

PATENT ASSIGNMENT COVER SHEET

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EPAS ID: PAT8180720

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	SECURITY AGREEMENT

CONVEYING PARTY DATA

Name	Execution Date
ECHOGEN POWER SYSTEMS (DELAWARE), INC.	04/12/2023

RECEIVING PARTY DATA

Name:	MTERRA VENTURES, LLC
Street Address:	1990 MAIN STREET
City:	SARASOTA
State/Country:	FLORIDA
Postal Code:	34236

PROPERTY NUMBERS Total: 147

Property Type	Number
PCT Number:	US2011029486
Application Number:	61417789
Application Number:	61243200
Application Number:	12631379
Application Number:	12631400
Application Number:	14450410
Application Number:	12631412
Application Number:	61316507
Application Number:	61417775
Application Number:	13212631
Application Number:	12722125
Application Number:	61209760
Application Number:	12716021
Application Number:	61209055
Application Number:	61170364
Application Number:	61219195
Application Number:	61231674
Application Number:	12880428
PCT Number:	US2010049042
PCT Number:	US2010044681

PATENT

Property Type	Number
PCT Number:	US2010039559
PCT Number:	US2010031614
Application Number:	61231238
Application Number:	11306911
Application Number:	60593485
Application Number:	11612417
Application Number:	60766013
Application Number:	11860151
Application Number:	11161144
Application Number:	60826899
Application Number:	12239811
PCT Number:	US2010044476
PCT Number:	US2007001120
PCT Number:	US2006049623
PCT Number:	US2007079318
Application Number:	13278705
Application Number:	14102628
Application Number:	61550017
Application Number:	13205082
Application Number:	14102677
Application Number:	61757522
Application Number:	61542478
Application Number:	13290735
Application Number:	61684933
Application Number:	14801153
Application Number:	13969738
Application Number:	61712929
PCT Number:	US2013064470
Application Number:	14051432
Application Number:	14803242
Application Number:	13590853
Application Number:	14469711
Application Number:	61712907
Application Number:	14051433
Application Number:	61757536
Application Number:	13264743
Application Number:	61779709
Application Number:	61776567

Property Type	Number
Application Number:	61757590
Application Number:	14164780
Application Number:	61777003
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Application Number:	14164496
Application Number:	61757629
Application Number:	61777014
PCT Number:	US2013064475
PCT Number:	US2014023026
PCT Number:	US2014013170
PCT Number:	US2011062266
PCT Number:	US2011062198
PCT Number:	US2011062201
PCT Number:	US2011062204
PCT Number:	US2011062207
PCT Number:	US2014023567
PCT Number:	US2014013154
Application Number:	14773767
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Application Number:	61779275
Application Number:	14774209
Application Number:	61712914
Application Number:	14051435
Application Number:	61779310
Application Number:	61779686
Application Number:	13380110
Application Number:	13389023
Application Number:	13389207
Application Number:	61723756
Application Number:	61780276
Application Number:	13633966
Application Number:	61782400
Application Number:	13644177
Application Number:	61782366
PCT Number:	US2014024548
PCT Number:	US2014024254

Property Type	Number
PCT Number:	US2014026173
PCT Number:	US2012000470
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Application Number:	61782578
Application Number:	61734522
Application Number:	62074182
Application Number:	15523441
Application Number:	62074192
Application Number:	15523485
Application Number:	16800420
Application Number:	61783511
Application Number:	61772204
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Application Number:	61818355
Application Number:	61874321
Application Number:	62010706
Application Number:	14475640
Application Number:	62011678
Application Number:	62011690
Application Number:	61993530
Application Number:	14707041
Application Number:	62010731
PCT Number:	US2014023990
PCT Number:	US2015057701
PCT Number:	US2014020242
PCT Number:	US2014053994
PCT Number:	US2014053995
PCT Number:	US2015057756
Application Number:	14475678
Application Number:	62093544
Application Number:	15536404
Application Number:	62204962
Application Number:	15231047
Application Number:	62511806
Application Number:	15988023
Application Number:	62690803

Property Type	Number
Application Number:	16453723
Application Number:	16453739
Application Number:	16867447
Application Number:	62123266
Application Number:	17546963
Application Number:	17974913
Application Number:	63392646
Application Number:	63443775
PCT Number:	US2015064212
PCT Number:	US2016046069
PCT Number:	US2018034289
PCT Number:	US2021026825
PCT Number:	US2021062675

CORRESPONDENCE DATA

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NAME OF SUBMITTER:	ARIADNA CAULFIELD
SIGNATURE:	/Ariadna Caulfield/
DATE SIGNED:	09/21/2023

Total Attachments: 14

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Schedule I. Patents/Applications.

Grantor: Echogen Power Systems (Delaware), Inc., a Delaware corporation

Secured Party: mTerra Ventures, LLC, a Delaware limited liability company

Grantor: Echogen Power Systems (Delaware), Inc., a Delaware corporation

Secured Party: mTerra Ventures, LLC, a Delaware limited liability company

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Fil. Date	Registration No.
PCT	PCT/Heat Engines with Cascade Cycles	PCT	PCT/US2011/029486		WO2011/119650	3/22/2011	
US Patent	PROV/Parallel Cycle Heat Engines	US	61/417,789			11/29/2010	
US Patent	PROV/Heat Engine and Heat to Electricity System	US	61/243,200			9/17/2009	
US Patent	UTIL/Heat Engine and Heat to Electricity Systems and Method	US	12/631,379	8,096,128	2010-0156112	12/4/2009	
US Patent	UTIL/Thermal Energy Conversion Method	US	12/631,400	8,794,002	2011-0061387	12/4/2009	
US Patent	CON/Thermal Energy Conversion Method	US	14/450,410	9,816,403	20140345279	8/4/2014	
US Patent	UTIL/Thermal Energy Conversion Device	US	12/631,412	9,115,605	2011-0185729	12/4/2009	
PCT	PCT/Heat Engine and Heat to Electricity Systems and Method	PCT	PCT/US2010/049042		WO2011/034984	9/16/2010	
US Patent	PROV/Heat Engines with Cascade Cycles	US	61/316,507			3/23/2010	
US Patent	PROV/Heat Engines With Cascade Cycles	US	61/417,775			11/29/2010	
US Patent	UTIL/Parallel Cycle Heat Engines	US	13/212,631	9,284,855	2012-0131920	8/18/2011	
US Patent	UTIL/Hybrid Power Systems	US	12/722,125	8,616,323		3/11/2010	
US Patent	PROV/Hybrid Power Systems	US	61/209,760			3/11/2009	
US Patent	UTIL/System and Method for Constructing Heat Exchanger	US	12/716,021		2010-0218930	3/2/2010	
US Patent	PROV/System and Method for Constructing Heat Exchanger	US	61/209,055			3/2/2009	
PCT	PCT/System and Method for Managing Thermal Issues in Gas Turbine Engines	PCT	PCT/US2010/031614		WO2010/121255	4/19/2010	
US Patent	PROV/System and Method for Managing Thermal Issues in Gas Turbine Engines	US	61/170,364			4/17/2009	
PCT	PCT/System and Method for Managing Thermal Issues in One or More Industrial Processes	PCT	PCT/US2010/039559		WO2010/151560	6/22/2010	
US Patent	PROV/System and Method for Managing Thermal Issues in One or More Industrial Processes	US	61/219,195			6/22/2009	
PCT	PCT/Solar Collector with Expandable Fluid Mass Management System	PCT	PCT/US2010/044681		WO2011/017599	8/6/2010	
US Patent	PROV/Solar Collector with Expandable Fluid Mass Management System	US	61/231,674			8/6/2009	
US Patent	UTIL/Heat Engine and Heat to Electricity Systems and Method	US	12/880,428	8,281,593	2011/0061384	9/13/2010	
PCT	PCT/Heat Pump with Integral Solar Collector	PCT	PCT/US2010/044476		WO2011/017476	8/4/2010	
US Patent	PROV/Heat Pump with Integral Solar Collector	US	61/231,238			8/4/2009	
US Patent	UTIL/High Efficiency Absorption Heat Pump and Methods of Use	US	11/306,911	7313926	2007-0089449	1/16/2006	
PCT	PCT/High Efficiency Absorption Heat Pump and Methods of Use	PCT	PCT/US2007/001120		WO2007/082103	1/16/2007	

US Patent	PROV/High Efficiency Absorption Heat Pump and Methods of Use	US	60/593,485			1/18/2005	
US Patent	UTIL/Thermodynamic Power Conversion Cycle and Methods of Use	US	11/612,417	7900450	2007-0151244	12/18/2006	
PCT	PCT/Thermodynamic Power Conversion Cycle and Methods of Use	PCT	PCT/US2006/049623		WO2007/079245	12/29/2006	
US Patent	PROV/Thermodynamic Power Conversion Cycle and Methods of Use	US	60/766,013			12/29/2005	
US Patent	UTIL/Hybrid Power Generation and Energy Storage System	US	11/860,151	8,099,198	2008/0211230	9/24/2007	
PCT	PCT/Hybrid Power Generation and Energy Storage System	PCT	PCT/US2007/079318		WO2008/039725	9/24/2007	
US Patent	UTIL/Hybrid Power Generation and Energy Storage System	US	11/161,144			7/25/2005	
US Patent	Hybrid Power Generation and Energy Storage System	US	60/826,899			9/25/2006	
US Patent	UTIL/Electrostatic Lubricant and Methods of Use	US	12/239,811		2010-0077792	9/28/2008	
Foreign Patent	UAE/Thermodynamic Power Conversion Cycle and Methods of Use	United Arab Emirates	575/2008			6/15/2008	
Foreign Patent	MX/Thermodynamic Power Conversion Cycle and Methods of Use	Mexico	MX/a/2008/008307			6/24/2008	
Foreign Patent	EP/Thermodynamic Power Conversion Cycle and Methods of Use	EPO	6849084.6			12/29/2006	
Foreign Patent	CN/Thermodynamic Power Conversion Cycle and Methods of Use	China	2.0068E+11			6/27/2008	
Foreign Patent	CA/Thermodynamic Power Conversion Cycle and Methods of Use	Canada	2634763			6/20/2008	
Foreign Patent	AU/Thermodynamic Power Conversion Cycle and Methods of Use	Australia	2006332649	2006332649		12/29/2006	
Foreign Patent	SA/Heat Engine and Heat to Electricity Systems and Method	Saudi Arabia	110310694			9/18/2010	

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Fil. Date	Registration No.
Foreign Patent	AU/High Efficiency Absorption Heat Pump and Methods of Use	Australia	2007204830			7/28/2008	
Foreign Patent	CA/High Efficiency Absorption Heat Pump and Methods of Use	Canada	2637488			1/16/2007	
Foreign Patent	CN/High Efficiency Absorption Heat Pump and Methods of Use	China	2.0078E+11			1/16/2007	
Foreign Patent	IL/High Efficiency Absorption Heat Pump and Methods of Use	Israel	192840			1/16/2007	
Foreign Patent	MX/High Efficiency Absorption Heat Pump and Methods of Use	Mexico	MX/a/2008/009087			7/15/2008	
Foreign Patent	UAE/High Efficiency Absorption Heat Pump and Methods of Use	United Arab Emirates	695/08			1/16/2007	
US Patent	UTIL/Heat Engine and Heat to Electricity Systems and Methods with Working Fluid Mass Management Control	US	13/278,705	8,613,195	US-2012-0047892-A1	10/21/2011	
US Patent	CON/Heat Engine and Heat to Electricity Systems and Methods with Working Fluid Mass Management Control	US	14/102,628	9,458,738	20140096524	12/11/2013	
US Patent	PROV/Turbine Drive Absorption System	US	61/550,017			10/21/2011	
US Patent	UTIL/Driven Starter Pump and Start Sequence	US	13/205,082	8,616,001	2012/0131919	8/8/2011	
US Patent	CON/Driven Starter Pump and Start Sequence	US	14/102,677	9,410,449	20140096521	12/11/2013	
US Patent	PROV/Shaft Seal Assembly and Working Fluid Recycling System	US	61/757,522			1/28/2013	
US Patent	PROV/CO2 Jet Pump Refrigeration Cycle	US	61/542,478			10/3/2011	
US Patent	PROV/Working Fluid Recovery - Return Cooling and Sealed Alternator	US					
US Patent	UTIL/Hot Day Cycle	US	13/290,735	8,783,034	20130113221	11/7/2011	
US Patent	PROV/Disposable Wire Pull	US					

US Patent	PROV/Concealed Fastener System	US					
US Patent	PROV/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	US	61/684,933			8/20/2012	
Foreign Patent	BR/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	Brazil	1.12015E+12		2893162	2/12/2015	
Foreign Patent	CA/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	Canada	2882290			2/17/2015	
Foreign Patent	DE/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	Germany	6.02013E+11				
US Patent	UTIL/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	US	14/801,153	9,759,096	20150344339	7/16/2015	
Foreign Patent	EP/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	EPO	13831350.7	2893162		2/19/2015	
Foreign Patent	FR/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	France		2893162			
Foreign Patent	IT/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	EPO		2893162			
Foreign Patent	KR/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	KOREA	10-2015-7007103			3/20/2015	
PCT	PCT/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	PCT	PCT/US2013/055547		WO2014/031526	8/19/2013	
Foreign Patent	UK/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	EPO		2893162			
US Patent	UTIL/Supercritical Working Fluid Circuit with a Turbo Pump and a Start Pump in Series Configuration	US	13/969,738	9,091,278	20140050593	8/19/2013	
US Patent	PROV/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	US	61/712,929			10/12/2012	
PCT	PCT/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	PCT	PCT/US2013/064470			10/11/2013	
Foreign Patent	BR/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	Brazil	1.12015E+12			4/8/2015	
Foreign Patent	CA/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	Canada	2887864			4/8/2015	

Type	Title	Country	App. No.	Pat. No.	Pub. No.	File Date	Registration No.
Foreign Patent	CN/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	China	2.0138E+11	ZL201380061449.2	CN105102772A	4/8/2015	
Foreign Patent	EP/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	EPO	13846097.7		2906787	4/13/2015	
Foreign Patent	KR/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	Korea	10-2015-7012411			4/8/2015	
US Patent	UTIL/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	US	14/051,432	9,118,226	20140103661	10/10/2013	
US Patent	UTIL/Heat Engine System with a Supercritical Working Fluid and Processes Thereof	US	14/803,242	9863287	20150345341	7/20/2015	
US Patent	PROV/Printable Brazing Flux	US					
US Patent	UTIL/Automated Mass Management Control	US	13/590,853	8,813,497	20130036736	8/21/2012	

US Patent	CON/Automated Mass Management Control	US	14/469,711	9863282	20150000281	8/27/2014	
US Patent	PROV/Supercritical Carbon Dioxide Power Cycle for Waste Heat Recovery	US	61/712,907			10/12/2012	
PCT	PCT/Supercritical Carbon Dioxide Power Cycle for Waste Heat Recovery	PCT	PCT/US2013/064471			10/11/2013	
US Patent	UTIL/Supercritical Carbon Dioxide Power Cycle for Waste Heat Recovery	US	14/051,433	9,341,084	20140102101	10/10/2013	
US Patent	PROV/CO2 Power Generation Protection System	US	61/757,536			1/28/2013	
Foreign Patent	EP/System and Method for Managing Thermal Issues in Gas Turbine Engines	EPO	10765339.6		2419621	11/3/2011	
US Patent	US/System and Method for Managing Thermal Issues in Gas Turbine Engines	US	13/264,743	9,014,791	US-2012-0067055-A1	10/14/2011	
US Patent	PROV/Generator with Integrated Cooling Provided by Closed-System Working Fluid	US	61/779,709			3/13/2013	
US Patent	PROV/Control of a Turbo Pump for an Advanced ScCO2 Rankine Cycle	US	61/776,567			3/11/2013	
PCT	PCT/Control of a Turbo Pump for an Advanced ScCO2 Rankine Cycle	PCT	PCT/US2014/023026		WO2014/164620	3/11/2014	
US Patent	PROV/Control of the Start Pump Bypass Valve in a ScCO2 Advanced Rankine Cycle	US					
US Patent	PROV/Control of a Turbo Pump Bypass Valve for a ScCO2 Advanced Rankine Cycle	US					
US Patent	PROV/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	US	61/757,590			1/28/2013	
Foreign Patent	AU/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	Australia	2014209091	2014209091		7/20/2015	
Foreign Patent	BR/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	Brazil	1.12015E+12			7/20/2015	
Foreign Patent	CA/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	Canada	2899163	2899163		7/20/2015	
Foreign Patent	DE/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	Germany		2948649			
Foreign Patent	EP/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	EPO	1742931	2948649	2948649	7/20/2015	
Foreign Patent	FR/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	France		2948649			
Foreign Patent	KR/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	Korea	10-2015-7023361			7/20/2015	
PCT	PCT/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	PCT	PCT/US2014/013170			1/27/2014	
Foreign Patent	UK/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	United Kingdom		2948649			

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Pub. Date	Registration No.
US Patent	UTIL/Process for Controlling a Power Turbine Throttle Valve During a Supercritical Carbon Dioxide Rankine Cycle	US	14/164,780	9,752,460	20140208751	1/27/2014	

US Patent	PROV/Power Turbine Bypass Valve on a ScCO2 Advanced Rankin Cycle	US	61/777,003			3/12/2013	
US Patent	PROV/Turbo Pump Bypass Valve on a ScCO2 Advanced Rankin Cycle	US					
US Patent	PROV/Power Turbine Attenuator for a ScCO2 Advanced Rankin Cycle	US					
US Patent	PROV/Drive Turbine Attenuator for a ScCO2 Advanced Rankin Cycle Process	US					
US Patent	UTIL/Heat Engine Cycles for High Ambient Conditions	US	13/291,086	8,857,186	2012-0131921	11/7/2011	
US Patent	PROV/Integral Hub Dry Gas Seal	US					
US Patent	UTIL/Heat Engines With Cascade Cycles	US	13/305,596	8,869,531	2012-0131918	11/28/2011	
PCT	PCT/Heat Engines With Cascade Cycles	PCT	PCT/US2011/062266		WO2012/074940	11/28/2011	
PCT	PCT/Parallel Cycle Heat Engines	PCT	PCT/US2011/062198		WO2012/074905	11/28/2011	
Foreign Patent	AU/Parallel Cycle Heat Engines	Australia	2011336831	2011336831		5/20/2013	
Foreign Patent	BR/Parallel Cycle Heat Engines	Brazil	1.12013E+12			5/20/2013	
Foreign Patent	CA/Parallel Cycle Heat Engines	Canada	2820606	2820606		5/20/2013	
Foreign Patent	CN/Parallel Cycle Heat Engines	China	2.0118E+11	ZL20118006275 9.7	CN103477035A	5/20/2013	
Foreign Patent	DE/Parallel Cycle Heat Engines	Germany					
Foreign Patent	EP/Parallel Cycle Heat Engines	EPO	11845835.3	2646657	2646657	5/20/2013	
Foreign Patent	FR/Parallel Cycle Heat Engines	France					
Foreign Patent	IN/Parallel Cycle Heat Engines	India	1754/KOLNP/2013			6/3/2013	
Foreign Patent	JP/Parallel Cycle Heat Engines	Japan	2013-541069	6039572		5/20/2013	
Foreign Patent	KR/Parallel Cycle Heat Engines	Korea	10-2013-7016571	1835915		6/26/2013	
Foreign Patent	RU/Parallel Cycle Heat Engines	Russian Federation	2013124072	2575674		5/20/2013	
Foreign Patent	UK/Parallel Cycle Heat Engines	United Kingdom					
PCT	PCT/Driven Starter Pump and Start Sequence	PCT	PCT/US2011/062201		WO2012/074907	11/28/2011	
Foreign Patent	BR/Driven Starter Pump and Start Sequence	Brazil	1.12013E+12			5/16/2013	
Foreign Patent	CA/Driven Starter Pump and Start Sequence	Canada	2818816	2818816		5/16/2013	
Foreign Patent	EP/Driven Starter Pump and Start Sequence	EPO	11845935.3		2646658	5/16/2013	
Foreign Patent	KR/Driven Starter Pump and Start Sequence	Korea	10-2013-7016572	10-1896130		8/27/2015	
PCT	PCT/Hot Day Cycle	PCT	PCT/US2011/062204		WO2013/070249	11/28/2011	
PCT	PCT/Parallel Cycle Heat Engines for Use in High Ambient Temperatures	PCT	PCT/US2011/062207		WO2012/074911	11/28/2011	
US Patent	PROV/Method for Maintaining Carbon Dioxide in Supercritical State at the Startup of Heat Engine System	US	61/757,612			1/28/2013	
PCT	PCT/Method for Maintaining Carbon Dioxide in Supercritical State at the Startup of Heat Engine System	PCT	PCT/US2014/013154			1/27/2014	
US Patent	UTIL/Method for Maintaining Carbon Dioxide in Supercritical State at the Startup of Heat Engine System	US	14/164,496	9638065	20140208750	1/27/2014	
US Patent	PROV/Waste Heat Exchanger Bypass in a Supercritical System	US	61/757,629			1/28/2013	
US Patent	PROV/Startup Scheme With Heat-Saturated Waste Heat Exchangers	US					

US Patent	PROV/Working Fluid Inventory Control During System Shutdown	US	61/777,014			3/12/2013	
PCT	PCT/Management of Working Fluid During Heat Engine System Shutdown	PCT	PCT/US2014/023567		WO2014/164826	3/11/2014	
US Patent	UTIL/Management of Working Fluid During Heat Engine System Shutdown	US	14/773,767			9/9/2015	
US Patent	PROV/Three Temperature Stage Supercritical CO2 cycle	US					
US Patent	PROV/Supercritical CO2 Rankine Cycle in Combination with Recompression Cycle	US	61/779,133			3/13/2013	
US Patent	PROV/Argon Rankine Cycle in LNG Gasification System	US					

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Pub. Date	Registration No.
US Patent	PROV/Supercritical CO2 Cycle with Pressure Exchanger	US					
US Patent	PROV/Use of a Condenser as a Vaporizer During System Shutdown	US					
US Patent	PROV/Ramp Profiles in Supercritical CO2 Control Scheme	US	61/779,275			3/13/2013	
PCT	PCT/Ramp Profiles in Supercritical CO2 Control Scheme	PCT	PCT/US2014/024548		WO2014/165144	3/12/2014	
US Patent	UTIL/Ramp Profiles in Supercritical CO2 Control Scheme	US	14/774,209			9/13/2015	
US Patent	PROV/Wast Heat Exchanger Bypass	US					
US Patent	PROV/Back Pressure Regulator for Attenuator in Supercritical CO2 System	US					
US Patent	PROV/Bypass and Throttle Valves for a Supercritical Working Fluid Circuit	US	61/712,914			10/12/2012	
Foreign Patent	EPS/Bypass and Throttle Valves for a Supercritical Working Fluid Circuit	EPO	13845485.5		2906788	4/8/2015	
PCT	PCT/Bypass and Throttle Valves for a Supercritical Working Fluid Circuit	PCT	PCT/US2013/064475			10/14/2013	
US Patent	UTIL/Bypass and Throttle Valves for a Supercritical Working Fluid Circuit	US	14/051,435		20140102098	10/10/2013	
US Patent	PROV/Turbine Driven Pump Mounting System	US					
US Patent	PROV/Supercritical CO2 System Package Design	US					
US Patent	PROV/Dry Gas Seal Shutdown Strategy	US	61/779,310			3/13/2013	
PCT	PCT/Turbine Dry Gas Seal System and Shutdown Process	PCT	PCT/US2014/024254		WO2014/165053	3/12/2014	
US Patent	PROV/Use of Charging Pump to Supply CO2 to Turbine Bearings	US	61/779,686			3/14/2013	
Foreign Patent	BR/Use of Charging Pump to Supply CO2 to Turbine Bearings	Brazil	1.12015E+12			9/11/2015	
Foreign Patent	EP/Use of Charging Pump to Supply CO2 to Turbine Bearings	EPO	14773079		2972044	10/13/2015	
Foreign Patent	PCT/Use of Charging Pump to Supply CO2 to Turbine Bearings	Korea	10-2015-7028161			10/8/2015	
PCT	PCT/Use of Charging Pump to Supply CO2 to Turbine Bearings	PCT	PCT/US2014/026173		WO2014/160257	3/13/2014	
Foreign Patent	BR/System and Method for Managing Thermal Issues in One or More Industrial Processes	Brazil	PI 1011938-8			12/22/2011	
US Patent	PROV/Controlled Blow down scheme of CO2 during emergency power turbine trip	US					
Foreign Patent	EP/High Efficiency Absorption Heat Pump and Methods of Use	EPO	7716676.7				
Foreign Patent	AU/System and Method for Managing Thermal Issues in One or More Industrial Processes	Australia	2010264462	2010264462		12/22/2011	
Foreign Patent	CA/System and Method for Managing Thermal Issues in One or More Industrial Processes	Canada	2,766,637			12/22/2011	

Foreign Patent	CN/System and Method for Managing Thermal Issues in One or More Industrial Processes	China	2.0108E+11	ZL20108003538 2.1	CN102575532A	2/10/2012	
Foreign Patent	EP/System and Method for Managing Thermal Issues in One or More Industrial Processes	EPO	10792586.9	2446122	2446122	6/22/2010	
Foreign Patent	DE/System and Method for Managing Thermal Issues in One or More Industrial Processes	Germany	6.0201E+11	2446122		6/2/2010	
Foreign Patent	FR/System and Method for Managing Thermal Issues in One or More Industrial Processes	France	10792586.9	2446122		6/2/2010	
Foreign Patent	IT/System and Method for Managing Thermal Issues in One or More Industrial Processes	Italy	10792586.9	2446122		6/2/2010	
Foreign Patent	UK/System and Method for Managing Thermal Issues in One or More Industrial Processes	United Kingdom	10792586.9	2446122		6/2/2010	
Foreign Patent	IN/System and Method for Managing Thermal Issues in One or More Industrial Processes	India	9820/CHENP/2011			12/27/2011	
Foreign Patent	JP/System and Method for Managing Thermal Issues in One or More Industrial Processes	Japan	2012-517669	5681711		12/21/2011	
Foreign Patent	MX/System and Method for Managing Thermal Issues in One or More Industrial Processes	Mexico	MX/A/2012/000059			1/2/2012	
Foreign Patent	NO/System and Method for Managing Thermal Issues in One or More Industrial Processes	Norway				12/22/2011	

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Fil. Date	Registration No.
Foreign Patent	ZA/System and Method for Managing Thermal Issues in One or More Industrial Processes	South Africa	2012/00229	2012/00229		1/11/2012	
US Patent	UTIL/System and Method for Managing Thermal Issues in One or More Industrial Processes	US	13/380,110	9,441,504	2012-0128463	12/22/2011	
US Patent	PROV/Opposed Flow Centrifugal Turbine	US					
US Patent	PROV/AWAITING NEW DISCLOSURE	US					
US Patent	UTIL/Solar Collector With Expandable Fluid Mass Management System	US	13/389,023		20120247455	2/6/2012	
US Patent	UTIL/Heat Pump With Integral Solar Collector	US	13/389,207	9,316,404	20120247134	2/6/2012	
Foreign Patent	BR/Heat Engine and Heat to Electricity Systems and Method	Brazil	1.12012E+12	112012006158-5	2652	3/14/2012	
Foreign Patent	CA/Heat Engine and Heat to Electricity Systems and Method	Canada	2,774,632	2,774,632		3/16/2012	
Foreign Patent	CA/Heat Engine and Heat to Electricity Systems and Method	Canada	2890527	2890527		5/21/2015	
Foreign Patent	CN/Heat Engine and Heat to Electricity Systems and Method	China	2.0108E+11	CN102741536	CN102741536A	3/16/2012	
Foreign Patent	EP/Heat Engine and Heat to Electricity Systems and Method	EPO	10817804.7	2478201	2478201	5/8/2012	
Foreign Patent	DE/Heat Engine and Heat to Electricity Systems and Method	EPO	6.0201E+11				
Foreign Patent	FR/Heat Engine and Heat to Electricity Systems and Method	EPO	10817804.7	2478201		9/16/2010	
Foreign Patent	IT/Heat Engine and Heat to Electricity Systems and Method	EPO	10817804.7	2478201		9/16/2010	
Foreign Patent	UP/Heat Engine and Heat to Electricity Systems and Method	United Kingdom	10817804.7	2478201		9/16/2010	
Foreign Patent	IN/Heat Engine and Heat to Electricity Systems and Method	India	908/KOLNP/2012			4/17/2012	
US Patent	PROV/Methane Burning/CO2 Geothermal Recovery System	US	61/723,756			11/7/2012	
US Patent	PROV/Supercritical Carbon Dioxide Cooling Jacket for An Electric Arc Furnace	US					

US Patent	PROV/Turbine Case Vent	US	61/780,276			3/13/2013	
US Patent	PROV/Two-Valve Actuation for Turbine Stop Valve	US					
US Patent	PROV/Method to Effectively Utilize a Flux Limited Heat Source in a sCO2 Power Generation System	US					
US Patent	UTIL/Heat Engine and Heat to Electricity Systems and Method	US	13/633,966	8,966,901	20130033037	10/3/2012	
Foreign Patent	EP/Heat Engines with Cascade Cycles	EPO	11760095.7	2550436	2550436	10/17/2012	
Foreign Patent	DE/Heat Engines with Cascade Cycles	Germany	6.02011E+11	2550436		10/17/2012	
Foreign Patent	FR/Heat Engines with Cascade Cycles	France	11760095.7	2550436		10/17/2012	
Foreign Patent	UK/Heat Engines with Cascade Cycles	United Kingdom	11760095.7	2550436		10/17/2012	
Foreign Patent	CA/Heat Engines with Cascade Cycles	Canada	2794150	2794150		9/24/2012	
Foreign Patent	BR/Heat Engines with Cascade Cycles	Brazil	1.12012E+12	112012024146-0		9/24/2012	
US Patent	PROV/High Net Power Supercritical CO2 Cycles	US	61/782,400			3/14/2013	
US Patent	UTIL/Carbon Dioxide Refrigeration Cycle	US	13/644,177	9,062,898	20140090405	10/3/2012	
PCT	PCT/CO2 Jet Pump Refrigeration Cycle	PCT	PCT/US2012/000470		WO2013/055391	10/3/2012	
PCT	PCT/Heat Engine and Heat to Electricity Systems and Methods with Working Fluid Mass Management Control	PCT	PCT/US2012/061151		WO2013/059687	10/19/2012	
PCT	PCT/Turbine Drive Absorption System	PCT	PCT/US2012/061159		WO2013/059695	10/19/2012	
US Patent	PROV/Inventory Management of a Supercritical CO2 System	US	61/782,366			3/14/2013	
Foreign Patent	BR/Inventory Management of a Supercritical CO2 System	Brazil	1.12015E+12			9/14/2015	
Foreign Patent	DE/Inventory Management of a Supercritical CO2 System	Germany		2971621			
Foreign Patent	EP/Inventory Management of a Supercritical CO2 System	EPO	14773620.1	2971621	2971621	9/15/2015	
Foreign Patent	FR/Inventory Management of a Supercritical CO2 System	France		2971621			
Foreign Patent	KR/Inventory Management of a Supercritical CO2 System	Korea	10-2015-7029280			10/14/2015	
PCT	PCT/Inventory Management of a Supercritical CO2 System	PCT	PCT/US2014/024305		WO2014/159587	3/12/2014	

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Fil. Date	Registration No.
Foreign Patent	UK/Inventory Management of a Supercritical CO2 System	United Kingdom		2971621			
US Patent	UTIL/Inventory Management of a Supercritical CO2 System	US	14/776,200	10,077,683	20160010512	9/14/2015	
US Patent	PROV/Controlling Turbopump Thrust in a Heat Engine System	US	61/782,578			3/14/2013	
Foreign Patent	PCT/Controlling Turbopump Thrust in a Heat Engine System	EPO	14775493.1		2971622	10/13/2015	
PCT	PCT/Controlling Turbopump Thrust in a Heat Engine System	PCT	PCT/US2014/023990		WO2014/159520	3/12/2014	
US Patent	PROV/Separation of Carbon Dioxide and Nitrogen using a Refrigerated Flash Drum	US					
US Patent	PROV/Separation of Carbon Dioxide and Nitrogen with the Use of Membranes	US					
US Patent	PROV/Separating Carbon Dioxide and Nitrogen	US	61/734,522			12/7/2012	
US Patent	PROV/Permanent Magnet Alternator Rotor ID Cooling	US					

US Patent	PROV/Separation of Carbon Dioxide and Nitrogen using Pressure Swing Absorption	US					
US Patent	PROV/Turbo Pump Startup Control Logic for a Super Critical CO2 Rankine Cycle	US	62/074,182			11/3/2014	
Foreign Patent	CA/Turbo Pump Startup Control Logic for a Super Critical CO2 Rankine Cycle	Canada	2966621	2966621		5/1/2017	
PCT	PCT/Turbo Pump Startup Control Logic for a Super Critical CO2 Rankine Cycle	PCT	PCT/US2015/057701		WO2016/073245	10/28/2015	
US Patent	UTIL/Turbo Pump Startup Control Logic for a Super Critical CO2 Rankine Cycle	US	15/523,441	10267184		5/1/2017	
US Patent	PROV/Active Thrust Management of a Turbo Pump in a Super Critical CO2 Advanced Cycle System	US	62/074,192			11/3/2014	
PCT	PCT/Active Thrust Management of a Turbo Pump in a Super Critical CO2 Advanced Cycle System	PCT	PCT/US2015/057756		WO2016/073252	10/28/2015	
US Patent	UTIL/Active Thrust Management of a Turbo Pump in a Super Critical CO2 Advanced Cycle System	US	15/523,485	10,570,777		5/1/2017	
US Patent	UTIL/Active Thrust Management of a Turbo Pump in a Super Critical CO2 Advanced Cycle System	US	16/800,420	11,293,309	20200208536	2/25/2020	
US Patent	PROV/Separation of Carbon Dioxide and Nitrogen Using Cryogenic Distillation	US	61/783,511			3/14/2013	
US Patent	PROV/Separation of Carbon Dioxide and Nitrogen Using Temperature Swing Adsorption, Using the Feed Stream as Heating Source	US					
US Patent	PROV/Alternator Stator Cooling by Closed-System Working Fluid	US					
US Patent	PROV/Power Cycles and Heat Engine Systems	US	61/772,204			3/4/2013	
PCT	PCT/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	PCT	PCT/US2014/020242		WO2014/138035	3/4/2014	
Foreign Patent	AU/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	Australia	2014225990			8/31/2015	
Foreign Patent	BR/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	Brazil	1.12015E+12			8/31/2015	
Foreign Patent	CA/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	Canada	2903784	2903784		8/31/2015	
Foreign Patent	DE/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	Germany		2964911			
Foreign Patent	EP/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	EPO	14759858.5	2964911	2964911	8/31/2015	
Foreign Patent	FR/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	France		2964911			
Foreign Patent	IT/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	Italy		2964911			
Foreign Patent	JP/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	Japan	2015-561535			8/31/2015	
Foreign Patent	KR/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	Korea	1.02016E+12			8/31/2015	

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Fil. Date	Registration No.
Foreign Patent	UK/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	United Kingdom		2964911			
US Patent	UTIL/Heat Engine Systems with High Net Power Supercritical Carbon Dioxide Circuits	US	14/772,404	10,934,895		9/3/2015	

US Patent	PROV/Power Electronics Cooling Using Heat Engine Working Fluid	US					
US Patent	PROV/Power Turndown in a Heat Engine with Single-Shaft Turbomachinery	US					
US Patent	PROV/Combined Rotor Cooling and Bearing Supply with Closed-System Working Fluid	US					
US Patent	PROV/Dual Turbocompressor Split Cycle	US	61/818,355			5/1/2013	
US Patent	PROV/System Shutdown Methods for Single-Shaft Turbomachinery Heat Engine	US					
US Patent	PROV/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	US	61/874,321			9/5/2013	
Foreign Patent	AU/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Australia	2014315252	2014315252		3/15/2016	
Foreign Patent	BR/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Brazil	1.12016E+12			3/4/2016	
Foreign Patent	CA/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Canada	2923403	2923403		4/1/2016	
Foreign Patent	CN/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	China	2.0148E+11	ZL201480057131.1	CN105765178A	4/18/2016	
Foreign Patent	DE/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Germany	6.02014E+11				
Foreign Patent	EP/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	EPO	14841858.5	3042048	3042048	3/9/2016	
Foreign Patent	FR/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	France	16199227	3163029		7/13/2016	
Foreign Patent	IT/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Italy	1484185.8	3163029		3/9/2016	
Foreign Patent	JP/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Japan	2016-540367			3/4/2016	
Foreign Patent	KR/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Korea, Republic of	10-2016-7008749	2304249		4/1/2016	
Foreign Patent	MX/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	Mexico	MX/A/2016/002907		MX/A/2016/002907	10/2/2016	
PCT	PCT/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	PCT	PCT/US2014/053994		WO2015/034987	9/4/2014	
US Patent	PROV/Heat Engine System Having a Selectively Configurable Working Fluid Circuit	US	62/010,706			6/11/2014	
Foreign Patent	UK/Highly Efficient Heat Engine System with a Supercritical Carbon Dioxide Circuit	EPO	3042048	3042048			
US Patent	UTIL/Heat Engine System Having a Selectively Configurable Working Fluid Circuit	US	14/475,640	9874112	20150076831	9/3/2014	
US Patent	PROV/ NEED TITLE	US					
US Patent	PROV/Systems and Methods for Integration of Cooling and Power Production	US					
US Patent	PROV/Systems and Methods for Balancing Thrust Loads in a Heat Engine System	US	62/011,678			6/13/2014	
US Patent	PROV/Systems and Methods for Controlling Backpressure in a Heat Engine System Having Hydrostatic Bearings	US	62/011,690			6/13/2014	

US Patent	PROV/Waste Heat Recovery Systems Having Magnetic Liquid Seals	US	61/993,530			5/15/2014	
US Patent	UTIL/Waste Heat Recovery Systems Having Magnetic Liquid Seals	US	14/707,041		20150330261	5/8/2015	
US Patent	PROV/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	US	62/010,731			6/11/2014	

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Fil. Date	Registration No.
Foreign Patent	EP/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	Germany	6.02014E+11	3042049		9/4/2014	
Foreign Patent	EP/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	EPO	14841902.1	3042049	3042049	9/4/2014	
Foreign Patent	EP/DIV/Control Methods for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	EPO	16199227.6	3163029	3163029	9/4/2014	
Foreign Patent	DE/DIV/Control Methods for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	Germany	16199227.6	3163029		9/4/2014	
Foreign Patent	FR/DIV/Control Methods for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	France	16199227.6	3163029		9/4/2014	
Foreign Patent	IT/DIV/Control Methods for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	Italy	16199227.6	3163029		9/4/2014	
Foreign Patent	UK/DIV/Control Methods for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	United Kingdom	16199227.6	3163029		9/4/2014	
Foreign Patent	EP/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	EPO	1481902.1	3042049		9/4/2014	
Foreign Patent	KR/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	Korea, Republic of	10-2016-7008673	10-2281175		4/1/2016	
PCT	PCT/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	PCT	PCT/US2014/053995		WO2015/034988	9/4/2014	
Foreign Patent	EP/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	United Kingdom	14841902.1	3042049		9/4/2014	
US Patent	UTIL/Control Method for Heat Engine Systems Having a Selectively Configurable Working Fluid Circuit	US	14/475,678	9926811	20150377076	9/3/2014	
US Patent	PROV/Passive Alternator Depressurization and Cooling	US	62/093,544			12/18/2014	
Foreign Patent	CN/Passive Alternator Depressurization and Cooling	China	2.0158E+11		CN107407164A	6/15/2017	
Foreign Patent	KR/Passive Alternator Depressurization and Cooling	Korea, Republic of	10-2017-7019716			7/14/2017	
PCT	PCT/Passive Alternator Depressurization and Cooling	PCT	PCT/US2015/064212		WO2016/099975	12/7/2015	
US Patent	UTIL/Passive Alternator Depressurization and Cooling	US	15/536,404		20170362963	6/15/2017	
US Patent	PROV/CO2 Box Condenser	US					
US Patent	PROV/Heat Engine System Including an Integrated Cooling Circuit	US	62/204,962			8/13/2015	
PCT	PCT/Heat Engine System Including an Integrated Cooling Circuit	PCT	PCT/US2016/046069		WO2017/027480	8/8/2016	
US Patent	UTIL/Heat Engine System Including an Integrated Cooling Circuit	US	15/231,047	10,024,198	20170130614	8/8/2016	
US Patent	PROV/Hybrid Plate-Fram/Printed Circuit Heat Exchangers	US					
US Patent	PROV/Inventory and Pressure Control Through ACC Manipulation in Power Cycle Operations	US	62/511,806			5/26/2017	

Foreign Patent	CA/Inventory and Pressure Control Through ACC Manipulation in Power Cycle Operations	Canada	3065101			1/7/2020	
Foreign Patent	CN/Inventory and Pressure Control Through ACC Manipulation in Power Cycle Operations	China	2.0188E+11	ZL201880049226.7	CN110959066A	1/21/2020	
Foreign Patent	EP/Inventory and Pressure Control Through ACC Manipulation in Power Cycle Operations	EPO	18805266.6		3631173	12/20/2019	
PCT	PCT/Inventory and Pressure Control Through ACC Manipulation in Power Cycle Operations	PCT	PCT/US2018/034289		WO2018/217969	5/24/2018	
US Patent	UTIL/Inventory and Pressure Control Through ACC Manipulation in Power Cycle Operations	US	15/988,023	10,472,994	20180340450	5/24/2018	
General	DHI Review	US					
US Patent	PROV/Passive Alternator Decompression and Cooling	US					
US Patent	PROV/LNG Vaporizer	US					
US Patent	PROV/CO2 Solar EOR	US					
US Patent	Systems and Methods for Generating Electricity Via a Pumped Thermal Energy Storage System	US	62/690,803			6/27/2018	

Type	Title	Country	App. No.	Pat. No.	Pub. No.	Fil. Date	Registration No.
US Patent	Systems and Methods for Generating Electricity Via a Pumped Thermal Energy Storage System	US	16/453,723	10,883,388	20200003080	6/26/2019	
General	US 8,584,843 Investigation	US					
US Patent	Systems and Methods for Generating Electricity Via a Pumped Thermal Energy Storage System	US	16/453,739	11,187,112	20200003081	6/26/2019	
US Patent	sCO2 Power Cycle Fill Procedure	US					
US Patent	Split Expansion Heat Pump Cycle	US	16/867,447	11,435,120	20210348806	5/5/2020	
Foreign Patent	Split Expansion Heat Pump Cycle	Australia	2021268555			9/27/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	Brazil	1.12022E+12			11/4/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	Canada	3175495			10/13/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	China	2.0118E+11		2.0218E+11	11/2/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	EPO	21800892.8			10/17/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	Israel	297347			10/16/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	India					
Foreign Patent	Split Expansion Heat Pump Cycle	Japan	2022-56667			11/1/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	Korea, Republic of	10-2022-7039128			11/8/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	Mexico	MX/A/2022/013921			11/4/2022	
PCT	Split Expansion Heat Pump Cycle	PCT	PCT/US2021/026825		WO2021225755	4/12/2021	
Foreign Patent	Split Expansion Heat Pump Cycle	Russian Federation	2022130043			11/18/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	Saudi Arabia	522441077			10/27/2022	
Foreign Patent	Split Expansion Heat Pump Cycle	South Africa	2022/10923			10/4/2022	
US Patent	3-Reservoir ETES System	US	62/123,266			12/9/2020	

PCT	Three Reservoir Electric Thermal Energy Storage System	PCT	PCT/US2021/062675		WO2022125816	12/9/2021	
US Patent	Three Reservoir Electric Thermal Energy Storage System	US	17/546,963		20220178301	12/9/2021	
US Patent	A High-Temperature, Dual Rail Heat Pump Cycle For High Performance at High-Temperature Lift and Range	US	17/974,913			10/27/2022	
US Patent	Method for controlling the thermal reservoir utilization balance of a pumped thermal energy storage system	US					
US Patent	CO2 Heat Pump Steam Generator	US	63/392,646			7/27/2022	
US Patent	Wast Heat Integration into Pumped Thermal Energy Storage	US	63/443,775			2/7/2023	