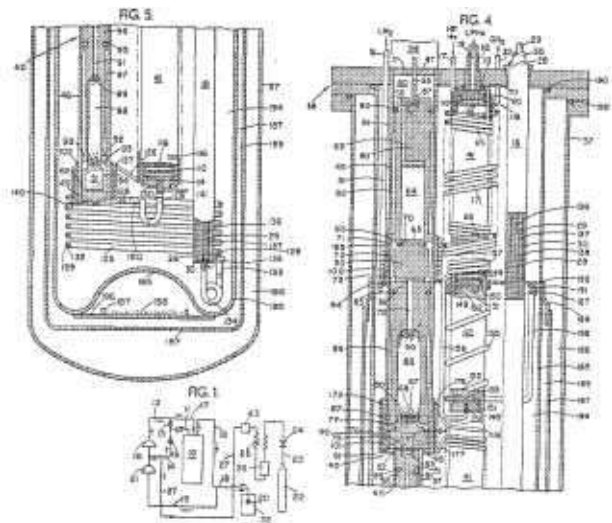
12/18 © EPODOC / EPO

- PN - [GB244532](#) A 19251222
 PR - GB19240022265 19240922
 AP - GB19240022265 19240922
 DT - **
 CCI - [F25B39/04](#) ; [F25B31/00](#)
 CCA - [F25B2400/071](#)
 PA - ARTHUR GREEN
 TI - Improvements in or relating to refrigerating apparatus
 AB - 244,532. Green, A. Sept. 22, 1924. Refrigerating, compression machines for.-A **compressor** chamber 2, preferably of U-shape in vertical section as shown in Fig. 1, is formed on one side of a plate or disc 1, preferably as an integral casting, the disc 1 having on one side a



facing 15 for the attachment of an outer cover member 16 forming a condenser **chamber** around the pump **chamber**, **cooled** by water **coils** 22, and on the opposite side a facing for a housing 17 for reduction gearing 19 between a shaft 29 driven by an electric motor or other power and a shaft 12 carrying eccentrics 11 for the **compressor** piston rods. A stuffing-box 13 is fitted on the shaft 12, and an **expansion valve** 23, Fig. 1, of the kind described in Specification 238,260, may be fitted at one part of the condenser casing. The compression cylinders are preferably formed in one with a member 5 closing the upper end of the **compressor** chamber 2, the refrigerant being admitted from the evaporator coil 25, Fig. 1, through lateral passages 20 in the **compressor** chamber, and discharged into the condenser through suitable valves 8 and passages in the cylinder heads. The capacity of the machine may be increased by the employment of a second group of cylinders, the groups being then set in the form of a V. The condenser and gear casings may have slotted lugs 28 for securing the machine to a base member, and rods 32 for suspending the machine may be mounted in lugs 30, 31. The apparatus may be used in conjunction with the refrigerating plant described in Specification 236,605.

PN - [GB1087894](#) A 19671018
 PR - US19640375854 19640617
 AP - GB19650021949 19650524
 DT - **
 CCI - [F25J1/0065](#) ; [F25J1/0276](#)
 CCA - [F25J2270/912](#)
 PA - LITTLE INC A
 TI - Cryogenic liquefier
 AB - 1,087,894. Liquefaction of gases. ARTHUR D. LITTLE Inc. May 24, 1965 [June 17, 1964] No. 21949/65. Heading F4P. Cooling of compressed helium to below its inversion temperature prior to liquefaction by **expansion** through a **valve** 20, Fig. 1, is effected by passage firstly through the inlet 17 of a coil 115, 116, Fig. 4, surrounding the upper portion of a packed **chamber** 41 traversed by upward flowing **cold** expanded helium gas from valve 20, secondly through a coil 175 surrounding a heatexchange station 101 of a refrigerator 40 using compressed helium as the working fluid, thirdly through a portion of the coil 116 surrounding the lower portion of chamber 41, Fig. 5, and leading to a coil 127 surrounding and in heatexchange with a station 102 at the lower cold end of refrigerator 40 and fourthly through an outer passage 129 of a coil 125 leading to an inner high pressure passage 136 of a vacuum insulated transfer tube 18 leading to the valve 20 and having a low pressure intermediate passage 137 traversed by expanded helium gas which on leaving the base of the tube 18 traverses the inner channel 132 of coil 125 leading to the bottom of chamber 41 for



discharge through a duct 29 leading to the inlet of a **compressor** 16 which also supplies the refrigerator inlet 11 through a stop-valve 13. The refrigerator 40 is described in Specification 1,087,893 and includes a station 100 **cooled** by a liquid nitrogen **coil** 165. Make-up helium from a low-pressure reservoir 22 is freed of condensible impurities by feeding through the upper inlet 23 of a vessel 42 packed with condensation plates 149 and charcoal 52 and **cooled** by a liquid nitrogen **coil** 155 and the purified helium passes through a coil 157 and a duct 27 leading to the **compressor** inlet.

The **refrigerator** 40, **chamber** 41, a portion of the transfer tube 18 and the purifier 42 are enclosed in a helium gas filled vacuum insulated housing 37 and the lower ends of 40, 41, 42 are surrounded by a radiation shield 187, 191 which is also cooled by liquid nitrogen. The apparatus may also be used to liquefy hydrogen.

14/18 © EPODOC / EPO

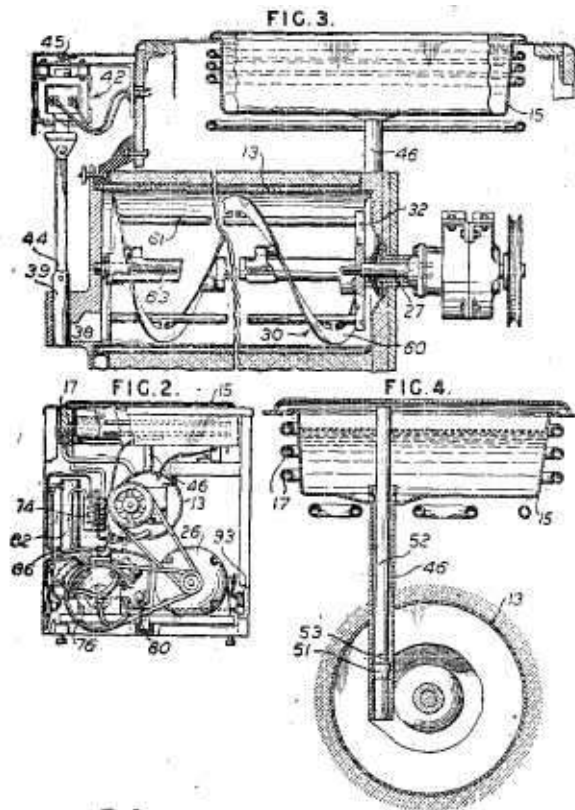
- PN - [GB766703](#) A 19570123
- PR - GB19540020401 19540713
- AP - GB19540020401 19540713
- DT - *
- CCI - [F02G5/00](#) ; [F01N5/00](#) ;
[F01P5/02](#)
- CCA - [Y02T10/16](#) ; [Y02T10/166](#)
- PA - CHARLES EDMUND JOHNSON
- TI - Improvements in or relating to
air cooled internal combustion
engines and to the utilization of
waste heat thereof
- AB - 766,703. Compound engines;
combustion product engines and



plant; cooling charge ;
combustion chambers; cooling
and heating engine and pump
cylinders; lubricating; valves.
JOHNSON, C. E. July 13, 1954, No.
20401/54. Classes 7 (1), 7 (2)
and 7 (6). [Also in Group XXVI] A
motor power plant comprises an
internal combustion engine
driving a **compressor** which
compresses cooled air and
discharges it through valve
control means and an air
storage compartment into the
cylinder head and conjoint
cylinder jacket of the internal
combustion engine, the
compressed air heated by **cooling**
the **cylinder** and exhaust gases of
the engine being mixed and then
passed through **valve** control
means to an **expansion** engine.
The crankshaft 2 has connected
to its crankpin 3, the connecting
rod 4 of an internal combustion
engine, the connecting rod 6 of
a **compressor** and the connecting
rod 8 of an expansion engine. Air
is drawn into the **compressor**
cylinder 10 through a box 15
having a **cooling coil** 16 through
which passes refrigerant which
has previously passed through
the **cylinder cooling** jacket 12. The
lower end of the **cylinder** 10
has **cooling** fins 11. A filter 15a is
mounted at the inlet to the box
15. The compressed air is passed
through a rotary valve 18 and air
chamber 22 to the internal
combustion engine. This engine
comprises a **cylinder** 24
having **cooling** fins contained in
a jacket 26 forming part of a box
27 containing an antechamber
28 and a finned exhaust
chamber 33. A rotary valve 39
controls ports 32, 34 between
the cylinder and the

antechamber and exhaust **chamber**. The **cooled** air enters the box 27 through the pipes 23 and **cools** the antechamber 28, the **cylinder** 24 and the exhaust chamber 33. Explosive mixture is fed into the antechamber 28 through valve 29, and there fired by sparking plugs 31. The combustion products pass through ports 32 into the cylinder 24 and act on the piston 25. At or near the end of the power stroke of the piston 25, the ports 32 are closed and the ports 34 opened so that the piston on its exhaust stroke will force the gases into the chamber 33. At a predetermined pressure the valve 36 opens and the gases mix with the cooling air in the box 27. From the box 27 the mixture of air and gas is passed through a pipe 38 and rotary control **valve** 57 into the **expansion** engine cylinder. At the end of the power stroke the exhaust gases pass through ports 53 to the exhaust pipe 54. On the return stroke the piston 55 forces the residual gases through the valve 57 to the exhaust pipe 60. Lubricating oil is fed to passages in the rotary valve 39 from a chamber 48 fed by a pipe 49. Specifications 705,411 and 724,554 are referred to.

PN - [GB779446](#) A 19570717
PR - GB19560005303 19560221
AP - GB19560005303 19560221
DT - *
CCI - [A23G9/28](#) ; [A23G9/20](#)
PA - HARVEY FLOYD SWENSON
TI - Commercial ice-cream freezer
AB - 779,446. Ice-cream freezers.
SWENSON H. F. Feb. 21, 1956, No. 5303/56. Class 29 Relates to an ice-cream freezer comprising a refrigerated cylinder 13 from which a frozen portion is discharged through an outlet 38 by a motor-driven dasher 30 when a valve 39 is opened. According to the invention, the valve 39 is opened and the dasher motor is energized at will either manually or by electrical means including a timer which acts to close valve 39 after a predetermined time has elapsed. As shown, the dasher comprises a spiral 60, stay rods 61 and pivoted scrapers 63, and is driven through a shaft 27 having a spigot and socket connection with the rear header plate 32 of the dasher. The dasher is so constructed as to maintain the bulk of the mix in the front part of the cylinder. A pipe 46 extends from a mix tank 15 to the rear end of the cylinder and within the pipe is a tube 52 which extends above the liquid level in tank 15, has a part 51 which obturates the lower part of pipe 46 and has holes 53 just above part 51. When a frozen portion is withdrawn through outlet 38, a replacement is drawn in through pipe 46, holes 53 and tube 52, the requisite amount of air entering through the upper part of tube 52. Alternatively a valve



in pipe 46 can be opened, whenever valve 39 is opened, by a solenoid. The refrigerant **compressor** 76 is driven by electric motor 26 which also drives the dasher 30 and the refrigerant circuit includes condenser 82 (the water supply to which is controlled by the discharge pressure), precooler 74, **expansion valve** 86, the evaporator jacket of **cylinder** 13, and a **cooling coil** 17 around the mix tank 15. If dasher operation, but not refrigeration, is desired, the **compressor** is unloaded by opening a valve 80 in a pipe joining the **compressor** discharge and suction. When excessive discharge pressure occurs, the machine is shut down by a pressure-operated switch 93. Valve 39 is closed by gravity and opened either by a solenoid 42 or by lifting a handle 44, and when the valve is open a switch 45 is closed to energize the motor 26. In operation, either tube 52 is raised by hand or the valve in pipe 46 is opened by actuation of a hand switch to allow a charge of mix to flow into the cylinder 13 and then the tube is lowered or the hand switch opened. Motor 26 is energized to drive the **compressor** and dasher, thermostat controls being by-passed to ensure quick freezing. The thermostat is then put in circuit. When a portion of frozen mix is desired, the timer dial is set to the desired time. to select the size of portion and, upon operation of a foot-switch, the timer is energized to open the valve 39 and energize the dasher motor for the predetermined time. Alternatively, a hand

switch can be closed to short circuit the timer and then the valve 39 can be opened for as long as required by hand, the switch 45 energizing the dasher motor to ensure discharge of the mix. An electric circuit is described to perform the above operations.

16/18 © EPODOC / EPO

PN - [GB217178](#) A 19241218

PR - US19230643364 19230604

AP - GB19240005269 19240229

DT - **

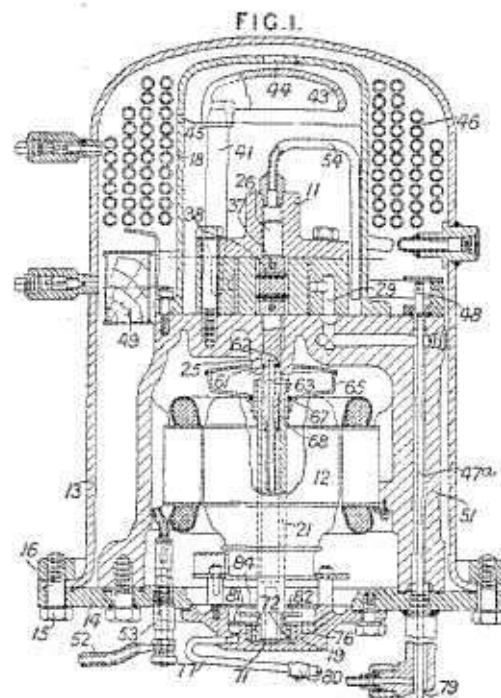
CCI - [F25B1/04](#)

CCA - [F25B2400/071](#)

PA - ANDREW ALBERT KUCHER

TI - Improvements relating to refrigerating machines

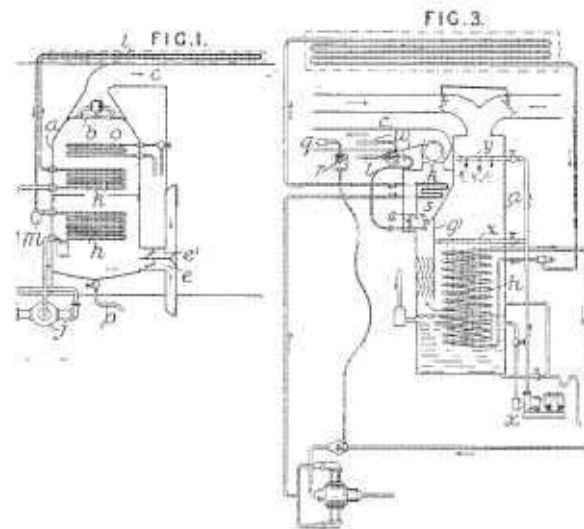
AB - 217,178. Kucher, A. A. June 4, 1923, [Convention date]. Refrigerating, compression machines and processes for.-A mixture of lubricant and refrigerant inseparable by mechanical means, such as is described in Specifications 195,943 and 208,547 is employed, and the mixture discharged from the **compressor** is subjected to the heat of the **compressor** whereby the greater part of the refrigerant is vaporized, leaving a liquid consisting mainly of lubricant. This liquid is fed to the moving parts of the machine and is subsequently returned to the suction side, where it mixes with the refrigerant from the evaporator. The invention is described as applied to a machine comprising a rotary **compressor** 11 driven by an electric motor 12 and enclosed in a condenser casing



13, as described in Specification 187,604. The mixture is discharged from the **compressor** into an inner casing 18, from which vapour passes to the condenser chamber through an opening 44, while the liquid collects in the case of the chamber 18 and is fed through a pipe 54 to the top of the **compressor**. The **compressor** discharge pipe 41 carries a baffle plate 43, and excess of liquid in the casing 18 can overflow through an opening 45 into the condenser **chamber**, which is **cooled** by water flowing through pipe **coils** 46. The condensed refrigerant collects in the lower part of the condenser chamber and flows to the evaporators (not shown), through a pipe 47a fitted with an **expansion valve** 48 controlled by a float 49. The casing 13 is secured to the base casting 14 by bolts 15 and a ring 16, and is provided with charging openings for the lubricant and refrigerant and connections for the water coil. The electric leads 52 for the motor pass through screwed plugs 53 in the base. The motor and **compressor** shafts are connected by keys to permit separation, the armature of the motor being supported by a removable base casting 19. The lubricant flows past the upper bearing 26 and through the **compressor** parts to an intermediate bearing 25, from which it is free to flow through annular and radial passages 61, 62 to an axial passage 63 leading to the hollow motor shaft. Any oil leaking past the intermediate bearing falls on the flat end of the motor shaft and is

thrown outwards into a catch tray 65 carried by the shaft. From the tray it passes into the hollow shaft through passages 67, 68. The lubricant collects in a well 71 in the base casting 19 and rises into an annular well 76. at a level below the centre of the ball bearing 72, being finally discharged through a pipe 77 connected with the return pipe 19 from the evaporators leading to suction passages 51, 29. In order to prevent the lubricant from being sprayed up into the motor, due to equalization of pressure when the machine is stopped, a check valve 80 is fitted in the pipe 77, and baffles 81, 82 and 84 are fitted in the casting 19 above the possible outlets for lubricant.

- 17/18** © EPODOC / EPO
- PN - [GB348550](#) A 19310512
- PR - GB19300004790 19300212
- AP - GB19300004790 19300212
- DT - *
- CCI - [F24F3/1405](#) ; [F24F3/153](#)
- CCA - [F24F2006/146](#)
- PA - STONE J & CO LTD; JOHN FURSE
BANCROFT VIDAL; ERIC GEORGE
ROWLEDGE
- TI - Improvements in and connected
with air treating or conditioning
means for ventilating
installations
- AB - 348,550. Treating air for
ventilation. STONE & CO., Ltd., J.,
Deptford, VIDAL, J. F. B., 18,
Brandram Road, Lee, and
ROWLEDGE, E. G., 23, Felhampton
Road, New Eltham, all in London.
Feb. 12, 1930, Nos. 4790 and
11451. [Class 137.] Forced
ventilation.-In air conditioning
apparatus for ventilating



installations comprising an enclosed cooler for reducing the moisture content and a reheater for restoring heat to the air before it passes to the enclosure to be ventilated, the **cooler** and reheater consist of **coils** connected up in a mechanical refrigeration circuit. Air from the enclosure being ventilated or fresh air from outside or a mixture of the two is drawn into a casing a by a fan b through ducts e<1>, e respectively and returned to the enclosure by way of a duct c after being **cooled** by **coil h**, resulting in a deposition of moisture, and reheated by a coil k. An additional heater o of any type is preferably included in the casing. The coils h, k are connected up in a mechanical refrigeration circuit in such manner that warm compressed fluid from a **compressor** passes first through the reheater coil k, then through a condenser l in which it is cooled and finally through an **expansion valve m** into the **cooling coil h**. As applied to a railway or like vehicle the condenser l is conveniently disposed on the roof and the compressor suspended beneath the vehicle. During cold weather the refrigerating plant may be stopped and the heater o used for heating the air. Water spray devices may be fitted within the casing for use when the air requires to be humidified. In a modified form of apparatus, Fig. 3, the air enters the casing a at the top and the cooling is assisted by cold water sprays y, z, the water being circulated by a pump x and **cooled** by part of the **cooling coil h**. A depending

partition g<1> forms a lateral **chamber** through which the **cooled** air ascends, the upper end of said chamber being divided into two passages, one containing the reheating coil k and the other forming a bypass to said heater. These passages are controlled by dampers 4, 5 automatically operated from a differential thermostat comprising an element u in the outlet duct c and an element t situated in the external atmosphere. A wet bulb thermostat q preferably comprising a bulb containing expansible liquid operating through bellows r controls a valve in the refrigeration circuit. In a further modification the casing a is arranged horizontally.

18/18 © EPODOC / EPO

PN - [GB939409](#) A 19631016

PR - GB19620004781
19620207; US19600077577
19601222

AP - GB19620004781 19620207

DT - **

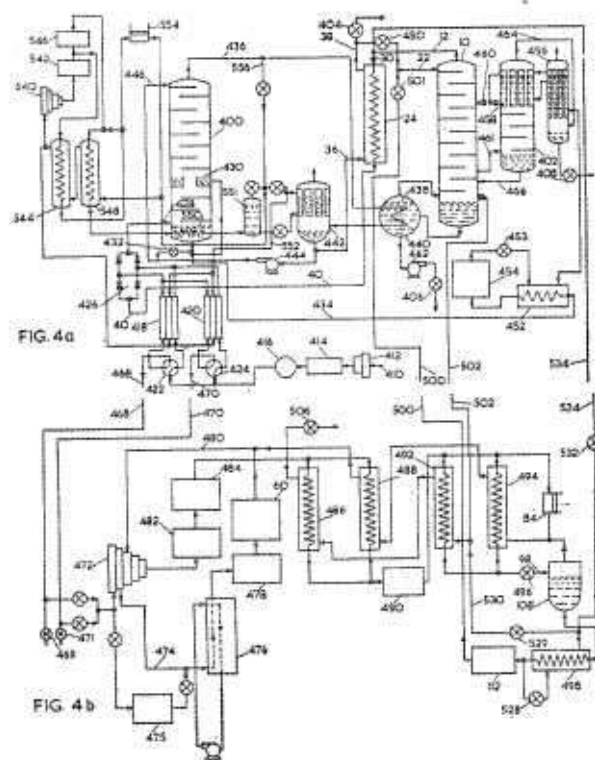
CCI - [F25J3/04878](#) ; [F25J3/04163](#) ;
[F25J3/04169](#) ; [F25J3/04218](#) ;
[F25J3/04224](#) ; [F25J3/04242](#) ;
[F25J3/04278](#) ; [F25J3/04357](#) ;
[F25J3/04393](#) ; [F25J3/04412](#) ;
[F25J3/04678](#)

CCA - [F25J2200/52](#) ; [F25J2200/54](#) ;
[F25J2205/02](#) ; [F25J2205/24](#) ;
[F25J2205/30](#) ; [F25J2205/60](#) ;
[F25J2235/42](#) ; [F25J2245/42](#) ;
[F25J2250/10](#) ; [F25J2250/20](#) ;
[F25J2250/42](#) ; [F25J2250/52](#) ;
[F25J2250/58](#) ; [F25J2270/90](#) ;
[Y10S62/909](#) ; [Y10S62/924](#)

PA - AIR REDUCTION

TI - Separation of the elements of air

AB - 939,409. Cold separation of air.



AIR REDUCTION CO. Inc. Feb. 7, 1962, No. 4781/62. Class 8(2). Effluent nitrogen withdrawn from the head of the high pressure column 400, Fig. 4a, of a two stage air rectification plant is liquefied and the major portion withdrawn as product through a valve 404 whilst the remainder is forced by a pump 444 through a duct 446 for use as reflux in said column 400 and effluent nitrogen from the head of the low pressure column 10 is also liquefied and returned as reflux to said column 10. As shown the high pressure nitrogen effluent is liquefied in the coil 438 of the oxygen reboiler 440 of column 10 from which product liquid oxygen is withdrawn through a valve 406, and the high pressure liquid nitrogen after being freed of uncondensed gases in a chamber 442 is fed through a duct 36 to the outlet 404 and through said pump 444 to the head of column 400 The low pressure nitrogen effluent from column 10 serves to subcool the high pressure liquid nitrogen in an exchanger 24 and thereafter traverses one or other of the outer passages of switchable exchangers 418, 420 in countercurrent to feed air from a **compressor** 412. The so contaminated nitrogen gas is fed through a duct 468 to a two-stage **compressor** 472, Fig. 4b, and after traversing a caustic scrubber 476, a cooler 478, a drier 60, a refrigerated chamber 482, an oil absorber 484, heat exchangers 486, 488, a further refrigerator 490 and coolers 492, 494 is expanded at a valve 496 into a separator 108 from which liquid nitrogen after being

sub-cooled at 498 is returned through a duct 500 and **expansion valve** 501 to the head of column 10 to serve as reflux. The **cold** requirements of condenser **chamber** 442 and for refluxing the column 400 are provided by a closed auxiliary nitrogen cycle comprising a **compressor** 540 and an oil filter 542 from which a first portion of compressed nitrogen is passed through the coil of a warm exchanger 544 whilst a second portion is cooled in a refrigerator 546 and is added to the first portion before being **cooled** in the **coil** of a cold exchanger 548, and the two portions are then passed through the reboiler 550 of column 400 before being passed through a surge drum 551 and the condenser 442. Vapour from the latter traverses a conduit 552 and the middle non-switchable passages of exchangers 418, 420 and a conduit leading to the inlet of **compressor** 540. Extra cold for the cycle is obtained by expanding a portion of nitrogen leaving the coil of exchanger 544 in an engine 554 and using the so-cooled nitrogen in exchangers 548, 544 before returning it to the **compressor** 540. Make-up nitrogen for the cycle is provided through a valved conduit 556. Argon rich vapour is withdrawn from column 10 through a conduit 461 and is passed up a column 402 containing a condenser 458 and rectified crude argon vapour is passed through a conduit 464 to a condenser 456 where the argon is condensed in heat exchange with liquid withdrawn from the

base of the column 400. Product liquid argon is withdrawn through a valve 408. In a modification a portion of the effluent nitrogen from the oxygen column 10, Fig. 1 (not shown), is used to scavenge reversible heat exchangers serving to cool and purify incoming air and the fouled nitrogen is then cleaned, compressed, cooled and expanded and used to liquefy the remainder of the said effluent nitrogen for use as reflux.

[SS 15] ((cold or cool+ or refrigerator) 5d (chamber or cylinder))

Results in EPODOC **90.475**

[SS 16] * and ((spiral+ or coil+) 5d cool+)

Results in EPODOC **1.965**

[SS 17] * and (beverage+ or drink+)

Results in EPODOC **62**

[SS 18] ..v

[EPODOC: SS 18]