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| 1 | Gravity field energy storage and recovery system | Device for storing energy, using a physical object, such as a mass or buoyant object floating in fluid. A mass is repositioned to greater altitude in a gravitational field to a position of higher potential energy. A buoyant object is forcibly submerged into a fluid, displacing fluid, to a position of higher potential energy. The stored potential energy may be recovered with extremely low loss regardless of the state of charge of the system, or length of time of the storage. Maintaining the charge is indefinitely lossless. | James Francis Kellinger; Michael Thane MacKay | US16801541 | 2020/2/26 |
| 2 | Materials, devices, and methods for resonant ambient thermal energy harvesting | The present disclosure is directed to materials, devices, and methods for resonant ambient thermal energy harvesting. Thermal energy can be harvested using thermoelectric resonators that capture and store ambient thermal fluctuations and convert the fluctuations to energy. The thermal resonators can include heat engines disposed between masses of varying sizes or diodes. The masses or diodes can be made of high and ultra-high effusivity materials to transfer thermal energy through the resonator and optimize power output. The masses or diodes of the resonator can be tuned to the dominant frequency of the temperature waveform to maximize the amount of energy being converted. The resonators can be added to existing structures to supply or generate power, and, in some embodiments, the structures themselves can be a mass of the thermal resonator. Methods for constructing and/or using such devices are also provided, as are methods for formulating ultra-high effusivity materials. | Massachusetts Institute of Technology | US16120114 | 2018/8/31 |

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| 3 | Controller for controlling generation of geothermal power in an organic rankine cycle operation during hydrocarbon production | Systems and methods for generating and a controller for controlling generation of geothermal power in an organic Rankine cycle (ORC) operation in the vicinity of a wellhead during hydrocarbon production to thereby supply electrical power to one or more of in-field operational equipment, a grid power structure, and an energy storage device. In an embodiment, during hydrocarbon production, a temperature of a flow of wellhead fluid from the wellhead or working fluid may be determined. If the temperature is above a vaporous phase change threshold of the working fluid, heat exchanger valves may be opened to divert flow of wellhead fluid to heat exchangers to facilitate heat transfer from the flow of wellhead fluid to working fluid through the heat exchangers, thereby to cause the working fluid to change from a liquid to vapor, the vapor to cause a generator to generate electrical power via rotation of an expander. | ICE Thermal Harvesting LLC | US17481658 | 2021/9/22 |
| 4 | SYSTEM AND METHOD FOR SUSTAINABLE GENERATION OF ENERGY | A system for sustainable generation of energy, comprising at least one device for converting natural power into useful energy, and at least one internal combustion engine or heat engine. The internal combustion engine or heat engine may be connected to a gas cleaning device for fuel or heat supply. A method for sustainable generation of energy, comprising the steps of generating a first amount of useful energy by converting natural power; and generating a second amount of energy by operating at least one internal combustion engine or heat engine, wherein the internal combustion engine or heat engine is driven by fuel or heat derived from cleaning a waste gas. | Perry VAN DER BOGT; Willibrordus Nicolaas Johannes URSEM | US17525057 | 2021/11/12 |
| 5 | SYSTEMS AND METHODS FOR ELECTRICAL POWER GENERATION | Power generation assemblies and methods relating thereto are disclosed. In an embodiment, the power generation assembly includes a thermoelectric generator, and a conductor configured to conduct electricity generated by the thermoelectric generator to the surface of a subterranean wellbore. The power generation assembly is to circulate a working fluid through a closed loop in the power generation assembly in response to the receipt of geothermal energy within a subterranean formation, to cause the thermoelectric generator to generate electricity. | National Oilwell Varco L P | US17413860 | 2019/12/20 |

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| 6 | Controller for controlling generation of geothermal power in an organic Rankine cycle operation during hydrocarbon production | Systems and methods for generating and a controller for controlling generation of geothermal power in an organic Rankine cycle (ORC) operation in the vicinity of a wellhead during hydrocarbon production to thereby supply electrical power to one or more of in-field operational equipment, a grid power structure, and an energy storage device. In an embodiment, during hydrocarbon production, a temperature of a flow of wellhead fluid from the wellhead or working fluid may be determined. If the temperature is above a vaporous phase change threshold of the working fluid, heat exchanger valves may be opened to divert flow of wellhead fluid to heat exchangers to facilitate heat transfer from the flow of wellhead fluid to working fluid through the heat exchangers, thereby to cause the working fluid to change from a liquid to vapor, the vapor to cause a generator to generate electrical power via rotation of an expander. | ICE Thermal Harvesting LLC | US17305296 | 2021/7/2 |
| 7 | Carbon negative energy generation system | A method for energy generation includes receiving, at a carbon negative energy generation system, input including calcium oxide and water and reacting, within a reaction chamber of the carbon negative energy generation system, the calcium oxide and water to release energy and generate calcium hydroxide. The method further includes directing, by the carbon negative energy generation system, the released energy to facilitate propulsion or onboard electricity generation and dispensing, by the carbon negative energy generation system, the calcium hydroxide into the ocean to sequester atmospheric CO2. | X Development LLC | US17085441 | 2020/10/30 |
| 8 | Inductively heated thermal actuator | A thermal actuator includes a piston slidingly within a cylinder. The piston cooperates with the cylinder to define a cavity. The piston also includes a rod extending away from the cavity. A magnetic field generator selectively imparts an alternating magnetic field to the cylinder, and inductively heats a heating element mounted within the cavity. The cavity also includes a volume of a phase-change material, which is melted by the heating element. The melting phase-change material expands to drive the rod from a retracted position to an extended position. | SAFRAN LANDING SYSTEMS CANADA INC | US16798114 | 2020/2/21 |

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| 9 | Vessel-mounted ocean thermal energy conversion system | An offshore power generation system comprising : a floating portable platform having one or more OTEC heat exchange units, one or more turbine generators, a water intake and discharge system, a mooring system; and a fixed manifold having one or more cold water intake connections in communication with a cold water pipe, and one or more cold water discharge connections in communication with the water intake system of the floating platform via an intermediate cold water conduit, wherein each cold water discharge connection is detachable from the intermediate cold water pipe. | The Abell Foundation Inc; THE ABELL FOUNDATION INC | US15112781 | 2015/1/20 |
| 10 | Deep Ocean Water Flow Accelerator | A deep ocean water extraction apparatus has a collection pool having an outer shell with a maximum diameter, a lesser diameter at a mostly closed bottom, and an open top of a diameter smaller than the maximum diameter, outflow tubes with pumps extending horizontally from an opening through a side wall of the shell, an opening through the bottom covered by a rigid disk having a plurality of tube openings through which descending collection tubes of common length are connected, and flotation elements attached to the descending collection tubes at a plurality of points spaced down the depth of the collection tubes. The apparatus is characterized in that water is pumped out of the collection pool, and common pressure on the surfaces of the collection pool and the surrounding ocean water, causes water to flow up the collection tubes into the collection pool. | Salvatore Deiana | US17335255 | 2021/6/1 |

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| 11 | Methods for generating geothermal power in an organic Rankine cycle operation during hydrocarbon production based on working fluid temperature | Systems and methods for generating and a controller for controlling generation of geothermal power in an organic Rankine cycle (ORC) operation in the vicinity of a wellhead during hydrocarbon production to thereby supply electrical power to one or more of in-field operational equipment, a grid power structure, and an energy storage device. In an embodiment, during hydrocarbon production, a temperature of a flow of wellhead fluid from the wellhead or working fluid may be determined. If the temperature is above a vaporous phase change threshold of the working fluid, heat exchanger valves may be opened to divert flow of wellhead fluid to heat exchangers to facilitate heat transfer from the flow of wellhead fluid to working fluid through the heat exchangers, thereby to cause the working fluid to change from a liquid to vapor, the vapor to cause a generator to generate electrical power via rotation of an expander. | ICE Thermal Harvesting LLC | US17305293 | 2021/7/2 |
| 12 | Wave energy thermal storage type seawater thermoelectric power generation device | A wave energy thermal storage type seawater thermoelectric power generation device which comprises a buoy-type energy capture system, a platform system and a mooring system. A whole friction liquid heating, thermal storage and power generation device is arranged inside a platform, which improves the adaptability of the whole system to the external environment. A flywheel and liquid friction heating method is adopted to generate heat more efficiently. Inner ratchets and pawls are used to control the movement of a flywheel so that the flywheel always rotates in one direction, and when the rotating speed of the flywheel exceeds that of the inner ratchets, the external wave energy cannot be transferred to the flywheel through the movement of the inner ratchets so as to limit the upper limit of the rotating speed of the flywheel and protect the safety of the flywheel system. | DALIAN UNIVERSITY OF TECHNOLOGY | US16980331 | 2019/10/11 |

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| 13 | Method for thermal profile control and energy recovery in geothermal wells | A method for controlling temperature maxima and minima from the heel to toe in geothermal well lateral sections. The method includes disposing at least a pair of wells proximately where thermal contact is possible. Working fluid is circulated in one well of the pair in one direction and the working fluid of the second well is circulated in as direction opposite. to the first. In this manner temperature equilibration is attainable to mitigate maxima and minima to result in a substantially more uniform temperature of the working fluids in respective wells and the rock formation area there between. Specific operating protocol is disclosed having regard to the temperature control for maximizing thermal energy recovery. | EAVOR TECHNOLOGIES INC | US16524017 | 2019/7/27 |
| 14 | Underwater energy harvesting drone and method for operation | An underwater energy harvesting drone has a primary hull to be submersibly received in ocean water and a plurality of thermoelectric modules, each module of said plurality of thermoelectric modules having a first operational interface in thermal contact with the primary hull. A thermal transfer element is in contact with a second operational interface on the plurality of thermoelectric modules and an electrical power storage device is connected to the plurality of thermoelectric modules. Positioning of the submersible primary hull to create a thermal gradient between the primary hull and the thermal transfer element induces electrical power generation by the thermoelectric modules thereby charging the electrical power storage device. | The Boeing Company | US15894613 | 2018/2/12 |
| 15 | MEMBRANE TYPE INSULATION SYSTEM FOR CRYOGENIC LIQUEFIED GAS CARRIER CARGO TANK AND | In a membrane type heat insulation system for a cryogenic liquefied gas carrier cargo tank and a liquefied gas fuel container, a secondary heat insulation layer comprises a plurality of panels which are stacked in multiple layers while each pair of upper and lower panels is arranged to intersect each other, whereby heat loss which may occur in the gap between the panels can be minimized and deformation due to a temperature difference can be minimized. | DAEWOO SHIPBUILDING MARINE ENGINEERING CO LTD | US16621124 | 2018/12/27 |

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| 16 | Onshore equipped ocean thermal and hydraulic energy conversion system and method | The ocean thermal and hydraulic energy conversion system includes a closed loop assembly comprising a pipeline filled with a working fluid, a pump and a turbine. The system includes a first supply line to transport warm water to an evaporator and then to a junction, and a second supply line to transport cold water to a condenser and then to the junction. The evaporator evaporates the working fluid from a liquid into a vapor using the warm water and the vapor powers the turbine. A generator is connected to the turbine and generates electricity by the powered turbine. The condenser condenses the working fluid vapor to a liquid using the cold water. A hydraulic converter receives the warm and cold water from the junction and converts the hydraulic energy into electricity. | Saudi Arabian Oil Company | US16794939 | 2020/2/19 |
| 17 | Geothermal Source On-Site Power Generation Plant With Computing Facility and Method | A method of processing electrical data and signals which comprises locating a site with a geothermal hot water resource which feeds hot water to an on-site heat engine that drives an on-site electricity generator which provides electrical power to an array of microprocessors, located in an enclosure structure, that processes data transmitted from a remote location at high speeds. The processed data is transmitted back to the remote locations at high speeds. | Gregory B Stewart; Vincent B Bunting; Glenn T Tucker; Gregory B Raplee; Brian Hageman | US17175499 | 2021/2/12 |
| 18 | Apparatus for air-conditioning of environments in the marine field | An apparatus for air-conditioning of watercraft and the like including : an electronically controlled variable-r.p.m. compressor, a main gas/water condenser (5), at least one environmental heat-exchanger (3) with an electronically controlled fan (14), at least one electronically controlled expansion valve (8), and at least one first electronic control unit (4) programmed for calculating continuously a temperature deviation detected (DeltaT=T_ad−T_a), and as a function of the temperature deviation regulating in combination, the r.p.m. of the compressor (1), opening of the flow valve (8), and the r.p.m. of the fan of the heat-exchanger (3). | Maurizio Tropea | US15303259 | 2015/4/8 |

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| 19 | Gravity field energy storage and recovery system | Device for storing energy, using a physical object, such as a mass or buoyant object floating in fluid. A mass is repositioned to greater altitude in a gravitational field to a position of higher potential energy. A buoyant object is forcibly submerged into a fluid, displacing fluid, to a position of higher potential energy. The stored potential energy may be recovered with extremely low loss regardless of the state of charge of the system, or length of time of the storage. Maintaining the charge is indefinitely lossless. | James Francis Kellinger; Michael Thane MacKay | US16801827 | 2020/2/26 |
| 20 | Power generation systems based on thermal differences using slow-motion high-force energy conversion | An apparatus includes first and second tanks each configured to receive and store a refrigerant under pressure. The apparatus also includes a cylinder defining a space configured to receive the refrigerant from the first and second tanks. The apparatus further includes a piston passing into the cylinder and having a head, where the head divides the space within the cylinder into a first volume for the refrigerant from the first tank and a second volume for the refrigerant from the second tank. In addition, the apparatus includes a converter configured to translate linear movement of the piston into rotational motion and a generator configured to produce electrical power based on the rotational motion. | Raytheon Company | US16451852 | 2019/6/25 |
| 21 | METHOD FOR ON DEMAND POWER PRODUCTION UTILIZING GEOLOGIC THERMAL RECOVERY | Methods for providing on demand power to an end user in a variety of embodiments are disclosed. Closed loop thermal recovery arrangements are disposed within a geologic formation having a predetermined potential thermal output capacity. A power generation device is incorporated in the loop to recover energy. A working fluid is circulated within the loop at varying flow rates to oscillate thermal output about the predetermined potential thermal output capacity, to produce on demand power where the average thermal output may equal the predetermined potential thermal output capacity. Integrations with intermittent renewable energy sources are provided which optimize performance and distribution. | EAVOR TECHNOLOGIES INC | US17105568 | 2020/11/26 |
| 22 | Ocean Thermal Energy Conversion Power Plant | An offshore power generation structure comprising a submerged portion having a first deck portion comprising an integral multi-stage evaporator system, a second deck portion comprising an integral multi-stage condensing system, a third deck portion housing power generation equipment, cold water pipe; and a cold water pipe connection. | The Abell Foundation Inc | US17101907 | 2020/11/23 |

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| 23 | Systems and methods for augmenting power generation based on thermal energy conversion using solar or radiated thermal energy | An apparatus includes first and second tanks each configured to receive and store a refrigerant under pressure. The apparatus also includes at least one generator configured to generate electrical power based on a flow of the refrigerant between the tanks. The apparatus further includes a collector configured to transfer solar thermal energy to one of the tanks to heat the refrigerant in that tank and/or radiate thermal energy from one of the tanks into an ambient environment to cool the refrigerant in that tank. In addition, the apparatus could include first and second insulated water jackets each configured to receive and retain water, where the first tank is located within the first insulated water jacket and the second tank is located within the second insulated water jacket. | Raytheon Company | US15725538 | 2017/10/5 |
| 24 | Drive system comprising at least one metal element exhibiting shape memory properties | A drive system based on cyclic conversion of thermal energy into mechanical or electrical energy by using a difference in temperature between at least two media and the contraction of a metal element with shape memory properties, and a method for generating energy using the drive system. The drive system has a first and a second store containing media at different temperatures, the second store having a passage opening through a bottom of a housing. The housing is a cylinder containing a liquid-tight and gas-tight cylinder piston dividing the cylinder into two cylinder spaces of variable volumes. One cylinder space contains the metal element and the other cylinder space contains a restoring element. The metal element is secured to the piston at a fixing point and to a fixing point within the second store so that the metal element is in contact with the medium of the second store. | Bleco Apparatebau GmbH | US16652475 | 2018/10/1 |
| 25 | Mask for surface snorkeling | A mask for surface snorkeling includes a rigid frame (2), a transparent visor (3), a soft face mask (4) sealingly applicable to the face of the user and having a membrane (7) which delimits an upper viewing chamber (8) being shaped to contain the eyes of the user and a lower breathing chamber (9) being shaped to contain the nose and the mouth of the user, and a breathing circuit (5) connected to the lower chamber (9), a ventilation circuit of the upper chamber (8) being further provided that is independent of and separated from the breathing circuit (5). | Cressi Sub S P A | US16203850 | 2018/11/29 |

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| 26 | Apparatus, system, and method for raising deep ocean water | Methods and systems for raising deep ocean water include pumping a quantity of fluid through at least one hose. At least one turbine is driven with the quantity of fluid pumped through at least one hose. At least one pump is driven with the at least one turbine. A second quantity of fluid is sucked into the at least one pump and driven through at least a second hose. | RE SYSTEMS LTD | US16660475 | 2019/10/22 |
| 27 | Liquefied gas-based rapid cooling possibility determination device, liquefied gas storage tank, liquefied gas carrying vessel, and liquefied gas-based rapid cooling possibility determination | The present invention provides a control device that includes a first temperature detection unit that detects a partition wall temperature of a tank main body in which liquefied gas is contained, and a second temperature detection unit that detects a temperature of a skirt that supports the tank main body. The control device further includes a temperature difference acquisition unit that acquires a temperature difference between the partition wall temperature detected by the first temperature detection unit and the temperature of the skirt which is detected by the second temperature detection unit, and a determination unit that determines whether or not a joint between the tank main body and the skirt is rapidly cooled by the liquefied gas on the basis of the partition wall temperature and the temperature difference. | MITSUBISHI SHIPBUILDING CO LTD | US16099373 | 2017/4/28 |
| 28 | FILTRATION APPARATUS AND METHOD | Provided is a filtering apparatus configured to interact with objects of interest within a medium. The properties of the filtering apparatus can be configured to modify the trajectory of individual objects of interest which interact with the filtering apparatus within several orders of magnitude of the mean free path of objects of interest. Surfaces of a filtering apparatus can be constructed to preferentially redirect objects of interest in a desired direction, such as a direction substantially parallel to a surface, or substantially along the length of a channel connecting two reservoirs. This can modify the net diffusion of objects of interest relative to the surface, which can modify the bulk fluid flow velocity magnitude along the surface. This can be employed to reduce the viscous drag on a surface moving relative to a fluid, or to generate thrust, or to convert thermal energy of a fluid into useful work. | Paul Neiser | US17098379 | 2020/11/14 |

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| 29 | NOVEL MULTILOOP GAS TURBINE AND METHOD OF OPERATION | The present disclosure relates to a novel gas turbine having applications, for example, in thermal power generation in an environmentally friendly manner. In various embodiments, the present disclosure provides a multiloop gas turbine with enhanced efficiency close to Ericsson/Carnot Cycle and a method of operating the multiloop gas turbine. | NOSTRUM ENERGY PTE LTD | US15567197 | 2016/4/16 |
| 30 | BOIL-OFF GAS RELIQUEFACTION SYSTEM AND METHOD OF DISCHARGING LUBRICANT OIL FROM BOIL-OFF GAS RELIQUEFACTION | Disclosed is a method of discharging lubricant oil from a BOG reliquefaction system configured to reliquefy BOG by compressing the BOG by a compressor, cooling the compressed BOG through heat exchange with non-compressed BOG by a heat exchanger, and reducing a pressure of fluid cooled through heat exchange by a pressure reducer. In the lubricant oil discharge method, the compressor comprises at least one oil-lubrication type cylinder and it is determined that it is time to discharge condensed or solidified lubricant oil, if at least one of preset conditions is satisfied. | DAEWOO SHIPBUILDING MARINE ENGINEERING CO LTD | US16635940 | 2017/8/3 |
| 31 | BOIL-OFF GAS RELIQUEFACTION SYSTEM, METHOD FOR DISCHARGING LUBRICATING OIL IN BOIL-OFF GAS RELIQUEFACTION SYSTEM, AND ENGINE FUEL SUPPLY METHOD | Disclosed is a BOG reliquefaction system. The BOG reliquefaction system includes : a compressor compressing BOG; a heat exchanger cooling the BOG compressed by the compressor through heat exchange using BOG discharged from a storage tank as a refrigerant; a bypass line through which the BOG is supplied to the compressor after bypassing the heat exchanger; a second valve disposed on a second supply line through which the BOG used as the refrigerant in the heat exchanger is supplied to the compressor, the second valve regulating a flow rate of fluid and opening/closing of the second supply line; and a pressure reducer disposed downstream of the heat exchanger and reducing a pressure of fluid cooled by the heat exchanger, wherein the compressor includes at least one oil-lubrication type cylinder and the bypass line is joined to the second supply line downstream of the second valve. | DAEWOO SHIPBUILDING MARINE ENGINEERING CO LTD | US16635981 | 2017/8/3 |

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| 32 | Tactical maneuvering ocean thermal energy conversion buoy for ocean activity surveillance | A system includes a first jacket that contains seawater and a first tank storing a first fluid under pressure. A second jacket contains seawater and a second tank storing a second fluid under pressure. An actuator cylinder defines a space that receives the fluids from the first and second tanks. The actuator cylinder includes an actuator piston that divides the space into a first volume for the first fluid and a second volume for the second fluid. A hydraulic cylinder includes a hydraulic piston configured to move and change an amount of hydraulic fluid in the hydraulic cylinder, wherein the hydraulic piston is fixedly coupled to the actuator piston. A buoyancy plug changes a position in connection with the amount of the hydraulic fluid in the hydraulic cylinder, wherein the position of the buoyancy plug affects a buoyancy of a vehicle. | Raytheon Company | US16460774 | 2019/7/2 |
| 33 | CARBON NEGATIVE SHIP BALLASTING SYSTEM | A method for ship ballasting includes receiving, at a carbon negative energy storage system, input comprising calcium oxide and water and reacting, within a reaction chamber of the carbon negative energy storage system, the calcium oxide and water to release energy and generate calcium hydroxide. The method includes directing, by the carbon negative energy storage system, the released energy to a requesting end user and providing, by the carbon negative energy storage system, the calcium hydroxide to a marine vessel ballasting system. The method includes releasing a mixture of the calcium hydroxide and ballast water from the marine vessel ballasting system into the ocean to sequester atmospheric COCO2. | X Development LLC | US17085552 | 2020/10/30 |
| 34 | Eccentrically rotating mass turbine | A turbine comprises a shaft (20), a mass (10) eccentrically mounted for rotation about shaft (20), having its center of gravity at a distance from the shaft (20) and a motion base (15). Motion base (15) rigidly supports the shaft (20), and is configured for moving the shaft (20) in any direction of at least two degrees of movement freedom, except for heave. A floating vessel-turbine (120), encloses entirely the eccentrically rotating mass (10) and the motion base (15). The turbine converts ocean wave energy into useful energy, very efficiently. | Vassilios Vamvas | US16689075 | 2019/11/19 |

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| 35 | Electric power generation and storage buoy | A system includes a fuel burner disposed within a buoy, and at least one fuel tank coupled to the fuel burner. The fuel tank preferably contains ethanol or propane. The system comprises either a thermoelectric generator or an electrical generator mechanically coupled to a heat engine. The ethanol or propane is burned to generate electric power. At least a portion of the electric power that is generated is stored in a battery system so that the system can provide peak levels of electric power consumption that are relatively large. The system can be used in autonomous marine applications. | Ocean Power Technologies Inc | US16540286 | 2019/8/14 |
| 36 | Watercraft thermal monitoring systems and methods | A watercraft may include a safety system having an imaging component and a control component. The control component may modify the operation of the watercraft based on images from the imaging component. The imaging component may include a thermal imaging component and a non-thermal imaging component. The watercraft may include more than one imaging component disposed around the periphery of the watercraft to monitor a volume surrounding the watercraft for objects in the water such as debris, a person, and/or dock structures. Operating the watercraft based on the images may include operating propulsion and/or steering systems of the watercraft based on a detected object. The control component may operate the propulsion and/or steering systems to disable a propeller when a swimmer is detected, to avoid detected debris, and/or to perform or assist in performing docking maneuvers. The imaging components may include compact thermal imaging modules mounted on or within the hull of the watercraft. | FLIR Belgium BVBA | US14985392 | 2015/12/30 |
| 37 | Geothermal source on-site power generation plant with computing facility and method | An electronic signals processing facility which includes a site with a geothermal hot water resource which feeds hot water to an on-site heat engine that drives an on-site electricity generator which provides electrical power to an array of microprocessors, located in an enclosure structure, that processes data transmitted from a remote location at high speeds. The processed data is transmitted back to the remote locations at high speeds. | Eagle Quill IP Group LLC | US15935929 | 2018/3/26 |

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| 38 | Magnetic phase transition exploitation for enhancement of electromagnets | An electromagnet can be used to provide a controlled magnetic field, for example for the purpose of minesweeping. The electromagnet is constructed of a material which has a Curie temperature, such that the electromagnet can be stored at a temperature above the Curie temperature, but deployed below the Curie temperature in use. | Thales Holdings UK Plc | US15596527 | 2017/5/16 |
| 39 | APPARATUS AND METHOD OF UTILIZING THERMAL ENERGY USING MULTI FLUID DIRECT CONTACT HYDRAULIC CYCLES | Apparatus for extracting useful work or electricity from low grade thermal sources comprising a chamber, a source of heated dense heat transfer fluid in communication with the chamber, a source of motive fluid in communication with the chamber, wherein the motive fluid comprises a liquid phase, a flow control mechanism cooperating with the source of heated dense heat transfer fluid and with the source of motive fluid to deliver said fluids into the chamber in a manner that said fluids come into direct contact with each other in the chamber to effect a phase change of the motive fluid from liquid to gas to increase the pressure within the chamber to yield pressurized fluids, and a work extracting mechanism in communication with the chamber that extracts work from the pressurized fluids by way of pressure let down. | BOUNDARY ENERGY INC | US16494054 | 2018/3/14 |
| 40 | Ocean thermal energy conversion power plant | An offshore power generation structure comprising a submerged portion having a first deck portion comprising an integral multi-stage evaporator system, a second deck portion comprising an integral multi-stage condensing system, a third deck portion housing power generation equipment, cold water pipe; and a cold water pipe connection. | The Abell Foundation Inc | US15789293 | 2017/10/20 |
| 41 | LED lights for deep ocean use | An underwater LED light for use in high ambient pressure environments having a housing, a transparent pressure-bearing window, an MCPCB having one or more LEDs, and a multilayer stack of spacers for carrying loads applied to the window to the MCPCB and to the housing. | DeepSea Power Light LLC | US16511923 | 2019/7/15 |

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| 42 | GEOTHERMAL PILE | A geothermal pile for harvesting electricity from a gradient of temperature between ambient air and an underground area is provided. The geothermal pile includes an elongated thermally-conductive body, a thermoelectric cell and an electrical output. The elongated thermally-conductive body has a first end and a second end opposite the first end. The second end is configured to be introduced, in use, into an underground area. The thermoelectric cell is provided at the first end so as to be exposed to ambient air when the second end is introduced into the underground area. The thermoelectric cell is in thermal contact with the second end of the elongated thermally-conductive body and is configured to generate electricity from a gradient of temperature between a first temperature of the ambient air and a second temperature of the underground area. The electrical output is electrically connected to the thermoelectric cell. | INOTEV INC | US16956479 | 2018/12/19 |
| 43 | Heavy water ocean thermal energy conversion method and system | An OTEC system and method utilize rigid containers, each of which defines a sealed volume partially filled with heavy water. A vessel houses the rigid containers and is disposed in ocean water. The vessel transports the rigid containers between a surface of the ocean water and a depth D of the ocean water at which the heavy water freezes to become frozen heavy water. An OTEC plant located at the surface of the ocean water melts the frozen heavy water in a condensing process. | Lester Reid Hopkins | US16266701 | 2019/2/4 |
| 44 | Weather mitigation assembly | A weather mitigation assembly for reducing the surface temperature of the ocean to mitigate developing oceanic weather systems includes a buoy that is floated on the ocean. An air pump is coupled to the buoy and a plurality of tethers is each coupled between the buoy and the ocean floor for keeping the buoy in a selected spot. A network of bubble pipes is each laid along the ocean floor. A supply pipe is fluidly coupled between the air pump and the network of bubble pipes. In this way the air pump can pump air into the network of bubble pipes. Each of the bubble pipes releases air bubbles upwardly toward the surface of the ocean urge cool water on the ocean floor upwardly toward the surface of the ocean. In this way the surface of the ocean can be cooled thereby reducing thermal energy available for developing weather systems. | Carl Comstock | US16374810 | 2019/4/4 |

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| 45 | Ocean powered rankine cycle turbine | An ocean powered Rankine cycle turbine includes a loop in which is circulated a working fluid. A first heat exchanger effects a phase change of the working fluid from liquid to gas. The gas expands to power a turbine. Gas exiting the turbine is condensed by a second heat exchanger to effect a phase change from gas back to liquid. A piston assembly is used to compress air. A wave energy converter uses ocean wave energy to reciprocally move the piston. As the wave goes down, the piston is extends drawing air into the piston housing. As the wave goes up, the piston compresses the air. Heat generated as the piston compresses air, is used to as a heat source for the first heat exchanger. Cold compressed air is used as a cold source for the second heat exchanger. | AOE ACCUMULATED OCEAN ENERGY INC | US16240255 | 2019/1/4 |
| 46 | BOIL-OFF GAS RELIQUEFACTION SYSTEM AND METHOD FOR DISCHARGING LUBRICANTING OIL IN BOIL-OFF GAS RELIQUEFACTION SYSTEM | A BOG reliquefaction system includes : a compressor; a heat exchanger cooling the BOG compressed by the compressor through heat exchange using BOG not compressed by the compressor; a pressure reducer disposed downstream of the heat exchanger and reducing a pressure of fluid cooled by the heat exchanger; and a combination of a first temperature sensor disposed upstream of a cold fluid channel of the heat exchanger and a fourth temperature sensor disposed downstream of a hot fluid channel of the heat exchanger, combination of a second temperature sensor disposed downstream of the cold fluid channel of the heat exchanger and a third temperature sensor disposed upstream of the hot fluid channel of the heat exchanger, or combination of a first pressure sensor disposed upstream of the hot fluid channel of the heat exchanger and a second pressure sensor disposed downstream of the hot fluid channel of the heat exchanger. | DAEWOO SHIPBUILDING MARINE ENGINEERING CO LTD | US16635962 | 2017/8/3 |

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| 47 | Unmanned aerial vehicle search and rescue system | A search and rescue drone system includes a buoyant body member, a frame attached to the buoyant body member for carrying a motor and propeller, and an electronic array including a camera, GPS, an EPIRB radio distress beacon, and a transmitter/receiver for remote control flying the drone and communicating with an operator. The search and rescue drone may be flown manually, or may have some autonomous flight and locator capabilities. For example, in one embodiment, the search and rescue drone may be programmed to simply fly to the location of an electronic wearable device, like a bracelet, that is worn by a man overboard. In another embodiment, the search and rescue drone includes a basket, harness, or other means for actually recovering a swimmer in distress, and flying that person back to safety on a ship or on shore. | Thomas Lawrence Moses; Merrill Stuart Ross | US16045137 | 2018/7/25 |
| 48 | Evaporator having a fluid distribution sub-assembly | An evaporator comprises a plurality of thermal elements disposed in a shell interior of an evaporator shell. A primary supply line configured to carry a working fluid is disposed in the shell interior. A plurality of tube sets is fluidically coupled to the primary supply line, and each tube set is spaced apart from an adjacent tube set along the first primary supply line. Each tube set comprises a plurality of individual tubes, with each tube proximate a different subset of thermal elements within the shell interior. Each tube comprises a plurality of first fluid distribution points configured to distribute the working fluid proximate the external surface of at least one of the plurality of thermal elements, thereby increasing the amount of surface area of the thermal elements in contact with the working fluid, and increasing the overall efficiency of the evaporator. | LOCKHEED MARTIN CORPORATION | US15178220 | 2016/6/9 |
| 49 | BOIL-OFF GAS RELIQUEFACTION SYSTEM AND METHOD FOR SHIP AND METHOD FOR STARTING BOIL-OFF GAS RELIQUEFACTION | Disclosed is a boil-off gas reliquefaction system for vessels. The BOG reliquefaction system for vessels includes : a multistage compressor compressing BOG; a heat exchanger cooling the BOG compressed by the multistage compressor through heat exchange using BOG not compressed by the multistage compressor as a refrigerant; a pressure reducer disposed downstream of the heat exchanger and decompressing a fluid cooled by the heat exchanger; and a bypass line through which BOG is supplied to the multistage compressor after bypassing the heat exchanger. | DAEWOO SHIPBUILDING MARINE ENGINEERING CO LTD | US16635479 | 2017/8/3 |

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| 50 | Hydraulic based efficient renewable energy storage and regeneration system | An energy storage and regeneration system that converts irregular, non-constant, and variable input power to regular, constant, and controlled output power using hydraulics whereby the irregular input power is used to pump hydraulic fluid into an accumulator array where it is stored pressurized. Energy is released in a controlled fashion using a hydraulic motor operated by the pressurized hydraulic fluid from the accumulator array, in accordance with the specified power demand. One or more power units may be deployed depending on the amount of energy required at the output. Each power unit includes a hydraulic motor and associated floating accumulator whose internal pressure is controlled to maintain a substantially constant pressure differential across its associated motor. The system can be integrated into various energy system sources including renewable energy such as wind, PV or thermal solar, wave, tidal, etc. | Energy Spring Ltd | US15619475 | 2017/6/10 |
| 51 | Mask For Surface Snorkeling | A mask for surface snorkeling includes a rigid frame (2), a transparent visor (3), a soft face mask (4) sealingly applicable to the face of the user and having a membrane (7) which delimits an upper viewing chamber (8) being shaped to contain the eyes of the user and a lower breathing chamber (9) being shaped to contain the nose and the mouth of the user, and a breathing circuit (5) connected to the lower chamber (9), a ventilation circuit of the upper chamber (8) being further provided that is independent of and separated from the breathing circuit (5). | Cressi Sub S P A | US16203850 | 2018/11/29 |
| 52 | RENEWABLE ENERGY-DRIVEN CARBON CYCLE ECONOMIC AND ECOLOGICAL OPERATING SYSTEMS | An integrated system for exploiting renewable energy sources based upon carbon dioxide captured from the atmosphere is provided, the system comprising : a solar energy collector; apparatus for capturing CO2 from the atmosphere; a wind power driven electrical generator; water power driven electrical generator; electric power distribution control means from the renewable energy sources; energy storage systems; water desalinating means and water electrolysis means powered by the renewably generated electricity; hydrocarbon fuel preparation means utilizing the hydrogen and the carbon dioxide generated by this system; and a body of saline water adjacent the land on which the integrated system is built. | Peter Eisenberger; Graciela Chichilnisky | US16551681 | 2019/8/26 |

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| 53 | APPARATUS FOR GAS STORAGE AND TRANSPORT | An assembly for storing and transporting compressed fluid, such as compressed natural gas (CNG) that includes; a plurality of hexagonally stacked pipe stored in a cargo hold in or on a vessel, such as a ship or barge, that includes a lower support, side supports and a forcing mechanism that presses so strongly down on the pipes that they cannot move relative to themselves or relative to the vessel on which they are placed in any service situation. The friction between each of the pipes causes the plurality of pipes to act as part of the vessel in terms of its structure. Each of the pipes in the plurality of pipes is connected to a manifold system to allow or the loading and unloading of the compressed fluid. | GEV Technologies Pty Ltd | US16325027 | 2017/8/3 |
| 54 | CONTINUOUS REINFORCED COLD WATER PIPE FOR AN OCEAN THERMAL ENERGY CONVERSION SYSTEM | A continuous reinforced cold water pipe (CWP) for an Ocean Thermal Energy Conversion (OTEC) system is formed from a sequential series of molded pipe sections, which are formed from a series of rigid frame sections and a curable material to form the continuous reinforced CWP. Each molded pipe section is formed by moving a rigid frame section into a mold, enclosing at least a portion of the rigid frame section in the curable material, and curing the curable material. As each molded pipe section is moved out of the mold, the next sequential rigid frame section, which is connected to the previous rigid frame section, is moved into the mold. The cycle is repeated as many times as required to form the continuous reinforced CWP having a desired length. | Lockheed Martin Corporation | US16569737 | 2019/9/13 |
| 55 | System and method for free-piston power generation based on thermal differences | An apparatus includes a generator configured to generate electrical power. The apparatus also includes first and second tanks each configured to receive and store a refrigerant under pressure. The apparatus further includes a first piston assembly having a first piston that divides a volume within the first piston assembly into first and second spaces each configured to receive refrigerant from at least one of the tanks. In addition, the apparatus includes a second piston assembly having a second piston coupled to the first piston. The generator is configured to generate the electrical power based on movement of at least one of the first and second pistons. During use, flows of the refrigerant between the tanks and the spaces can be created based on a pressure differential, such as a pressure differential created by a temperature difference between the tanks. | Raytheon Company | US15873422 | 2018/1/17 |

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| 56 | Power generating device | The invention relates to a renewable energy power generating device for converting wind and/or water-flow energy into useable electrical power. The power generating device includes a support structure (112 A) rotatable about a first axis of rotation (C), a plurality of aerofoil blades rotatably mounted on the support structure (112 A) and free to rotate relative thereto about a second axes of rotation (Q) substantially parallel to and radially spaced from the first axis of rotation (C), and a means (162, 166, 168) for actuating the aerofoil blades (114) between first (114 A) and second (114 B) reflexed camber aerofoil section conditions such that the aerofoil blades (114) are freely rotatable to automatically set an angle of attack relative to a fluid flow direction (D) thereby to generate a lift force thereover and transmitting a torque to the support structure (112 A) to drive it through a repeating 360 degree rotary cycle. | Robert Reginald Bray | US15511169 | 2015/9/16 |
| 57 | Heat and humidity removal unit for a self-contained breathing apparatus | This disclosure relates to a regenerable, heat-abating, humidity-neutralizing, carbon dioxide removal system for a self-contained breathing apparatus. The self-contained breathing apparatus can include a carbon dioxide removal unit that scrubs carbon dioxide out of exhaled air from a user to provide humidified, scrubbed exhaled air. The self-contained breathing apparatus can further include a heat and humidity removal unit that is configured to receive the humidified, scrubbed exhaled air, and is configured to remove water vapor and heat associated with the water vapor from the humidified, scrubbed exhaled air in order to provide cooled, dehumidified inhalation air. The cooled, dehumidified air can be supplemented with oxygen and returned to the user at a comfortable temperature. In some implementations, the heat and humidity removal unit can replace conventional heat exchange and energy storage units, including heat exchange and energy storage units that use phase change materials. | Paragon Space Development Corporation | US15360750 | 2016/11/23 |

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| 58 | Systems and methods for power generation based on surface air-to-water thermal differences | A system includes a vehicle having a body and a power generation system. The power generation system includes first and second tanks each configured to receive and store a refrigerant under pressure. The power generation system also includes at least one generator configured to generate electrical power based on a flow of the refrigerant between the tanks. The first tank is configured to be cooled by one of ambient air and water to a lower temperature, and the second tank is configured to be warmed by another of the ambient air and the water to a higher temperature. The first tank or associated heat exchanger can be positioned such that the first tank is above the water's surface when a portion of the body breaches the surface. The second tank or associated heat exchanger can be positioned such that the second tank is below the water's surface when a portion of the body breaches the surface. | Raytheon Company | US15787948 | 2017/10/19 |
| 59 | Hybrid energy harvesting system for thermal-powered underwater vehicle | A hybrid energy harvesting system for powering underwater vehicles having at least one thermal engine, at least one of a solar or a wave energy harvester, and a battery which stores electric energy produced by the harvesters. The energy harvesters keep the battery charged and thereby expand an underwater vehicle's operational areas to high latitudes and shallow water. Multiple thermal engines employing different phase-change materials can be used to expand the vehicle's working temperature range and thus allow it to operate over a larger area. An electric motor powered by the battery and a pump driven by the motor can be used to pump hydraulic fluid between the accumulators and external bladders of the thermal engines to cause the vehicle to descend and ascend when the thermal gradient to which the vehicle is subjected is insufficient. | Teledyne Instruments Inc | US16284501 | 2019/2/25 |
| 60 | Systems, Devices, and/or Methods for Managing Heat Energy | Certain exemplary embodiments can provide a system, which comprises a ship flight deck (e.g., an aluminum flight deck). The system further comprises a plurality of heat pipes. Each of the plurality of heat pipes is installed in a cavity defined by a ship flight deck. Each of the plurality of heat pipes can be surrounded by a high heat capacity material such as a Phase Change Material. | Les Richard Gonda; Russell Biagi; George Douglas Long; Scott Kasen | US16377955 | 2019/4/8 |

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| 61 | Continuous reinforced cold water pipe for an ocean thermal energy conversion system | A continuous reinforced cold water pipe (CWP) for an Ocean Thermal Energy Conversion (OTEC) system is formed from a sequential series of molded pipe sections, which are formed from a series of rigid frame sections and a curable material to form the continuous reinforced CWP. Each molded pipe section is formed by moving a rigid frame section into a mold, enclosing at least a portion of the rigid frame section in the curable material, and curing the curable material. As each molded pipe section is moved out of the mold, the next sequential rigid frame section, which is connected to the previous rigid frame section, is moved into the mold. The cycle is repeated as many times as required to form the continuous reinforced CWP having a desired length. | Lockheed Martin Corporation | US15391236 | 2016/12/27 |
| 62 | FORCED FLOW FLUID CIRCULATION COOLING FOR BARGES | The disclosure relates to an open-loop cooling system installed on a refrigerated barge for removing heat from an external heat exchanger. The system includes an open loop with a pump drawing water from the environment and forcing the water across the outer surface of the heat exchanger to augment existing heat removal due to contact with and flow of water across the heat exchanger due to the motion of the barge. A fluid is forced across the side faces and inner faces of the cooler to increase heat transfer from the barge closed-loop cooling system to the water environment. | Southern Towing Company LLC | US16206616 | 2018/11/30 |

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| 63 | SURFACE MODIFICATION CONTROL STATIONS AND METHODS IN A GLOBALLY DISTRIBUTED ARRAY FOR DYNAMICALLY ADJUSTING THE ATMOSPHERIC, TERRESTRIAL AND OCEANIC PROPERTIES | Surface modification control stations and methods in a globally distributed array for dynamically adjusting the atmospheric, terrestrial and oceanic properties. The control stations modify the humidity, currents, wind flows and heat removal rate of the surface and facilitate cooling and control of large area of global surface temperatures. This global system is made of arrays of multiple sub-systems that monitor climate and act locally on weather with dynamically generated local forcing & perturbations for guiding in a controlled manner aim at long-term modifications. The machineries are part of a large-scale system consisting of an array of many such machines put across the globe at locations called the control stations. These are then used in a coordinated manner to modify large area weather and the global climate as desired. The energy system installed at a control stations, with multiple machines to change the local parameters of the ocean, these stations are powered using renewable energy (RE) sources including Solar, Ocean Currents, Wind, Waves and Batteries to store energy and provide sufficient power and energy as required and available at all hours. This energy is then used to do directed work using special machines, that can be pumps for seawater to move ocean water either amplifying or changing the currents in various locations and at different depths, in addition it will have machineries for changing the vertical depth profile of the ocean of temperature, salinity and currents. Control stations will also directly use devices such as heat pumps to change the temperatures of local water either at surface or at controlled depths, or modify the humidity and salinity to change the atmospheric and oceanic properties as desired. The system will work in a globally coordinated manner applying artificial intelligence and machine learning algorithms to learn from observations to improve the control characteristics and aim to slow down the rise of | Sunit Tyagi | US16409055 | 2019/5/10 |
| 64 | Electric marine propulsion systems with drive trains, and associated systems and methods | The present technology is directed generally to electric marine propulsion systems with drive trains, and associated systems and methods. In representative embodiments, the disclosed technology includes pre-assembled transmission cartridges, gear reduction planetary gears, and/or component support arrangements that can increase the life of the system and/or reduce manufacturing costs. | Pure Watercraft Inc | US15665281 | 2017/7/31 |

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| 65 | Apparatus and methods for controlling transmission of data | Apparatus to control transmission of data, the apparatus comprising : a controller configured to : receive data from at least a first sensor within an azimuth thruster; control storage of the received data in memory; determine whether at least one criterion is satisfied, the at least one criterion varying with the relative positioning of a first antenna mounted on a lower housing of the azimuth thruster and a second antenna mounted on an upper housing of the azimuth thruster, the lower housing being configured to rotate relative to the upper housing; and control transmission of the stored data from the first antenna in response to determining that the at least one criterion is satisfied. | ROLLS ROYCE plc | US15202112 | 2016/7/5 |
| 66 | METHOD AND APPARATUS FOR POWER PRODUCTION | Methods and fluids for generating power with closed well loops in a geothermal environment. The loops may be segregated or non segregated. Operation of the loop circuits is dynamically modifiable in subzero temperatures which contributes to higher and efficient power output. Specific working fluid compositions, including drag reducers, complement the efficiency together with the absence of casing within the loop for maximum thermal transfer between the formation and the working fluid. | EAVOR TECHNOLOGIES INC | US16181492 | 2018/11/6 |
| 67 | Submerged datacenter | The subject disclosure is directed towards a submerged datacenter, which may be made up of modules, into a body of water such as the ocean. The submersion facilitates cooling of the datacenter as well as providing protection of the datacenter from environmental conditions that exist at or near the surface. Power may be generated from the datacenter heat, and power generated by or near the body of water (e.g., via waves, tides, wind, currents, temperature differences) may be used to help power the datacenter. | Microsoft Technology Licensing LLC | US15481427 | 2017/4/6 |

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| 68 | METHOD AND DEVICE FOR WASHING AND PURIFYING OCEAN ENGINEERING ENGINE TAIL GAS BY MEANS OF SEAWATER WITH ZERO ENERGY CONSUMPTION | A process of using seawater to scrub and clean exhaust gas of engine in ocean engineering with zero energy consumption includes steps of leading the exhaust gas of engine into a scrubbing tower of a scrubbing and cleaning system, pumping seawater into the scrubbing tower with a seawater pump, scrubbing the exhaust gas of engine with the seawater in the scrubbing tower, and discharging clean exhaust gas and scrubbing seawater out of the scrubbing and cleaning system after scrubbing, wherein a step of recycling thermal energy of the scrubbing seawater is carried out before the scrubbing seawater is discharged out of the scrubbing and cleaning system, and in the step of recycling thermal energy, the thermal energy of the scrubbing seawater is recycled and used as the power of the seawater pump. | Sigan Peng | US16094049 | 2016/5/9 |
| 69 | Gas hydrate transportation and storage system and method | Disclosed is a marine vessel to transport natural gas hydrates (NGH), the marine vessel includes a hull formed from solid NGH and a skeletal structure to support the hull. Additionally disclosed is a container to transport NGH including a block of solid NGH and a skeletal structure to support the block. Further disclosed is a method of fabricating a marine vessel for transporting and storing natural gas hydrates (NGH), the method includes preparing a mold, placing a skin layer in the mold, assembling a skeletal structure in the mold, preparing a NGH slurry, and pouring into NGH slurry into the mold. | Yehoshua Fishler | US15540314 | 2015/12/28 |
| 70 | Ostomy Pouching System | An ostomy pouching system is described. A baseplate includes a seal adapted to be securely placed on the skin about the perimeter of tissue defining a stoma incised into a patient. An ostomy reservoir forms a sealed space within which discharge can be received and held. A flex layer includes a seal that is airtight, watertight, or both, and which is structurally interposed between at least a portion of two or more of the skin, tissue, stoma, baseplate, and ostomy reservoir. The flex layer includes a resiliently and elastically malleable phase change material. The flex layer is deformable such that at least one portion of the flex layer can transmute the magnitude of a force applied to the flex layer and redirect the force. External forces acting upon at least one of the skin, tissue, stoma, baseplate, and ostomy reservoir are mitigated, transmuted, and isolated by the flex layer. | Alan N Schwartz | US16203424 | 2018/11/28 |

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| 71 | Ocean thermal energy conversion pipe connection | A method of assembling a pipe on a water-supported floating platform is provided. The platform includes an open central bay, and a gantry on the platform is arranged so as to surround at least a portion of the bay. The method includes providing a pipe intake assembly and staves on the platform; transferring the pipe intake assembly to the interior space of the bay; assembling the individual staves on the pipe intake assembly in an offset construction; lowering the pipe portion within the bay and into the water until the upper ends of the staves reside within a lower portion of the gantry; increasing the length of the pipe portion by assembling additional staves to the upper ends of the assembled staves; and repeating the step of increasing the length of the portion of the pipe until the pipe has a desired length. | Barry R Cole; Laurence Jay Shapiro; Jonathan M Ross | US14435718 | 2013/10/15 |
| 72 | Ocean thermal energy conversion plant | An offshore power generation structure comprising a submerged portion having a first deck portion comprising an integral multi-stage evaporator system, a second deck portion comprising an integral multi-stage condensing system, a third deck portion housing power generation equipment, cold water pipe; and a cold water pipe connection. The heat exchangers in the evaporator and condenser systems include a multi-stage cascading heat exchange system. Warm water conduits in the first deck portion and cold water conduits in the second deck portion are integral to the structure of the submerged portion of the offshore platform. | The Abell Foundation Inc | US14511382 | 2014/10/10 |

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| 73 | DEVICE FOR ABSORBING THERMAL ENERGY FROM THE SURROUNDING ENVIRONMENT AND USING SAME (GENERATOR) | Existing turbine energy generators currently use temperature difference to do work. To operate, they require a boiler, a condenser that usually operates at normal temperatures, a turbine, and a pump for increasing the fluid pressure, said generators mostly using water as a cooling medium. The invention is based on lowering the temperature of the condenser, such that the boiler can operate under normal operating conditions. In order to do this, 1) a cooling medium having a low boiling temperature (below 0) is used instead of water; 2) the temperature of the condenser—which is well insulated—is lowered to said temperature by using a normal secondary cooling cycle between the evaporator and the condenser, the cooling cycle transferring the excess heat from the condenser to the evaporator without the need for external cooling—this cycle uses a second cooling medium having a temperature slightly below that of the first cooling medium. | Mahmoud Tharwat Hafez AHMED | US16063298 | 2016/12/15 |
| 74 | Forced flow water circulation cooling for barges | The disclosure relates to an open-loop cooling system installed on a refrigerated barge for removing heat from an external heat exchanger in communication with a closed-loop internal cooling system. The system includes an open loop with a pump drawing water from the environment and forcing the water across the outer surface of the heat exchanger to augment existing heat removal due to contact with and flow of water across the heat exchanger due to the motion of the barge. Water is forced across the side faces and inner faces of the cooler to increase heat transfer from the barge closed-loop cooling system to the water | Southern Towing Company LLC | US15183392 | 2016/6/15 |
| 75 | Thermal to mechanical energy conversion method using a | The invention relates to a thermal to energy conversion method and system using a Rankine cycle equipped with a heat pump, wherein heat pump (2) is integrated in the Rankine cycle. | IFP Energies nouvelles | US15031416 | 2014/9/17 |

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| 76 | Device for signature adaptation and object provided with device for signature adaptation | The invention pertains to a device for signature adaptation, comprising a surface element arranged to assume a determined thermal distribution, wherein said surface element comprises at least one temperature generating element arranged to generate at least one predetermined temperature gradient to a portion of a first heat conducting layer of said surface element, characterized in that said device for signature adaptation comprises a liquid cooling element arranged to provide at least one liquid flow, thermally contacting an inner portion of said at least one temperature generating element so that thermal energy is dispersed from said at least one temperature generating element. | BAE Systems Hägglunds Aktiebolag | US14897399 | 2014/7/2 |
| 77 | FOLDABLE STRUCTURES | A foldable system is described. The system includes a panel consisting of at least two layers, a first flexible layer and a second non-flexible layer, the first and the second layer being attached to each other such that they form a whole, the panel including folds, the folds being applied in the second layer such that the panel can be folded into a predetermined shape. In addition, the first flexible layer includes material with a higher melting temperature than the melting temperature of the second layer. | ONAK BVBA | US15764530 | 2016/10/2 |
| 78 | GEOTHERMAL HEAT HARVESTERS | Thermal energy is extracted from geological formations using a heat harvester. In some embodiments, the heat harvester is a once-through, closed loop, underground heat harvester created by directionally drilling through hot rock. The extracted thermal energy can be converted or transformed to other forms of energy. | Geothermic Solution LLC | US15935241 | 2018/3/26 |
| 79 | Thermal pulse energy harvesting | A device for thermal energy harvesting can use pulsed heat. | Massachusetts Institute of Technology | US14151224 | 2014/1/9 |
| 80 | Wireless communication system and method | A marine propulsor comprises : a stationary part and a movable part which is movable relative to the stationary part; and a wireless communication system, comprising at least one transmitter which is disposed in the movable part and is configured to transmit an electromagnetic data signal and at least one receiver which is disposed in the stationary part and is configured to receive the electromagnetic data signal. The wireless communication system includes a diversity scheme for mitigating multipath distortion of the electromagnetic data signal between the at least one transmitter and the at least one receiver. | ROLLS ROYCE PLC | US14730838 | 2015/6/4 |

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| 81 | Apparatus and method for periodically charging ocean vessel or other system using thermal energy conversion | An apparatus includes multiple tanks each configured to receive and store a liquid refrigerant under pressure. The apparatus also includes one or more insulated water jackets each configured to receive and retain water around at least part of an associated one of the tanks. The apparatus further includes at least one generator configured to receive a flow of the liquid refrigerant and to generate electrical power based on the flow of the liquid refrigerant. The apparatus also includes one or more first valves configured to control the flow of the liquid refrigerant between the tanks and through the at least one generator. In addition, the apparatus includes one or more second valves configured to control a flow of the water into and out of the one or more insulated water jackets. | Raytheon Company | US15173178 | 2016/6/3 |
| 82 | Ocean wave energy converter utilizing temporary immobilization of a float | A float operated lever device for wave energy conversion comprising at least one force amplifying lever, a pivot secured on a secured platform, a buoyant float attached to said lever and a latch means secured in position for obstructing the motion of said force amplifying lever for a fraction of half wave's period, when said float is nearly at its highest and lowest positions whereby said force amplifying lever travels downward or upward respectively, at a greater velocity and for a greater distance than in the case of free floating thus producing an amplified output force, pivoting speed and angular displacement.<br>A method for thermal energy storage and retrieval of electricity in phase change material. | Vassilios Vamvas | US14261418 | 2014/4/24 |
| 83 | Pair Of Eye Goggles | A pair of eye goggles is described. A strap can be fit removably around a head. A nosepiece can be fit over the nose. A pair of eyepieces includes a transparent lens and a frame. An airtight and watertight skin interface is adapted to fit securely against the wearer's skin. A flex layer includes a seal that is at least one of airtight and watertight and which is structurally interposed between at least a portion of two or more of the skin, the nosepiece, the eyepieces, the transparent lens, the frame, and the skin interface. The flex layer includes a phase change material that is resiliently and elastically malleable. The flex layer is deformable such that at least one portion can transmute the magnitude of a force applied and can redirect the force in at least one direction. External forces acting are at least one of mitigated, transmuted, and isolated. | Alan N Schwartz | US15920393 | 2018/3/13 |

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| 84 | High efficiency ocean thermal difference power generating system using liquid-vapor ejector and motive pump | There is provided a high efficiency ocean thermal difference power generating system by using liquid-vapor ejector and motive pump comprising : an evaporator for changing transferred refrigerant liquid into refrigerant vapor with high temperature and high pressure by the thermal exchange with surface seawater; a vapor-liquid divider which is installed at the outlet part of the evaporator and divides the refrigerants to liquid-state refrigerant and vapor-state refrigerant respectively; a distributor which is installed at the inlet of the evaporator and distributes the refrigerants flowed into the evaporator to multi-paths; a turbine for generating electric power by using the high pressure refrigerant vapor transferred from the liquid-vapor divider or the evaporator; a motive pump for increasing the pressure of the refrigerant liquid distributed from the distributor or the liquid-vapor divider; a liquid-vapor ejector for mixing the low pressure refrigerant vapor which passed the turbine and the high pressure refrigerant liquid which passed a motive pump, thereby proceeding expansion and compression; a condenser for condensing the refrigerants which was mixed in the liquid-vapor ejector by the thermal exchange with deep seawater; and a refrigerant circulation pump for increasing the pressure of the refrigerants which was condensed in the condenser up to the evaporation pressure and for circulating. | KOREA INSTITUTE OF OCEAN SCIENCE TECHNOLOGY | US14895280 | 2015/3/5 |
| 85 | Anti-fog diving mask | An anti-fog diving mask contains : at least one lens and at least one anti-fog film, and each of the at least one anti-fog film corresponds to and adheres on an inner surface of each of the at least one lens. Said each anti-fog film is transparent and is made of a hydrophilic substrate so as to absorb water molecules, thus avoiding foggy sight as diving in a temperature difference under water. | Yeou Jou GUAN | US15262006 | 2016/9/12 |
| 86 | Ocean thermal energy conversion power plant cold water pipe connection | An offshore structure for use with an OTEC system includes a submerged spar having a lower portion having a cold water intake. The cold water intake includes a domed terminus in fluid communication with a cold water pipe. A dry machinery space adjacent the cold water intake includes one or more cold water supply pumps and one or more cold water pipe lifting and retention winches having a lifting cable connected to the cold water pipe. | The Abell Foundation Inc | US14873752 | 2015/10/2 |

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| 87 | Wireless communication system | There is provided a wireless communication system for a marine propulsor, comprising : a transmitter; a receiver; and a waveguide, arranged to convey an electromagnetic data signal between the transmitter and the receiver; wherein the waveguide comprises an electrically non-conductive solid or liquid medium for propagating the electromagnetic data signal. | ROLLS ROYCE PLC | US14730990 | 2015/6/4 |
| 88 | OCEAN THERMAL ENERGY CONVERSION METHOD AND SYSTEM | The invention is an ocean thermal energy conversion method and a system in which a motive fluid having predetermined characteristics is circulated in a closed loop between a cold source in cold deep ocean water and heat sources in warm surface water. The motive fluid is compressed between the cold source and a first primary warm water heat source resulting in the motive fluid being substantially totally vaporized at an outlet of the warm water heat source. The motive fluid is heated downstream from the primary heat source by a secondary heat source. The thermal energy of the heated motive fluid is recovered from a turbine and the motive fluid is condensed in the cold source. | IFP ENERGIES NOUVELLES | US14349082 | 2012/9/11 |
| 89 | RENEWABLE ENERGY-DRIVEN CARBON CYCLE ECONOMIC AND ECOLOGICAL OPERATING SYSTEMS | An integrated system for exploiting renewable energy sources based upon carbon dioxide captured from the atmosphere is provided, the system comprising : a solar energy collector; apparatus for capturing CO2 from the atmosphere; a wind power driven electrical generator; water power driven electrical generator; electric power distribution control means from the renewable energy sources; energy storage systems; water desalinating means and water electrolysis means powered by the renewably generated electricity; hydrocarbon fuel preparation means utilizing the hydrogen and the carbon dioxide generated by this system; and a body of saline water adjacent the land on which the integrated system is built. | Peter Eisenberger; Graciela Chichilnisky | US15491252 | 2017/4/19 |
| 90 | Ocean thermal energy conversion power plant | An offshore power generation structure comprising a submerged portion having a first deck portion comprising an integral multi-stage evaporator system, a second deck portion comprising an integral multi-stage condensing system, a third deck portion housing power generation equipment, cold water pipe; and a cold water pipe connection. | The Abell Foundation Inc | US14441372 | 2013/11/7 |

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| 91 | Ocean thermal energy conversion power plant | An offshore power generation structure comprising a submerged portion having a first deck portion comprising an integral multi-stage evaporator system, a second deck portion comprising an integral multi-stage condensing system, a third deck portion housing power generation equipment, cold water pipe; and a cold water pipe connection. | Barry R Cole; Jonathan M Ross; Andrew Rekret; Henry Sibenaller; William Schulz; Russ Krull; Laurence Jay | US13011619 | 2011/1/21 |
| 92 | Modular heat exchanger | A heat exchanger comprising a plurality of plates that are demountably attached to a frame is disclosed. Each plate comprises a plurality of channels for conveying a primary fluid through the heat exchanger. The frames are arranged in the frame so that spaces between adjacent frame pairs define conduits for conveying a secondary fluid through the heat exchanger. The plates are mounted in the frame so that they can be individually removed from the frame. Further, each of the channels is fluidically connected to input and output ports for the primary fluid by detachable couplings. As a result, heat exchangers in accordance with the present invention are more easily repaired or refurbished than prior-art heat exchangers. | Nicholas J Nagurny; Eugene Jansen; Doug Hillson; Michael R Eller | US12573982 | 2009/10/6 |
| 93 | FLOATING SOLAR COLLECTOR ASSISTED OTEC GENERATOR | An Ocean Thermal Energy Conversion (OTEC) system having a turbine with an upstream side and a downstream side. Warm water under a partial vacuum is converted into a vapor, the vapor being supplied to the upstream side of the turbine at a pressure controlled by the temperature of the warm water. A condenser is situated on the down-stream side of the turbine to cause the vapor, after passing through the turbine, to undergo a phase change back to a liquid, which can be used as potable water. The condenser is coupled to a source of a cooling liquid, and the pressure of the vapor on the downstream side of the turbine is determined by the temperature of the cooling liquid. A flexible floating solar collector supplies the warm liquid to the upstream side at a temperature higher than normal ambient temperature. | Charles M GRIMM | US14424367 | 2013/8/12 |

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| 94 | Energy and/or material transport including phase change | Techniques, systems and material are disclosed for transport of energy and/or materials. In one aspect, a method includes generating gaseous fuel (e.g., from biomass dissociation) at a first location of a low elevation. The gaseous fuel can be self-transported in a pipeline to a second location at a higher elevation than the first location by traveling from the first location to the second location without adding energy of pressure. A liquid fuel can be generated at the second location of higher elevation by reacting the gaseous fuel with at least one of a carbon donor, a nitrogen donor, and an oxygen donor harvested from industrial waste. The liquid fuel can be delivered to a third location of a lower elevation than the second location while providing pressure or kinetic energy. | McAlister Technologies LLC | US14459309 | 2014/8/13 |
| 95 | Reservoir temperature differential electrical generator | A reservoir temperature differential generator is partially submergible in a water body and a temperature differential is sensible between each of a first end, disposed above the water-air interface, and a second end submerged beneath the water surface. A volatile working fluid having a low boiling point is circulated between each of a first and second heat exchanger to effect phase change and drive a heat engine for generation of electrical energy. A plurality of sensors is included to monitor real-time environmental conditions, and thus direct a fluid circuit between a sensed maximum temperature and a sensed minimum temperature. The fluid circuit, maintained interior to the present device, is forcibly reversible between each of the first and second heat exchangers to maintain phase change of the working fluid across a maximized temperature differential in response to changing environmental conditions. | Art Heinrichs | US14395290 | 2012/6/13 |
| 96 | SUBMERGED DATACENTER | The subject disclosure is directed towards a submerged datacenter, which may be made up of modules, into a body of water such as the ocean. The submersion facilitates cooling of the datacenter as well as providing protection of the datacenter from environmental conditions that exist at or near the surface. Power may be generated from the datacenter heat, and power generated by or near the body of water (e.g., via waves, tides, wind, currents, temperature differences) may be used to help power the datacenter. | Microsoft Corporation | US14319926 | 2014/6/30 |

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| 97 | ADVANCED METHOD OF GENERATING AND PRODUCING ENERGY FROM SEAWATER | The disclosed embodiments relate to wind and hydropower vessel plant configured for generating renewable electrical energy and for the production of oxygen, methane, salt, hydrogen, supplemental energy, and desalination. The wind and hydropower vessel plant comprises a hybrid apparatus relating to exposable turbine, submersible turbine, and thermal turbine configuration. The turbines are incorporated in a system comprising a platform for producing renewable energy that is storable and/or transportable. The disclosed embodiments further include vessel for gathering natural energy available in or on the oceans wherein said vessel is disposed with means for converting heat energy, and wherein said means further comprise heat pumps comprising heat exchanger arranged for extracting the heat off the seawater to produce usable energy and other source of fuels. | JOSEPH AKWO TABE | US14886090 | 2015/10/18 |
| 98 | Systems and methods for providing supplemental aqueous thermal energy | Systems and methods for collecting, storing, and conveying aqueous thermal energy are disclosed. In a particular embodiment, a floating film retains solar energy in a volume of water located under the film. A series of curtains hanging from a bottom surface of the film define a passage between a periphery of the film and a center of the film to direct the heated water at the center of the film. The heated water is circulated to deliver the heat to a dissociation reactor and/or donor substance. The donor is conveyed to the reactor and dissociated. | McAlister Technologies LLC | US14333303 | 2014/7/16 |

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| 99 | Microchannel expanded heat exchanger | A microchannel heat exchanger (800) is manufactured by bonding a first sheet (802a) of material and a second sheet (802b) of material in a first connection pattern for integral formation of a core portion (801) and a manifold portion (808) for the first and second sheets (802a, 802b) of material. A third sheet (802c) of material is then superposed on to the second sheet (802b) of material and bonded in a second connection pattern to the second sheet of material for integral formation of the core portion (801) and the manifold portion (808) for the second and third sheets (802b, 802c) of material. The second and third sheets (802b, 802c) of material are bonded without bonding the second sheet (802b) of the material to the first sheet (802a) of material. The core portion (801) and the manifold portion (808) of the heat exchanger (800) are thus integrally created. The interstices between the first, second, and third sheets (802a, 802b, 802c) of material are then expanded to create fluid flow channels (806). This method can also be used to create a heat sink. The bonding method may be a form of laser welding where an opaque sheet absorbs the laser energy and the heat conducts through the top sheet to the sheet immediately below, but does not cause bonding with subsequent sheets below. | David C Denkenberger | US13513276 | 2010/12/2 |
| 100 | Exploration method and system for detection of hydrocarbons | A method for detecting hydrocarbons is described. The method includes performing a remote sensing survey of a survey location to identify a target location. Then, an underwater vehicle (UV) is deployed into a body of water and directed to the target location. The UV collects measurement data within the body of water at the target location, which is then analyzed to determine whether hydrocarbons are present at the target location. | Robert J Pottorf; Leonard J Srnka; William Bond; Sebastien L Dreyfus; Michael Lawson; William P Meurer; Daniel P Cherney; Steven R May; William G Powell; Christoper J Vandewater; Mehmet D | US14350773 | 2012/11/9 |

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| 101 | System and method for power generation using a hybrid geothermal power plant including a nuclear plant | A hybrid geothermal power system is discussed. The system includes a geothermal system including power plant (101) and pumping station (102) and a nuclear plant (103). Pumping station (102) is used to inject fluid from reservoir (104) through an injection well (105) into the bedrock (106) (also referred to as the hot dry rock HDR zone) and extracted via a secondary bore (extraction well) usually coupled to the power plant (101). In the present example however the injection well is linked to the extraction well (107). As fluid is injected into the bedrock a drop in temperature occurs due to heat transfer to the fluid. Nuclear plant (103) is utilized to combat this drop, the plant (103) has the fissionable components (1091, 1092, 1093) of the reactor positioned within bores (1081, 1082, 1083) within the HDR zone. | Garry Hine | US14145652 | 2013/12/31 |
| 102 | Light fixture with internally-loaded multilayer stack for pressure transfer | A submersible luminaire includes forward and aft housings that couple together. A transparent pressure-bearing window, a window support structure, a circuit element populated with LEDs, and a pressure support structure are mounted inside the forward housing. The support structures are configured to bear at least some of the pressure applied to the transparent window from external pressure sources. The support structures are further configured to transfer thermal energy to an exterior environment. | Mark S Olsson; Jon E Simmons; John R Sanderson IV; Aaron J Steiner | US13623019 | 2012/9/19 |
| 103 | Large diameter pipe flexible connection | A flexible connection for use between a vertical, large diameter cold water conveying pipe and a floating platform that supports the cold water conveying pipe or another pipe to permit the pipe and the platform to rotate in roll and pitch directions relative to one another without imposing excessive bending moments or strain on the cold water pipe. The flexible connection also contains internal and external pressure across the connection. The flexible connection includes an articulation mechanism that interconnects the vertical cold water conveying pipe and the platform or a pipe on the platform, and a flexible, fluid impermeable | LOCKHEED MARTIN CORPORATION | US13828769 | 2013/3/14 |

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| 104 | MODULAR SECTION OF WATER PIPE, WATER PIPE INCLUDING SUCH SECTIONS, AND OCEAN THERMAL ENERGY SYSTEM INCLUDING SUCH A WATER PIPE | A modular section of water pipe (114) includes : a deformable membrane (130) able to encompass, in an operational state of the section, a tubular space (132) defining an axial direction (AA') to conduct water, anda series (135) of rings (120, (140) extending along the axial direction (AA') in the tubular space (132), and including : two end rings (120), each being at a separate end (116, 118) of the section (114) along the axial direction (AA'), the membrane (130) being fastened to the end rings (120), at least one central ring (140), arranged between the two end rings (120), andcables (150, 160) connecting each ring (120, 140) to the closest ring (120, 140) along the axial direction (AA'). | DCNS | US15116295 | 2015/2/6 |
| 105 | Thermal torque engine | A thermal torque engine comprising a hot box heated by a thermal agent and a wheel having a plurality of peripherally mounted canisters with diametrically opposed canisters connected by a conduit. One of the pair of canisters having a quantity of refrigerant that is pressurized when within the hot box. The pressurized refrigerant moves to the cooler canister with the process continuing for subsequent paired canisters as long as there is a predetermined thermal difference between the interior and exterior of the hot box. | Scott Sparkman | US14062529 | 2013/10/24 |
| 106 | Offshore floating platform with ocean thermal energy conversion system | An offshore floating platform having at least one buoyant column with an upper end extending above a sea surface, a lower end submerged below the sea surface, and at least one keel tank disposed at the lower end. A deck is supported at the upper end the column. An ocean thermal energy conversion (OTEC) system is integrated with the platform in which heat is extracted from warm sea surface waters to vaporize a liquid working fluid and heat is rejected to cold water from lower depths of the sea to condense the vaporized working fluid. At least one turbine and power generator is disposed on the deck, at least one evaporator is disposed on the platform beneath the deck, and at least one condenser is disposed on the seabed or platform or keel tank a distance beneath the evaporator. A desalination system may also be combined and incorporated with the OTEC system. | Nagan Srinivasan | US12773013 | 2010/5/3 |

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| 107 | Cold water pipe assembly for ocean thermal energy conversion | A cold water pipe assembly, and mechanisms for generating a cold water pipe assembly, are provided. A plurality of mooring lines are secured to a pipe end member. A pipe segment of a plurality of pipe segments is slidably coupled with respect to the mooring lines at a plurality of locations on a pipe wall of the pipe segment. The plurality of pipe segments is iteratively extended to form a pipe assembly of a desired length by joining a next pipe segment to a previous pipe segment to extend the pipe assembly, and lowering the pipe end member and the pipe assembly by extending the mooring lines. At least some of the next pipe segments are slidably coupled with respect to the mooring lines at a plurality of locations on a respective pipe wall of the at least some of the next pipe segments. | Lockheed Martin Corporation | US14577237 | 2014/12/19 |
| 108 | Mitigating global warming by OTEC-induced ocean upwelling | This invention mitigates global warming substantially by combining elements from two separate fields in a novel way. It is based on the discovery that the volumetric rate of cold water upwelling that will result in a 1.08 C reduction in the Earth's Surface Air Temperature (SAT) is similar to the volumetric rate of cold water upwelling that would be produced by roughly 20, 000 OTEC plant-ships of 400 MW size each. These can generate 7 terawatts of electric power converted to an ammonia energy carrier and shipped to on-land locations, where can be "cracked" and burned as CO2-free fuel for power plants. The large reduction in SAT enables proposal of an affordable financial strategy that would pay most of the costs of the system out of the revenue from CO2 emission allowances granted by governing agencies for alternative energy systems that also cause a direct reduction in SAT. | Alan Kleinfeld Miller | US15082354 | 2016/3/28 |
| 109 | Sealed Gimbal for Ocean Thermal Energy Conversion Cold Water Pipe | A gimbal that provides for passive vertical latching and unlatching of a Cold Water Pipe (CWP) in a floating vessel such as an Ocean Thermal Energy Conversion (OTEC) facility is sealingly connected to a cold water sump on the floating vessel. The CWP gimbal is capable of reacting all static and dynamic forces of the suspended CWP at angles on the order of +/−20 degrees while remaining sealed at high differential pressures. | Seahorse Equipment Corp | US14014765 | 2013/8/30 |

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| 110 | APPARATUS AND METHODS FOR ENERGY CONVERSION | The present invention provides an energy conversion turbine having at least the following components : a central shaft having a rotational axis, a series of blades in mechanical connection with and disposed around the central shaft, wherein the turbine is configured such that fluid flowing about the blades causes the temperature about one blade face to become lower than the temperature about the opposing blade face. Each blade may be airfoil-shaped and may have at least one curved face such that, when facing an incident fluid flow, the fluid flow passing over one side of the airfoil has a greater velocity than that passing over the opposing side, this achieving the temperature differential required. The airfoils may be mounted between two concentric cylinders, the concentric cylinders being coaxial with the rotational axis of the central shaft. Typically, the turbine is rotationally mounted within a Venturi-like throat, and in some forms of the invention fluid straighteners are disposed at either or both ends of the throat, and in between two consecutive turbines. Some forms also provide a fluid flow accelerator upstream from the turbine and a fluid flow decelerator downstream from the turbine. Also provided are methods for generating power, such as electrical power using the turbine. | Luis Indefonso Solorzano; Eudes Vera | US14953653 | 2015/11/30 |
| 111 | Thermal gradient hydroelectric power system and method | A thermal gradient hydroelectric power system and method is disclosed herein. Specifically, the method can comprise cycling through a submersed evaporator warm from a natural warm water source, said warm water source having a first temperature. The method also can comprise evaporating a working fluid using said evaporator, and routing the working fluid from the evaporator through a vapor line to a condenser above said evaporator. Finally, the method can also comprise cycling through a condenser cold water from a natural cold water source, the cold water source having a second temperature, and condensing the working fluid, the working fluid having a boiling point between said first temperature and said second temperature. | Rowland Xavier Johnson; Glen Rector | US13427870 | 2012/3/22 |

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| 112 | Submersible lights with pressure compensation | A deep submersible light may include a body defining a hollow interior and a solid state light source such as a plurality of high brightness LEDs mounted in the interior of the body. A transparent window may be mounted over the LEDs. The space between the transparent window and the LEDs may be filled with an optically transparent fluid, gel, or grease, which allows light to pass through and ambient water pressure to pass in, thus pressure compensating the LEDs by allowing them to see ambient water pressure. The transparent window may be mounted in the body for reciprocation in both a forward direction and a rearward direction to accommodate volumetric changes in the compensating fluid, gel, or grease caused by changes in temperature and water pressure as the manned or remotely piloted submarine travels from the sea surface to deep ocean depths. | Mark S Olsson; Kevin R Hardy; John R Sanderson; Brian P Lakin; Ray Merewether; Jon E Simmons; Kenneth A Steeves | US14154137 | 2014/1/13 |
| 113 | Undersea energy harvesting electrical power station | The present disclosure is generally directed to a method, system and an apparatus that includes a hollow canister including a top portion and a bottom portion, the top portion including a top opening and the bottom portion including a bottom opening. The hollow canister additional includes an inner compartment within the hollow canister, the inner compartment being porous to allow fluid transfer across the inner compartment, a neutral buoyancy device, a variable buoyancy device, and a thermoelectric module lining an inner portion of the hollow canister. The thermoelectric module generates electricity based on a temperature difference of between an interior temperature the hollow canister and an exterior temperature on a periphery of the hollow canister. | Nathan Hiller | US13455548 | 2012/4/25 |

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| 114 | SYSTEM AND PROCESS OF COOLING AN OTEC WORKING FLUID PUMP MOTOR | A cooling system and process in an OTEC system are described where the sub-cooled working liquid from the working fluid pump outlet is used to cool the working fluid pump motor, either directly or indirectly via heat exchange with a secondary fluid. The heat from the motor that is being rejected into the working fluid just prior to the working fluid flowing to the evaporator helps to alleviate heat duty in the evaporator meaning more potential for the evaporator to create energy. Also, because two-phase evaporators, such as those in an OTEC system, are less efficient than single-phase heat exchangers at single-phase heating, this pre-heating of the working fluid will help the evaporator performance substantially. | LOCHEED MARTIN CORPORATION | US14199549 | 2014/3/6 |
| 115 | Cold state engine for utilising air thermal energy to output work, refrigeration and water | A cold state engine utilizing air heat energy to output work, refrigeration and water, includes a first cycle and a second cycle. The first cycle comprises of vaporizer, expander, and working fluid pump. The second cycle includes a vaporizer, circulation pump, air heat exchanger. The two cycles are opera lively interconnected via at least a vaporizer, piping, valves, sensors and a generator. Using air or water as a high temperature heat source, an expander generates cryogenic liquid as a low temperature heat source, using natural gases (such as N2, He, Air, CO2 etc.) as a working fluid, based on methods of cryogenic working fluid thermodynamic-refrigeration cycle and frost-free two stage heat exchange cycle. | Jason Lew | US14220903 | 2014/3/20 |

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| 116 | Closed-cycle cryogenic engine and operating method for propelling vehicles and generating electricity | A closed-cycle cryogenic engine includes a high specific heat working fluid remaining in a gaseous phase. The high temperature heat reservoir is the natural environment and the low temperature heat reservoir is created artificially by evaporating water. Isothermally compressing the working fluid at low temperature by absorbing compression heat by evaporating water extracts heat energy from the environment, converting it into net output. A plurality of serially connected isentropic expanders is interposed with a like plurality of re-heating stages. The temperature difference between the high and low temperature heat reservoirs is a few degrees, allowing expansion operation with low expansion ratios, enabling a large number of expanding and reheating steps Each engine cycle extracts natural heat energy from the environment, converting a large fraction into high density net output work. Very little water, the engine's only fuel, is consumed since evaporating water's latent heat is high. | Michael Minovitch | US14120711 | 2014/6/20 |
| 117 | Steam power cycle system | There is provided a steam power cycle system that permits to perform an appropriate heat exchange between a working fluid that is a non-azeotropic mixture and a heat source, to enhance the performance of the whole system. More specifically, a plurality of condensers are provided so as to be connected to each other in series, and the working fluid in a gas phase from the expander is introduced into the respective condensers. Consequently, the ratio of a low boiling point substance of the working fluid becomes higher toward the posterior condenser, it is possible to make the condensation temperature of the working fluid lower than that of the anterior condenser. It is therefore possible to make the temperature of the working fluid possibly close to the temperature of the low-temperature fluid, thus permitting an effective use of the difference in temperature of the heat source. | Saga University | US14182022 | 2014/2/17 |

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| 118 | TWO-PHASE EXPANSION DEVICE CAPABLE OF MAXIMIZING THE AMOUNT OF MOVEMENT PRODUCED BY A TWO-PHASE FLOW | A two-phase expansion device (106) capable of maximizing the amount of movement produced by a two-phase flow. The two-phase expansion device (106) includes at least : one dispenser (105) for dispensing the fluid to a plurality of two-phase expansion nozzles (60); a plurality of adjacent two-phase expansion nozzles (60) with substantially parallel axes, each two-phase expansion nozzle (60) including sequentially at least one diffuser (65), one neck (66), and one tube (67), the two-phase expansion nozzles (60) being arranged to each receive a portion of the flow from the hot source; and elements for supporting the plurality of two-phase expansion nozzles (60) and including elements for sealably separating the two-phase expansion nozzles (60). | STOREWATT | US14894419 | 2014/7/9 |
| 119 | Method and device for heating and cooling | Method and device for storing thermal energy in, and recapturing thermal energy from, respectively, an underground energy storage (1), having at least four holes (2), through which a heat carrier is transported and therewith heating or cooling the ground (3), respectively. The holes (2) are arranged essentially along at least two concentric circles (10, 11, 12). A control gear is arranged to control a valve system, which is arranged to direct the heat carrier to holes that are arranged along one circle and thereby heating or cooling, respectively, the ground along the circle. When the temperature of the heat carrier is higher than that of the surrounding ground (3), inner circles are heated before outer circles, and when the temperature of the heat carrier is lower than that of the surrounding ground (3), outer circles are cooled before inner circles. | Thomas Wildig; Björn Giertz | US12279542 | 2007/1/22 |

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| 120 | Thermal energy system and method for its operation | The present invention relates to a thermal energy system (1) that includes at least one exchanger module (100, 200, 300) that includes at least one heat exchanger (110a, 110b, 210a, 210b, 310a, 310b), in particular two heat exchangers, each module including at least a first circuit (140a, 140b, 240a, 240b, 340a, 340b) for a first fluid traversing, in a regular mode of operation, through the heat exchanger in a main flow direction, a second circuit for a second fluid for exchanging thermal energy between the first fluid and the second fluid, and at least one pump (160, 260, 360) including a fluid drive device (162, 262, 362) for driving the first fluid in the main flow direction, characterised in that the drive device is arranged, along the main flow direction, upstream of the heat exchanger. In addition, the invention relates to the application of such a system in ocean thermal energy conversion systems. | Brice Hermant; Christophe Royne; Thierry Bouchet | US13824128 | 2012/6/27 |
| 121 | Pipe for drawing up cold water for a marine thermal | A pipe for drawing up cold water for a marine thermal energy plant is produced from a composite material including glass fiber reinforcements and a thermosetting resin. | Virginie Lelarge; Daniel Bathany; Raymond Begoc | US13638084 | 2011/3/24 |
| 122 | Phase Change Device for Use within a Volume of Fluid | A phase-change device for use in a volume of fluid, comprising a pressure vessel; a displacement cylinder; a displacement piston; a drive cylinder containing a phase-change material; a drive piston; and a gas spring. As the device sinks and experiences cooler fluid temperatures, the phase change material reduces in volume, causing the drive cylinder to move relative to the drive piston and thereby exert an outward force on the displacement piston. The displacement piston is pulled away from the displacement cylinder, increasing the overall displacement of the device. The increase in displacement increases the buoyancy of the device, thereby causing the device to rise in the fluid. | Ideal Innovations Incorporated | US14457778 | 2014/8/12 |
| 123 | Ocean Thermal Energy Conversion Cold Water Pipe | An offshore power generation structure comprising a submerged portion having heat exchange sections, power generation sections, a cold water pipe and a cold water pipe connection. The cold water pipe comprises a plurality of offset first and second staved portions. | The Abell Foundation Inc | US14802474 | 2015/7/17 |

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| 124 | Methods and systems for electric power generation using geothermal field enhancements | Methods for increasing the enthalpy of a geothermal brine, methods for recovering heat enthalpy stored in a geothermal brine, and methods for the production of a heated brine from a natural geothermal reservoir are provided. The methods may be incorporated into a geosolar electric power generation project to provide a steady and flexible source of renewable energy from a geothermal heat source in combination with solar insolation. | Paul M Klemencic | US12562080 | 2009/9/17 |
| 125 | OTEC cold water retrieval and desalination systems | A system for raising water for OTEC and desalination is provided. The system includes at least one submerged platform positioned within a body of water, wherein the at least one submerged platform is buoyantly held up from a bottom surface of the body of water, and wherein the at least one submerged platform is held below a top surface of the body of water by at least one mooring attached to the bottom surface of the body of water. At least one cable is movably connected to the at least one submerged platform. At least one container is held by the at least one cable, wherein a quantity of water is emptied from the at least one container. | Douglas Edwards | US14008132 | 2012/3/30 |
| 126 | Apparatus, System and Method for Raising Water Using a Container | An apparatus, system, and method for raising water using containers is provided. The system includes a first frame ascendable and descendible within a body of water. At least one container is connected to an elongated cable, wherein the elongated cable is connected to the first frame, wherein two free ends of the elongated cable are connectable together when the first frame is in a descended position within the body of water. The system may include an Ocean Thermal Energy Conversion (OTEC), Low-Temperature Thermal Desalination (LLTD), and/or Seawater Air Conditioning (SWAC) system, among others. | Douglas EDWARDS; RE Systems Ltd | US14648313 | 2013/12/6 |

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| 127 | Hydraulic pressure transducer and hydraulic system | A power station system operable to generate energy and comprising a heat engine system and a hydraulic system connected thereto. The heat engine system comprises n number of energy cells, wherein n is an integer, and n≧2, a heat source connected to the energy cells, and a cooler means connected to the energy cells. Each energy cell is operable to generate a pressurized fluid when a phase change material (PCM), comprised in each energy cell, changes from solid phase to liquid phase, and the energy cells are operable between a first phase, and a second phase. During the first phase, a first n/2 of the energy cells produce pressurized fluid, and a second n/2 of the energy cells are cooling down, and during the second phase, the first n/2 of the energy cells are cooling down, and a second n/2 of the energy cells produce pressurized fluid. The hydraulic system comprises a pressure transducer, and a hydraulic motor connected thereto, and is operable to generate a constant rotation speed. | Bengt Östlund; Assar Svensson; Häkan Ingvast | US13383437 | 2010/7/12 |
| 128 | Wind and hydropower vessel plant | The disclosed embodiments relate to wind and hydropower vessel plant. The vessel plant is configured for generating renewable electrical energy. The wind and hydropower vessel plant comprises apparatus which relates to exposable turbine and/or submersible turbine configuration. Both exposable and submersible turbines are incorporated in a system by reference, comprising a platform for producing renewable electrical energy that is storable and/or transportable. The disclosed embodiments further include a plant for the production of hydrogen, methane, oxygen, desalinated water, salt and supplemental energy. | Joseph Akwo Tabe | US12383569 | 2009/3/25 |
| 129 | Plant for manufacturing a rigid pipe for drawing up deep water within an offshore platform | A plant for manufacturing a rigid pipe for drawing up deep water within an offshore platform includes a floating platform on which a continuous production device is installed in the vertical axis of the pipe, and including : a first stage of winding webs of fibers impregnated with resin around a winding roll for the partial crosslinking thereof, a second stage of complete crosslinking of the resin, a third stage of mounting functional members on the pipe, a fourth stage of inspecting the pipe thus manufactured, anda fifth stage of guiding the pipe. | Virginie Lelarge; Daniel Bathany; Raymond Begoc | US13638298 | 2011/3/29 |

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| 130 | Geothermal Energy Production Using a Closed-Loop Heat Exchange System | Disclosed herein are various embodiments for modular systems and methods of creating electrical power from geothermal energy using a modular closed loop system. Within each module, water is pumped under pressure through a plurality of pipes positioned in hot rock layers in the subsurface of the Earth. The water becomes superheated but is prevented from turning into steam until just before it reaches the turbines. The steam drives the turbines and connected generators, after which excess heat may be extracted for other uses including driving a secondary turbine. The condensed steam is then recycled by being pumped underground again. The systems and methods described contain the water within the pipes, thus avoiding induced seismicity and using far less water than conventional geothermal energy production. Power generation may be scaled up by adding modules. | Richard James Archambeau; Charles B Archambeau | US14245875 | 2014/4/4 |
| 131 | Ocean survival system | The invention is an amorphous bag designed and shaped, that when deployed, slipped around the body up to the neck and secured to a flotation means, so when floating in the ocean, provides a user deterrent protection from shark attack. It is sized to enclose a person, made of a flexible, impermeable, multi-colored, metallic polyester, and/or any material that can be formed into a thin film of a durable thickness; with the top end open, and bottom end sealed closed. The exterior has various camouflaging color patterns to disguise the device by blending in with the surrounding ocean to reduce the risk of shark attack. The interior is a reflective silver color for signaling to rescue craft. The amorphous bag further includes two flaps made of the excess material from the amorphous bag extending from front and rear sides of top open end. The seal created using excess material flaps substantially envelope a user to prevent leaking of body fluids that can escape and attract sharks. The cover provided by excess material flaps creates a thermal chamber which slows the onset of hypothermia or sun damage, thus increasing survival duration. | Lee Swerdlin | US14260254 | 2014/4/23 |

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| 132 | Ocean thermal energy conversion power plant cold water pipe connection | An offshore structure for use with an OTEC system includes a submerged spar having a lower portion having a cold water intake. The cold water intake includes a domed terminus in fluid communication with a cold water pipe. A dry machinery space adjacent the cold water intake includes one or more cold water supply pumps and one or more cold water pipe lifting and retention winches having a lifting cable connected to the cold water pipe. | Jonathan M Ross; Daniel L Wilkins; Manish Gupta; Greg M Morrow; Laurence Jay Shapiro; Barry R Cole; Andrew Rekret | US13209893 | 2011/8/15 |
| 133 | Method for manufacturing a membrane material | Method for manufacturing a membrane material especially for use in the manufacturing of sails for sailboats and the like, where said method comprises the following steps :<br>a) distributing a first material layer on a vacuum table;<br>b) dispensing an adhesively coated yarn from a dispenser in a predefined pattern on said first material layer;<br>c) arranging a second material layer superposed the first material layer and the treads, thereby creating a membrane matrix;<br>d) passing a heating source across the matrix, thereby curing the adhesive applied to the yarn and laminating the membrane;<br>where the first material layer is provided with pin holes distributed across the first material layer, allowing the vacuum to traverse the first material layer. | Claus Olsen | US13267449 | 2011/10/6 |
| 134 | Underwater compressed fluid energy storage system | A compressed fluid storage system includes a bi-directional compressor/expander (C/E) unit constructed to compress fluid during a first operational mode and allow expansion of fluid in a second operational mode, a fluid storage system positioned on a sea floor under a body of water, and a piping system positioned between the C/E unit and the fluid storage system and configured to pass fluid between the C/E unit and the fluid storage system. | Scott Raymond Frazier; Brian Von Herzen | US12889013 | 2010/9/23 |

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| 135 | Temperature differential engine device | A temperature differential engine device includes a low-boiling-point medium steam turbine (1), a heat absorber (2), a thermal-insulating type low-temperature countercurrent heat exchanger (3), a circulating pump (4), and a refrigerating system (5) which are interconnected to constitute a closed circulating system filled with low-boiling-point medium fluid. The low-boiling-point medium steam turbine (1) and the heat absorber (2) constitute a low-density-medium heat-absorbing working system, and the circulating pump (4) and the refrigerating system (5) constitute a high-density-medium refrigerating-circulating system. The temperature differential engine device can transfer thermal energy into mechanical energy. | Angfeng Liu | US13577644 | 2011/2/9 |
| 136 | Geothermal power generation system and method using heat exchange between working fluid and molten salt | A geothermal power generation system using heat exchange between working fluid and molten salt includes a heat collecting unit. A plurality of molten salt containing units are disposed in the ground at predetermined intervals from each other. A heat exchanging unit transfers a heat source of the heat collecting unit to the molten salt in the plurality of molten salt containing units. A plurality of working fluid containing units respectively surround the molten salt containing units and are disposed in the ground at predetermined intervals from each other. A turbine unit is connected to the plurality of working fluid containing units, and generates mechanical energy using steam energy that is generated by the plurality of working fluid containing units. A power generating unit is connected to the turbine unit, and generates electrical energy using the mechanical energy. | KOREA INSTITUTE OF GEOSCIENCE AND MINERAL RESOURCES | US13718916 | 2012/12/18 |

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| 137 | Goggles with facial conforming eyepieces | An adjustable goggle with eyepieces that are individually custom fitted over the user's eye sockets. The goggle includes a strap configured to extend around the user's head, two face conforming eyepieces affixed and configured on the strap so that they may be positioned over the user's eyes, and a three axis, adjustable nosepiece that extends between the two eyepieces. The nosepiece is made of one or more elastic strands that have the same or different resilient properties. The ends of the strands are affixed to the eyepieces to apply a resilient force thereon. During use, the user selects the desired nosepiece so that the eyepieces may be independently aligned themselves over the eye sockets and form a comfortable, watertight seal against the surrounding facial tissues when the goggles are worn. If needed, an optional sealing pad may be affixed to the inside surface of each eyepiece to provide a watertight seal against the surrounding facial tissues. | Alan Schwartz | US13683775 | 2012/11/21 |
| 138 | Deep sea thermal energy mining | A method and apparatus for heating fluids with the earth's internal energy released through the vents of the ridge expansion zones in the planet's seas. The whole apparatus is composed of three main parts : components located on a large barge include the main pump, a water filtering system, a pressure regulating valve. The second part contains long concentric tubes of constant diameter handing from the barge and defining outer and inner fluid channels through which cool water flows down while heated water flows up. The third part is a heat exchanger attached at the bottom of the long concentric tubes, which is placed over a thermal vent in the ocean floor. Crust fracturing may be used to stimulate the vent's flow by injecting high pressure water through wells that may be vertical, inclined or directional. | Alberto Sarria | US13661141 | 2012/10/26 |

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| 139 | ARMOR COMPONENTS AND METHOD OF FORMING SAME | An armor component including a body including a material component configured to undergo a phase change upon a projectile impact. The material component may also have a ready state defining a first lattice structure configured to change from the ready state to an absorbed state defining a second lattice structure different from the first lattice structure. The material component may also have a ready state defining a first density and configured to change from the ready state to an absorbed state defining a second density, wherein the first density is less than the second density. In a particular aspect, the material component, in combination with a first component on or adjacent to the material component, can be configured to prevent pentration of a projectile having an energy of 4, 000 J upon impact with a strikeface of the material component. | Saint Gobain Ceramics Plastics Inc | US14292129 | 2014/5/30 |
| 140 | Ocean thermal energy conversion cold water pipe | An offshore power generation structure comprising a submerged portion having heat exchange sections, power generation sections, a cold water pipe and a cold water pipe connection. The cold water pipe comprises a plurality of offset first and second staved portions. | Andrew Rekret; Henry Sibenaller; William Schulz | US12691655 | 2010/1/21 |
| 141 | Increasing the efficiency of supplemented ocean thermal energy conversion (SOTEC) systems | A system and method for increasing the efficiency of an ocean thermal energy conversion (OTEC) system is described. In some examples, the system collects thermal energy using a solar collector, warms ocean water located within the solar collector, and provides the warmed water to an OTEC system, such as to a vaporizer of a heat engine. In some examples, the OTEC system provides electricity and other energy to another system, creating a cycle of sustainable economic development of energy and resources. | Roy E McAlister | US12857546 | 2010/8/16 |
| 142 | Plant for manufacturing a rigid pipe for drawing up deep water | This plant for manufacturing a rigid pipe for drawing up deep water for a marine thermal energy plant is characterized in that it comprises a floating platform on which there is installed a continuous production device in the vertical axis of the pipe, including a first stage of winding webs of fibers impregnated with resin about a winding roll for the partial crosslinking thereof, said wall being formed by modular elements in the form of plates, which are connected together so as to form a strip that moves in a spiral and repeating in the upper part of the roll so as to form a winding surface for the webs. | Virginie Lelarge; Daniel Bathany; Raymond Begoc | US13638319 | 2011/3/28 |

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| 143 | Industrial Ocean Thermal Energy Conversion Processes | A combined OTEC and steam system having an OTEC power generation system including a multistage condensing system in fluid communication with a cold water system and a steam system comprising a steam condenser, wherein the steam condenser is in fluid communication with the cold water system. | The Abell Foundation Inc | US14490478 | 2014/9/18 |
| 144 | High efficiency OTEC service station | A high efficiency OTEC service station for supporting a novel high efficiency ocean thermal energy conversion system. The high efficiency OTEC service station generally includes a semi-submersible platform positioned in a warm ocean location. The station includes an upper deck having an interior which stores one or more fluid pumps, generators and turbines for use in generating electrical power. A lower deck having an interior stores one or more working fluid tanks, water storage tanks and spent working fluid tanks. Three heater assemblies are provided for heating working fluid at various stages of an OTEC cycle and for use in creating potable water for other applications. A heat exchanger extends from the lower deck, which also includes one or more buoyancy tanks. By utilizing a novel approach to ocean thermal energy conversion, the OTEC service station achieves greater efficiency and lower operating costs than prior art systems. | David H Cowden; Era W Cowden | US13323899 | 2011/12/13 |
| 145 | PRESSURE POWER SYSTEM | The invention relates to energy conversion and generation systems, and more specifically, to a system and method of generating and converting energy by way of a pressure differential in a working fluid. A Pressure Power System is described comprising a cold sub-system, a warm sub-system, a work extraction system, and a hydraulic pump arranged in a closed loop. The cold sub-system and the warm sub-system are respectively maintained at lower and higher temperatures relative to one another, so that a Working Fluid circulated through the closed loop by the pump, will have different equilibrium vapor pressures in the two sub-systems. The different respective state functions of the Working Fluid results in two different levels of elastic potential energy, and subsequently, a pressure differential between the two sub-systems. A work extraction system is positioned between the two sub-systems to convert the elastic potential energy/pressure differential into useful kinetic energy. | Bruce I Benn; Jean Pierre Hofman | US14403326 | 2013/5/24 |

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| 146 | Methods and systems to harvest energy from the earth | The present disclosure provides an engine assembly that is installed below the surface of the earth to harvest the thermal energy of the earth, using a working fluid in a closed loop system, and convert it into electricity, which can be commercialized at the surface. The subterranean engine comprises a hot region and a cold region, and a working fluid that moves between the two regions. The movement and efficiency of the working fluid operates the pistons that drive a generator coupled to the pistons, thereby generating electricity. The hot region of the engine is primarily powered by the geothermal energy. The engine can further incorporate renewable energy to improve the movement of the working fluid between the hot and cold regions. The system can further be used to store renewable energy below ground. | David Randolph Smith | US13422820 | 2012/3/16 |
| 147 | Offshore installation for producing electrical energy | This offshore installation for producing electrical energy from thermal energy of the oceans includes a floating platform supporting a generator for producing electrical energy from the temperature difference of the water at the surface and at a depth and associated with a pipe for drawing up water from a depth, is characterized in that the pipe for drawing up water from a depth include three portions, including a first formed with a rigid pipe, the lower end of which is immersed at a great depth and the upper end of which is immersed in midwater at a reduced depth, a second portion formed with flexible pipes for connecting the upper end of this rigid suction pipe to a third portion forming a suction pipe, formed with rigid pumping pipes structuring a lattice of pipes attached under the platform. | Virginie Lelarge; Daniel Bathany; Bernard Pallier | US13637869 | 2011/3/29 |
| 148 | OCEAN BUOYANCY POWER GENERATING SYSTEM | A ocean buoyancy power generating system includes a water inlet pipe with a water inlet, a water drawing pipe, a guiding pipe, multiple water drawing devices, a gas charging unit, an ocean power generating and collecting apparatus or ocean thermal energy conversion (OTEC) power generating and collecting apparatus, a first moving apparatus, and a second moving apparatus. Through cyclically discharging the gas to one of the water drawing devices in the water inlet pipe by the gas charging unit, buoyancy is generated on the water drawing device to continuously drive the seawater in the water drawing pipe to move upwards for electric power generation. | Kuo Hua Hsu | US14450816 | 2014/8/4 |

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| 149 | Apparatus and method for cooling a super conducting machine | An apparatus and a method for cooling a super conducting machine are disclosed, in which at least two condenser areas each make thermal contact with a cold head, and in which the at least two condenser areas each have a connecting line, via which the at least two condenser areas are connected fluidically to an evaporator area. A liquid cooling fluid can be moved or pumped from at least one condenser area into the evaporator area by way of a temperature difference, and a pressure difference associated therewith, in the at least two condenser areas. | Michael Frank; Peter Van Hasselt | US13822128 | 2011/9/19 |
| 150 | MULTI-STAGE OTEC POWER PLANT | A multi-stage power plant. The condenser side of the power plant runs the cold water in series through the stages. The boiler side runs the incoming warm water in parallel among the stages. Furthermore, it has a separate channel for using warm ocean water to drive a super heater for the boiled refrigerant vapor. Means are disclosed for producing large quantities of desalinated water by having the heat transferred from the warm ocean water to the boiler by evaporating and condensing water. Means also are disclosed for producing large quantities of desalinated water by having the heat transferred from the condenser to the cold ocean water by evaporating and condensing water. | Melvin Lewis Prueitt | US14272569 | 2014/5/8 |
| 151 | Method and system for storing energy and generating power heat in a subsea environment | Systems and methods are disclosed for storing energy and generating power and/or heat within a subsea environment. The systems and methods utilize stored compressed air within an air storage chamber to drive an engine/generator system in order to generate power. The engine may or may not utilize combustion. Alternatively, the systems and methods utilize stored compressed air to supply air to a combustor to generate heat. The heat generated can be used for variety of purposes, including to generate steam and to heat heavy oil. | Harrison W Sigworth Jr; Trevor N Demayo; Yaofan Yi | US13101713 | 2011/5/5 |

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| 152 | Ocean thermal energy conversion plant | An offshore power generation structure comprising a submerged portion having a first deck portion comprising an integral multi-stage evaporator system, a second deck portion comprising an integral multi-stage condensing system, a third deck portion housing power generation equipment, cold water pipe; and a cold water pipe connection. The heat exchangers in the evaporator and condenser systems include a multi-stage cascading heat exchange system. Warm water conduits in the first deck portion and cold water conduits in the second deck portion are integral to the structure of the submerged portion of the offshore platform. | Russ Krull; Laurence Jay Shapiro; Jonathan M Ross | US12691663 | 2010/1/21 |
| 153 | Sea water desalination and thermal energy conversion | A system for energy conversion includes a first sub-system to be disposed at about a surface of the ocean and a second sub-system to be disposed at an ocean depth. The first sub-system includes an evaporation unit. The system also includes a turbine that is coupled between the first and second sub-systems. The first heat exchange unit is configured to vaporize a working fluid, the vaporized working fluid turns the turbine. The second sub-system is configured to condense the working fluid. | Valangiman Subramanian Ramamurthy | US12506259 | 2009/7/21 |
| 154 | Under water hydrogen and oxygen powered hydraulic impulse engine | Apparatus includes an ignition system that repeats an ignition cycle by providing hydrogen and oxygen and also provides a control spark with a sufficient amount of energy for igniting a combustible mixture of hydrogen and oxygen. The combustion chamber is immersed in an aqueous fluid, fills with the same or other aqueous fluid, receives the hydrogen and oxygen therein, receive the control spark to ignite the combustible mixture of hydrogen and oxygen to cause a combustion reaction to occur and form steam that yields a specific amount of heat energy, and provides the aqueous fluid from the combustion chamber in response to the substantial increase in pressure on the aqueous fluid contained therein. | Timothy F Dolan; William C Henderson IV | US13465460 | 2012/5/7 |

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| 155 | SHIPPING METHOD FOR CO2 STORAGE AND IMPORT OF CNG | Disclosed is a method of transporting CO2 by ship for the purpose of storage in the ocean. The CO2 is transported at a temperature between −25° C. and +25° C., and under a pressure that is sufficiently high for the CO2 to be in a liquid or supercritical state. The choice of temperature/pressure conditions for the CO2 enables the transport of CO2 one way to be effectively combined with transport of compressed natural gas (CNG) the other way. Ships can be used that have relatively cheap tubular containment equipment similar to the type normally used for CNG but with lower pressure and not subject to cyclic thermal and mechanical effects of pressurizing and depressurizing. | Jacques François André Trollux | US14239523 | 2012/8/17 |
| 156 | METHOD AND APPARATUS FOR PRE-INSTALLING COLD WATER PIPES FOR A FLOATING OCEAN THERMAL ENERGY CONVERSION FACILITY | An apparatus for installing means to supply cold water from depth to a floating vessel comprises a template having a plurality of receptacles for receiving a plurality of vertically-oriented Cold Water Pipes. A method for installing a plurality of Cold Water Pipes at a floating, offshore Ocean Thermal Energy Conversion facility comprises : lowering such a template to the seafloor; inserting vertically-oriented pipes into the receptacles on the template; providing sufficient buoyancy near the top of the pipe to maintain the pipe in a generally vertical state; positioning a floating vessel having receptacles configured to engage the upper ends of the pipes over the template; raising the template with the inserted pipes from the seafloor until the upper ends of the pipes engage the receptacles; and, locking the pipes in the receptacles such that the pipes are in fluid communication with a Cold Water Sump on the floating vessel. | Stephen E Kibbee; Peimin Cao | US13540745 | 2012/7/3 |
| 157 | FRICTION SURFACE STIR PROCESS | A process is described that employs what can be termed a friction surface stirring (FSS) process on the surface of a metal object. The FSS process occurs on some or the entire surface of the metal object, at a location(s) separate from a friction stir welded joint. The FSS process on the surface produces a corrosion resistant mechanical conversion "coating" on the object. The "coating" is formed by the thickness of the material of the object that has been FSS processed. In one exemplary application, the process can be applied to a metal strip that is later formed into a tube whereby the "coated" surface resides on the inside of the tube making it highly resistant to corrosive flow such as seawater. | Lockheed Martin Corporation | US14199513 | 2014/3/6 |

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| 158 | Ocean thermal power system | The various embodiments provide a power-generating plant including a dynamic floating platform that is configured to efficiently produce 100 MW of power using a honeycomb configuration of mist lift cells. The mist lift columns are configured to optimize performance and to adjust configurations of components to compensate for changes in orientation of the platform and temperature of sea water in order to manage power output of the plant. | Joe Van Ryzin; Steven Rizea | US13564001 | 2012/8/1 |
| 159 | GEOTHERMAL SYSTEM FOR REGULATING TEMPERATURE OF PAVEMENT AND SUPERSTRUCTURES | A geothermal system is provided. The geothermal system may include a superstructure with at least one geothermal concrete layer, a geothermal source, a heat exchange system, a transfer medium, a distribution system having at least one pump, and a plurality of in-feed piping circuitously connected to a plurality of return piping, both embedded within the geothermal concrete layers. The heat exchange system may bring the transfer medium into contact with the geothermal source so as to convey its heat to the transfer medium. The at least one pump may pump the transfer medium throughout the distribution system, wherein the temperature of the superstructure may be regulated. A user may operate the distribution system to provide sufficient transfer medium to cure the geothermal concrete layer at a near ideal heat of hydration. | Emad FAROUZ | US14097026 | 2013/12/4 |
| 160 | Phase change material thermal power generator | An energy producing device, for example a submersible vehicle for descending or ascending to different depths within water or ocean, is disclosed. The vehicle comprises a temperature-responsive material to which a hydraulic fluid is associated. A pressurized storage compartment stores the fluid as soon as the temperature-responsive material changes density. The storage compartment is connected with a hydraulic motor, and a valve allows fluid passage from the storage compartment to the hydraulic motor. An energy storage component, e.g. a battery, is connected with the hydraulic motor and is charged by the hydraulic motor when the hydraulic fluid passes through the hydraulic motor. Upon passage in the hydraulic motor, the fluid is stored in a further storage compartment and is then sent back to the area of the temperature-responsive material. | Jack A Jones; Yi Chao; Thomas I Valdez | US13170400 | 2011/6/28 |

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| 161 | Deep submersible light with pressure compensation | A deep submersible light may include a body defining a hollow interior and a solid state light source such as a plurality of high brightness LEDs mounted in the interior of the body. A transparent window may be mounted over the LEDs. The space between the transparent window and the LEDs may be filled with an optically transparent fluid, gel, or grease, which allows light to pass through and ambient water pressure to pass in, thus pressure compensating the LEDs by allowing them to see ambient water pressure. The transparent window may be mounted in the body for reciprocation in both a forward direction and a rearward direction to accommodate volumetric changes in the compensating fluid, gel, or grease caused by changes in temperature and water pressure as the manned or remotely piloted submarine travels from the sea surface to deep ocean depths. | Mark S Olsson; Kevin R Hardy; John R Sanderson IV; Kenneth A Steeves; Brian P Lakin; Ray Merewether; Jon E Simmons | US13252182 | 2011/10/3 |
| 162 | Thermodynamic power generation system | Disclosed is a power generation system that includes a heat source loop, a heat engine loop, and a heat reclaiming loop. The heat can be waste heat from a steam turbine, industrial process or refrigeration or air-conditioning system, solar heat collectors or geothermal sources. Heat from the heat source loop is introduced into the heat reclaiming loop or heat engine loop. The power generation system further includes a heat reclaiming loop having a fluid that extracts heat from the heat engine loop. The fluid of the heat reclaiming loop is then raised to a higher temperature and then placed in heat exchange relationship with the working fluid of the heat engine loop. The power generating system is capable of using low temperature waste heat that is approximately 150 degrees F. or less. | American Thermal Power LLC | US13964560 | 2013/8/12 |
| 163 | Structural and acoustical vibration dampener for a rotatable blade | A structural and acoustical vibration dampener for a rotatable blade comprises a layer of structural/acoustic damping material coupled to at least a portion of the blade. A fan blade comprises a structural layer and a layer of damping material coupled to at least a portion of the structural layer. A method of applying a structural and acoustical vibration dampener to a fan blade comprises identifying a region on the fan blade and securing the structural/acoustical vibration dampener to the fan blade over at least a portion of the region. | Costas Christofi; Quynh Hoang; Sanjay Gupta; Angus Lemon; James T Vershaw; Nandagopal Nalla; Emile Abi Habib | US12163397 | 2008/6/27 |

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| 164 | METHOD OF GENERATING ELECTRICAL POWER FOR A PORT | A method for generating electrical power for a port. The method includes providing a power generator, where the power generator is secured to a structure within a port and converts energy within a body of water to electrical power. The method also includes providing a power storage, where the power storage is configured to receive the electrical power from the power generator and store the electrical power for future use. The method further includes a power transfer, where the power transfer is configured to direct the electrical power from the power storage to the location of use within the port. | Chuck Weller | US13960635 | 2013/8/6 |
| 165 | Process and power system utilizing potential of ocean thermal energy conversion | Ocean Thermal Energy Conversion (OTEC) systems and methods utilizing the systems are disclosed for producing a useable form of energy utilizing warm surface seawater and cold seawater from depths up to 2 miles below the surface and utilizing a multi-component working fluid. The systems and methods are designed to maximize energy conversion per unit of cold seawater, the limited resource, achieving relative net outputs compared to a Rankine cycle using a single component fluid by at least 20% and even as high as about 55%. | Alexander I Kalina | US13188063 | 2011/7/21 |
| 166 | High efficiency OTEC system | A high efficiency OTEC system for the efficient and low-cost production of energy and potable water through ocean thermal energy conversion. The high efficiency OTEC system utilizes a working fluid such as ammonia with a standard Rankine cycle. One embodiment of the present invention comprises a heat exchanger which includes a fluid transfer assembly, a pump, a first heater, a turbine and a generator. The fluid transfer assembly utilizes a condenser conduit to condense working fluid by transferring the fluid to the cold depths of the ocean before returning to the warm surface through an insulated return conduit. The working fluid is vaporized through use of the first heater before entering a turbine connected to a generator to produce energy. In some embodiments, a second heater may be added to the system for production of potable water. In further embodiments, a third heater may be provided for additional heating capabilities. | David H Cowden; Era W Cowden | US13074171 | 2011/3/29 |

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| 167 | Floating platform with detachable support modules | A floating support that can be joined with a floating platform while the floating platform is at a deployment location is disclosed. The support provides functionality to the floating platform in order to change, augment, upgrade, or diversify the platform's overall capability. In some embodiments, the present invention eases the serviceability of the platform by enabling a first support that has diminished capability to be readily replaced by a second support having superior capability—without removing the floating platform from its deployment location. In some embodiments, the present invention enables platform operation that is analogous to "plug and play" electronics systems. Further, in some embodiments, hydrodynamic performance of the floating platform can be changed with the addition or removal of one or more floating supports. | Stephen L Bailey; Joseph Van Ryzin; Patrick D Grandelli; Natalie Levings; John E Halkyard | US12688468 | 2010/1/15 |
| 168 | Process and power system utilizing potential of ocean thermal energy conversion | Ocean Thermal Energy Conversion (OTEC) systems and methods utilizing the systems are disclosed for producing a useable form of energy utilizing warm surface seawater and cold seawater from depths up to 2 miles below the surface and utilizing a multi-component working fluid. The systems and methods are designed to maximize energy conversion per unit of cold seawater, the limited resource, achieving relative net outputs compared to a Rankine cycle using a single component fluid by at least 20% and even as high as about 55%. | Alexander I Kalina | US13213322 | 2011/8/19 |
| 169 | Geothermal Wind System | The Geothermal Wind System is a hybrid power production system using geothermal transfer of heat between native rock and an air mass circulating between two or more portals of substantially different vertical elevations by use of the stack effect and the buoyancy of heated air or gravity pulling cooled air to turn one or more wind turbines which drive one or more generators. This wind speed can be improved by use of a venturi valve in close proximity to the turbine(s). A novel example of an aerodynamic, adjustable radial venturi is also herein incorporated. Two modes of the GWS are herein described, one used at shallow depths having geothermal temperatures approximating the average exterior climate, and the second used with geothermal temperatures found at greater depths at substantially higher than outside temperatures. The GWS is a non-polluting, non-carbon burning, non-water-dependent power production system easily implemented in third world countries. | Larry Clark Simpson | US13436390 | 2012/3/30 |

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| 170 | HEAT ENGINE SYSTEM FOR VEHICLES | A heat engine system for a vehicle, wherein the vehicle is operable on a road surface, includes a collector configured for collecting an air layer disposed adjacent the road surface. The heat engine system also includes a heat engine configured for converting thermal energy provided by a temperature difference between the air layer and an ambient air surrounding the vehicle to another form of energy. The air layer has a first temperature, and the ambient air has a second temperature that is lower than the first temperature. In addition, the heat engine system includes a guide configured for transferring the air layer from the collector to the heat engine. A vehicle includes a body defining an interior compartment and having an underside surface spaced opposite the road surface, and the heat engine system. | Marten Wittorf; Alan L Browne; Nancy L Johnson; James Holbrook Brown | US13427107 | 2012/3/22 |
| 171 | Air conditioning using mechanical leverage and refrigerants | In one embodiment, a mechanical leverage system using refrigerants in conjunction with temperature differences found in the environment is utilized for air conditioning, energy generation and other applications. The mechanical leverage system provides a means for altering boiling point temperatures of refrigerants in which the system is enabled to absorb and expel heat within the temperature differentials found in the environment. The mechanical leverage system is capable of saving or generating energy. | Arthur F Hurtado | US13011729 | 2011/1/21 |
| 172 | System for generating and transporting electric power from hydrothermal vents | An electric generator includes a channel for directing a flow of a first fluid and a thermoacoustic resonance chamber that penetrates the channel, including a first heat exchanger inside the channel and a second heat exchanger outside the channel, wherein the thermoacoustic resonance chamber has a toroidal shape configured to enclose a second fluid adapted to create a resonance of and carry an acoustic pressure wave to transfer heat between the first heat exchanger and the second heat exchanger. The thermoacoustic resonance chamber includes a plurality of channels to provide a plurality of resonance cavities capable of supporting standing thermoacoustic waves around the toroidal shape. The plurality of channels are configured to partition the thermoacoustic resonance chamber into a plurality of tubular channels extending around the toroidal shape. | Daniel Asturias; Isaac Harwell | US12954193 | 2010/11/24 |
| 173 | Ocean thermal energy conversion | Apparatus and methods are disclosed for OTEC plant. The device can be deployed in ocean with depth of 600 meter or more. | LAU JAMES CHUNG KEI | US12924199 | 2010/9/23 |

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| 174 | COMPOSITE HEAT EXCHANGER SHELL AND BUOYANCY SYSTEM AND METHOD | A heat exchanger includes a shell made of a composite material, and a heat exchanger housed substantially within the shell. The shell is made of a composite material further comprises planks positioned in the outer periphery of the shell. The planks, in one embodiment, are substantially hollow or include substantially hollow portions. In some embodiments, the planks are formed of pultruded plastic. The shell of the heat exchanger further includes layers of fiberglass. The pultruded plastic planks are sandwiched between at least a first layer of fiberglass and a second layer of fiberglass. The layers of fiberglass are infused with resin. A floating portion of an Ocean Thermal Energy System includes shells made of composite material. The cold seawater intake can also be an elongated tube of composite material. | Lockheed Martin Corporation | US13715514 | 2012/12/14 |
| 175 | DEHUMIDIFIER SYSTEM AND METHOD | A condenser or heat exchanger includes a circulation system for moving a cooling fluid, and a graphite foam in thermal communication with the circulation system. The condenser or heat exchanger can be used to remove water, or more particularly freshwater from humid air in tropical, subtropical, and arid climates. | Lockheed Martin Corporation | US13683534 | 2012/11/21 |
| 176 | Energy transfer machine and method | A novel engine for producing power from a temperature differential with additional benefits of low cost, high efficiency, quiet operation minimal wear of components, and the ability to produce power or cooling from low grade heat sources. | James B Klassen; David W Boehm | US12141713 | 2008/6/18 |
| 177 | Water intake pipe of ocean thermal energy conversion power plant | A water intake pipe of an ocean thermal energy conversion power plant is made by connecting a plurality of connecting sections, and each connecting section includes a plurality of steel ropes between two flange disks and covered with a soft tube material, and each connecting section is in a cage form and fixed by the flange disks, and the water intake pipe includes a support, and the closer the connecting section to the sea surface, the higher is the load-carrying capacity of each steel rope, and the steel rope closer to the sea surface has a greater tension. | Fang Sheng Kuo; Chung Hsuan Kuo | US12940003 | 2010/11/4 |

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| 178 | Energy Generation Device | An energy generator capable of transferring heat from a cold region to a hot region, which utilizes the adiabatic temperature difference called lapse rate generated in gas or gas-like particles when a force field or an energy potential gradient is applied to the particles. The temperature difference is increased by the thermal conductivity of the particles and lowered by the thermal conductivity of the substrate or container holding the particles and by parasitic thermal shorts caused by photons, phonons, or other particles not subjected or less affected by the force field. Implementations include semiconductors with a doping gradient or with an externally applied voltage; vapors in contact with their liquids; gases in contact with adsorbing surfaces; polar molecules with electrons in the conduction band. Multilayer devices are described. Applications include, for example, coolers, heaters, electrical generators and photon generators. | George S Levy | US13668914 | 2012/11/5 |
| 179 | Method of carbon sequestration | The present invention relates to methods and apparatus for robust and long-term sequestration of carbon. In particular, the present invention relates to sequestration of carbon as carbonates, using coccolithophorid algae grown using land-based aquaculture. The invention also relates to improved methods of Ocean Thermal Energy Conversion (OTCE). | JOVINE RAFFAEL | US12998764 | 2009/10/28 |
| 180 | SYSTEMS AND METHODS FOR PROVIDING SUPPLEMENTAL AQUEOUS THERMAL ENERGY | Systems and methods for collecting, storing, and conveying aqueous thermal energy are disclosed. In a particular embodiment, a floating film retains solar energy in a volume of water located under the film. A series of curtains hanging from a bottom surface of the film define a passage between a periphery of the film and a center of the film to direct the heated water at the center of the film. The heated water is circulated to deliver the heat to a dissociation reactor and/or donor substance. The donor is conveyed to the reactor and dissociated. | Roy Edward McAlister | US13584773 | 2012/8/13 |

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| 181 | Air-water power generation system | The Air-Water Power Generation System utilizes the temperature differential between warm air and a surface cooled by water evaporation. To enhance the temperature differential, the air that evaporates the water is first cooled by releasing heat to boil the working fluid in a boiler and then is cooled further by a counter-flow heat exchanger before the air enters the condenser where a water film is evaporating. The air then becomes colder as the water evaporates in the condenser, and this provides the cooling to condense the working fluid. Finally, the cold air flows out of the condenser and flows back through the counter-flow heat exchanger to provide the cooling of the air flowing from the boiler. | Melvin L Prueitt | US12753423 | 2010/4/2 |
| 182 | Ocean thermal energy conversion system and condenser thereof | An ocean thermal energy conversion (OTEC) system includes a working fluid pump, an evaporator, a turbine, a condenser, and a working fluid. The evaporator is connected to the working fluid pump. The turbine is connected to the evaporator. The condenser is respectively connected to the turbine and the working fluid pump, and located in a sea area below sea surface. The condenser includes a condenser main body and a deep sea water pipe. The condenser main body is respectively connected to the turbine and the working fluid pump. The deep sea water pipe is connected to the condenser main body, and has an inlet end and an outlet end. The deep sea water pipe is connected to the condenser main body via the outlet end. The working fluid flows between the working fluid pump, the evaporator, the turbine, and the condenser under the driven of the working fluid pump. | Po Hua Hsu; Chi Jung Kuo | US12424651 | 2009/4/16 |
| 183 | Decoupled, fluid displacer, sterling engine | A mechanically decoupled, fluid displacing Sterling engine includes first and second containers, first and second fluid conduits mounted to the containers, a pump mounted in cooperation with the second conduit for selectively pumping fluid between the containers, a processor controlling the pump, a third fluid conduit whose lower end extends into the lower end of the second container, a fluid motivated actuator mounted to the third conduit. The first and second containers contain an actuating volume of an actuating fluid and a working gas. Expanding of the gas actuates the actuator. The volume of the containers is pressurized by a geothermal temperature differential. The pump displaces the actuating fluid between the containers so as to correspondingly displace the gas for heating or cooling to provide the temperature differential to the gas. | John Lee Warren | US13373447 | 2011/11/15 |

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| 184 | Ocean current electrical generating system | A series of underwater sails spaced apart, attach to a moving cable loop between pulleys with electric generators. The sails inflate by the force of the water current and drive the cable in the direction of the current to turn the generators to generate electricity. As the sails reach the end pulley or tail spool they deflate and are pulled back to the beginning power pulley in a continual repeated cycle. | J Emile M Gagnon | US12983290 | 2011/1/1 |
| 185 | OCEAN THERMAL ENERGY CONVERSION POWER PLANT | An power generation structure comprising a portion having a first deck portion comprising an integral multi-stage evaporator system, a second deck portion comprising an integral multi-stage condensing system, a third deck portion housing power generation equipment, a cold water pipe, and a cold water pipe connection. The evaporator and condenser systems include a multi-stage cascading heat exchange system. Warm water conduits in the first deck portion and cold water conduits in the second deck portion are integral to the structure of the portion of the platform. | Laurence Jay Shapiro; Johathan M Ross; Barry R Cole; Bruce Robert Marson | US13209865 | 2011/8/15 |
| 186 | FLOATING ICE SHEET BASED RENEWABLE THERMAL ENERGY HARVESTING SYSTEM | The invention provides a floating ice sheet based renewable thermal energy harvesting system, that can harvest energy from naturally occurring temperature differential between liquid water below a floating ice sheet that is substantially at the freezing temperature of water (0 degrees C. or slightly lower for salt water), and colder air above the floating ice sheet. For example, this is a naturally occurring phenomenon in Artic and Antarctic region sea ice or ice shelf regions, where the air temperature above the floating ice may range from −5 degrees C. down to winter extreme cold temperatures of around −50 degrees C. In addition to the inventive application of thermodynamic cycle engines to harvest renewable energy from this naturally occurring temperature differential, variant embodiments also combine wind energy and/or solar energy subsystems to provide synergistic further benefits and greater quantities of renewable energy harvestable from devices of this class. | Mithra M K V Sankrithi; Siva U M Sankrithi | US12006035 | 2007/12/31 |

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| 187 | Recoverable heat exchanger | A modular heat exchanger that can be submerged to great depths and then easily recovered in order to reduce the costs and disadvantages of the prior art. Because the heat exchanger is submergible and recoverable, it can be more easily maintained. This ease of maintenance allows the heat exchangers to be deployed at greater depths. This, in turn, allows for greater differences in temperatures, greater efficiency for the heat engine, and a more effective ocean thermal energy conversion system. | Nicholas J Nagurny | US12371586 | 2009/2/14 |
| 188 | Process and apparatus for molding continuous-fiber composite articles | A process and apparatus for multi-shot, liquid-resin-molding of continuous-fiber composite articles is disclosed. The process involves the step-wise fabrication of an article wherein continuity of the fibers is maintained between the multiple workpieces of the finished composite article. | Alan K Miller; Stephen L Bailey; Theodore Rosario Jr | US13184745 | 2011/7/18 |
| 189 | Amphibious robotic crawler | An amphibious robotic crawler for traversing a body of water having two frame units coupled end-to-end or in tandem by an actuated linkage arm. Each frame unit includes a housing with a drivable continuous track rotatably supported thereon. The frame units are operable with a power supply, a drive mechanism and a control module. Each frame unit further includes a buoyancy control element for suspending the frame unit in the water, and for controlling the depth of the robotic crawler within the water. The control module coordinates the rotation of the continuous tracks, the position of the linkage arm and the buoyancy of the buoyancy control elements to control movement, direction and pose of the robotic crawler through the body of water. | Stephen C Jacobsen; Fraser M Smith; Marc X Olivier | US12814302 | 2010/6/11 |
| 190 | DIRECT BONDING OF HEAT CONDUCTING FOAM AND SUBSTRATES | A technique for joining porous foam material, such as graphite, metal or ceramic foam, to a substrate is described. The substrate can be metal, a thermoset plastic or a composite material. The substrate has a melting point below that of the foam material. The two are joined together by using the foam to apply heat locally at the surface of the substrate. Some or all of the foam is heated to the appropriate temperature at or above the melting point of the substrate material. The foam and the substrate are then brought together, with the heat from the foam melting or softening the substrate material so that the substrate material infuses into the pores of the foam. As the foam cools below the melting point temperature, the substrate material solidifies to create a mechanical bond between the foam and the substrate. | Eugene JANSEN; Scott M MAURER | US13431361 | 2012/3/27 |

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| 191 | OCEAN THERMAL ENERGY CONVERSION COUNTER-CURRENT HEAT TRANSFER SYSTEM | For OTEC (Ocean Thermal Energy Conversion), rather than transferring large quantities of surface heat from near the ocean surface used to vaporize a working fluid to drive a heat engine (turbine) and generator to the deep ocean to provide a heat sink, this invention provides a method of using small masses of low-boiling-point fluids to absorb heat in a heat pipe near the ocean surface using the latent heat of evaporation and returning the heat of condensation of the vapor in a condensed working fluid pumped back to the ocean surface in a counter-current heat pipe system. The counter-current flow minimizes the amount of heat that is absorbed from the surface to vaporize the working fluid as well as the mount of heat dumped into the deep ocean. | BAIRD JAMES R | US13416065 | 2012/3/9 |
| 192 | COMBINED BRAYTON - RANKINE CYCLE | A power generation system that comprises a first power generator; a first turbine operable to drive the first power generator; a vaporizer operable to vaporize a working fluid, wherein the vaporized working fluid turns the first turbine; and a condenser operable to condense the vaporized working fluid exiting the first turbine, wherein the condenser is coupled to the vaporizer such that the condensed working fluid is vaporized in the vaporizer. The power generation system also comprises a second power generator; a second turbine operable to burn a fuel to drive the second power generator; a switch to selectively operate the second turbine independently of the first turbine; and a heat exchanger coupled to the second turbine to receive flue gas from the second turbine when operated, wherein heat is transferred in the heat exchanger from the flue gas to the vaporized working fluid after the vaporized working fluid exits the vaporizer and prior to the vaporized working fluid entering the first turbine. | John W Rapp; Nicholas J Nagurny | US12343954 | 2008/12/24 |

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| 193 | Shape memory alloy actuated adaptive exhaust nozzle for jet engine | The proposed adaptive exhaust nozzle features an innovative use of the shape memory alloy (SMA) actuators for actively control of the opening area of the exhaust nozzle for jet engines. The SMA actuators remotely control the opening area of the exhaust nozzle through a set of mechanism. An important advantage of using SMA actuators is the reduction of weight of the actuator system for variable area exhaust nozzle. Another advantage is that the SMA actuator can be activated using the heat from the exhaust and eliminate the need of other energy source. A prototype has been designed and fabricated. The functionality of the proposed SMA actuated adaptive exhaust nozzle is verified in the open-loop tests. | Gangbing Song; Ning Ma | US12539242 | 2009/8/11 |
| 194 | SYSTEM FOR GENERATING ELECTRICAL POWER FOR A PORT | One example embodiment includes a system for generating electrical power for a port. The system includes a power generator, where the power generator is configured to convert energy within a body of water to electrical power. The system also includes a power storage, where the power storage is configured to receive the electrical power and store the electrical power for future use. The system further includes a power transfer, where the power transfer is configured to direct the electrical power to the location of use. | WELLER CHUCK | US13368459 | 2012/2/8 |
| 195 | SUBMERGED CHARGING STATION | A submerged charging station having a rechargeable energy producing device is disclosed. The device comprises a submerged thermally based electric generator that comprises a temperature-responsive material that utilizes differences in depths in order to generate energy. The submerged thermally based electric generator changes depths along a tether that is attached to a buoy and an anchor. The submerged thermally based electric generator provides energy to a battery, which can be part of the charging station, or to an autonomous underwater vehicle (AUV) that travels to different charging stations to be recharged. | JONES JACK A; CHAO YI; CURTIN THOMAS | US13004857 | 2011/1/11 |

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| 196 | Power generating apparatus | A power-generating apparatus including an autocontrol electronic mechanical unit, a power-generating unit, a power transportation device, a liquid supply device, a shift device, and a discharge device. The power-generating unit includes a pair of interactive and coupled reverse-linked, hollow movement bodies. The relationship between the two movement bodies can be changed through filling liquid to one movement body or discharging liquid from the other. The movement body filled with liquid goes down and brings the other movement body without liquid up to generate power in cycle continuously utilizing lifting and drop movements of the two movement bodies. The power-generating apparatus can utilize objects' gravitational potential energy to generate power in cycle uninterruptedly so as to ensure the continuity and stability of power generation. The power-generating apparatus completely uses the ambient natural energy during its entire power generation process. | Jifan Jin | US12395454 | 2009/2/27 |
| 197 | OTEC system | An Ocean Thermal Energy Conversion (OTEC) system comprising a self-contained submersible OTEC plant is disclosed. The OTEC plant comprises a electrical generation system and a thermal mass whose temperature is based on the temperature of water at a first depth of a body of water. The OTEC plant is moved to a second depth of the body of water, wherein water at the second depth is a different temperature that the water at the first depth. The OTEC system generates electrical energy based on a difference in the temperatures of the water at the second depth and the temperature of the thermal mass. The OTEC system is able to generate electrical energy at either of the first depth and the second depth. | Robert James Howard; Nicholas J Nagurny; Laurie E Meyer; John W Rapp | US12328656 | 2008/12/4 |
| 198 | Industrial Ocean Thermal Energy Conversion Processes | A combined OTEC and steam system having an OTEC power generation system including a multistage condensing system in fluid communication with a cold water system and a steam system comprising a steam condenser, wherein the steam condenser is in fluid communication with the cold water system. | Laurence Jay Shapiro; Barry R Cole; Jonathan M Ross; Russ Krull | US13183047 | 2011/7/14 |

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| 199 | Ocean thermal buoyancy and propulsion system | A water navigable vessel or glider can transport cargo across oceans and other bodies of water without the use of fossil or nuclear fuels. The vessel includes a housing, a cargo or payload area within the housing, one or more control fins attached to the housing, a ballast within the housing, an expandable and contractible container configured to receive a clathrate and maintain a minimum amount of pressure on the clathrate within the housing in proximity to the ballast, and an intake valve coupled to the ballast. The clathrate changes state, thereby changing the buoyancy of the glider, and causing the glider to move through the body | Matthew Herbek; Robert Dietzen; Braden Powell; Sean Day; Kenneth Blanchette; Matthew Gries; Matthew B Ascari; John W Rapp; Robert J Howard | US12544375 | 2009/8/20 |
| 200 | Thermoelectric generator and method of generating electricity | A generator device for converting thermal energy to electric energy. A magnetic circuit includes at least a portion made of a magnetic material. A temperature-varying device varied the temperature in the portion made of the magnetic material alternately above and below a phase transition temperature of the magnetic material to thereby vary the reluctance of the magnetic circuit. A coil is arranged around the magnetic circuit, in which electric energy is induced in response to a varying magnetic flux in the magnetic circuit. A magnetic flux generator creates magnetic flux in the magnetic circuit. The temperature-varying device alternately passes hot and cold fluid by, or through holes in, the portion made of the magnetic material of the magnetic circuit in a single direction to thereby vary the temperature in the portion made of the magnetic material alternately above and below the phase transition temperature of the magnetic material. | Gunnar Russberg; Mikael Dahlgren; Stefan Thorburn | US12593413 | 2008/3/18 |
| 201 | Ocean thermal energy conversion system | An Ocean Thermal Energy Conversion (OTEC) system is disclosed. The OTEC system generates electrical energy based on a difference in the temperatures of the water from a surface region of a body of water and a thermal mass whose temperature is based on the temperature of water from a deep water region of the body of water. The thermal mass attains a desired temperature while it is positioned in the deep water region, with which it is thermally coupled. The present invention uses a bulk transport vessel to carry the thermal mass from the deep water region to a depth where it can be thermally coupled with the OTEC system. | Robert James Howard; Nicholas J Nagurny; Laurie E Meyer; John W Rapp | US12328661 | 2008/12/4 |

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| 202 | APPARATUS AND METHOD FOR ELECTRIC FLOATING STORAGE AND | An Electric Floating Storage and Offloading system comprises a floating vessel that may be moored at a location convenient for connection to the power grid and which supports an array of grid-scale batteries or other energy storage devices and has means for delivering stored electrical energy to the power grid or to an end user. | Stephen E Kibbee | US13207075 | 2011/8/10 |
| 203 | Structural ice composite body with thermal conditioning capability | The invention discloses an ice composite body with a layer of water close to its freezing point within the body's armor shell at its base, with a pressurizing system for the water which maintains an upward pressure on the ice core at the set level needed to structurally support any burden resting on the top part of the shell, the top part of the shell & the ice core. The ice core has a separate non structural layer at its lowest level & a separate system of melting & freezing this layer of the ice core for thermal conditioning purposes, while using the pressurizing system to maintain hydrostatic and litho-static balance & thus maintain structural integrity. The pressurization system results in a more reliable structural support system for the top part of the shell particularly for dealing with thermal cycling & in warmer climates. The melting & freezing of the thermal conditioning ice layer can be used to shift air-conditioning demand from daytime peak to nighttime off-peak, without affecting the structural support system for the top section of the armor shell used to support equipment, traffic, buildings or for other purposes involving a load, or the capacity of the ice body to provide heating using the heat from the refrigeration system for the structural ice core. | MCALISTER PADRAIG | US13187020 | 2011/9/29 |

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| 204 | Method and apparatus for powering of amphibious craft | The methods and apparatuses of the present invention provides for powering and maneuvering (forward, reverse and steering) systems for amphibious vehicle, marine vessel or ground vehicle operation and control. An improved propulsion system may incorporate the use of electric motors combined with impellers which use positive and negative magnetic torque applications and allows for new control strategies when used in water or on the ground. More precise control of the motoring and steering forces is provided which is suitable for use in a variety of amphibious, marine vessels or ground vehicle applications. Various types of electric drive motor/generators may be incorporated for use therein. Intelligent motion control systems may provide for improved vehicle control that can provide motive force and braking force in a precisely controlled manner that significantly improves performance and has faster control dynamics incorporating a fully integrated electrical braking and maneuvering system. | SULLIVAN STEVEN | US12357153 | 2009/1/21 |
| 205 | Spaced plate heat exchanger | A brazed aluminum counter-flow heat exchanger particularly suited for use in Ocean Thermal Energy Conversion is produced by assembling and welding subassemblies of corrugated fins that were previously vacuumed brazed in a stacked group. After the brazing operation, the stacked group of subassemblies are later separated and rearranged to create a subsequent stack of alternating layers of corrugated layers and layers having wide open saltwater passageways. To complete the unit, a friction stir welding process provides final exterior weld seams that penetrate to the internal saltwater passageways in the heat exchanger. The full weld penetration eliminates corrosion-conducive crevices at the welded joints, thus making the aluminum heat exchanger suitable for saltwater use. | FOUST HARRY D | US12378545 | 2009/2/17 |

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| 206 | Underwater Vehicle | An underwater vehicle comprising an electrical power generation system that converts thermal energy from a body of water into electrical energy is disclosed. The vehicle comprises the electrical power generation system and a thermal mass whose temperature is based on the temperature of water at a first depth of a body of water. The vehicle is moved to a second depth of the body of water, wherein water at the second depth is a different temperature that the water at the first depth. The electrical power generation system generates electrical energy based on the difference between the temperature of the water at the second depth and the temperature of the thermal mass. The electrical power generation system is able to generate electrical energy when the temperature difference is negative as well as when the temperature difference is | Robert James Howard; John W Rapp | US12399944 | 2009/3/7 |
| 207 | High volume low speed fan | A high volume low speed (HVLS) fan provides improved air circulation and thermal control in a building by incorporating composite fan blades pivotable to both positive and negative pitch angles. The blades are molded of polymer material over a metal tube core for strength and ease of attachment to the fan hub, and have a symmetrical airfoil shape to produce an efficient bi-directional conical airflow. The fan includes a control unit providing manual and automated intelligent control over blade angle and rotational speed, as well as startup with approximately zero blade angle for more economical power consumption and less motor wear. The fan structure and mounting system allows the fan to be installed at an optimal height inside a variety of buildings to provide increased efficiency of air destratification and air mixing. An array of multiple HVLS fans with alternating directions of airflow can further increase efficiency of air movement. | Joe E Madsen | US12291294 | 2008/11/7 |

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| 208 | Turbine airfoil with non-parallel pin fins | A turbine blade for use in a gas turbine engine having an internal serpentine flow cooling circuit with pin fins and trip strips to promote heat transfer for obtaining a thermally balanced blade sectional temperature distribution. The serpentine flow cooling circuit forms a 7-pass serpentine flow circuit from the leading edge, along the pressure side, through the trailing edge region, and then along the suction side. The serpentine flow circuit of the present invention is formed by a printing process without the need for a ceramic core and casting, and where the pin fins for all of the channels can be aligned perpendicular to the airfoil surface. The metallic and ceramic printing process can be used to form a single piece airfoil with all of the internal cooling passages and | George Liang | US12337696 | 2008/12/18 |
| 209 | Wave gear drive - WGD | The Wave Gear Drive, WGD system is a new method for directly converting sea wave energy to mechanical drive using wave undulations and a buoyant float directly acting on a spiral spring or rack and pinion or power pulley system to drive a rotary or reciprocating water pump that pumps a small quantity of water to a high head, collect it and feed it directly or in conjunction with a water reservoir on top of the offshore WGD system supporting structure, to a hydro turbo generator to generate leveled electric power covering the full wave cycle duration and transmit it to the shore using power and control cables laid at the sea bed, or to drive a polyphase generator to generate electric current, control and condition it to operate in parallel, and transmit it to shore using power and control cables laid at the sea bed; in addition to ebb/tide turbo generators and wind turbo generators that are part of the offshore REWGD system which provides access platform for the wind turbines for ease of construction and maintenance; and provides a break water system. | AYNTRAZI SHAMIL SAMI | US12798902 | 2010/4/14 |

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| 210 | AUTOMATED POSITIONING AND SUBMERSIBLE OPEN OCEAN PLATFORM | An open-ocean fish-growing platform has a submersible cage structure for growing fish, an antenna for receiving positioning signals transmitted from an external source, a position-correction apparatus for calculating a position error signal from a target geostatic position, and an ocean thermal energy conversion (OTEC) system for generating electric power for thruster units to maintain the cage structure in the target geostatic position. The OTEC system inducts colder ocean water from a deeper ocean depth for driving its heat exchange cycle, and is also of hybrid type using a fuel-fired unit as a heat source. The cold water effluent from the OTEC system is directed into the cage for flushing wastes generated by the growing fish. The self-positioning, self-powered open-ocean platform enables unmanned, extended marine deployment in deeper ocean waters without the need for tethering or anchoring to the ocean floor. | TROY PAUL JAMES | US11849338 | 2007/9/3 |
| 211 | SUBMERSIBLE VEHICLE WITH SWEPT HULL | A submersible vehicle having an outer hull which defines a hull axis and appears substantially annular when viewed along the hull axis, the interior of the annulus defining a duct which is open at both ends so that when the vehicle is submerged in a liquid, the liquid floods the duct. At least part of the outer hull is swept with respect to the hull axis. A buoyancy control system may be provided. Various methods of deploying and using the vehicle are described. | Harry George Dennis Gosling | US13096765 | 2011/4/28 |
| 212 | Process and apparatus for molding continuous-fiber composite articles | A process and apparatus for multi-shot, liquid-resin-molding of continuous-fiber composite articles is disclosed. The process involves the step-wise fabrication of an article wherein continuity of the fibers is maintained between the multiple workpieces of the finished composite article. | Alan K Miller; Stephen L Bailey; Theodore Rosario Jr | US12484779 | 2009/6/15 |

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| 213 | Electricity Generation System | An electricity generation system having a low frequency alternating heat and cold distribution system provided for alternately distributing heat and cold at low frequency; a heat-electricity conversion system operatively connected to the low frequency alternating heat and cold distribution system and provided for generating electricity in response to the alternately distributed heat and cold; an electric power delivery system operatively connected to the heat-electricity conversion system and provided for distributing the generated electricity; and a process control system operatively connected to the low frequency alternating heat and cold distribution system, to the heat-electricity conversion system, and to the electric power delivery system in order to control the operations thereof, is provided. | DAHLGREN MIKAEL; RUSSBERG GUNNAR; THORBURN STEFAN | US13073685 | 2011/3/28 |
| 214 | Hydrothermal energy and deep sea resource recovery system | A system that utilizes the naturally superheated fluids available from hydrothermal vents to harness the almost limitless quantities of heat energy they contain. It consists of one major system that has three parts : (i) funnel, (ii) pipes, and (iii) any combination of several mechanical attachments. The recovered heat energy will then be used to drive steam turbines or other equipment for electricity generation, water desalination, or any other thermal energy use. It could also be simultaneously or separately fed into resource recovery equipment for the recovery of valuable metals, minerals, and chemicals without system modification. | MARSHALL BRUCE | US11890735 | 2007/8/6 |
| 215 | PHASE CHANGE MATERIAL THERMAL POWER GENERATOR | An energy producing device, for example a submersible vehicle for descending or ascending to different depths within water or ocean, is disclosed. The vehicle comprises a temperature-responsive material to which a hydraulic fluid is associated. A pressurized storage compartment stores the fluid as soon as the temperature-responsive material changes density. The storage compartment is connected with a hydraulic motor, and a valve allows fluid passage from the storage compartment to the hydraulic motor. An energy storage component, e.g. a battery, is connected with the hydraulic motor and is charged by the hydraulic motor when the hydraulic fluid passes through the hydraulic motor. Upon passage in the hydraulic motor, the fluid is stored in a further storage compartment and is then sent back to the area of the temperature-responsive material. | JONES JACK A; CHAO YI; VALDEZ THOMAS I | US12113882 | 2008/5/1 |

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| 216 | INCREASING THE EFFICIENCY OF SUPPLEMENTED OCEAN THERMAL ENERGY CONVERSION (SOTEC) SYSTEMS | A system and method for increasing the efficiency of an ocean thermal energy conversion (OTEC) system is described. In some examples, the system collects thermal energy using a solar collector, warms ocean water located within the solar collector, and provides the warmed water to an OTEC system, such as to a vaporizer of a heat engine. In some examples, the OTEC system provides electricity and other energy to another system, creating a cycle of sustainable economic development of energy and resources. | Roy E McAlister | US12857546 | 2010/8/16 |
| 217 | Thermodynamic Power Conversion Cycle and Methods of Use | A high efficiency thermodynamic power conversion cycle is disclosed using thermal storage, atmospheric heat exchangers, and wind channeling in a synergistic method. Using the preferred configuration with ground source water, solar collectors, and heat pump including the further preferred utilization of ionic liquids or electride solutions as the working fluid in the system, achieves optimal total energy efficiency and enables otherwise insufficient thermal differentials to effectively generate power. | GURIN MICHAEL H | US11612417 | 2006/12/18 |
| 218 | Clathrate ice thermal transport for ocean thermal energy conversion | A substance is added to cold ocean water in a cold water pipe of an Ocean Thermal Energy Conversion (OTEC) system. The substance raises the freezing point of the ocean water in a cold water heat exchanger of the OTEC system, thereby forming an ice slurry. The substance is added at the depth of the apparatus. The ice slurry is transported from the point of addition in the cold water pipe to the cold water heat exchanger at the surface. | Robert J Howard; John W Rapp; Patrick Grandelli; Joseph C Van Ryzin | US12142231 | 2008/6/19 |
| 219 | GLOBAL WARMING MITIGATION METHOD | The present invention provides a method of limiting sea level rise. In a first step heat that would otherwise cause thermal expansion of the ocean and resultant sea level rise is extracted to produce energy. The energy is used to convert a portion of the liquid ocean water to the gaseous elements hydrogen and oxygen by the process of electrolysis. The ocean level is reduced by the volume of water converted to gas. The hydrogen is captured for use as an energy source and is transported to a desert to be recombined with resident oxygen to produce energy and water for irrigation. | BAIRD JAMES RUSSELL | US12838172 | 2010/7/16 |

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| 220 | Submarine cold water pipe water intake system of an ocean thermal energy conversion power plant | A submarine cold water pipe water intake system of an ocean thermal energy conversion power plant is installed at a cold water inlet of a power boat, and the cold water pipe includes : a water intake head; a water intake pipe formed by connecting composite pipes in a series, and each composite pipe is formed by arranging a plurality of wavy inner pipes sequentially into a tubular shape; a connecting pipe formed by engaging an outer pipe and an inner pipe, and an inner pipe of the connecting pipe being connected to the cold water inlet of the power boat, and an end of the outer pipe of the connecting pipe is connected to a connecting portion of the water intake pipe. | KUO FANG SHENG | US12078538 | 2008/4/1 |
| 221 | Subsea cryogenic fluid transfer system | The current invention includes to systems and methods of transferring cryogenic fluids between two locations. More particularly, some embodiments of the invention are related to systems and methods of using cryogenic risers and rotatable connections for transferring cryogenic fluids, including liquefied natural gas, from an ocean going vessel to a second location. One embodiment of the invention includes a system for transporting a cryogenic fluid between a floating vessel and a second location. The system including a cryogenic riser, a submersible turret connector. The being riser adapted to allow the vertical position of the first end of the riser to be changed, the second end of the first riser located in a body of water and in fluid communication with the second location. The submersible turret connector connected to the first end of the first riser. The first connector adapted for releasably connecting to a first floating vessel located on the body of water so that a cryogenic fluid can be communicated between the first vessel and the first end of the first riser, the first connector being moored to the bottom of the body of water such that the vertical position of the first connector can be changed, and the first connector adapted to allow the first vessel to rotate around the first connector upon the surface of the body of water while the first vessel is connected to the first connector. | Mark E Ehrhardt; William S Mathews; Dawn Rymer; W Brett Wilson | US10579359 | 2005/9/7 |

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| 222 | SYSTEM FOR EXPLOITING THE THERMAL ENERGY AT THE BOTTOM OF THE OCEAN | An apparatus for exploiting the thermal energy at the bottom of the ocean. The apparatus comprises a thermal energy harnessing assembly and a drilling assembly mounted thereto. The thermal energy harnessing assembly includes in-feed tube and out-feed tubes. The drilling assembly has openings in fluid communication with the in-feed tube and a thermal energy capturing conduit in fluid communication with the out-feed tube. When the drilling assembly engages a bottom surface of the ocean and fluid is introduced into the in-feed tube, fluid flows towards the drilling assembly and out of the openings at such a pressure as to drill into the bottom surface of the ocean allowing thermal energy to escape therefrom and to flow into the out-feed tube via the thermal energy capturing conduit. | LABELLE STEPHANE | US12733921 | 2008/9/29 |
| 223 | Global Warming Mitigation Method | The present invention provides a method of sequestering carbon dioxide and water in a desert environment. In a first step heat that would otherwise cause thermal expansion of the ocean and resultant sea level rise is extracted to produce energy. A portion of the energy is used to desalinate seawater. The desalinate water is pumped into a desert environment and vegetation is planted in the irrigated desert portion. The vegetation sequesters carbon dioxide. The seawater extracted for desalination further reduces sea level rise. Irrigation water moderates the day and nighttime temperature fluctuations of hot deserts. Lowering the daytime temperature increases the deserts potential to sequester water. The commercial and arable potential of the desert is augmented by the enrichment of its soil by composted vegetation, its irrigation and the moderation of its diurnal temperature fluctuations. | BAIRD JAMES RUSSELL | US12408656 | 2009/3/20 |

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| 224 | THERMOELECTRIC POWER GENERATING DEVICE AND POWER GENERATING SYSTEM USING SAID THERMOELECTRIC POWER GENERATING DEVICE | A thermoelectric power generating device and a power generating system using the same are provided which have easiness in maintenance and require a smaller space and which can perform thermoelectric conversion (power generation) from fluids with different temperatures to conduct electric power supply in a way cheaper and more stable than in the conventional devices. A thermoelectric element 27 constituted by P- and N-type thermoelectric semiconductor elements arranged alternately and sealed in heat transfer plates 30 in a sandwiched manner through electrodes and insulators to provide a plate-like thermoelectric power generating unit 31. A plurality of the units 31 are laminated to alternately form first and second spaces 32 and 33 for communication of high- and low-temperature fluids W and C, respectively, between the units. Openings provided by the respective units 31 are gathered to form first inflow and outflow passages 34 and 35 for inflow and outflow of the high-temperature fluid W to and out of the first spaces 32, respectively, and second inflow and outflow passages for inflow and outflow of the low-temperature fluid C to and out of the second spaces 33, respectively. | Yuji Awashima; Haruki Yoshimoto | US12680351 | 2008/9/24 |
| 225 | Unmanned ocean vehicle | An unmanned, autonomous, waterborne vehicle (500) for marine use capable of operating on and below the surface of water, said vehicle (500) including an enclosed hull (501) having a payload bay (506), a hybrid propulsion system having energy collection means (504) in the form of a wing sail (503) covered with photovoltaic cells and energy storage means (511) for utilizing at least solar energy and wind energy, a plurality of sensors (508, 514) for detecting predetermined environmental parameters and a communications system (509, 515) for transmitting data from said sensors (508, 515) to and for receiving command signals from one or more remote stations and/or cooperating vehicles. | Robert A Dane; Edward Payne Kilbourn | US10565449 | 2004/7/30 |
| 226 | Rigid structural array | A device for maintaining a plurality of ocean wave energy converters at a predetermined proximity. The device includes at least one deck having a plurality openings, each adapted to receive a portion of an ocean wave energy converter. | MONTGOMERY JAMES SCOTT | US12057250 | 2008/3/27 |

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| 227 | Method and device for converting heat into mechanical work | A novel method converts heat into mechanical work. In a cyclic process, a working medium is compressed while giving off heat and it is subsequently brought in thermal contact with the surroundings via a first heat exchanger. Then it is expanded while obtaining mechanical work, whereupon the cyclic process is run through once more. A high degree of efficiency is achieved by virtue of the fact that the working medium, after expansion, is guided through another heat exchanger, which is situated inside a rapidly rotating rotor and which, on the exterior thereof, is surrounded by at least one substantially annular gas space from whose exterior heat is dissipated. There is also disclosed a device for carrying out the novel method. | HIRSCHMANNER RUDOLF | US11584759 | 2006/7/21 |
| 228 | OTEC cold water pipe system | A system for relieving the stress on an Ocean Thermal Energy Conversion (OTEC) cold water pipe includes a slidable joint that couples the OTEC cold water pipe to a surge tank at an opening in the surge tank. The system can further include a first flotation device that is coupled to the OTEC cold water pipe below the surge tank, and a second flotation device that is coupled to the OTEC cold water pipe within the surge tank. | Robert J Howard | US12014625 | 2008/1/15 |
| 229 | Wave elimination system for ocean thermal energy conversion assembly | An ocean thermal energy conversion assembly includes a ship having support tubes connected between a lower part and a top deck of the ship so as to define an open space. A passage is defined through the lower part and an annular connector is connected to a lower end of the passage. A plurality of rods extend from a top of the annular connector and are pivotably connected to the annular connection portion. A transmission pipe is connected to an underside of the annular connector. A hollow damper is connected to an outer periphery of the annular connector and an outer periphery of the hollow damper is engaged with an inner periphery of a bottom opening in a lower end of the passage. A top cover seals a top opening of the passage and has a wave-elimination way which communicates with holes in the top cover. | KUO FANG SHENG; KUO PO HSUAN; KUO CHUNG HSUAN | US12134812 | 2008/6/6 |

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| 230 | Engine | An engine is provided that utilizes an active heat exchanger such as a heat pump to transfer heat into and remove heat from a low boiling point liquid that is disposed in a pair of diametrically opposed containers. The addition of heat into the low-boiling point liquid causes the liquid to move vertically from a bottom container to a top container, transforming the transferred heat energy into potential energy. The top container is allowed to fall under the weight of the transferred liquid, transforming the potential energy to kinetic energy which is used to perform the desired work. The expanding low-boiling point liquid can also be used to advance a magnetic back and forth through a wire coiling to produce an electric current, converting the transferred heat energy into electrical energy. The use of an active heat exchanger such as a heat pump permits the use of one unit of electrical energy to transfer 3 to 5 units of heat energy. | MILLER MICHAEL | US11676416 | 2007/2/19 |
| 231 | Atmospheric temperature difference power generator | This invention consists of a process for utilizing the atmospheric temperature variation with height to produce useful energy. It is accomplished by the use of a lighter than air condensable fluid or mixture of fluids circulating between heat exchangers at different altitudes, with a two phase flow return. | RUSSO ANTHONY | US12285030 | 2008/9/29 |
| 232 | Petroleum-based Thermoelectric Energy Conversion System | A system for generating electrical energy based on a temperature differential between petroleum products extracted from a geothermal reservoir and water from a region of a body of water is disclosed. Some embodiments comprise a submerged pump and a submerged OTEC system, wherein the OTEC system provides locally generated electrical energy to the pump. | Nicholas J Nagurny; Natalie Levings; Lance Greer | US12495943 | 2009/7/1 |

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| 233 | DRAG-REDUCTION, PROPULSION, AND LIFT GENERATING SYSTEM | A motion generating system for propelling and/or lifting a craft exploiting explosive and implosive processes, whereby a propulsive or lifting force on the craft arises from two sources : generation of a stream of fluids which imparts thrust to the craft; and generation of zones of reduced pressure and density in front of and above the craft allowing the craft to be thrust forward and lifted by ambient pressure on the rear and underside of the craft. Furthermore, reduction of fluid density in front of the craft results in a reduction of frontal drag allowing the attainment of higher speeds. The motion generating system may have other applications; for example, the motion generating system may be used to propel a stream of liquid in the manner of a pump. | BROOK SAPOTY | US11991442 | 2006/10/4 |
| 234 | Method and apparatus for remotely piloted landmine clearing platform with multiple sensing means | A landmine detection and neutralization apparatus and method is disclosed. The apparatus to determine the location of landmines, comprises at least two detection modules utilizing different infrared, sound, and/or optical detection and a remotely operated miniature airborne vehicle, that may carry the detection modules at an optimum altitude over a surface that may contain landmines. The neutralization device may be a microwave and/or infrared wave generator. The method for determining the location of landmines comprises using at least two different landmine detection techniques where the techniques are infrared, sound, and optical detection, operating the detection techniques in a close proximity to a surface that may contain landmines and maintaining this close proximity by operating a remotely operated miniature airborne vehicle. Neutralization may be achieved by directing microwaves or infrared waves at detected landmines. | KILKIS SAN | US11130100 | 2005/5/17 |
| 235 | Thermoelectric Energy Conversion System | A system for generating electrical energy using a naturally occurring temperature difference is disclosed. The system provides electrical energy by thermally coupling a conduit that conveys hot material from a petroleum reserve and cold deep-level water to opposing sides of a thermoelectric element. The thermoelectric element generates electrical energy based on the temperature difference between these two surfaces. | John W Rapp; Robert James Howard; Nicholas J Nagurny; Natalie Levings; Lance Greer | US12411824 | 2009/3/26 |

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| 236 | CONVERSION OF OCEAN WAVE ENERGY INTO ELECTRICAL POWER | Devices and methods for capturing electrical energy from ocean and other waves at improved cost and efficiency are presented. The major innovations include capturing energy in two vectors simultaneously and connectedly, new applications of Bernoulli's principle, and an application of the breaker effect. The invention presents devices using related principles for use in surface and subsurface waves, and the placing of the devices in the water and wave farms. The full system of wave capture includes many connected parts and power generators. | FARB DANIEL | US11997906 | 2007/1/2 |
| 237 | Shape memory alloy actuated adaptive exhaust nozzle for jet engine | The proposed adaptive exhaust nozzle features an innovative use of the shape memory alloy (SMA) actuators for actively control of the opening area of the exhaust nozzle for jet engines. The SMA actuators remotely control the opening area of the exhaust nozzle through a set of mechanism. An important advantage of using SMA actuators is the reduction of weight of the actuator system for variable area exhaust nozzle. Another advantage is that the SMA actuator can be activated using the heat from the exhaust and eliminate the need of other energy source. A prototype has been designed and fabricated. The functionality of the proposed SMA actuated adaptive exhaust nozzle is verified in the open-loop tests. | Gangbing Song; Ning Ma | US11214418 | 2005/8/29 |
| 238 | Submerged Geo-Ocean Thermal Energy System | A system for generating electrical energy using a naturally occurring temperature difference is disclosed. The system provides electrical energy by thermally conduit a geothermal heat source and cold deep-level water to opposing sides of a thermoelectric element. The thermoelectric element generates electrical energy based on the temperature difference between these two surfaces. | John W Rapp; Robert James Howard; Nicholas J Nagurny | US12396349 | 2009/3/2 |

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| 239 | Structure and methods using multi-systems for electricity generation and water desalination | A pyramid-like structure consisting of a base and 3 or more side frames, each side frame forming an angle to the base. The pyramid-like structure having an enclosed space within and including a way to collect solar energy and to collect and transfer thermal energy from the sun; air suction mechanisms to take surrounding air into the enclosed space; a plurality of wind turbines; a Main Thermal Reservoir to take in and hold heat transfer medium, which is heated therein and then pumped to the top day tanks. The heat transfer medium is heated by a Heat Absorption and Transfer Layer through a network of pipes on the side frame back to the Main Thermal Reservoir, wherein thermal energy is collected, absorbed and transferred to the enclosed space of the pyramid, heating the enclosed space and within the air suction means, causing a temperature differential between the surrounding air and heated air inside the enclosed space of the pyramid to create a continuous flow of the heated air to turn the wind turbines. If desired, the thermal energy can be used to by a desalination system to process seawater into potable | Siong Cheak Mok | US11552097 | 2006/10/23 |
| 240 | Method and system for generating power from a heat source | A method of generating power from a heat source, said method including : compressing (10) a working fluid to increase its temperature; exchanging (11) heat between said working fluid and said heat source to superheat said working fluid; expanding (12) said superheated working fluid to drive a turbine, thereby reducing its temperature; condensing (13) said working fluid to further reduce its temperature : and returning said working fluid to said compressing step (10), the method further including the step (14) of regenerating the heat of said working fluid wherein working fluid passing between said compressing step (10) and said heat exchanging step (11) exchanges heat with working fluid passing between said expanding step (12) and said condensing step (13); wherein said steps are performed in a thermodynamic cycle (S1-S1′-S2-S3-S3′-S4) within a supercritical region (SC) above the saturation dome (A) of said working fluid, and wherein said heat regenerating step (14) is performed under isenthalpic conditions to induce continuous heat exchange. A system for generating power from a heat source is also provided. | Behdad Moghtaderi; Elham Doroodchi | US12227340 | 2007/5/14 |

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| 241 | Heat Transfer Methods for Ocean Thermal Energy Conversion and Desalination | A means is provided to produce fresh water from seawater on both the boiler side and the condenser side of an OTEC power plant. Part of the warm ocean surface water is evaporated, and its vapor transfers heat to the working-fluid boiler as the vapor condenses. The condensation of the vapor provides fresh water. On the condenser side, the condensation of the working-fluid vapor from the turbine in the condenser releases heat that evaporates seawater that runs down the outside of the condenser surfaces. The vapor from the seawater is condensed by a heat exchanger that uses input from colder seawater. As the cold seawater accepts heat from the condensing vapor, it becomes slightly warmer and provides the source of seawater that accepts heat from the condenser. The condensing vapor on the heat exchanger becomes fresh water that is drawn out as potable water. To provide additional fresh water, a multi-stage desalination unit uses the warm water discharge and the cold-water discharge from the OTEC plant to provide a temperature gradient that causes evaporation and condensation in each stage of the unit. | PRUEITT MELVIN L | US11860647 | 2007/9/25 |
| 242 | Micro Generator System | The present invention relates to a micro generator system which uses temperature difference (about 5˜10° C.) between skin and outside environment to allow an engine to drive microfluid flow as well as pass nanomagnetic particles within microfluid through coli to produce an inducing electricity. | FU JEN KAO | US12199228 | 2008/8/27 |
| 243 | CENTRIFUGAL SEPARATION OF | A system and process to extract one or more rare gases from a feed gas using a centrifuge. | HOWARD ROBERT J; RAPP JOHN W | US12139221 | 2008/6/13 |
| 244 | EXTRACTION OF NOBLE GASES FROM OCEAN OR SEA WATER | A process includes degassing ocean or sea water in an ocean thermal energy conversion (OTEC) system, and then extracting one or more noble gases from the out-gas of the ocean or sea water. An OTEC system capable of degassing ocean or sea water and extracting noble gases therefrom is also described. | HOWARD ROBERT J; RAPP JOHN W | US12130749 | 2008/5/30 |

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| 245 | THERMAL ENERGY STORAGE SYSTEMS AND METHODS | A thermal energy storage apparatus is disclosed. The thermal energy storage apparatus has a phase change medium. The thermal energy storage apparatus also has an inner manifold area having at least one inner feed port. The thermal energy storage apparatus also has an outer manifold area having at least one outer feed port and fluidically coupled to the inner manifold area. The inner manifold area and the outer manifold area are configured to be substantially immersed in the phase change medium. Methods of constructing and controlling embodiments of related thermal energy storage apparati are also disclosed, as well as embodiments of related heat exchangers. | FLYNN BRIAN J; GEIKEN GERALD | US12172673 | 2008/7/14 |
| 246 | FLUID PROPERTY REGULATOR | A self-sufficient material property profile regulation method and system, for adjusting fluid property profiles such as in an ocean of multiple property layers, is described. Using this Fluid Property Regulator, the property profiles of a non-enclosed material, including property profiles related to material density, chemical characteristics and space-time position, are affected due to motion of the material relative to a body in the flow stream. The state of other matter with which the initial material then makes direct or indirect contact is also affected. For example, in the case of a liquid such as an ocean current, the temperature, salinity, nutrient content and other properties may be destratified (i.e. layers being combined) as the system lifts large quantities of deep water and combines this material with surface water in the downstream far-field region of the system. The resulting regulation of such ocean water property profiles may then also indirectly affect the properties of the atmosphere above the ocean so that the system can be said to affect planetary properties both oceanic and atmospheric. Rather than merely discharging a pumped material, such as cold water that might quickly re-submerge, the system regulates lasting property profiles. The new Fluid Property Regulator system described in this invention regulates material properties to produce desired outcomes such as increased food and energy production as well as to prevent undesirable outcomes such as hurricanes, elevated planetary temperatures, decreased planetary ice sheet size, raised sea level and glacial freshwater incursions that can halt important major currents. | CANNON DAVID J | US12118668 | 2008/5/9 |

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| 247 | Ship propulsion system with cooling systems for the stator and rotor of the synchronous machine of the propulsion system | Disclosed is a ship propulsion system comprising a synchronous machine (6) with an especially superconducting rotor winding that is to be subjected to intense cooling and a normally conducting stator winding (11) which is to be cooled. The stator winding (11) is disposed at least in part inside a support structure (14) encompassing a hollow cylindrical magnetically soft outer body (13) and web-type support teeth (21i) that extend in an axial and radial direction. A hollow cylindrical part (15a) of an exterior housing (15) encloses the outer body (13). In order to cool at least some areas of said housing part (15a), the stator winding (11) is thermally coupled to water as a cooling medium (K) via the support structure (14) and the housing part (15a). | Norbert Huber; Jürgen Rieger; Wolfgang Schmidt; Bernd Wacker; Joachim Frauenhofer; Wolfgang Rzadki | US10557555 | 2004/5/12 |
| 248 | Modular vertical floating pipe | Modular vertical floating pipe comprising a plurality of modules, each module formed by (a) two pipe segments of slightly different diameter, the lower segment with the smaller diameter segment joined by a collar with the upper pipe segment and (b) an annular floater of such dimensions that could slide up only in the lower vertical segment. A longer pipe would be formed by inserting one module on top of another, and repeating the operation until all modules have been utilized. The additional weight of a new module will be pushing the section of the pipe already formed down. The difference in diameter between the upper and lower segments will allow the pipe to bend with undersea currents. Appropriate seals will dampen the bending movements and cabling supporting a weight attached to cabling guides will prevent disengagement of the modules. By tying the cable to the top floater, the long pipe could be lowered and disconnected from the platform, allowing the platform and the pipe to ride a threatening storm independently. | SAUCEDO EDUARDO; SAUCEDO RAUL AGUSTIN; BARNES FRANCISCO JOSE | US11079200 | 2005/3/15 |
| 249 | Process and System for producing synthetic liquid hydrocarbon fuels | A process for producing synthetic hydrocarbons that reacts carbon dioxide, obtained from seawater of air, and hydrogen obtained from water, with a catalyst in a chemical process such as reverse water gas shift combined with Fischer Tropsch synthesis. The hydrogen is produced by nuclear reactor electricity, nuclear waste heat conversion, ocean thermal energy conversion, or any other source that is fossil fuel-free, such as wind or wave energy. The process can be either land based or sea based. | Dennis R Hardy; Timothy Coffey | US11108149 | 2005/4/12 |

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| 250 | TRANSPORTABLE GAS-TO-LIQUIDD PLANT | A transportable GTL processing facility constructed on an inland barge is provided. Also provided is a process for producing liquid hydrocarbons from natural gas utilizing a transportable GTL processing facility. The facility and process may be used to access and convert stranded natural gas in an economical fashion into liquid hydrocarbons. Further provided is a transportable GTL processing facility and process for producing liquid hydrocarbons wherein the liquid hydrocarbons are upgraded into transportation fuels and other locally usable materials. Water facilities of the transportable GTL processing facility are supplied from the sea near the barge. | Kenneth Agee; Juan Inga; John Hutton; Ed Sheehan; Ad van Loenhout; Linda Zeelenberg; Arjan Gerritse; Peter van Sloten | US11855619 | 2007/9/14 |
| 251 | Integrated OTEC platform | An integrated platform to house an ocean thermal energy conversion (OTEC) system that utilizes : (i) a cold water circuit consisting of a way of receiving and distributing the cold water from the cold water pipe (CWP) to vertical conduits housing the condensers into collectors that discharge via large pumps into open discharge channels connected to the discharge water pipe (DWP); (ii) a surface water circuit consisting of a way of collecting and distributing the surface water to vertical conduits housing the evaporators to surface water collectors that discharge via large pumps into the same discharge channels connected to the DWP; (iii) means of adjusting the buoyancy of the integrated platform by adding water as ballast into floatation chambers in the hull surrounding the discharge channels or in a plurality of either vertical or horizontal flotation chambers to provide protection to the CWP and DWP and stability to the integrated platform. By adjusting the buoyancy of the platform such that the collectors are about level with the sea level, pumping requirements are minimized. | SAUCEDO EDUARDO | US11165277 | 2005/6/24 |
| 252 | Temperature equilibrating methodology & installation with water supply | A closed piping comprised of ground water pipe of a water supply system buried in the stratum and a closed water pipe provided on the ground to execute thermal conduction for equilibrating temperature from the thermal energy in the deeper stratum to a subject matter on the ground by the current running in the closed water pipes. | YANG TAI HER | US11489542 | 2006/7/20 |

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| 253 | HEAT TRANSFER FOR OCEAN THERMAL ENERGY CONVERSION | For OTEC (Ocean Thermal Energy Conversion), rather than transfer huge quantities of cold water from deep in the ocean to the surface to provide a heat sink for a heat engine or for desalination, this invention provides a method of using small masses of low-boiling-point fluids to absorb heat in a heat exchanger near the ocean surface using the latent heat of evaporation and then depositing the latent heat of condensation in a deep ocean heat exchanger, using the cold seawater as a heat sink. The condensed liquid is pumped back to the ocean surface. The heat engine (turbine) and generator can be at the ocean surface, or it can be in deep ocean. By using a fluid that transfers heat by evaporation and condensation, much larger quantities of heat can be moved per kilogram of fluid than can be transferred by moving the same mass of seawater. | PRUEITT MELVIN L | US11755138 | 2007/5/30 |
| 254 | RELOCATABLE WATER PUMP STATION FOR AND METHOD OF DANGEROUS NATURAL PHENOMENA | The present invention proposes to apply against dangerous natural phenomena (mainly hurricane) relocatable water pump stations using wave energy and having two states : operating state (for cold water pumping) and collapsed state (suitable for transportation). In collapsed state these stations have a severe less cross-section at least in one of horizontal directions. Such stations include reconfiguration means for theirs transforming from one said state to the second state and back. | FELDMAN BORIS; FELDMAN ALEXANDER; FELDMAN MICHAEL | US11438138 | 2006/5/22 |
| 255 | Differential temperature energy harvesting in a fuel cell powered underwater vehicle | A method and apparatus for harvesting energy in a fuel cell powered vehicle has first and second energy harvesting elements with at least two ends, the first end being electrically insulated from and in thermal communication with a high temperature reservoir associated with the fuel cell, the second end being electrically insulated from and in thermal communication with a low temperature reservoir associated with an exterior of the vehicle. The apparatus has particular utility for use in watercraft, specifically an underwater vehicle. The energy harvesting apparatus can include an electrical storage means for storing the energy harvested, and/or an electric load for consuming the energy harvested. | Michael Richard Durling; Benjamin Walter Hojnacki | US11296167 | 2005/12/7 |

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| 256 | Subsea Power Supply | The present invention discloses a subsea power system for use in capturing "free" or "waste" energy (e.g., thermal, geothermal, pressurized subsurface gases or liquids, wind, wave, solar, or other free, waste, or low cost energy sources) to convert and/or store to power a subsea service or device during times when the free or waste energy supply is not as abundant, is not available, or demands require greater output than is provided at steady state. The subsea power system may include : (1) one or more energy-capturing devices—such as a turbine and/or thermoelectric generator—for harvesting free or waste energy, (2) a fuel cell, electrolyzer, and oxygen and hydrogen storage vessels for harvesting energy from the surrounding seawater, and (3) a power converter for receiving energy from the various sources and converting the energy into a useful form consumable by subsea devices. | Eric Smedstad | US10907112 | 2005/3/21 |
| 257 | Ship propulsion system with cooling systems for the stator and rotor of the synchronous machine of the propulsion system | Disclosed is a ship propulsion system comprising a synchronous machine (6) with an especially superconducting rotor winding that is to be subjected to intense cooling and a normally conducting stator winding (11) which is to be cooled. The stator winding (11) is disposed at least in part inside a support structure (14) encompassing a hollow cylindrical magnetically soft outer body (13) and web-type support teeth (21i) that extend in an axial and radial direction. A hollow cylindrical part (15a) of an exterior housing (15) encloses the outer body (13). In order to cool at least some areas of said housing part (15a), the stator winding (11) is thermally coupled to water as a cooling medium (K) via the support structure (14) and the housing part (15a). | Joachim Frauenhofer; Norbert Huber; Jurgen Rieger; Wolfgang Rzadki; Wolfgang Schmidt; Bernd Wacker | US10557555 | 2004/5/12 |
| 258 | Power plant system for utilizing the heat energy of geothermal reservoirs | A geothermal power plant system for producing electricity and process heat at least one compressed gas storage device and at least one gas compression device connected to the at least one compressed gas storage device. At least one gas utilization device is connected to the at least one compressed gas storage device. At least one device for utilizing renewable energy such as of solar energy, wind energy, hydropower, ocean thermal energy, ocean waves, ocean current and tidal current, ambient heat or cold is provided. | PFLANZ TASSILO | US11019216 | 2004/12/23 |

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| 259 | Transportable gas-to-liquid plant | A transportable GTL processing facility constructed on an inland barge is provided. Also provided is a process for producing liquid hydrocarbons from natural gas utilizing a transportable GTL processing facility. The facility and process may be used to access and convert stranded natural gas in an economical fashion into liquid hydrocarbons. Further provided is a transportable GTL processing facility and process for producing liquid hydrocarbons wherein the liquid hydrocarbons are upgraded into transportation fuels and other locally usable materials. Water facilities of the transportable GTL processing facility are supplied from the sea near the barge. | AGEE KENNETH; INGA JUAN; HUTTON JOHN; SHEEHAN ED; VAN LOENHOUT AD; ZEELENBERG LINDA; GERRITSE ARJAN; VAN SLOTEN PETER | US11353916 | 2006/2/14 |
| 260 | Method and device for converting heat into mechanical work | A novel method converts heat into mechanical work. In a cyclic process, a working medium is compressed while giving off heat and it is subsequently brought in thermal contact with the surroundings via a first heat exchanger. Then it is expanded while obtaining mechanical work, whereupon the cyclic process is run through once more. A high degree of efficiency is achieved by virtue of the fact that the working medium, after expansion, is guided through another heat exchanger, which is situated inside a rapidly rotating rotor and which, on the exterior thereof, is surrounded by at least one substantially annular gas space from whose exterior heat is dissipated. There is also disclosed a device for carrying out the novel method. | CHRISTIAN VOLKL; RUDOLF HIRSCHMANNER | US10584759 | 2006/7/21 |
| 261 | Wind energy system with intercooling, refrigeration and heating | A wind energy generating and storage system includes at least one direct compression windmill station that with an intercooler. Direct compression is direct rotational motion of a shaft or a rotor coupled to one or more compressors. A storage device coupled to the windmill station. At least a first compressor is coupled to the storage device to compress or liquefy air, or to drive any process to make liquefied air. The compressor has a fluid intake opening and a fluid exhaust opening. The compressor operates at a pressure of about 10 to 100 atmospheres. Rotation of a turbine drives the compressor. At least one expander is provided that releases compressed or liquid air from the storage device. A generator converts the compressed or liquid air energy into electrical energy. | INGERSOLL ERIC; MARCUS DAVID | US11437423 | 2006/5/19 |

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| 262 | Wind generating and storage system with a windmill station that has a pneumatic motor and its methods of use | A wind energy generating and storage system includes at least one direct compression windmill station that with a pneumatic motor. Direct compression is direct rotational motion of a shaft or a rotor coupled to one or more compressors. A storage device coupled to the windmill station. At least a first compressor is coupled to the storage device to compress or liquefy air, or to drive any process to make liquefied air. The compressor has a fluid intake opening and a fluid exhaust opening. Rotation of a turbine drives the compressor. At least one expander is provided that releases compressed or liquid air from the storage device. A generator converts the compressed or liquid air energy into electrical energy. | INGERSOLL ERIC | US11437406 | 2006/5/19 |
| 263 | Method of creating liquid air products with direct compression wind turbine stations | A method of creating liquid gas uses a wind energy system is provided that has a plurality of direct compression wind turbine stations. Direct compression is direct rotational motion of a shaft or a rotor coupled to one or more compressors. Wind energy is collected from the plurality of direct compression wind turbine stations. Compressed air is created with at least a portion of the wind energy. Liquid gas is created with at least a portion of the compressed air. | INGERSOLL ERIC | US11437408 | 2006/5/19 |
| 264 | Solar thermal energy conversion system | A solar cell floats over a body of saline water. A submerged fresh water collection system underlies the cell. A partial vacuum is created in the solar cell for drawing water vapor from the cell to the collection system. Water vapor is condensed in a condenser disposed between the cell and the collection system. Heat generated by the condensation of water vapor is utilized to heat the salt water, which rises upwardly to replace the salt water vaporized in the cell. The fresh water from the fresh water collection system is routed under the cell such that it becomes thermally enriched. The thermally enriched fresh water is provided to a power generator to improve efficiency. | BATTAH HAMMAM JAMIL GIRGIESS | US10378491 | 2003/3/3 |

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| 265 | Method and device for compensation of the thermal expansion of a cellular wheel sluice rotors | The invention relates to a cellular wheel sluice for the feeding of hot bulk material with stabilization of the radial play between the rib ends of the cellular wheel and the wall of the case borehole by means of the combination of materials of different thermal expansion coefficients, whereby for stabilization of the radial play between the walls of the cellular wheel and the case wall its changes of diameter caused by heat are compensated. In a first embodiment each wall of the cellular wheel is composed of plate-shaped parts running parallel to one another of variable thermal expansion, whereby the displacement body with the greatest temperature expansion coefficient is shorter in its axial length than the axial length of the cellular wheel ribs and is arranged in such a way that the axially spaced fastening elements are not frictionally connected. In a second embodiment the end strips used for sealing the gap in their radial expansion are fixed in a retention body with slight thermal expansion coefficient and therefore are always kept at a temperature-independent constant external diameter spaced apart from the cellular wheel shaft. | HEEP DIETER | US11212129 | 2005/8/25 |
| 266 | Tidal irrigation and electrical system (TIES) | A tidal irrigation and electrical system used to harness the power of the ocean tide to generate electricity, create sustainable aquaculture, act as a CO2 sink, and generate hydrocarbons. An artificial atoll is created on the continental shelf to define a lagoon completely isolated from the surrounding ocean. As the tides rise and fall, the natural tidal action draws nutrient-rich, cold seawater into the lagoon to stimulate the growth of biolife. As the ocean tide falls, the natural tidal action draws the lagoon water out of the lagoon and through a biofilter to remove the biolife prior to discharge of the water back to the ocean. | SHERMAN MARTIN T | US10401205 | 2003/3/27 |

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| 267 | Phase change material thermal capacitor clothing | An apparatus and method for metabolic cooling and insulation of a user in a cold environment. In its preferred embodiment the apparatus is a highly flexible composite material having a flexible matrix containing a phase change thermal storage material. The apparatus can be made to heat or cool the body or to act as a thermal buffer to protect the wearer from changing environmental conditions. The apparatus may also include an external thermal insulation layer and/or an internal thermal control layer to regulate the rate of heat exchange between the composite and the skin of the wearer. Other embodiments of the apparatus also provide 1) a path for evaporation or direct absorption of perspiration from the skin of the wearer for improved comfort and thermal control, 2) heat conductive pathways within the material for thermal equalization, 3) surface treatments for improved absorption or rejection of heat by the material, and 4) means for quickly regenerating the thermal storage capacity for reuse of the material. Applications of the composite materials are also described which take advantage of the composite's thermal characteristics. The examples described include a diver's wet suit, ski boot liners, thermal socks, gloves and a face mask for cold weather activities, and a metabolic heating or cooling blanket useful for treating hypothermia or fever patients in a medical setting and therapeutic heating or cooling orthopedic joint supports. | BUCKLEY THERESA M | US09989913 | 2001/11/20 |
| 268 | Thermal barrier coating material method of production thereof, gas turbine member using the thermal barrier coating material, and gas turbine | The invention relates to a thermal barrier coating material for coating a gas turbine member that provides a higher thermal barrier property and a higher peeling resistance. In a first aspect of the invention, a metal binding layer 22 and a porous ZrO2-based ceramic layer 23 are laminated successively on a base material 21, and microcracks that extend in the thickness direction are formed in the ceramic layer 23. After laminating the ceramic layer 23 on the metal binding layer 22 by thermal spraying, etc., microcracks 24 are formed by irradiating with a laser beam a surface of the ceramic layer 23 and thereby heating the surface of the ceramic layer 23 at 1000° C. to 1700° C., while cooling the rear surface of the base material 21. Thus, microcracks 24 are formed by a heating and cooling cycle. | TORIGOE TAIJI; MORI KAZUTAKA; OKADA IKUO; AOKI SUNAO; TAKAHASHI KOUJI; OHARA MINORU; HIRATA TAKEHIKO; KANEKO HIDEAKI | US10478690 | 2003/12/8 |

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| 269 | Article and method for temperature regulation using a thermosensitive reactive hydrogel material | A temperature regulation and flow control device is described. A web of material, e.g., for a wet suit, has a layer of gel particles embedded in a flow control layer, preferably a foam matrix. A water permeable neoprene layer covers the flow control layer and allows water to enter the suit. The flow of water in the suit is regulated by the expansion and contraction of the gel as it undergoes a volume phase transition in response to a change in temperature. When the diver is in cold water, the cold water enters the foam substrate and the gel expands, causing permeability (i.e., flow) to decrease. Flow is restricted in response to cooling, and the foam substrate expands and tightens the fit of the wet suit. In warmer water, an opposite effect occurs, whereby the gel contracts and flow increases. The gel contracts relaxing the fit of the suit. A gel having a particular volume phase transition critical temperature is selected in order to maintain body temperature in a particular environment. This technology also can be used to control temperature in other applications. | Mide Technology Corporation | US10730161 | 2003/12/8 |
| 270 | Hardened voyage data recorder | A hardened voyage data recorder includes two subsystems : a removable non-volatile memory and a base containing electronics and firmware for communicating with data sensing systems and for accessing the memory. According to the invention, the memory is protected in a "boiler" and the electronics includes an ETHERNET interface for connecting to shipboard data acquisition devices. The firmware is preferably configured via web pages. A communications protocol for communicating with the recorder is also disclosed. | L 3 Communications Corporation | US09899647 | 2001/7/6 |

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| 271 | Article and method for temperature regulation using a thermosensitive reactive hydrogel material | A temperature regulation and flow control device is described. A web of material, e.g., for a wet suit, has a layer of gel particles embedded in a flow control layer, preferably a foam matrix. A water permeable neoprene layer covers the flow control layer and allows water to enter the suit. The flow of water in the suit is regulated by the expansion and contraction of the gel as it undergoes a volume phase transition in response to a change in temperature. When the diver is in cold water, the cold water enters the foam substrate and the gel expands, causing permeability (i.e., flow) to decrease. Flow is restricted in response to cooling, and the foam substrate expands and tightens the fit of the wet suit. In warmer water, an opposite effect occurs, whereby the gel contracts and flow increases. The gel contracts relaxing the fit of the suit. A gel having a particular volume phase transition critical temperature is selected in order to maintain body temperature in a particular environment. This technology also can be used to control temperature in other applications. | Mide Technology Corporation | US09840836 | 2001/4/24 |
| 272 | Convective power generating method and device | A method for improving the efficiency of power generation in a method for power generation comprising forcefully forming an ascending gas flow channel and a descending gas flow channel within a closed zone with a gas sealed therein, generating a whirling flow by the synergistic interaction of both and rotating a turbine by the whirling flow to generate electric power as well as a device for realizing the same. A whirling flow to rotate fans (3, 4) is generated by installing a cylindrical rotor (2) between the ascending gas flow channel and the descending gas flow channel. Optionally, a second cylindrical rotor (12) is further installed between the ascending gas flow channel and the partition wall isolating the closed zone from outside so as to reduce the friction between the ascending gas flow and the descending gas flow. And, the present invention is suitable as a method for power generation by utilizing, for example, a temperature difference occurring in nature. | ABE TOSHIHIRO | US10239689 | 2002/9/25 |

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| 273 | Shore-based ocean thermal gradient hydraulic power plant | The present patent introduces an alternative construction to my concept of an Ocean Thermal Gradient Hydraulic Power Plant (OTGHPP), U.S. Pat. No. 6, 202, 417 of Mar. 20, 2001, in the form of an intake pump furnishing sea water to the intake nozzle of the Steam Lift Pump (SLP) under sufficient volume and pressure to achieve an optimum flow and working head on the OTGHPP's hydraulic turbine without deep immersion of the nozzle, as normally would be useful for plants sited in deep water. | BECK EARL J | US10046047 | 2002/1/15 |
| 274 | Closed loop control of volatile organic compound emissions from the tanks of oil tankers, including as may be simultaneously safeguarded from spillage of oil by an underpressure system | Upon loading of oil cargo the ullage space of a tank of an oil tanker is sealed substantially gas tight with the gaseous contents of the ullage space both (i) initially inerted so as to be incapable of supporting combustion of any oil within the tank, and (ii) at an initial pressure less than atmosphere. The tank is preferably continued closed, preferably optionally with closed loop recirculation for purposes of gas mixing, for the entire voyage of the tanker save that (1) ullage space gas pressure uncommonly exceeds limits because of any of (i) leakage of atmospheric gases into the tank, and/or (ii) outgassing of gases within the oil contents of the tank, (iii) evaporation of the oil or portions thereof, and/or (iv) expansion of the ullage space gases upon thermal heating, and/or (2) free oxygen within the ullage space gases exceeds limits because of any leakage of atmospheric gases into the tank, at which time the tank is re-inerted, preferably with flue gases, or again de-pressurized, as and when required. Normally ullage space gas pressure remains, nonetheless to potentially becoming more positive, suitably negative throughout the entire voyage of the tanker, continuously preventing that hydrostatic pressure within the tank should equalize with a surrounding ocean upon any occasion of incipient rupture of the tank below the water line and thus continuously precluding at least some outflow of oil as would otherwise occur upon the occasion of the rupture. Normally free oxygen within the ullage space gases remains, nonetheless to potentially increasing, suitably low throughout the entire voyage of the tanker so as to prevent that combustion should occur | MH Systems Corporation | US09865414 | 2001/5/25 |

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| 275 | Method for adjusting the recirculating air fraction of the inlet air delivered to a vehicle passenger compartment | Disclosed is a heating and/or air-conditioning system for a vehicle and a method for adjusting a recirculating air fraction of the inlet air delivered to a passenger compartment of a vehicle in order to avoid exceeding a predetermined limit value of at least one air parameter, in particular the carbon dioxide fraction and/or the humidity in the passenger compartment air. The method provides that one or more secondary parameters be obtained and analyzed for indirect determination of the air parameter, and that the recirculating air fraction be adjusted as a function of the analysis. | BEHR GmbH Co | US10164312 | 2002/6/7 |
| 276 | Composite buoyancy module | A buoyancy system for a deep water floating platform includes at least one composite buoyancy module coupled to the a riser having a length greater than 1000 feet and an associated weight. The composite buoyancy module is sized to have a volume to produce a buoyancy force at least as great as the weight of the riser. The composite buoyancy module may include a vessel with a composite vessel wall. The buoyancy module or vessel may have a non-circular cross-section defining an area which is greater than approximately 79 percent of an area defined by a square with sides tangent to the vessel wall to maximize buoyancy. A second buoyancy module may be directly coupled to the first buoyancy module to achieve a desired buoyancy. | EDO Corporation | US09691315 | 2000/10/18 |

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| 277 | Ocean water pressure energy generation system | A rigid cylinder structure is vertically positioned at sea bottom, so that the top of the cylinder's surface is at a depth of 300 meters below sea surface. This surface constitutes the upper face of a piston which moves within the cylinder, when it is exposed periodically by way of a shiftable opening & closing valve, which is located at the top of the cylinder, it intervenes, then exposes the piston at regular intervals to sea water pressure of 30 atm. Being basically a Pascal Hydrolic system, this pressure is transmitted through a pipe to a larger area piston, but in addition to the Pascal system, the multiplied pressure is in turn is used to pressurize a gas above it & compresses it to {fraction (1/9)} of it's initial volume. The result of compression is a 14 fold temperature increase-adiabatic. The high pressure & high temnperature as is then contained in a closed cycle second upper volume, which has just the exact dimensions for the gas which is compressed to {fraction (1/9)} of its initial volume. Here, the temperature & pressure is maintained constant as a result of a special valve & repeated compressions which supply additional pressure, which at each compression peak, lets pressure input in, but does not let a pressure loss when large piston makes its downward, hence decompression motion. Also within this volume is the spiraling pipe which attains thermal equilibrium within this space which contains the working gas. And the working gas, which has no condensation throughout the repeated cycles turns the turbines. Having no condensation & on the contrary being very strongly insulated, system eliminates the loss of internal energy. The minor loss of internal energy is more than compensated with each compression.<br>Compressing a gas repeatedly every 40 minutes, to a fraction of it's initial volume & thereby to increase the temperature of the gas without any burning process & hence without any exhaust-greenhouse gas | ZAPTCIOGLU FIKRET M | US09818224 | 2001/3/28 |

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| 278 | Device for monitoring the anchor or anchor chain | A device for monitoring the anchor or anchor chain, intended for facilities floating ahead of the anchor, such as ships, comprising a measurement device which determines by one or more sensors the prevailing state at one or more points of an anchor chain or anchor, between the anchor chain and a ship, or between the anchor and the ship, then generates an electrical signal representative of the strength to a transmitter which, upon reception of the signal transmitted by the measurement device, sends a corresponding signal. An alarm system receives the signal sent by the transmitter and triggers an alarm if the measured state exceeds a set value. | Deep Blue Technology AG | US09422866 | 1999/10/21 |
| 279 | Boiler for a hardened voyage data recorder | A hardened voyage data recorder includes two subsystems : a removable non-volatile memory module and a base containing electronics and firmware for communicating with data sensing systems and for accessing the memory. According to the invention, the memory is a stacked BGA memory protected in a "boiler" which is designed to tolerate a low temperature fire environment for a relatively long term. The boiler and the memory module subsystem are designed to withstand penetration forces associated with marine accidents. Cabling from the memory is arranged so that the structural integrity of the boiler is not compromised. | PURDOM GREGORY W | US09899646 | 2001/7/6 |
| 280 | Thermal control apparatus for high pressure product swivel | In a fluid swivel with at least an outer housing and an inner housing, the temperature of both inner and outer housings are measured. When the temperature of the inner housing is greater than the temperature of the outer housing, a heating element elevates the temperature of the outer housing. | FMC Technologies Inc | US10004743 | 2001/12/4 |
| 281 | Tidal irrigation and electrical system (TIES) | The purpose of this tidal irrigation and electrical system (TIES) is to harness the power of the tide to generate electricity, create sustainable aquaculture and generate hydrocarbons and/or ethonals and/or other products derived from biomass, all the while furnishing a CO2 sink. | SHERMAN MARTIN | US09810128 | 2001/3/19 |

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| 282 | Ocean power plant inlet screen | An inlet screen for an ocean thermal power plant has an outer side parallel to the ocean current and a plurality of parallel bars extending at an acute angle to the horizontal, wherein the acute angle opens toward the upstream direction of the current. The total area of through openings in the inlet screen receive the predetermined flow requirement of the power plant at a velocity no greater than 0.5 feet per second, so that fish are not sucked against the screen. The vertical spacing between the bars is no greater than one-half of the inner diameter of tubes in heat exchangers in the plant. The spacing between bars is at a minimum at the outer side of the screen, and the spacing increases between the outer side and the inner side, so that objects do not become wedged between the bars. The inlet screen extends sufficiently below the ocean level to accommodate the plant's water flow requirement at a velocity of no greater than 0.5 feet per second, and extends sufficiently above the ocean level to dissipate the energy of ocean waves as they strike walls of the plant, so that the total form of the waves on the plant is reduced. | Sea Solar Power Inc | US09832788 | 2001/4/12 |

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| 283 | Hydrogen and oxygen battery, or hudrogen and oxygen to fire a combustion engine and/or for commerce. | The present invention is directed to a method of and an apparatus for the disassociation of water into hydrogen and oxygen via a thermolysis, heat/ignition process. The hydrogen and oxygen produced may be burned as fuel in a hydrogen thermolysis reactor to provide propellant for a turbine or to provide heat to generate steam for a steam engine or may be combusted in a combustion engine. The present invention can produce heat for space heat for buildings and for manufacturing, etc. or can produce mechanical drive that can generate electricity, power hydraulic systems, or provide thrust to propel airplanes, spaceships, rockets or submarines (which have their own oxygen supply for combustion in outer space or underwater from the oxygen contained in the water converted into hydrogen and oxygen) and can provide the energy needed to power automobiles, trucks, buses, trains, boats, etc. A heat/ignition process is utilized to accomplish complete thermolysis and burning of water : A thermolysis coil located at the core of the hydrogen thermolysis reactor preheats the water under pressure until it reaches a temperature of approximately 2500 deg. F., without intense pressure the water would become gaseous; and, the water is heated by a resistance electrical current or by masers and/or by lasers before it is ejected from the coil and becomes heated to approximately 5000 deg. F. Most of the water will dissociate into hydrogen and oxygen within the liquid state due to extreme temperature and pressure, according to the Second Law of Thermodynamics; and, in the final step the water is ejected from the high-pressure, high-temperature thermolysis coil into a vacuum zone of negative-pressure and high-temperature created by a hydraulically operated vacuum turbine within the thermolysis nozzle and is transformed into fuel plasma containing atomic hydrogen and atomic oxygen. The plasma passes through an electric arc capable of | HUNT ROBERT DANIEL | US09774110 | 2001/1/31 |
| 284 | Cyclonic ejection pump | A cyclonic ejection pump is designed for large flow rates, for example, applicable to the so-called “Oceanic Thermal Energy Conversion, ” normally abbreviated to OTEC, an energy generating system developed for utilizing the potential thermal oceanic energy as well as for those applications for which a large capacity is required, such as the propelling of vessels. The pump is also able to function as a non-return valve. | BEERLINGS SCIPIO P S | US09508267 | 2000/9/18 |

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| 285 | Process and system for preventing the evaporation of a liquefied gas | A device is disclosed for preventing the evaporation of a liquefied gas stored in an impervious and thermally insulating tank built into a bearing structure of a ship or located in a set of floating or land-side storage tanks. The device passes a fluid refrigerant through the mass of liquefied gas to cool the mass to a temperature slightly below its reference storage temperature. By so doing, the refrigerant compensates for the heating of the mass, due to thermal leaks within the insulating tank, during the transport or storage of the liquefied gas. | Gaz Transport et Technigaz | US09395250 | 1999/9/13 |
| 286 | Method of reducing infrared viewability of objects | A method of camouflaging an object emitting infrared radiation by absorbing radiation or by altering its emissive pattern reduces its viewability by an infrared detector. An infrared radiation absorbing and/or altering layer containing microcapsules (10) is positioned proximate the infrared radiation source. The radiation is absorbed by means of a phase change material or plastic crystals. Concentrations and/or phase change materials are varied to enhance camouflage. | MCKINNEY RICHARD A; BRYANT YVONNE G; COLVIN DAVID P | US09374361 | 1999/8/13 |
| 287 | Hydrogen-based ecosystem | A complete infrastructure system for the generation, storage, transportation, and delivery of hydrogen which makes a hydrogen ecosystem possible. The infrastructure system utilizes high capacity, low cost, light weight thermal hydrogen storage alloy materials having fast kinetics. Also, a novel hydrogen storage bed design which includes a support/heat-transfer component which is made from a highly porous, high thermal conductivity, solid material such as a high thermal conductivity graphitic foam. Finally a material including at least one particle having atomically engineered local chemical and electronic environments, characterized in that the local environments providing bulk nucleation. | Energy Conversion Devices Inc | US09444810 | 1999/11/22 |

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| 288 | Hydrogen-based ecosystem | A complete infrastructure system for the generation, storage, transportation, and delivery of hydrogen which makes a hydrogen ecosystem possible. The infrastructure system utilizes high capacity, low cost, light weight thermal hydrogen storage alloy materials having fast kinetics. Also, a novel hydrogen storage bed design which includes a support/heat-transfer component which is made from a highly porous, high thermal conductivity, solid material such as a high thermal conductivity graphitic foam. Finally a material including at least one particle having atomically engineered local chemical and electronic environments, characterized in that the local environments providing bulk nucleation. | OVSHINSKY STANFORD R; YOUNG ROSA T | US09871449 | 2001/5/31 |
| 289 | Gas turbine moving blade | Gas turbine moving blade is improved so as to prevent occurrence of cracks caused by thermal stresses due to temperature differences between blade and platform when gas turbine is stopped. In steady operation time of moving blade (20), cooling air (40 to 43) enters cooling passages (23 to 26) to flow through cooling passages (23a, 24a to 24c, 25a to 25c) for cooling the blade (20) to then flow out of the blade (20). Recessed portion (1) having smooth curved surface is provided in platform (22) near blade fitting portion on blade trailing edge side. Fillet (R) of the blade fitting portion on the blade trailing edge side is formed with curved surface having curvature larger than conventional case. Hub slot below the fillet (R) for blowing air is formed having slot cross sectional area larger than other slots of blade trailing edge. TBC is applied to blade (20) surface. By these improvements, thermal stresses due to temperature differences between the blade (20) and the platform (22) in gas turbine stop time are made smaller and occurrence of cracks is | TOMITA YASUOKI; HASHIMOTO YUKIHIRO; SUENAGA KIYOSHI; ARIMURA HISATO; TORII SHUNSUKE; KUBOTA JUN; SHIROTA AKIHIKO; AOKI SUNAO; ISHIGURO TATSUO | US09790975 | 2001/2/23 |

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| 290 | Steam phase change waterjet drive | A waterjet drive engine for the propulsion of large ships includes an elongated water conduit having a rearwardly directed exhaust portal, a forward extremity having a water intake portal, and a middle portion of larger diameter than the diameter of the exhaust portal. A hollow axially symmetrical chamber is centrally positioned within the middle portion, defining therewith an annular interstitial zone through which ambient water is caused to flow. A shaft driven by the ship's power system extends into the chamber and is provided with a circular array of propulsion blades positioned within the interstitial zone and adapted to force water rearwardly. A plurality of nozzles enter the chamber and direct high pressure steam toward the exhaust portal. The effect of the steam is to add an augmenting force to the rotative motion of the shaft. | CORLISS JOSEPH J | US09505832 | 2000/2/17 |
| 291 | Ocean thermal gradient hydraulic power plant | The present patent incorporates major improvements and simplifications of 1976 U.S. Pat. No. 3, 967, 449 necessary to make the concept functional and useful on a large scale. The earlier patent listed many approaches to the several design problems believed to be necessary at the time of the earlier application, while this one reflects the extensive research and laboratory investigation to identify, validate and demonstrate the functionality of the various parts. In particular, the methods for producing the necessary nuclei for steam bubble production, the method of insuring bubble growth, the method of condensing the steam bubbles produced and methods for minimizing the release of air in large bubbles, and for dealing with those that are released are covered in detail. The first patent, with 50 claims listed many approaches to many problems, some of which were either misunderstood from an unsatisfactory literature or unnecessarily complicated. To an extent those have been eliminated, resulting in what appears to be the simplest embodiment of the concept. | BECK EARL J | US09327436 | 1999/6/8 |

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| 292 | Flexible composite material with phase change thermal storage | A highly flexible composite material having a flexible matrix containing a phase change thermal storage material. The composite material can be made to heat or cool the body or to act as a thermal buffer to protect the wearer from changing environmental conditions. The composite may also include an external thermal insulation layer and/or an internal thermal control layer to regulate the rate of heat exchange between the composite and the skin of the wearer. Other embodiments of the PCM composite also provide 1) a path for evaporation or direct absorption of perspiration from the skin of the wearer for improved comfort and thermal control, 2) heat conductive pathways within the material for thermal equalization, 3) surface treatments for improved absorption or rejection of heat by the material, and 4) means for quickly regenerating the thermal storage capacity for reuse of the material. Applications of the composite materials are also described which take advantage of the composite's thermal characteristics. The examples described include a diver's wet suit, ski boot liners, thermal socks, , gloves and a face mask for cold weather activities, and a metabolic heating or cooling blanket useful for treating hypothermia or fever patients in a medical setting and therapeutic heating or cooling orthopedic joint supports. | BUCKLEY THERESA M | US09467990 | 1999/12/20 |
| 293 | Fisherman refrigerating device using engine exhaust | The invention is a fisherman refrigerating device using engine exhaust, which comprises a refrigerating tub, a storage bottle of the coolant liquid ammonia, a condenser and two generators whose guiding pipe is connected to the inlet of the condenser via a valve. The outlet connects to the coolant inlet of the storage bottle, the coolant outlet of the storage bottle then connects to the inlet of the vaporizer through a flux control valve. The vaporizer outlet connects to the guiding pipe of the generators by a valve, the outer case of the generator has an engine exhaust pipe and an inner pipe on it. An inner tube with apertures and calcium chloride are between those pipes, and the inner tube connects to the guiding pipe. A sprinkling tube sits above the inner pipe and the outer case has a water pipe connector. | LI DING YU | US09363293 | 1999/7/28 |

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| 294 | Passive thermal capacitor for cold water diving garments | A thermal liner in a diving suit has a layer of incompressible phase change materials for storing latent heat energy and for later releasing the stored energy while changing phase. This thermal liner provides thermal protection for divers' wetsuits, drysuits, and hot-water suits using stored energy from phase change materials, for extreme cold water diving. The thermal liner can function as an emergency backup heat source upon power failure when electrically-heated drysuits are used, or as an emergency backup heat source in case of interruption of warm water supply when hot-water diving suits are used. It can also be used as a supplemental source of heat for divers wearing passively-insulated wetsuits or drysuits to prolong acceptable durations in cold water missions. The thermal liner gives divers an emergency "come home" capability in case of power failure within drysuits supplied with an electrically-heated undergarment, or of an interruption of the warm water supply to a hot-water suit. A warm protective barrier is provided between the diver's skin and the hot-water suit that protects the diver from thermal shorts due to water current or compression of the suit by surface contacts. Alternately, the thermal liner may cool a diver during dressing on the surface by absorbing the diver's body heat as the phase change materials melt prior to the dive. | US NAVY | US09208104 | 1998/12/7 |
| 295 | Maritime power plant system with processes for producing, storing and consuming regenerative energy | A maritime power plant system for producing, storing and consuming regenerative energy has a support structure on which energy producing devices for producing a continuous supply of energy by at least two different methods from regenerative energy sources are provided. The regenerative energy sources are ocean water, ocean waves, wind, and solar radiation. At least one industrial production facility is also connected to the support structure. A submarine reverse osmosis device is provided. | PFLANZ; TASSILO | US09164082 | 1998/9/30 |

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| 296 | Flexible composite material with phase change thermal storage | A highly flexible composite material having a flexible matrix containing a phase change thermal storage material. The composite material can be made to heat or cool the body or to act as a thermal buffer to protect the wearer from changing environmental conditions. The composite may also include an external thermal insulation layer and/or an internal thermal control layer to regulate the rate of heat exchange between the composite and the skin of the wearer. Other embodiments of the PCM composite also provide 1) a path for evaporation or direct absorption of perspiration from the skin of the wearer for improved comfort and thermal control, 2) heat conductive pathways within the material for thermal equalization, 3) surface treatments for improved absorption or rejection of heat by the material, and 4) means for quickly regenerating the thermal storage capacity for reuse of the material. Applications of the composite materials are also described which take advantage of the composite's thermal characteristics. The examples described include a diver's wet suit, ski boot liners, thermal socks, gloves and a face mask for cold weather activities, and a metabolic heating or cooling blanket useful for treating hypothermia or fever patients in a medical setting and therapeutic heating or cooling orthopedic joint supports. | BUCKLEY; THERESA M | US07913246 | 1992/7/14 |

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| 297 | Phase change thermal control materials, method and apparatus | An apparatus and method for metabolic cooling and insulation of a user in a cold environment. In its preferred embodiment the apparatus is a highly flexible composite material having a flexible matrix containing a phase change thermal storage material. The apparatus can be made to heat or cool the body or to act as a thermal buffer to protect the wearer from changing environmental conditions. The apparatus may also include an external thermal insulation layer and/or an internal thermal control layer to regulate the rate of heat exchange between the composite and the skin of the wearer. Other embodiments of the apparatus also provide 1) a path for evaporation or direct absorption of perspiration from the skin of the wearer for improved comfort and thermal control, 2) heat conductive pathways within the material for thermal equalization, 3) surface treatments for improved absorption or rejection of heat by the material, and 4) means for quickly regenerating the thermal storage capacity for reuse of the material. Applications of the composite materials are also described which take advantage of the composite's thermal characteristics. The examples described include a diver's wet suit, ski boot liners, thermal socks, gloves an a face mask for cold weather activities, and a metabolic heating or cooling blanket useful for treating hypothermia or fever patients in a medical setting and therapeutic heating or cooling orthopedic joint supports. | BUCKLEY; THERESA M | US08404419 | 1995/3/15 |

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| 298 | Adaptive control surface using antagonistic shape memory alloy tendons | A pliant, controllable contour control surface comprising a first flexible facesheet formed to a first initial contour of the control surface, and a second flexible facesheet formed to a second initial contour of the control surface. The first and second facesheets each have a set of prestrained shape memory alloy tendons embedded therein, extending from a leading edge to a trailing edge of the control surface. Each set of the shape memory alloy tendons is separately connected to a controlled source of electrical current such that tendons of the first and second flexible facesheets can be selectively heated in an antagonistic, slack-free relationship, to bring about a desired modification of the configuration of the control surface. A computer based control system is utilized for maintaining a constant temperature of the antagonists to establish conditions conducive to the stress induced transformation from austenite to martensite, accomplished by causing constant current to flow through the antagonists. Proportional/integral (PI) control is utilized in connection with the opposing shape memory tendons. | LOCKHEED CORP | US08559860 | 1995/11/20 |
| 299 | Ocean thermal energy conversion (OTEC) system | An improved ocean thermal energy conversion (OTEC) system which includes a novel combined evaporator/condenser. The combined evaporator/condenser further includes a plurality of evaporator spouts and a mist eliminator, wherein the pressure is maintained across the plurality of evaporator spouts. The OTEC system also generates fresh water as a primary product and generates only enough electricity, as a secondary product, to operate the OTEC system itself. | FLYNN; ROBERT J; CICCHETTI; GEORGE J; COONY; JONATHAN D'E | US08166005 | 1993/12/14 |

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| 300 | Ocean thermal energy conversion platform | A method and apparatus for an OTEC platform are disclosed. The platform provides the high stability needed for OTEC applications. The platform includes a centrally located cold water pipe. The cold water pipe is suspended from a center column that is open at both the top and the bottom. The platform further includes multiple columns surrounding the cold water pipe. The columns extend from above the sea surface to deep depths below the sea surface. The OTEC platform also includes multiple power modules. The power modules are submersed below the sea surface and are utilized to provide stability to the platform. Moreover, the power modules are dispersed around the columns to provide additional stability. Various embodiments of the arrangement of the columns are also disclosed. The columns may be proximate the center column or may be placed an extended distance from the center column. | SEATEK INTERNATIONAL INC | US08329489 | 1994/10/31 |
| 301 | Ocean thermal energy conversion (OTEC) system | A hybrid ocean thermal energy conversion (OTEC) system, including an energy generation sub-system for receiving warm sea water, evaporating a working fluid at a natural depth of the received warm sea water to produce a working vapor, and generating energy from the working vapor and a pumping sub-system for pushing cold sea water up to a natural depth of the received warm sea water and condensing the working vapor with the cold sea water. | OTEC DEVELOPMENTS | US08298664 | 1994/8/31 |

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| 302 | Water-wave energy converter systems | What is created is a multichambered honeycomb structure; made of laminates and composite materials to cut cost and provide strength and durability; disposed floating on open waters in an elongated form to serve as sea wall to break up the surfs to create a calm harbor for safe refuge for boats, floating houses, fishermen and protection of the shoreline; having an impact wall with window one-way valves to convert the energy of the surfs into elevated water that drive a water turbine, or into compressed air that drive a gas turbine electric generator; having a rectangular floater oscillator that activates a rocker arm drive bar by the energy of the water waves; having an under water deep well reverse osmosis desalinator that is driven by said rocker arm; having a piston type force water pump driven by said floater oscillator; having a thin plate rectangular magnet push-and-pull electric generator driven by said rocker arm drive bar; having a multistage piston vacuum pump driven by said rocker arm; having a mist-spray-vacuum chamber evaporator that is activated by said vacuum pump and said force water pump to produce desalinated water by distillation processes; having a solar trap in the form of air bubble sheets or vacuum sandwich plates to cover as a blanket to provide solar heat into said evaporation vacuum chamber; or said structure being in the form of cluster of rigidly interlocked houses anchored out on the ocean stabilized by anti-oscillation resistors. | LABRADOR; GAUDENCIO A | US07811470 | 1991/12/18 |
| 303 | Energy generating apparatus | An apparatus and method for obtaining energy is disclosed. The method includes heating a fluid in a liquid state by heat exchange with a heat source to generate a vapor of the fluid at a first elevation. The vapor of the fluid is caused to rise to a second elevation within an enclosed space and is condensed at the second elevation by heat exchange with a cold source. The liquid obtained by condensing the vapor is caused to fall from the second elevation and the energy of the falling liquid is converted to another form of energy, which is preferably electricity. The apparatus of the invention includes structure for vaporizing a liquid to form a vapor, a vapor tower for increasing the potential energy of the vapor by causing the vapor to rise along an upwardly-extending path. Structure is also provided for condensing the vapor by heat exchange with a cold source and recovering the increase in potential energy from the vapor, preferably in the form of electric power. | BROSSARD; PIERRE | US08061679 | 1993/5/14 |

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| 304 | Seal device for rotating shafts, in particular stern tube seal for propeller shafts of a ship | The invention employs the principle of the prior art for cooling a heated body by means of so-called heat pipes, with seal devices for rotating shafts, in particular for a ship's propeller shaft. According to this principle, an externally closed chamber extending in the longitudinal direction and filled with a liquid working fluid extends on one end into the body to be cooled, and on the other end into a cold medium, whereby a constant circulation takes place, so that the work fluid is evaporated in the hot portion of the chamber, the vapor flows into the cold portion of the chamber, condenses there, and the condensate is returned to the hot portion by way of a capillary structure (FIG. 1 ). | BLOHM VOSS AG | US07969889 | 1992/10/30 |
| 305 | Compressed gas buoyancy generator powered by temperature differences in a fluid body | A compressed gas buoyancy generator powered by temperature differences in a fluid medium having a thermal gradient which includes a body having an inflatable chamber connected thereto for rendering the body buoyant at a surface of the fluid medium and a mechanism for inflating the inflatable chamber with a gas, the inflating mechanism including a mechanism for inflating the inflatable chamber with the gas by obtaining energy from the thermal gradient within the fluid medium. The inflating mechanism includes a mechanism for absorbing heat at a surface portion of the fluid medium and for converting the absorbed heat at a predetermined depth of the fluid medium into a mechanical work for inflating the inflatable chamber when the body is at the surface of the fluid medium. | WEBB; DOUGLAS C | US07909212 | 1992/7/6 |
| 306 | Autonomous propulsion within | Energy is collected from temperature differentials in a volume of fluid and the energy is used for autonomous propulsion in the fluid. | WEBB DOUGLAS C | US07961015 | 1992/10/14 |
| 307 | Desalination system having rechargeable syphon conduit | A desalination system includes a transfer conduit between a pool of salt water and a pool of desalinated water. The conduit is initially filled with water and is then elevated so that a portion of the conduit is above the syphon height of water at atmospheric pressure with the open ends of the conduit submerged below the respective pools. Using solar heat to create a temperature differential in the conduit, desalinated water vapor is transferred across a partial vacuum volume formed in the conduit. | WILSON HENRY A | US07954155 | 1992/9/30 |

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| 308 | Multi-system power generator | A geothermal power system utilizes a fluid refrigerant capable of changing phase between liquid and gaseous states. The system includes a heat exchanger exposed to a heat source such as earth, water, air, or industrial waste for vaporizing the fluid in the heat exchanger. The heat exchanger includes at least two compartmentalized heat exchanger cells. Each of the heat exchanger cells is disposed in a portion of the naturally occurring heat source, the portions being sufficiently spaced apart such that a temperature of any one portion is substantially unaffected by a temperature of any other portion. The vaporized fluid is directed to a turbine or energy extraction means wherein the gas is expanded and energy is re)eased in the form of mechanical rotation of a shaft. The turbine shaft may be coupled to a generator for converting the mechanical rotational energy to electrical power. The gas discharged from the turbine is cooled/condensed and circulated into an accumulator, with a sensor and a controller for continuously maintaining the optimum amount of refrigerant flowing in the system under particular heat source/heat sink conditions. The liquid refrigerant is then recirculated to the heat exchanger, and the process is performed continuously. A compressor and sensored and controlled accumulator may be utilized in a second and separate refrigerant heat exchange loop with compartmentalized heat exchanger cells if necessary to maintain continuous output from the geothermal power system under all temperature conditions. | WIGGS B RYLAND | US07842468 | 1992/2/27 |
| 309 | Foam-core structure with graphics-imprinted skin | A system is disclosed for applying a graphics-imprinted skin to a substrate of expanded polyolefin foam. The system is used to create bodyboards and other foam devices with durable graphic images. The skin is made of a plurality of thin-film polyethylene layers adhesively bonded together. The outermost layer is a sheet of nonopaque (i.e., clear) polyethylene with graphic images imprinted on one side. The images are printed in reverse pattern and viewed through the polyethylene sheet from the other side. The nonopaque sheet is then adhesively bonded to an opaque backing sheet along the graphic-imprinted surface. The result is a flexible laminated skin material with visible graphics on one side. The skin material is then thermolaminated to the foam substrate with the graphics facing outwardly. A method of continuous fabrication is also disclosed. | KRANSCO | US07824784 | 1992/1/23 |

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| 310 | Seawater pre-deaerator for open-cycle ocean thermal energy conversion applications | A seawater deaerator has a large reservoir through which seawater slowly flows. Gas is injected into the bottom of the reservoir through porous aeration stones forming bubble nuclei. The seed bubbles move upward through the seawater in the reservoir expanding but not coalescing, and withdrawing dissolved gas from the seawater. The deaerated seawater flows out of the reservoir and subsequently flows through spouts into a flash evaporator. Gas is withdrawn from a low pressure gas chamber at the top of the reservoir by a vacuum pump. The exhaust of the vacuum pump supplies gas to the air injectors. | RES CORP OF THE UNIVERSITY OF | US07350912 | 1989/5/12 |
| 311 | Underwater release mechanism | An underwater acoustic release system includes a buoyed member with an attached line that is released from a preselected underwater location using an acoustic signal that activates a heating element to melt a volume of wax or like meltable substance. The wax expands, pushing a cylinder or like linkage to release the buoy and its attached line so that it rises to the surface identifying the location for a survey vessel. | Navigation Technology Corporation | US07846005 | 1992/3/4 |
| 312 | Thermal radiation energy conversion | Thermal energy radiation is converted into another energy form by setting up a temperature differential between two heat sinks forming part of a conventional converter or heat engine, but the warmer heat sink derives its input energy by collecting optically-focused thermal radiation from a primary heat sink within the converter structure. Heat rejected by the cooler heat sink is recycled to the primary heat sink to enhance the thermal efficiency above the Carnot level set by the base temperature conditions. The power rating of the converter is enchanced by combination with a reverse heat engine which elevates the temperature of heat input to the primary heat sink and so the temperature of the radiating surface. | ASPDEN HAROLD | US07600574 | 1990/10/19 |

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| 313 | Method of recovering energy from ocean water | A conduit extends from a platform on the surface of the ocean into cold deep ocean water containing dissolved gases. Sufficient water is drawn from the top of the conduit to cause the gas containing cold deep ocean water to enter the lower end of the conduit and release dissolved gas thereby forming a foam which causes the bulk density of the foam to fall. The change in bulk density causes the foam to move upward through the conduit pushing the foam to higher heights in an effort to reach pressure equilibrium inside and outside the conduit at a level of incipient foaming. The moving foam is used to drive a turbine or otherwise provide useful energy. | MOLINI ALBERTO E | US07571988 | 1990/8/24 |
| 314 | Low cost drifter | A low-cost floating drifter adapted to accurately follow near-surface ocean currents and transmit periodically to monitoring satellites data and position-determining information. Global tracking of ocean currents is made economically and scientifically feasible by the use of large numbers of such drifters. The drifter includes a floating surface buoy in the approximate shape of an oblate spheroid and containing an electronic system, a slotted plane antenna, transmitter, sunrise and sunset detector, environmental sensors, buoy hull strain sensor and battery power supply. The surface buoy is stabilized and induced to follow ocean currents by a drogue suspended from the bottom center surface. The drogue includes a wire-cored buoyant rope of up to hundreds of meters in length and weighted to a slight negative buoyancy. The drogue may also include an elongated cylindrical sock of substantially greater diameter than the rope. By means of the sunrise and sunset detector and the electronic system, the transmitter is controlled to operate only during selected passes of a solar synchronous satellite so as to conserve the battery and permit unattended life of up to several years. By means of the hull strain sensor and the electronic system the transmitted signal contains data from which the drogue integrity can be determined. Other status and environmental data are also transmitted. The drifter has special provisions to resist corrosion, fish-bite damage and biological fouling. | The Charles Stark Draper Laboratory | US07325522 | 1989/3/17 |

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| 315 | Sewage disposal | Treated sewage is loaded into the tanks of a large ocean-going tanker, transported therein to a deep water site, and then deposited directly onto the seabed at that site through piping deployed from the vessel and extending downwardly therefrom. The piping may be a flexible hose, or a string of steel pipes, or a combination of the two. The piping may be deployed over the side of the vessel, or preferably from a moon pool. The depth of the seabed for deposit might for example be one thousand or fifteen hundred meters, or considerably deeper, e.g., 7000 m; in extremely deep water it may not be necessary for the piping to extend fully to the seabed, although it is recommended that it extend at least below the depth at which the majority of fish are found and below the depth where there are significant thermal changes. The disposal tanker is provided with a hose reel and/or pipe erection plant and/or equipment for handling piping and for deploying the disposal piping from the tanker to the deep seabed disposal region. | The Maersk Company Limited; General Environmental Technologies Limited | US07244574 | 1988/9/12 |
| 316 | Methods and apparatus for ocean thermal energy conversion using metal hydride heat exchangers | Methods and apparatus for ocean thermal energy conversion using metal hydride heat exchangers to power a turbine by desorbing and absorbing hydrogen gas. Heat exchangers are alternatively floated to the ocean surface to warm the metal hydride bed or sunk to the bottom to cool the bed. The turbine powers an electric generator which produces electricity which may be utilized directly, stored in a superconducting magnet, used to desalinate water, or used to power the electrolysis of water in order to produce hydrogen for use as a fuel. | HYDRIDE TECHNOLOGIES INC | US07058828 | 1987/6/5 |
| 317 | Sea water well and aquaculture preserve, and the combination with a power generation system | A power generation system of the ocean thermal energy conversion type including one of a closed or open system and a working fluid capable of undergoing a change in state from a liquid to a vapor state and back to the liquid state after expansion. The system includes an evaporator and a condenser, and a liquid line communicating a liquid (ocean water) at a required temperature to cause condensation of the working fluid after the working fluid has been evaporated and expanded through a turbine. The liquid line in communication with cold water is characterized by a well disposed in solid land adjacent the ocean and the direct supply of water either comprising a working fluid or for evaporating the working fluid. Water flow from the system may be released to an aquaculture preserve. | KAWAMURA BRUCE K | US06864355 | 1986/5/19 |

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| 318 | Ocean thermal energy conversion hydro well apparatus | An apparatus is disclosed to generate electricity using ocean thermal and salinity gradients. An elongated chamber extends vertically downward from the surface of the ocean. Warm, high-salinity water from the ocean surface flowing by gravity down the apparatus is used to drive a turbine and electrical generator. Air bubbles are introduced into the flow at the upper opening of the apparatus. This air is subject to hydraulic compression as the water falls. The flow of sea water and air passes through a cooling tube near the bottom of the apparatus where it is cooled to the temperature of ambient sea water at that depth. The flow then enters a chamber where the air and water are allowed to separate. Because of its greater density than the ambient sea water at that depth, the water in the chamber tends to flow out exhaust ports located at the bottom of the chamber. Excess air pressure held in the chamber can either be used to operate a booster pump to increase the flow through the turbine, or to assist in exhausting water from the separation chamber. | JENSEN ROBERT K | US07002640 | 1987/1/12 |
| 319 | Vertical ship | There is disclosed herein a vertical ship utilizing the buoyancy principles of a submarine. The vertical watercraft is fluid-dynamically streamlined in the direction of travel and has an elongate, pipe-like hull. The elongate, normally vertical hull is provided with ballast means by which the height of a pilot house on the top of the pipe-like hull may thereby be lifted or lowered. Also, the ballast means permit changes in attitude of the hull relative to the gravity vector. The vertical watercraft may be provided with numerous energy recovery means and, as well, may be used as a mining and cargo vessel. | MOISDON ROGER F G | US06715726 | 1985/3/25 |
| 320 | Temperature-difference-actuated pump employing nonelectrical valves | A temperature-difference-actuated pump is disclosed which does not require the use of electrically operated solenoid valves or the like, making the inventive pump especially useful in locations where electricity is not readily available. Either one or two pump chambers is provided, in which is disposed a pumping element such as a flexible bag or piston. One side of each chamber is connected selectively to a boiler or condenser through a mechanically operated switch deriving its working power from the pumping element. The other side of the chamber is utilized to provide the pumping action, either directly or via a noncondensable fluid. | Nippon Mining Co Ltd | US06895575 | 1986/8/12 |

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| 321 | Device for controlling the capacity of a variable capacity compressor | A control device for a variable capacity compressor in an automotive air conditioning system. The control device includes a first sensor disposed forward of the evaporator and a second sensor disposed behind the evaporator. The control device compares the air temperature detected by the sensors with predetermined temperatures, and controls the capacity of the compressor in accordance with the compared results. | SANDEN CORP | US06823363 | 1986/1/28 |
| 322 | Oceano-thermosteric power plant | An oceano-thermosteric power plant is provided with plural evaporators and plural condensers, alternate parts of which are not operated at night and in winter on light load and hence a high efficiency heat exchange can be maintained. During the period that selected condensers and evaporators are not in service, excess cold water from the out-of-service condensers is circulated through the out-of-service evaporators in the opposite direction and hence the filth deposited inside the out-of-service evaporators can be washed away. | UNIV SAGA | US06722368 | 1985/4/12 |
| 323 | Condensing atmospheric engine and method | A thermodynamic method and engine is provided for extracting natural thermal energy from ambient atmospheric air and converting it into mechanical work. The extraction process is accomplished by isentropically expanding ordinary air at atmospheric pressure into a thermally insulated vacuum chamber maintained at low pressure. By employing sufficiently high expansion ratios, a large portion of the air can be made to undergo a spontaneous phase transformation into the solid state at cryogenic temperature. This results in a substantial reduction of the specific volume of the condensed air which enables the vacuum environment of the chamber to be maintained by expending less mechanical work than that gained from the initial expansion. Thus, the net amount of mechanical work generated therefrom is positive. Substantial additional mechanical work is generated by harnessing the thermal potential difference between the low temperature condensed air and the ambient environment via additional cryogenic engine stages. | MINOVITCH MICHAEL ANDREW | US06522847 | 1983/8/12 |

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| 324 | Ballistic cold water pipe | In order to bring cold water from the depths of a body of water, a long pipe is extended into the body of water. Arrangements are provided for pumping the water out of the pipe. A nozzle is then provided to direct a stream of water up through the pipe at high velocities, without touching the walls thereof, based on the high pressure of the water at the lower end of the pipe. At the top of the pipe near the surface of the body of water, arrangements are provided for collecting the cold water drawn from below. This ballistic cold water pipe may be employed to economically provide cold water for ocean thermal energy conversion (OTEC) systems, and for other purposes. | R D ASS | US06680352 | 1984/12/11 |
| 325 | Thermal energy conversion | In heat transfer from a warm water source, efficiency is improved in a thermal energy conversion (TEC) by increasing the temperature of heat supplied to a turbine system substantially above the water temperature. This temperature increase is accomplished in a separate system by reacting gaseous ammonia with water to produce sensible heat at a high temperature; the ammonia is later fractionated from the water using lower temperature heat from the existing heat source. A single-stage temperature increase system (TIS), may be used or there may be an addition of a second stage for raising the temperature of the heat supply even higher. | REID ALLEN F; HALFF ALBERT H | US06512668 | 1983/7/11 |
| 326 | Arrangement for concentrating sea waves | An arrangement for concentrating sea waves, includes a grid-like structure of stopping and/or delaying elements adapted to influence the amplitude and/or phase of the waves and located in such positions in the water that the elements in interaction with the incident sea waves form an interference pattern which gives a concentration of the wave energy in a limited area (concentration area). When the wave energy is to be utilized for power production, the grid-like element structure is designed to give a concentration of the wave energy in a concentration area located in the short-range field of the element structure. Preferably the elements in the structure are mainly situated in front of the concentration area with respect to the dominant wave incident directions. Moreover, the element structure may have an extension (aperture) which is substantially larger than the wave length of the dominant waves at the location. | Sentralinstitutt For Industriell Forskning | US06308850 | 1981/10/5 |

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| 327 | Offshore incineration of hazardous waste materials | A method and an ocean-going vessel are disclosed for more effectively incinerating hazardous liquid wastes at sea. Intermodal shipping tank containers are filled at waste generation sites; transported to dockside and loaded above decks on an incinerator ship; taken out to sea and incinerated in horizontal, liquid burning type incinerators so that the effluents emerge horizontally. Wastes flow by gravity from containers into staging sumps located below decks, and then pumped to incinerator. Pollution abatement tanks, also below decks, collect spilled waste from containers, as well as overflow from staging sumps. Material collected in abatement tanks is pumped into staging sump, and pumped to incinerator. Fuel oil may be introduced into sumps for fueling incinerators to maintain incinerator operation when there is insufficient supply of waste. Effluents are sea-water scrubbed for cooling to eliminate thermal lift and carried promptly into sea. | GREY VINCENT G | US06607606 | 1984/5/7 |
| 328 | Solar breeze power package and saucer ship | A solar breeze power package having versatile sail and windmast options useful both on land and sea and especially useful in the saucer ship type design. The Vertical Axis Wind Turbine (VAWT) of the several Darrieus designs in conjunction with roll-up or permanently mounted solar cells combine in a hybrid or are used separately to provide power to a battery bank or other storage device. | VEAZEY SIDNEY E | US06444554 | 1982/11/26 |
| 329 | Ocean thermal energy system | An ocean thermal energy apparatus comprising a fluid cooling compartment, a fluid heating compartment, fluid conduits conducting cooled fluid from the fluid cooling compartment to the fluid heating compartment, generating apparatus, and pump apparatus to return fluid from the generating apparatus to the fluid cooling compartment. In particular, such an apparatus designed to float in the ocean such that the fluid cooling compartment is disposed deeper in the ocean in colder water, and the fluid heating compartment is disposed in a shallower position in warmer water, yet remaining in fluid communicating relationship. | BERMAN DANIEL | US06446649 | 1982/12/3 |

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| 330 | Stackable container for use in a containerization system | A method and apparatus for use in a system of containerized handling of fish onboard an ocean-going vessel. Fish are stored in closely stacking containers within the hold of the fishing vessel and are cyclically removed from within the hold to working positions on the deck of the vessel, where they are charged with fish and ice and returned to storage positions, by the cooperative use of an in-hold travelling hoist adapted to move a selected plurality of containers to and from chosen position within the hold compartment without disturbing other containers and an above-deck conveying system operable to convey the plurality of containers between a position inside the hold compartment directly below the hatchway through the deck overlying the hold compartment and a selected working position on the deck. | CONTRAWL LTD | US06402111 | 1982/7/26 |
| 331 | Flexible retractable cold water pipe for an ocean thermal energy conversion system | A cold water pipe (11) for an ocean thermal energy conversion (OTEC) system comprises a tubular membrane (12) made of a fabric such as a canvas, which is substantially impervious to flowing water. A proximal end of the pipe (11) is secured to a surface structure such as a ship (10), and a distal end of the pipe (11) is extendible from the surface structure to a selected ocean depth. The pipe (11) functions as a conduit through which cold water from the selected ocean depth can be drawn to the surface structure for use in a thermodynamic process of the OTEC system. The distal end of the pipe (11) can be quickly retracted to the surface structure when it becomes desirable to move the surface structure. | LOCKHEED MISSILES SPACE | US06505832 | 1983/6/20 |

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| 332 | Plate-pin panel heat exchanger and panel components therefor | A plate-fin panel for a heat exchanger may be either formed as an aluminum extrusion or fabricated from a corrugated metal sheet sandwiched between two flat metal sheets. The extruded aluminum version may be clad with protective sheet metal jackets made of, or coated with, a corrosion resistant Cu-Ni alloy. Individual panel sections can be joined together by tongue and groove engagement to obtain a total desired panel width if available extrusion press or rolling mill capacity is insufficient. The plate-fin panels are assembled into slotted headering plates, and a layer of synthetic plastics potting compound seals dissimilar metal joints against electrolytic corrosion as well as leakage and provides sufficient adhesive strength to reduce or eliminate the need for welding the panels to the headers. Mechanical brush or hydraulic jet apparatus is capable of continuously or intermittently cleaning slime or encrustations from all panel surfaces exposed to seawater. | HERONEMUS WILLIAM E | US06372539 | 1982/4/28 |
| 333 | Low cost method for producing methanol utilizing OTEC plantships | Method for producing low cost methanol. A source of carbon is provided to an OTEC plant or plantship which is processed to produce carbon monoxide which is reacted with hydrogen to produce methanol. The oxygen and hydrogen are obtained from the electrolysis of water with the required energy supplied by ocean thermal energy conversion. | UNIV JOHNS HOPKINS | US06502291 | 1983/6/8 |
| 334 | Method and apparatus for flash evaporation of liquids | A vertical tube flash evaporator for introducing a superheated liquid into a flash evaporation chamber includes a vertical inlet tube with a flared diffuser portion at its upper outlet end. A plurality of annular screens are positioned in axially spaced-apart relation to each other around the periphery of the vertical tube and below the diffuser portion thereof. The screens are preferably curved upward in a cup-shaped configuration. These flash evaporators are shown in an ocean thermal energy conversion unit designed for generating electric power from differential temperature gradients in ocean water. The method of use of the flash evaporators of this invention includes flowing liquid upwardly through the vertical tube into the diffuser where initial expansion and boiling occurs quite violently and explosively. Unvaporized liquid sheets and drops collide with each other to enhance surface renewal and evaporation properties, and liquid flowing over the outlet end of the diffuser falls onto the curved screens for further surface renewal and evaporation. | US ENERGY | US06471392 | 1983/3/2 |

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| 335 | Generating power from the ocean utilizing the thermal properties of magnetic material | A power generation system is taught utilizing a ferromagnetic material contained in a tape and rotatably disposed in a triangular configuration around a series of pulleys. The entire system is under water in the ocean so as to utilize the temperature differentials available between just below the surface of the ocean and approximately 100 meters below. The tape which is ferromagnetic passes through superconducting coils having parallel fields and thereby providing a very large magnetic field. The lower portion of the ferromagnetic tape, which is cooled by the ocean, experiences greater magnetization than the upper warmer portions of the magnetic tape. The lower portion of the tape experiencing greater magnetization is pulled up into the magnetic field and thereby causes movement of the tape. As the tape moves upward it is warmed by the ocean currents with the result that a lower portion of the tape now experiences the greater magnetization. This therefore causes continual movement. Attached to one of the pulleys is a drive belt arrangement which in turn is connected to a generator thereby causing the generator to turn and generate electricity upon movement of the magnetic tape. | CARR JR WALTER J; MILLER ROBERT C | US06394668 | 1982/7/2 |

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| 336 | Arrangement in or relating to a power plant | PCT No. PCT/NO80/00016 Sec. 371 Date Jan. 5, 1982 Sec. 102(e) Date Jan. 5, 1982 PCT Filed May 14, 1980 PCT Pub. No. WO81/03360 PCT Pub. Date Nov. 26, 1981.A power plant for exploitation of the temperature difference between different water layers in a pelagic area (2), comprising a closed system which is filled with ethane which is both in the liquid and vapor phases. The system comprises two heat exchanging apparatuses (13, 9) which are in fluid communication with each other, of which the first (13) supplies heat to the ethane by means of heat exchange with water from a relatively warmer water layer, while the other (9) removes heat from the ethane by means of heat exchange with water from a colder water layer, whereby a difference in pressure is created in the system which is utilized to take energy out of the system. In order to make the system large enough and the ethane pressure high enough to give a reasonable power yield, the heat exchanging apparatuses are placed in respective chambers (5, 4) which are comprised by cavities in solid or consolidated rock (1). The necessary fluid communications (6, 17) and water pipes (10, 12, 15, 16) are also blasted in the rock with fluid cross-sections large enough to make pressure losses small. | MOE PER H | US06339432 | 1982/1/5 |
| 337 | Compact mist flow power generator | An ocean thermal energy converter (OTEC) generates electricity from warm surface water in dropping 100 meters or so, and then raises it back to the surface using its own thermal energy in a large floating vacuum chamber. The mist flow process as described in U.S. Pat. No. 4, 216, 657 is employed to accelerate water droplets and water vapor upward from the bottom of the chamber under a pressure difference created by spraying cold water from lower ocean levels into the same chamber. The cold water is sprayed upward and parallel to the upper side walls of the chamber to control the flow of the warm droplets, as well as condense the vapor. This cold spray has too small an initial velocity to reach the top of the chamber, but receives momentum from the accelerated warm droplets. The warm water may be injected substantially vertically or alternatively at an angle inclined toward the axis of the chamber to assist in coalescing and concentrating the stream after the individual droplets have been accelerated upward. | R D ASS | US06361863 | 1982/3/25 |

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| 338 | Open cycle OTEC plant | The present invention provides an open cycle ocean thermal energy conversion plant for deriving power from the thermal differential between the surface waters and cold waters at a depth in tropical oceans. Warm surface water is sprayed into a lower chamber which is at pressure approximately equal to the vapor pressure of the warm water where part of the water evaporates. The vapor then passes through a venturi or venturis dividing the lower chamber from the upper chamber which is maintained at pressure approximately equal to the vapor pressure of the cold water. The pressure difference across the venturi(s) causes the vapor to emerge into the upper chamber at supersonic speed. Cold water injected into the supersonic jets gains momentum and energy from the jets which causes it to be forced upward to the top of the chamber where it is collected. In the process the vapor is cooled and condensed by cold water. The cold water is collected and is permitted to flow downward to drive hydraulic turbines thereby providing exploitable electrical energy. | UNIV JOHNS HOPKINS | US06384506 | 1982/6/3 |
| 339 | Method for installing submarine pipelines using a marine railway | A method of installing a cold water conduit for use with Ocean Thermal Energy Conversion (OTEC), fossil or nuclear power plants. The method is comprised of installing a marine railway system on the ocean floor and subsequently using the railway system as an aid to the installation of the cold water conduit and as a support structure for the conduit. | MCDERMOTT INC | US06268557 | 1981/6/1 |
| 340 | Combination power plant | A combination power plant including an ocean thermal energy conversion power plant and a steam generation power plant. Water discharged from a condenser in the ocean thermal energy conversion power plant is mixed with water discharged from an evaporator in the ocean thermal energy conversion power plant. The mixed water is used as cooling water for a condenser in the steam generation power plant. Part of the water discharged from the condenser in the steam generation power plant is used as heating water for the evaporator in the ocean thermal energy conversion power plant. | TOKYO SHIBAURA ELECTRIC CO | US06359089 | 1982/3/17 |
| 341 | Method of creating a cold water conduit to be used in ocean | A method of creating a cold water conduit for use with an ocean thermal energy conversion plant by drilling and blasting at least one passageway completely through an underwater land formation. | MCDERMOTT INC | US06249580 | 1981/3/31 |

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| 342 | Ocean energy and mining system | A system for generating energy and extracting minerals from the ocean. The system preferably comprises an underwater chamber adapted to intake cold water at the floor of the ocean and which, for energy generating purposes performs electrolysis. The chamber communicates via a conduit system with a submerged deformable condenser disposed above it. The condenser is coupled to a mineral recovery system positioned at the surface. A pump draws cold solution from the ocean bottom through the system. The condenser includes a pair of sub-compartments disposed in heat exchange relation, and refrigerant within one of the sub-compartments is liquefied by cooler water flowing through the other sub-compartment. A separate, deformable evaporator includes an internal chamber for boiling refrigerant which is warmed by surface water pumped through an adjacent chamber. As refrigerant flows from the evaporator to the condenser a turbine is driven to generate energy. Preferably the condenser and evaporator are formed from thinwalled materials such as plastic or the like, and are located at depths such that hydrostatic pressure neutralizes refrigerant pressure. In one form of the invention separate passageways are provided throughout the condenser sub-system to segregate minerals generated by electrolysis. | JOHNSTON HAROLD W | US06196168 | 1980/10/14 |

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| 343 | Energy conversion derived from pressure and temperature differentials at different elevations | A method and system of energy conversion derived from temperature and pressure differentials that may be provided between high and low elevations. A solution of a liquid in a gas is transported in a first conduit from a low elevation to a high elevation, whereby the absolute pressure and the temperature of the solution change. Some of the liquid separates out of the solution in the first conduit in the form of particles suspended in the remaining solution to create a mixture of the separated particles and the remaining solution in the first conduit as a result of the changes in absolute pressure and temperature, so that at any particular position in the first conduit where the separation takes place, the average proportional density of the mixture after the separation has taken place is decreased in relation to the density of the solution at such position prior to the separation taking place. The mixture is transported into a separation chamber at the high elevation in response to pressure differentials created by the decrease in average proportional density of the mixture in the first conduit. At least of portion of the suspended particles are separated from the mixture in the separation chamber to create a separated liquid, and a dried gas; and the separated liquid is transported through a second conduit to a transducer at a lower elevation than the high elevation. The transducer converts the pressure and motion of the transported separated liquid into a useful form of energy. | KIRA GENE SADAO; SORENSEN JENS OLE | US06156274 | 1980/6/4 |

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| 344 | System for generating energy using the temperature difference between the water temperature at the sea surface and the water temperature at greater depth | A system for generating energy by converting thermal energy into another form of energy by the exchange of water from great depth with surface water, said system comprising a floating installation having a downwardly directed cold water pipe as well as a number of thermal energy converting aggregates, said installation having the form of a pontoon, carrying a platform by means of columns, a number of box-shaped units containing the thermal energy converting aggregates being placed on top of the said pontoon, each unit having a channel with pump and heat exchanger, said channels having their inlets either in connection with the cold water supply or with the environmental water, the connection with the cold water being at the underside of the units and the connection with the environmental water at the upper side of the units, each channel having its outlet at the side of the pontoon. Said units each may have a warm water channel and a cold water channel or part of the units only contain cold water channels and another part only warm water channels. | HOLLANDSCHE BETONGROEP NV | US06222226 | 1981/1/2 |
| 345 | Closed cycle system for generating usable energy from waste heat sources | A closed cycle system for generating usable energy from heat sources wherein the available temperature difference between the heat source and the heat sink is 40 DEG F. or greater such as in tropical ocean waters having a temperature gradient between the surface water and the below surface waters has a steam or gas turbine operatively mounted on and associated with an evaporator-condenser assembly for generating and delivering vapors such as steam for driving the turbine and for condensing steam exhausting from said turbine. The evaporator-condenser assembly has a common wall between the evaporator section and the condensing section and also a U-shaped seal and transfer passage therebetween for transferring condensed fluid from the condensing section to the evaporating section. Due to the large volume of vapors required at the relatively low temperature at which this system operates, the evaporating section has a pump delivery system and a cascade tray system to adjust the rate of evaporation of the working fluid such as water therein. The system as above described including a condensing section for obtaining distilled water as a by-product of the operation of the system. | HEAT POWER PRODUCTS CORP | US06259531 | 1981/5/1 |

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| 346 | Upper end mounting for deep water thermal conduit | A flexible and pivotable connection for the top of a cold water conduit 8 to a floating device 1-3 provided with means for the conversion of energy based on the temperature difference between surface water and deep sea water supplied by the conduit. The connection supports the top of the conduit by means of flexible cables to a central core 7 guided and fixed in a sleeve 5, 6 of the floating device. The flexible cables 10, 11 partly extend horizontally from the lower end of the core to a top ring 9 of the conduit, and partly from the lower end of the core downwardly towards a lower annular portion 12 of the conduit. | HOLLANDSCHE BETONGROEP NV | US06193691 | 1980/10/3 |
| 347 | Method and apparatus for producing electricity from thermal sea power | A method and apparatus of producing useful energy from a large body of water having cold subsurface water and water at the surface which is warmer than the subsurface water. The apparatus comprises a tubular pump to air-lift in a manner to be described cold subsurface water to the surface and which tube is open at the surface and open at the colder subsurface water and wherein a vertically adjustable air jet assembly is arranged within the tube and connected to a compressed air source to release bubbles from the air jet assembly which rise within the tube, entraining cold subsurface water, making it buoyant and cooling the surface. The method of producing useful energy includes the steps of creating an area on the warm surface of a large body of water which is colder than normal by utilizing compressed air to upwell the cold subsurface water by releasing compressed air through an air jet assembly which is vertically adjustable in a vertical conduit having an opening at the lower end and also at the upper end and which is of a length to extend to a depth within the large body of water at which cold subsurface water is located so that, when compressed air is released through the air jet assembly, it rises in the tube from a level which is most efficient entraining water and causing cold subsurface water to rise to the surface and utilizing the temperature gradient between the cooled surface of the water and the normally warmer surface of the water to generate electricity. | GIRDEN BARNEY B | US06127642 | 1980/3/6 |

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| 348 | Platform for utilization of the thermal energy of the sea | The invention relates to a platform for utilization of the thermal energy of the sea, comprising a floating structure carrying a downwardly extending tube (2) for taking up cold water and supporting at least two power modules (3) each comprising an evaporator (15) and a condensor (12) and pumps for circulation of hot and cold water, each power module being connected to a turbine-driven generator set (19, 19'). According to the invention, the support structure has open cells receiving the power modules and each module has its component parts arranged in a vertical array so as to constitute a cylindrical assembly extending through the support structure. Preferred applications : offshore manufacture of aluminium, ammonia and hydrogen. | SEA TANK CO | US06097285 | 1979/11/26 |
| 349 | Iceberg propulsion system | A tabular iceberg is used as an energy source for a propulsion system which propels the iceberg across vast distances of the ocean with minimal fuel consumption. The iceberg thus becomes, in effect, a self-propelled vessel in which potential energy associated with the iceberg is converted to kinetic energy to power the propulsion system. Two propulsion mechanisms can be used, preferably in conjunction. The first mechanism uses the gravity flow of melting ice to provide propulsive thrust, while the second mechanism utilizes the temperature differential between the iceberg and the surrounding water to power a heat cycle engine, which, in turn, drives a generator to provide electricity which runs propeller drive motors. | CONNELL JOSEPH A | US06095070 | 1979/11/16 |

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| 350 | Atmospheric thermal energy conversion system | A method of providing useful work utilizing the difference between higher and lower elevations and an attendant difference in temperature. The method includes the step of providing a working medium comprised of more than one component, the components having different temperature values at which they vaporize and condense. Vapors of the working medium are condensed at the location of the higher elevation, and are directed under the force of gravity to means at a lower elevation capable of utilizing the medium in liquid form to produce useful work. The working medium in liquid form absorbs heat at the lower elevation and produces the vapors for the condensation step, the vapors being directed from the lower elevation to the higher elevation for condensing. The composition of the working medium is adjusted to response to changes in ambient temperature to provide a system having maximum efficiency in extracting work from the working medium. | ALUMINUM CO OF AMERICA | US06155464 | 1980/6/2 |
| 351 | Method and apparatus for transferring cold seawater upward from the lower depths of the ocean to improve the efficiency of ocean thermal energy conversion systems | A method and apparatus for transferring cold seawater from lower ocean depths upward toward sea level for use in ocean thermal energy conversion systems is disclosed wherein an in situ desalination process is utilized to create a density differential between the desalinated water and the surrounding seawater. The desalinated water being of a lesser density than the surrounding seawater, rises naturally upward through a conduit and is utilized as a heat transfer medium in the ocean thermal energy conversion system. The desalinated water, which is a byproduct of the energy conversion system, may be utilized for domestic consumption or alternatively dispersed into the near surface region (photic zone) of the ocean to increase the nutrient concentration therein. | FINLEY WARREN T | US06122301 | 1980/2/19 |
| 352 | Thermal-cycle engine | A comparatively low heat differential is utilized for energy generation wherein flow of a fluid from a low temperature reservoir to a high temperature reservoir is maintained by the weight of the fluid, for example through utilization of centrifugal force provided as the vaporized fluid from the high temperature reservoir operates a gas turbine. Evaporation cooling is preferably employed in establishing the temperature differential. | KING WILLIAM L | US05901356 | 1978/5/1 |

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| 353 | Ocean thermal energy conversion system and method for operation | A power generation system and method of operation for generating electricity by utilizing temperature differences inherently present in the ocean between water near the surface and water from the ocean's depths. A pump provides relatively warm, surface ocean water to a flash evaporator where a portion of the water is flashed into steam. The steam is expanded through a subatmospheric pressure range turbine which exhausts into a condensing enclosure. The steam exhausting into the enclosure is condensed by relatively cold ocean water pumped thereinto. The turbine drives a generator and thus produces the electricity. The turbine speed and generator output are controlled by selectively introducing atmospheric air and relatively warm water into the exhausted motive steam flow. Such selective introduction into the exhausted steam flow of air and/or relatively warm water increases the absolute pressure at the turbine's exhaust end and thus reduces steam flow through the turbine. Adjusting regulating valves for the air and warm water flows in response to changes in turbine speed and/or generator load provides means for regulating the speed of the turbine and generating load. | WESTINGHOUSE ELECTRIC CORP | US05918127 | 1978/6/22 |
| 354 | Composite flexible conduit for sucking large volumes of sea water from deep water bodies | For conveying very large volumes of sea water from sea bottom to the surface in order to exploit the temperature differential between the surface layers and the bottom layer and thus produce power, a flexible conduit is provided which is composed by cylindrical sections of a resilient reinforced material connected by hoops of a rigid material, an array of cables extending longitudinally of the conduit being secured to said hoops. The conduit can be assembled or disassembled by a stepwise operational sequence. | TECNOMARE SPA | US06008481 | 1979/2/1 |

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| 355 | Deployment, release and recovery of ocean riser pipes | An ocean thermal energy conversion facility includes a long pipe assembly which is supported at its upper end by the hull of the floating facility. Cold water flows to the facility from deep in the ocean. The pipe assembly comprises an elongate pipe construction and a weight connected to the lower end of the construction by a line of selected length. A floatation collar is connected to the construction at its upper end to cause the construction to have positive buoyancy and a center of buoyancy closer to the upper end of the construction than its center of mass. The weight renders the entire pipe assembly negatively buoyant. In the event that support of the pipe assembly should be lost, as by release of the assembly from the facility hull in an emergency, the assembly sinks to the ocean floor where it is moored by the weight. The pipe construction floats submerged above the ocean floor in a substantially vertical attitude which facilitates recovery of the assembly. | GLOBAL MARINE INC | US05935672 | 1978/8/21 |
| 356 | Hydraulic fluid generator | Two sources of water with a temperature differential of say 20 DEG F. flow alternately through heat exchanger tubes to expand and contract a working liquid that has a high coefficient of thermal expansion, the whole working cycle being carried out below the boiling point of the working liquid. With check valves preventing reverse flow, the expansion and contraction of the working liquid provides a high pressure hydraulic output which may be used to drive a hydraulic motor. To provide substantially steady output flow, four banks of heat exchangers may be operated sequentially with hydraulic accumulator means smoothing out the flow pulsations. Each bank has a four-stage operating cycle and electrical circuitry controls the four banks simultaneously to cause the four different stages to occur in certain of the four different banks in staggered relation for producing a substantially constant overall hydraulic output. | MCCONNELL DAVID P | US05677041 | 1976/4/14 |

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| 357 | Connection of the upper end of an ocean upwelling pipe to a floating structure | Apparatus is provided for connecting to a floating structure the upper end of a pipe assembly disposed substantially vertically in an ocean and the like. The pipe can be an upwelling pipe in an ocean thermal energy conversion installation. Gimbal apparatus are coupled between the pipe and the structure concentrically about the pipe. The gimbal apparatus define two orthogonal gimbal axes about which the pipe can move relative to the structure. The gimbal apparatus carry essentially all of the load between the pipe and the structure. Ball joint apparatus are coupled between the upper end of the pipe and the structure to define the boundaries of a path of fluid flow between the pipe and the structure. The ball joint apparatus includes an element associated with the pipe and an element associated with the structure. The ball joint apparatus is centered in the intersection of the gimbal axes. | GLOBAL MARINE INC | US05935591 | 1978/8/21 |
| 358 | Recovery of energy from geothermal brine and other hot water sources | Process and system for recovery of energy from geothermal brines and other hot water sources, by direct contact heat exchange between the brine or hot water, and an immiscible working fluid, e.g. a hydrocarbon such as isobutane, in a heat exchange column, the brine or hot water therein flowing countercurrent to the flow of the working fluid. The column can be operated at subcritical, critical or above the critical pressure of the working fluid. Preferably, the column is provided with a plurality of sieve plates, and the heat exchange process and column, e.g. with respect to the design of such plates, number of plates employed, spacing between plates, area thereof, column diameter, and the like, are designed to achieve maximum throughput of brine or hot water and reduction in temperature differential at the respective stages or plates between the brine or hot water and the working fluid, and so minimize lost work and maximize efficiency, and minimize scale deposition from hot water containing fluid including salts, such as brine. Maximum throughput approximates minimum cost of electricity which can be produced by conversion of the recovered thermal energy to electrical energy. | OCCIDENTAL PETROLEUM CORP | US06083112 | 1979/10/5 |

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| 359 | Connection of cold water riser pipes to supporting structures | Apparatus is provided for connecting to a floating structure the upper end of a pipe assembly disposed substantially vertically in an ocean or the like. The pipe can be an upwelling pipe in an ocean thermal energy conversion installation. A downwardly open, elongate hollow socket is connected to the structure, and a mating elongate hollow pin member is connected to the upper end of the pipe assembly. Mating of the pin member in the socket requires only upward linear motion of the pin into the socket. Separate tethers are connectible in parallel to the pin and socket between the pipe assembly and the floating structure for holding the pin member in mated engagement with the socket. The tethers are severable for releasing the pipe assembly, which is negatively buoyant, from the floating structure in the event of an emergency or otherwise. | GLOBAL MARINE INC | US05935641 | 1978/8/21 |
| 360 | Power plant optimization control | Fouling which occurs in the heat exchangers of a thermal energy conversion power plant causes the heat transfer between the circulating fluid and working fluid to be degraded, diminishing the efficiency of the plant. The invention provides for optimizing the net power level of the plant by perturbing the flow of circulating fluid individually to the heat exchangers to identify the direction of flow change which results in an increase in generated net power level and adjusting the flow of circulating fluid to each heat exchanger. This optimization may be carried out periodically. In another case, when temperature differential of the circulating fluid across at least one of the heat exchangers falls below a predetermined level, only the circulating fluid of the related heat exchangers need be altered to optimize the net power level generated by the plant. Heat exchanger fouling may cause the plant to be shut down for cleaning of the heat exchangers during a cleaning time interval succeeding each operational time interval. Another aspect of the invention provides for deriving a ratio of operating time interval to corresponding cleaning time interval which maximizes the net electrical energy produced by the plant. | WESTINGHOUSE ELECTRIC CORP | US06064458 | 1979/8/6 |

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| 361 | Deaerating system for sea thermal power plants | Apparatus for deaerating a stream of warm surface sea water for removing a portion of the gases from the water prior to its entry into a heat exchanger or boiler. The gases, such as oxygen, can be removed by subjecting the warm surface sea water to a vacuum after which the water, having been collected at a plurality of sources, is fed in separate passageways to a common plenum chamber from where the water is discharged through the passages of the boiler or heat exchanger into the ocean. | SEA SOLAR POWER | US06066512 | 1979/8/14 |
| 362 | Method and apparatus for producing electricity from thermal sea power | A method and apparatus are disclosed whereby cold subsurface water in a large body of water is upwelled by air-lifting in vertical jet streams to the surface of the body of water. The cold subsurface water eminates radially in all directions from the vertical jet streams, while floating on top of the body of water. The cold water then descends in vertical jet streams to the subsurface allowing the cycle to be repeated. The cold subsurface water brought to the surface in a number of places over a relatively large area of the body of water allows the temperature differential between the cold surface water and the warm surface water adjacent thereto and at the periphery thereof to be used by a fluid in a heat engine cycle to drive turbines and thereby generate electricity. The cold surface water also allows the production of electricity of air turbines which may be placed adjacent to the area having cold water thereon. The cold water cools the air above it creating strong winds which drive the air turbines. | GIRDEN BARNEY B | US05916897 | 1978/6/19 |
| 363 | Ocean thermal engine | An ocean thermal engine utilizing the thermocline and hydrostatic pressure of the ocean to change the buoyancy of a series of rigid containers having good thermal conductivity fitted with means for confining a thermodynamic fluid capable of vaporizing and condensing within the temperature range of the ocean thermocline. The rigid containers are arranged in spaced relation around rotatable supporting means so that the change in buoyancy of the containers causes said means to rotate and to drive a generator if electrical energy is desired. | UNIV DELAWARE | US06020639 | 1979/3/15 |

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| 364 | Flexible ocean upwelling pipe | In an ocean thermal energy conversion facility, a cold water riser pipe is releasably supported at its upper end by the hull of the floating facility. The pipe is substantially vertical and has its lower end far below the hull above the ocean floor. The pipe is defined essentially entirely of a material which has a modulus of elasticity substantially less than that of steel, e.g., high density polyethylene, so that the pipe is flexible and compliant to rather than resistant to applied bending moments. The position of the lower end of the pipe relative to the hull is stabilized by a weight suspended below the lower end of the pipe on a flexible line. The pipe, apart from the weight, is positively buoyant. If support of the upper end of the pipe is released, the pipe sinks to the ocean floor, but is not damaged as the length of the line between the pipe and the weight is sufficient to allow the buoyant pipe to come to a stop within the line length after the weight contacts the ocean floor, and thereafter to float submerged above the ocean floor while moored to the ocean floor by the weight. The upper end of the pipe, while supported by the hull, communicates to a sump in the hull in which the water level is maintained below the ambient water level. The sump volume is sufficient to keep the pipe full during heaving of the hull, thereby preventing collapse of the pipe. | GLOBAL MARINE INC | US05935673 | 1978/8/21 |

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| 365 | Mist flow ocean thermal energy process | Power is generated using the temperature difference between the water at the surface of a large body of water whose temperature might be in the vicinity of 25 DEG C. or 77 DEG F., and water at considerable depth in the body of water whose temperature might be in the order of about 5 DEG C. or 41 DEG F. A floating structure is provided which extends in the order of 50 meters below the surface of the water, and input water is initially filtered and deaerated, and then drops for most of the height of the submerged structure before driving a conventional hydraulic turbine. The warm water at the output of the turbine is returned to the level of the surface of the body of water by a mist flow pump arrangement using a large tapered duct that is operated at reduced pressure, with droplets of the warm water from the output of the turbine being sprayed into the bottom of the duct. With the duct being at a pressure below the saturation vapor pressure of the injected warm water, some of the water evaporates or boils to form steam and this expanding steam carries the water droplets to the top of the duct against the force of gravity. The droplets are small enough so that the viscous friction is sufficient to enable the steam to carry them up. At the top of the duct the flow is turned radially outward to a condenser, in which cold water from the depths is employed to condense the mist, and the mixed hot and cold water stream is subsequently returned to an intermediate temperature level of the body of water. | R D ASS | US05888018 | 1978/3/20 |

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| 366 | Thermal energy conversion system utilizing expandites | An ocean thermal energy conversion system includes a mass of expandites that change density in response to changes in temperature at a given pressure to thereby change buoyancy with respect to ocean water; a mass transport conduit circuit for introducing the expandites to ocean water at different combinations of temperature and pressure and transporting the expandites and ocean water in response to pressure differentials created by density changes and concomitant buoyancy changes of the expandites as the expandites are exposed to ocean water at different combinations of pressure and temperature; and a transducer such as a turbo-electric generator for converting the pressure of water transported by the circuit to electrical energy. Expandites are defined as separate objects that expand or contract when heated or cooled, thereby changing their density. The disclosed expandites includes substances encased in plastic bags, such as ammonia which expands upon undergoing a phase transformation upon going from a liquid to a gas, and nitro benzene which expands upon undergoing a phase transformation from a liquid to a solid. | SORENSEN JENS OLE | US06025800 | 1979/4/2 |

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| 367 | Open cycle ocean thermal energy conversion steam control and bypass system | Two sets of hinged control doors for regulating motive steam flow from an evaporator to a condenser alternatively through a set of turbine blades in a steam bypass around the turbine blades. The evaporator has a toroidal shaped casing situated about the turbine's vertical axis of rotation and an outlet opening therein for discharging motive steam into an annular steam flow path defined between the turbine's radially inner and outer casing structures. The turbine blades extend across the steam flow path intermediate the evaporator and condenser. The first set of control doors is arranged to prevent steam access to the upstream side of the turbine blades and the second set of control doors acts as a bypass around the blades so as to maintain equilibrium between the evaporator and condenser during non-rotation of the turbine. The first set of control doors preferably extend, when closed, between the evaporator casing and the turbine's outer casing and, when open, extend away from the axis of rotation. The second set of control doors preferably constitute a portion of the turbine's outer casing downstream from the blades when closed and extend, when open, toward the axis of rotation. The first and second sets of control doors are normally held in the open and closed positions respectively by locking pins which may be retracted upon detecting an abnormal operating condition respectively to permit their closing and opening and provide steam flow from the evaporator to the condenser. | US ENERGY | US05934574 | 1978/8/17 |

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| 368 | Open cycle ocean thermal energy conversion system structure | A generally mushroom-shaped, open cycle OTEC system and distilled water producer which has a skirt-conduit structure extending from the enlarged portion of the mushroom to the ocean. The enlarged part of the mushroom houses a toroidal casing flash evaporator which produces steam which expands through a vertical rotor turbine, partially situated in the center of the blossom portion and partially situated in the mushroom's stem portion. Upon expansion through the turbine, the motive steam enters a shell and tube condenser annularly disposed about the rotor axis and axially situated beneath the turbine in the stem portion. Relatively warm ocean water is circulated up through the radially outer skirt-conduit structure entering the evaporator through a radially outer portion thereof, flashing a portion thereof into motive steam, and draining the unflashed portion from the evaporator through a radially inner skirt-conduit structure. Relatively cold cooling water enters the annular condenser through the radially inner edge and travels radially outwardly into a channel situated along the radially outer edge of the condenser. The channel is also included in the radially inner skirt-conduit structure. The cooling water is segregated from the potable, motive steam condensate which can be used for human consumption or other processes requiring high purity water. The expansion energy of the motive steam is partially converted into rotational mechanical energy of the turbine rotor when the steam is expanded through the shaft attached blades. Such mechanical energy drives a generator also included in the enlarged mushroom portion for producing electrical energy. Such power generation equipment arrangement provides a compact power system from which additional benefits may be obtained by fabricating the enclosing equipment, housings and component casings from low density materials, such as prestressed concrete, to permit those casings and | US ENERGY | US05934575 | 1978/8/17 |

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| 369 | Self-cleaning inlet screen to an ocean riser pipe | A long, vertically disposed ocean water upwelling pipe, such as a cold water riser in an ocean thermal energy conversion facility, is fitted at its lower inlet end with a self-cleaning inlet screen. The screen includes a right conical frustum of loose metal netting connected at its larger upper end to the lower end of the pipe. A heavy, negatively buoyant closure is connected across the lower end of the frustum. A weight is suspended below the closure on a line which passes loosely through the closure into the interior of the screen. The line tends to stay stationary as the lower end of the pipe moves, as in response to ocean current vortex shedding and other causes, thus causing the closure to rattle on the line and to shake the netting. The included half-angle of the frustum is about 20 DEG so that, on shaking of the netting, marine life accumulated on the netting becomes loose and falls free of the netting. | GLOBAL MARINE INC | US05935674 | 1978/8/21 |
| 370 | Method of electrical closed heat pump system for producing electrical power | A method of electrical power generation is disclosed wherein the energy source to operate the said electrical power generation apparatus is that energy existing between two fluid sources being at different temperatures and therefore at different energy levels. These fluid sources could be as divergent as warm underground crude oil as it is pumped from wells and the cooler atmospheric air above the said oil wells, or as intimately related as the warm water output from conventional and nuclear power generating plants and the cooling water source usually available to such generating plants. Warm water pumped from deep below the earths surface, geo-thermally heated, as the warm or hot source and surface water from lakes, oceans, rivers, etc. as the colder, or lower energy source provides an additional source of energy for the method of electrical power generation herein described. Perhaps the largest source of waters, in which sufficient temperature differentials exist, are tropical ocean waters where temperature differences between the warm surface water and the cold deep ocean water, several thousand feet below the ocean surface, are often as high as 40 DEG to 45 DEG F. | HUMISTON GERALD F | US05833664 | 1977/9/15 |

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| 371 | Open cycle ocean thermal energy conversion system | An improved open cycle ocean thermal energy conversion system including a flash evaporator for vaporizing relatively warm ocean surface water and an axial flow, elastic fluid turbine having a vertical shaft and axis of rotation. The warm ocean water is transmitted to the evaporator through a first prestressed concrete skirt-conduit structure circumferentially situated about the axis of rotation. The unflashed warm ocean water exits the evaporator through a second prestressed concrete skirt-conduit structure located circumferentially about and radially within the first skirt-conduit structure. The radially inner surface of the second skirt conduit structure constitutes a cylinder which functions as the turbine's outer casing and obviates the need for a conventional outer housing. The turbine includes a radially enlarged disc element attached to the shaft for supporting at least one axial row of radially directed blades through which the steam is expanded. A prestressed concrete inner casing structure of the turbine has upstream and downstream portions respectively situated upstream and downstream from the disc element. The radially outer surfaces of the inner casing portions and radially outer periphery of the axially interposed disc cooperatively form a downwardly radially inwardly tapered surface. An annular steam flowpath of increasing flow area in the downward axial direction is radially bounded by the inner and outer prestressed concrete casing structures. The inner casing portions each include a transversely situated prestressed concrete circular wall for rotatably supporting the turbine shaft and associated structure. The turbine blades are substantially radially coextensive with the steam flowpath and receive steam from the evaporator through an annular array of prestressed concrete stationary vanes which extend between the inner and outer casings to provide structural support therefor and impart a desired flow direction to the steam | US ENERGY | US05934572 | 1978/8/17 |

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| 372 | Power generator utilizing elevation-temperature differential | A power generator including a closed pressure resisting tubular loop having a lower warmed end and an upper cooled end joined by connecting penstock column and a return column, the tubular loop being filled with fluid under pressure, the critical point of which is between the temperatures of the cooled and warmed ends, to cause the fluid to convert to a liquid phase in the upper end for discharge into the penstock column, and cause the liquid to convert into a gas phase in the lower end, for discharge while in its gas phase into the return column so that circulation of fluid as it converts between its liquid and gas phases is continuous, and a hydraulic power unit driven by downwardly moving liquid in the penstock column, reacting to the hydrostatic pressure so generated. | POMMIER LORENZO A | US05869646 | 1978/1/16 |
| 373 | Energy conversion system for deriving useful power from sources of low level heat | An energy conversion system for deriving useful power from the thermal gradients in the ocean, or from solar, geothermal, or other sources of low level heat, by using warm water to heat a confined working gas such as air whereby a pressure increase results due to warming the gas, arranging so that the expansion moves a piston or other device to extract power, and then cooling the gas and compressing it back to initial conditions while directly or indirectly contacting it with cooler water to thereby decrease the work needed for recompression. Net useful work results from the difference between the work of expansion at higher temperature and the work of recompression at lower temperature. | JAHNIG CHARLES E | US05732050 | 1976/10/13 |

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| 374 | Ocean thermal energy conversion valve | A fluid flow control valve to be interposed in the depending end portion of a large diameter casing projecting downwardly below the ocean thermocline and forming a cold water passageway for moving water to the surface. The valve includes a jacket surrounding the casing and spanning a transverse partition and ports in the casing wall above the partition. A control line supported sleeve valve, having a length at least equal to the spacing between the partition and upper limit of the casing ports, is coaxially disposed in the casing and includes upper and lower floatation chambers slidably contacting the inner surface of the casing wall and spaced-apart a distance at least as great as the vertical extent of the casing ports. Inflatable seals, surrounding the floatation chambers, are selectively inflated with the floatation chambers to provide buoyancy and for opening and closing the passageway in accordance with the position of the sleeve valve. | TAYLOR JULIAN S | US05809345 | 1977/6/23 |
| 375 | Geothermal energy conversion system | A geothermal energy recovery system of improved efficiency makes use of thermal energy stored in hot, solute-bearing well water as it is pumped upward to the earth's surface through an extended heat exchange element for continuously heating a downward flowing organic fluid to a supercritical state. Some of the energy of the latter fluid is used within the well for operating a turbine-driven pump for pumping the hot, solute-bearing well water at high pressure and always in liquid state to the earth's surface, where it is reinjected into the earth in another well. The temperature difference between the upward flowing brine and the downward flowing organic fluid is maintained finite in a predetermined manner along the subterranean extended heat exchange element. After driving the deep-well turbine-driven pump, the organic fluid arises to the earth's surface in a thermally insulated conduit; at the earth's surface, vapor turbine electrical power generation equipment is driven by the heated organic fluid which is then returned into the well for reheating in the extended heat exchanger. | SPERRY RAND CORP | US05860270 | 1977/12/13 |

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| 376 | Valveless differential temperature engine | The invention describes a valveless and practically frictionless differential temperature engine. The engine consists of a relatively warm evaporator chamber and a relatively cold condensor chamber containing a low boiling point fluid. The temperature differential between the chambers results in a corresponding vapor pressure differential between the chambers. Changes in the vapor pressure differential between the chambers causes liquid to rise and fill in a tube communicating between the liquid phase of the evaporator chamber and the vapor phase of the condensor chamber. The movement of the liquid is transmitted to a float and to a force receiving component outside of the chambers. The changes in the vapor differential between the chambers are automatically cyclically regulated by the level of liquid in the evaporator chamber which alternately submerges and uncovers the lower open end of a slanted tube communicating between the vapor phases of the chambers. | SIEGEL ISRAEL | US05710787 | 1976/8/2 |
| 377 | Compliant underwater pipe system | A compliant underwater pipe system having a compliant pipe whose buoyancy is readily controlled extending vertically in a sea, having a pump module mounted at the bottom end of the compliant pipe and an energy conversion device at the top end thereof whereby cold water is pumped from the bottom of the sea to the energy conversion device that utilizes the difference in temperature of the water to produce energy in a useable form. | DAUBIN SCOTT C | US05717352 | 1976/8/24 |
| 378 | Solar sea power system | Described is an ocean thermal energy conversion system wherein floating, submerged and fixed drilling platforms installed offshore primarily for exploration and/or production of hydrocarbons serve also as working and supportive bases for means for producing electricity by the adiabatic expansion of hydrocarbon gases which are thereby cooled. The cooled gases are then heated by contact with the solar heated surface layers of water and thermally expand thereby actuating a turbine and an electricity producing generator. Pipelines usually installed for the transmission of gases and crude oil to the shore are used dually by running electric cables with them to bring the electricity produced by the system to on-shore consuming or storage facilities. The system also includes means for increasing the surface water temperature such as insulated pipes bringing heat-containing effluent streams from on-shore treating plants. | TEXACO DEVELOPMENT CORP | US05733838 | 1976/10/19 |

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| 379 | Mass transport heat exchanger method and apparatus for use in ocean thermal energy exchange power plants | Ocean thermal energy conversion (OTEC) uses a fluid, such as ammonia, heated by high-temperature surface water to provide a turbine-driving working gas. To condense the gas for re-use, a slurry of phase-transformation particles and cold ambient sea water is mixed in a deeply-submerged tank and delivered to a surface tank essentially at the cold sub-surface temperature. Condensing of the working gas is performed at the ocean surface level by exposure to the cold slurry temperature. Particle phase-transformation, which occurs at a temperature between that of the cold sub-surface water and the reject temperature of the heat-exchanger, maintains a surface tank temperature at about that of the sub-surface water. | US NAVY | US05801180 | 1977/5/27 |
| 380 | Installation for the production of energy which utilizes a source of heat or natural thermic differences in level | An installation and a method for the production of energy which utilize a source of heat or natural thermic differences are described. A first container contains a fluid in the liquid state and is capable of transmitting the heat to the fluid, a second container being used for holding the fluid after completion of the thermodynamic cycle and after it has returned to the liquid state, the second container being at a temperature lower than the temperature which prevails in the first container. Conduit means for connecting the first and second container are provided. The fluid has a low boiling point and is capable of undergoing a change from the liquid to gaseous state. A turbine or equivalent device is provided to utilize the kinetic energy of the fluid and transform this energy into mechanical energy; the fluid is converted from the liquid to the gaseous state upon entry into this device and returns to the liquid state in the interior of the second container. The operation may be reversed with the second container being exposed to the source of heat. | MUNARI DELIO DE | US05780476 | 1977/3/23 |

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| 381 | Ocean thermal plant | An ocean thermal plant consisting of a floating energy converter utilizing large volumes of sea water to produce electrical power. In this plant, a fluid working medium is pumped to an evaporator where it is heated by a flow of warm surface sea water. The fluid in liquid form boils to a pressurized gas vapor which is routed to drive a turbine that, in turn, drives a generator for producing electricity. The gas vapor then enters a condenser immersed in cold sea water pumped from lower depths. The gas vapor condenses to its original liquid form and is then pumped to the evaporator to repeat the cycle. Modular components can be readily interchanged on the ocean thermal unit and inlet pipes for the sea water are provided with means for maintaining the pipes in alignment with the oncoming current. The modular construction allows for the testing of various components to provide a more rapid optimization of a standardized plant. | NASA | US05782481 | 1977/3/29 |
| 382 | Open cycle method and apparatus for generating energy from ocean thermal gradients | Power is generated by subjecting a body of water in an evacuated chamber alternately to pressure corresponding to the vapor pressure of water at the surface of a body of water, such as tropical sea water, and pressure corresponding to the vapor pressure of subsurface water. The body of water falls and rises in correspondence with the changing pressures and the pressures are alternated in synchronism with the natural period of oscillation of the body of water so as to increase the amplitude of its oscillation. Power is withdrawn from the oscillating body of water either by feeding overflow water to water turbines or by anemometer type turbines within the chamber. Apparatus details are disclosed. | UNIV CARNEGIE MELLON | US05778791 | 1977/3/17 |
| 383 | Thermal insulation systems | 1531174 Insulation CONCH INTERNATIONAL METHANE Ltd 2 May 1977 [13 July 1976] 18338/77 Heading F4P Insulation panels 8 are mounted within a container 13 by lips 12 on the panels engaging adjustable flanges 17 threaded on studs 14, the gap between adjacent lips 12 being sealed by elongate strips 19 secured by nuts 18. The space 21 between adjacent panels is filled with insulating material and the space sealed by a strip 22. The panels 8 preferably comprise a balsa frame closed by plywood sheets 10, 11 and filled with foamed plastics or glass fibre. | CONCH L N G | US05704987 | 1976/7/13 |

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| 384 | Method of preventing the accumulation of micro-organisms in thermal energy conversion systems | In an ocean thermal energy conversion system utilizing solar energy stored as heat in tropical waters to generate electricity, the evaporating and condensing functions of the heat exchangers are interchanged in order to prevent the accumulation of micro-organisms on their surfaces. The surfaces of the heat exchangers are also mechanically brushed or scraped so as to remove any thin films of microbial slime. In order to remove additional micro-organisms from the surfaces of the heat exchangers, the flow of hot and cold sea water through each of the heat exchangers is interchanged preferably on a daily basis. Thus, micro-organisms from the warm surface waters that attach themselves to one heat exchanger surface will be destroyed by the cold water that flows through that heat exchanger on the next day. On the other hand, the organisms that live in the cold water at great depths cannot survive the next day's warm water environment which is caused by alternating the flow to the two heat exchangers. | PACIFIC POWER AND PROTEIN INC | US05727680 | 1976/9/29 |
| 385 | System and method of ocean thermal energy conversion and mariculture | An integrated system for converting ocean thermal energy to electrical power for use in synthesis of anhydrous ammonia and a mariculture operation for raising a selected species of marine fauna. The mariculture operation is carried out in a lagoon located adjacent to a deep ocean region where the surface water temperature is at least 21 DEG C and the deep nutrient-rich water temperature is no more than about 10 DEG C. A separate working fluid, such as ammonia, operates in a Rankine cycle between the warm and cold seawater temperatures. The deep ocean water is used to condense the working fluid and is then mixed with warm surface water that has been used to evaporate the same working fluid in a closed power cycle. The resulting mixture is directed to the lagoon, where the nutrient-rich component contributes to the growth rate of a selected mariculture species. The warm surface water temperature may be increased by creating a monomolecular evaporation retarding layer in the ocean surface surrounding the power plant intake. | MAGER DAVID; HERONEMUS WILLIAM E | US05727681 | 1976/9/29 |

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| 386 | Ocean nuclear power equipment | A temperature differential power plant is combined with a nuclear power plant and employs the temperature differential between hot water discharged from cooling the nuclear reactor, steam obtained from the nuclear reactor, and cold water taken in from an outside source such as the sea. The generated output and thermal efficiency of the entire power equipment is thereby increased; the temperature of the hot water discharged from cooling the nuclear reactor is decreased to aid in the recirculation thereof and eliminate hot water pollution; and, only the cold water taken in is discharged with its temperature being controllable so as not to create a cold water pollution problem. Temperature differential power plants can be used in stages with the hot water discharged from cooling the nuclear reactor passing successively from one stage to the next. | HITACHI SHIPBUILDING ENG CO | US05651892 | 1976/1/23 |

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| 387 | High temperature geothermal energy system | Method and apparatus for controlling a well providing access to an underground source of high temperature geothermal brine against flashing as the hot brine is delivered upwardly through the well to surface power apparatus for use of heat from the brine in the generation of electrical power, thereby eliminating plugging of the well by precipitated mineral deposits as well as other problems which have heretofore caused most geothermal resources of this character to be beset with operational problems. A pump down in the well pressurizes the hot output liquid that is delivered to the surface generating equipment against flashing, the pump having a novel long tailpipe suspended therefrom which extends deep into the well. Liquid that is substantially cooler than the high temperature brine, and which may be output liquid from the power apparatus or may be provided from another cooler geothermal source, is injected into the well from the surface to form a continuously downflowing column about the outside of the pump and tailpipe assembly, and the tailpipe is sufficiently long so that the weight of the column of injected liquid applies sufficient pressure against the high temperature brine proximate the lower end of the tailpipe to prevent flashing of the brine. The cooler injection liquid is mixed with the high temperature brine proximate the tailpipe to produce hot output liquid of intermediate temperature, enabling the pump to operate at a low enough temperature, and under a low enough pressure head, to come within the capability of present pump technology and to minimize the pumping power and length of the pumping string required. The invention also includes novel concrete ditch reinjection conduit means for precipitating out minerals from highly concentrated brine that may be used for generating power, while delivering the brine to a reinjection well for return to the underground geothermal system, thereby preventing | MAGMA ENERGY INC | US05683506 | 1976/5/5 |

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| 388 | Low temperature engine | The invention describes a new type of engine particularly adapted for the conversion of solar thermal energy at low temperature to mechanical and electrical energy. A relatively cold and a relatively warm chambers are sealed from the outside environment and contain a low boiling point evaporating fluid. A tube dips at its lower open end in the fluid phase of the warm chamber. The upper open end of the tube is branched and opens into the vapor phases of the cold and warm chambers. The level of the fluid in the lower end of the tube rises and falls in response to alternate opening and closing of the communications of the tube with the vapor phases of the warm and cold chambers. The movement of fluid is translated to useful work through a float responding to the fluid levels. A high density fluid may be used in the warm chamber to increase the buoyant force acting upon the float. One modification of the engine functions as a highly efficient fuel-operated steam engine. | SIEGEL ISRAEL | US05674552 | 1976/4/7 |

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| 389 | Underwater thermal energy conversion unit | An underwater thermal energy conversion unit adapted to exploit the temperature differential between the surface temperature and the water temperature at the depth of submersion to generate useful power. The unit includes a cylinder divided by a piston assembly into a variable-temperature (VT) air-filled chamber and a constant-temperature (CT) air-filled chamber, both chambers being in heat exchange relationship with the relatively cold water at the depth of the submerged cylinder. The air in the CT chamber is always at the cold water temperature, whereas the air in the VT chamber communicates through a thermally-insulated duct with ambient air above the water body, so that when a control valve is open, the air temperature within the VT chamber rises above the cold water temperature, and when the valve is thereafter closed to isolate the VT chamber from ambient air, the air temperature therein falls again to the cold water temperature. A sensing system causes the valve to open when the temperatures in both chambers are at about the same level. As a consequence, the temperature in the VT chamber proceeds to rise to create an air pressure difference between the chambers, causing the piston assembly to move in the direction of the CT chamber to compress the air therein. When the temperature in the VT chamber reaches a level close to that of the ambient air, the sensing system then acts to close the valve, and the temperature in the VT chamber then proceeds to fall. As this occurs, the pressurized air in the CT chamber forces the piston assembly in the direction of the VT chamber to a point of equilibrium to complete the cycle. The reciprocation of the piston assembly is converted into output power | SPECTOR DONALD | US05703284 | 1976/7/7 |
| 390 | Low pressure engine | The low pressure engine operates through a temperature and pressure differential between two chambers containing a low boiling point liquid. The pressure differential causes the liquid to rise in a relatively small interspace between a conduit and a float in the relatively warm chamber. In order to obtain a mechanical advantage the float is temporarily restricted from responding to the buoyant force exerted by the liquid until the liquid in the interspace has reached a predetermined level. | SIEGEL ISRAEL | US05650444 | 1976/1/19 |

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| 391 | Pump starting system for sea thermal power plant | In a turbine driven power generating plant of the type using for example a hydrocarbon or halocarbon as the working fluid operating on or near the surface of an ocean, warm surface water is used as a source of heat for a boiler and cold water pumped from substantial depths is used to condense the working fluid after it has been expanded through the turbine. An auxiliary power source for starting the water pumps of the main system includes a prime mover driving a compressor which in turn supplies a high energy working fluid to a turbine coupled to drive the water pumps. The turbine exhaust after being cooled in a heat exchanger by the cold water pumped from the ocean depths, is returned to the suction side of the compressor. | SEA SOLAR POWER INC | US05699245 | 1976/6/24 |
| 392 | Device for converting internal energy of hot fluids to shaft work | Apparatus to convert the internal energy of hot fluids to mechanical work comprising a pair of nozzles, e.g. convergent-divergent nozzles, mounted oppositely on hollow support arms which are in turn mounted on a rotating hollow shaft which is coupled to a conventional electric generator or other device requiring mechanical power. The hot liquid, e.g. hot brine, flows through the hollow shaft and the hollow support arms to the nozzles, where the hot fluid expands and creates a thrust and torque on the shaft, causing it to rotate and create shaft power. The nozzles and rotating shaft are mounted in a closed container from which the exhaust fluid, gases and liquid are removed by conventional means so as to maintain a reduced pressure within the container. | OCCIDENTAL PETROLEUM CORP | US05605289 | 1975/8/18 |

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| 393 | Dynamic positioning system for a vessel containing an ocean thermal energy conversion system | A dynamic positioning system for a sea-going vessel containing an ocean thermal energy conversion (OTEC) system utilizes the thrust produced by the sea water effluents resulting from the energy conversion process to position the vessel against wind and ocean current forces. In one preferred embodiment applicable to both cylindrical surface and spar buoy types of vessels, both the warm water and cold water discharges are collected in a common annular plenum and then discharged through nozzles spaced angularly around the periphery of the plenum. Each nozzle is rotatable through a 90 DEG arc in a vertical plane to alter the direction of the discharge water jet and thereby to alter the horizontal component of the thrust or the driving force acting upon the vessel. The nozzles may be selected as to location and angular orientation to attain the net resultant force vector necessary to provide station-keeping or propulsion to the vessel under most any combination of wind and ocean current conditions. | TRW INC | US05681003 | 1976/4/28 |
| 394 | System for producing work using a small temperature differential | The small temperature differential between a warmer zone and a colder zone is exploited to produce work by confining a liquid having a temperature between the temperatures of the warmer and colder zones within a substantially closed air-free chamber in the warmer zone so as to vaporize part of the liquid and drive the remainder by its own vapor pressure to perform work by conversions of the potential or kinetic energy of the liquid. The liquid can pass over and drive a turbine for example. The liquid then flows into another chamber closed to the atmosphere. Once the liquid has been transferred from the first to the second chamber, the chambers may be functionally interchanged or the liquid again transferred to the first chamber. | PECAR MILAN | US05587704 | 1975/6/17 |
| 395 | Thermodynamic motor with constant rotating power shaft driven by power sources with inconsistent | A motor offering usable energy which comprises a number of power sources which are powered solely by their reaction to the evaporation of water or by their reaction to the atmosphere's normal characteristic of temperature decrease with increase in elevation. | LEFKOFF CHARLES BERRY | US05542922 | 1975/1/22 |

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| 396 | Ocean thermal gradient power plant | An ocean thermal gradient power plant utilizing the concept of converting the potential and/or kinetic energy developed as a low pressure, high specific volume steam to a hydraulic or kinetic working head in seawater. The plant comprises a hull having a pair of air-evacuated, partially submerged compartments therein. Each compartment contains a static hydraulic head and is interconnected with the other compartment above the level of the static hydraulic heads. One compartment contains a steam-lift pump which, in addition to the static head therein, creates a hydraulic working head therein. The water from the hydraulic working head drives a turbine and then exits the compartment to an intermediate depth. Steam from the steam-lift pump is drawn into the other compartment where it is condensed by a barometric condenser. The water in this compartment exits via a pipe extending from the level of the static hydraulic head to an intermediate depth. A Taylor compressor is located at the orifice of the pipe to remove any collected air from the system. | BECK EARL J | US05582017 | 1975/5/29 |
| 397 | Power generation arrangement | This invention relates to a system for generating power utilizing the elevation differences and available temperatures on the earth's surface, such as occurs in a mountainous region with a nearby valley or desert. The system includes heat rejection means, as for example, a condenser located at a higher elevation (a mountain top). Means for supplying heat to the system may be provided at a lower elevation (in a valley or desert region below). A geothermal source of heat, such as a hot spring, may be used. Power generation means are also provided in the valley and operatively communicated with the condenser on the mountain top and the heat supply means in the valley. Liquid flowing from the condenser to the power generation means at a relatively high pressure will drive the power generation means to create electrical energy and the liquid will be expanded, vaporized and cooled. The cooled vapor will absorb heat from the heat supply means and then be returned to the condenser on the mountain top. It may be desirable to have the relatively high pressure liquid pass through the power generation means in a liquid stage. The liquid will then be boiled off into a vapor at the heat supply means. This vapor then will be returned to the condenser on the mountain top. | PARKER SIDNEY A | US05538011 | 1975/1/2 |

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| 398 | System for producing work using a small temperature differential | The small temperature differential between a warmer zone and a colder zone is exploited to produce work. A brightly volatile fluid is confined within a substantially closed air-free, air emptied chamber in the warmer zone so as to drive the fluid by its own vapor pressure up a tube into an air-free upper end of an air emptied vertical duct in the colder zone to its lower end at the warm zone. As the fluid descends in the duct it passes over and drives a turbine so as to create mechanical work and then flows into another ductward opened chamber. Once all of the fluid has flown out of the one chamber and into the other a pair of conduits between the lower and upper regions of the other chamber and the lower and lower ends of the duct are closed and the corresponding conduits of the first chamber are opened so that the same process can occur in this other chamber. | PECAR MILAN | US05480096 | 1974/6/17 |
| 399 | UNDERWATER OBJECT LOCATING SYSTEM | 1. In a method for determining the presence in the ocean of a submerged object which has a temperature that is different from that of the contiguous seawater, the steps of RADIATING A DIRECTIONAL BEAM OF ELECTROMAGNETIC WAVES OF A PRESELECTED FREQUENCY TOWARDS THE OCEAN SURFACE AT AN ANGLE SUCH THAT A PORTION OF SAID ELECTROMAGNETIC WAVES IS REFLECTED FROM THE OCEAN SURFACE AND A PORTION ENTERS THE OCEAN, SAID PRESELECTED FREQUENCY BEING CHOSEN SUCH THAT SAID PORTION OF ELECTROMAGNETIC WAVES WHICH ENTER THE OCEAN IS PROPAGATED AN APPRECIABLE DISTANCE THEREIN, THE ELECTROMAGNETIC WAVES WHICH ARE SO PROPAGATED WHEN THEY ENCOUNTER VARIATIONS IN THE INDEX OF REFRACTION OF THE SEAWATER CAUSED BY THE TEMPERATURE DIFFERENCE BETWEEN THIS WATER AND THE SUBMERGED OBJECT BEING REFLECTED AT THESE SUBSURFACE LOCATIONS WITH THEIR FREQUENCY ALTERED AS A CONSEQUENCE OF THIS INTERACTION AND, THEREAFTER, EMERGE FROM SAID OCEAN; DETECTING THE ELECTROMAGNETIC WAVES WHICH ARE REFLECTED FROM THE OCEAN SURFACE AND ANY ELECTROMAGNETIC WAVES WHICH EMERGE FROM SAID OCEAN; AND ANALYZING THE FREQUENCY OF THE ELECTROMAGNETIC WAVES SO DETECTED TO DETERMINE THE PRESENCE OF ANY ELECTROMAGNETIC WAVES WHICH HAVE A FREQUENCY DIFFERENT FROM THAT OF SAID PRESELECTED FREQUENCY. | NAVY UNITED STATES OF AMERICA | US04049106 | 1960/8/11 |

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| 400 | MOBILE POWER GENERATION DEVICE EMPLOYING TROPICAL WATER | A power generating device operating in tropical ocean waters, containing a working fluid which absorbs heat from the warm surface ocean water to boil and vaporize to raise a piston. The device is then caused to descend to colder water depths whereby the vapor condenses, allowing the piston to fall through its stroke to perform useful work. | DANIELLO GEORGE T | US05490845 | 1974/7/22 |
| 401 | BOAT STRUCTURE | A composite boat structure comprising a hull and a liner fitting therewithin, wherein the hull and liner are formed primarily of materials having substantially different coefficients of thermal expansion, such as, aluminum and ABS plastic, respectively. The hull and liner are secured to each other by means which permit relative movement between the elements in response to differences in expansion and contraction resulting from temperature differentials. | DELHI MANUFACTURING CORPORATION | US05422157 | 1973/12/5 |
| 402 | Method and apparatus for cryogenic tank warm-up | A warm-up system for liquefied gas storage containers is operable as a closed cycle and comprises a reservoir containing a liquid heat transfer medium, pumping equipment for transferring the liquid from the reservoir to a vaporiser where the liquid is vaporised at an elevated pressure, and heat exchange elements within the storage containers for indirect heat exchange with the cold of said containers. The heat transfer medium for LNG is preferably a petroleum hydrocarbon such as isopentane and the vapour fed from the vaporisor may be adjusted to balance the heating rates of the containers. | CONCH INT METHANE LTD | US05301847 | 1972/10/30 |

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| 403 | BUOYANT UNDERWATER STRUCTURES | Underwater structures of limited and controllable buoyancy comprise shells, closed at the top and sides, in which is retained a volume of water having a lower specific gravity than that outside said shells. These shells may be flexible and transparent. Further, they may be completely closed and the water therein pressurized to impart rigidity to the structure. Typically, in a salt water environment, the buoyant internal liquid may comprise fresh water or a mixture of fresh water and salt water. A temperature differential between the water inside the shell and that outside may be used to obtain the desired density difference and resultant buoyancy. Access openings may be provided. Such structures may be moored or attached and may be used, for example, to cover an underwater work site and provide better visibility, freedom from underwater currents, etc. Closed, rigidified structures may be used for controlled buoyancy submarine hulls, structural supporting members, etc. | LAMBERTSEN C | US05078493 | 1970/10/6 |
| 404 | DIFFERENTIAL TEMPERATURE FLUID MOTOR | This disclosure is directed to a differential temperature fluid motor having a warm chamber containing a small supply of activating fluid connected in communication with a cold chamber adapted for cooling the activating fluid and for obtaining a mechanical advantage from a small supply of rising activating fluid. By utilizing a temperature differential between the cold and warm chambers to obtain a vapor pressure differential, a flow of activating fluid is cycled to and from the two chambers for concentration of buoyant force and imparting relative movement in the cold chamber and translation of said movement into useful work. | SIEGEL I | US05334974 | 1973/2/22 |

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| 405 | BEARERS FOR SOLID OF REVOLUTION TANKS ON BOARD SHIPS | Load bearers for bearing solid of revolution tanks having vertical axes of revolution on board ships, comprising continuous peripheral structure arranged around the tank and positioned in the equatorial area thereof, two bearer and coupling members surrounding the tank and each being coupled by one of their edges to the peripheral structure and by the other to a bearer member of the ship so that the forces perpendicular to the axis of revolution of the tank are absorbed by at least one of the bearer and coupling members and the forces parallel to the axis of revolution of the tank are absorbed by both the bearer and coupling members, one of which works under traction and the other under compression so that whatever the interspacing between the bearer and coupling members and the tank may be, bending moments will not be induced in the tank, said peripheral structure being coupled to the tank so that at least the inner peripheral part of the structure forms part of the tank. | TECNICA SENER IND Y NAVAL SA | US05349723 | 1973/4/10 |
| 406 | LNG CARGO TANK INSULATION SYSTEM | In a marine vessel having a hull structure for transporting or storing a cargo tank adapted to contain liquified and/or compressed gas, the tank is supported within the hull in any convenient manner by a support structure, with the exterior surface of the tank substantially entirely covered by a thermal insulation material. The insulation material also covers a portion of the support structure and extends from the point of juncture of the support structure with the tank towards a termination point spaced from the hull. The insulation material covering the support structure is tapered from a maximum thickness adjacent the point of juncture of the support means with the tank to a minimum thickness at the termination point so as to create a controlled temperature gradient in the support structure thereby to minimize the thermal stresses in the tank at the point of juncture thereof with the support structure. | KVAENNER BRUG AS | US05275893 | 1972/7/28 |
| 407 | MODULARIZED SEA POWER ELECTRICAL GENERATOR PLANT | An electrical generating plant utilizing temperature differentials (thermoclines) between various levels of the ocean having modularized boiler units, condenser units, and engine units which are adapted for assemblage in a stacked array to form a power unit. Any number of power units can be efficiently and economically connected together and attached to a pair of prefabricated pipes to form a generating plant. | UNIV CARNEGIE MELLON | US05152295 | 1971/6/11 |

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| 408 | SALVAGE PONTOON | A salvage pontoon characterized by flat suction coupling plates, object attaching arms having explosive driven studs, and a cryogenic gas supply is disclosed. A ballast arrangement is disclosed to permit raising of the object and attached pontoon in controlled increments. | US NAVY | US3730122D | 1971/5/5 |
| 409 | TANKER FOR LIQUEFIED GASES | 1, 214, 055. Carrying liquefied gases. CONCH OCEAN Ltd. 3 Jan., 1969 [21 Feb., 1968], No. 8362/68. Headings B7A, B7M and B7S. [Also in Division F4] In a tanker for carrying liquefied gases, a fluid-tight tank 4 in hold 3 is externally insulated by thermal insulation 7 between the tank and the walls of the hold, the outer parts of the insulation adjacent the walls of the hold being formed with passages through which any water present may pass, the water being able to drain into sumps 11 near the bottom of the hold for removal through pipes 12 by pump 13. In the embodiments described the outer part of the insulation consists of timber fixing strips 6, 61 secured to the inner surface of the hold, the fixing strips being slotted as at 6a, 6b, 6c for the passage of the water. | CONCH OCEAN LTD | US3547301D | 1969/1/27 |
| 410 | CONTAINER FOR LIQUEFIED GASES | 1, 226, 035. Liquefied gas storage containers. CONCH OCEAN Ltd. 18 Sept., 1968 [12 Oct., 1967], No. 44324/68. Heading F4P. A non-self supporting fluid-tight cold-resistant flexible membrane tank 6 right hand side of Fig. 1, is supported against internal loads by a surrounding solid thermal insulation 5 which is itself supported by a rigid shell 2, e.g. the inner hull of a tanker and the membrane tank 6 is anchored to the insulation by rigid anglesectioned members 19, Fig. 5, which extend along and are secured to the junction of adjacent side top and bottom walls of tank 6 and referred to as corners, and members 19 are also rigidly secured to the corners of the insulation 5. The membrane tank is formed of nickel-steel corrugated sheets 16 and corrugated dihedral corner-pieces 17 and trihedral corner-pieces 171, Fig. 4, to which are welded the angled anchor members 19 along regularly spaced intervals along the lengths of the corners of the membrane tank. Members 19 are bolted to spaced hardwood blocks 21, 22, adhesively secured to insulation panels 8 constructed as described in Specification 951, 923. The spaces between adjacent hardwood blocks is occupied by balsa wood blocks 23. A modified membrane tank 41, Fig. 10, has stepped top and side walls providing internal entrant corners a and external re-entrant corners b. | CONCH OCEAN LTD | US3547302D | 1968/9/20 |

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| 411 | CONTAINER FOR LIQUEFIED GASES | 1, 186, 060. Carrying liquefied gases. CONCH OCEAN Ltd. 9 Oct., 1968 [31 Oct., 1967], No. 49426/67. Headings B7A and B7S. [Also in Division F4] Heat insulation material 16, 17, 20, 21, Fig. 3, surrounding a cold liquidized gas storage tank 15 of polygonal form, Fig. 2, has embedded therein near the outer surface a film of water impermeable material 19 extending parallel to the tank sides whereby any water or water vapour which penetrates the outer thickness 20 of the insulation which is permeable runs down the film 19 and is collected in a recess 13a in an outer tank 13, e.g. the inner hull of a tanker. The insulation comprises a thick layer 17 of balsa wood mounted on spaced water impermeable wood strips 16 attached to the inner hull 13, a layer of permeable fibreglass 20 between adjacent strips 16 and impermeable fibreglass 21 between layer 17 and the film 19. The latter may be of metal or plastics material and is adhesively secured to the strips 16, which are provided with drain holes 16a. In a modification the storage tank is of the self-supporting type and the insulation which is spaced therefrom comprises a thick inner layer of balsa wood and a thin outer layer of fibreglass between which layers the water impermeable film is sandwiched; provision being made for collecting water running down the outer surface of the film and also for collecting leakage from the tank as described in Specification 919, 755. | CONCH OCEAN LTD | US3537415D | 1968/10/22 |
| 412 | TANKSHIP FOR THE TRANSPORTATION OF LOW-TEMPERATURE LIQUEFIED GASES | 1, 133, 167. Carrying liquefied gases. LINDE A.G. 16 March, 1967 [28 March, 1966], No. 12353/67. Headings B7A and B7S. [Also in Division F4] In a tanker vessel for the transport of a cargo of liquefied gas at low temperature, the cargo is carried only in containers 5 which are located wholly above the level of the upper deck 3. Smaller auxiliary tanks 6 extend parallel to the fore-and-aft axis of the tanker outboard of containers 5. The sides of the hull 1 are connected by a cladding 7 with the outer walls of the auxiliary tanks and the containers. An insulating layer 8 is arranged between the cladding 7 and the containers and auxiliary tanks. The deck 3 is protected by a second barrier 12 arranged on a load-bearing insulating layer 13. The space between the cladding 7 and the second barrier 12 forms a gas-tight chamber which may be filled with a protective gas. | RUDOLF BECKER | US3422779D | 1967/4/3 |

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| 413 | System for cooling, transporting and | | MCMULLEN JOHN J | US04529135 | 1966/2/21 |
| 414 | Electro-plasmic jet forming hardware | | SMITH JR BONNE | US04008558 | 1960/2/15 |
| 415 | Marine tankers | 892, 041. Carrying liquefied gas cargo. CORY & SON Ltd., Wm. March 31, 1958 [April 5. 1957], No. 11124/57. Class 113. [Also in Group XXVIII] A tanker for the bulk transport in the liquid state at low temperature of methane (or like ordinarily-gaseous substance) has liquefaction plant and circulating connections between the cargo tank or tanks and the plant whereby the gaseous methane boiling off in the tanks can be withdrawn, reliquefied and returned to the tanks. The ship is of turret construction with heavily insulated main tanks 18-23 extending substantially the full width of the ship and smaller tanks 33 which can be used to top up the main tanks if the liquefaction plant is unable to do so the cargo in the main tanks is kept topped up to a level in the narrow neck 27 of each tank, which neck is surmounted by a pump motor housing 32. These tanks extend up through the main deck 24 and except for tank 20 their necks 27 reach up through the turret deck 25. Main and secondary liquefaction plants are disposed at locations 76 and 77 respectively. In an emergency methane gas may be vented to atmosphere through six pairs of mast vents each having an anti-flash gauge at its upper end. Excess methane gas may be burnt off at flares on top of the masts 64 and 65. Specifications 892, 042, 892, 043, 892, 044, 892, 045, 892, 046 and 892, 047 are referred to. | WM CORY SON LTD | US03725709 | 1958/4/1 |
| 416 | Steam power producing plant working with two water sources, the | | CENTRE NAT RECH SCIENT | US02663040 | 1946/4/18 |
| 417 | Method and apparatus for | | GEORGE CLAUDE; PAUL BOUCHEROT | US01617908 | 1932/6/17 |
| 418 | METHOD AND APPARATUS FOR | | GEN ELECTRIC | US00663737 | 1911/12/4 |