

Cool Sound Industries, Inc.

PATENTS

The following patents below are based on our original designs. Cool Sound Industries MAIN PATENT which Herbert F. Wighard is given credit to for all patents below. Which are related to the “**Double acting pulse tube electroacoustic system**” the original patent number US 5813234 and is used for thermoacoustic technology. This patent was filed on Sept. 27, 1995. The latest patent in thermoacoustics was filed on March 18, 2014. Cool Sound Industries plans to file additional patents for Air-conditioning using thermoacoustic technology.

Citing Patent	Filing date	Publication date	Applicant	Title
US5813234	Sept. 24, 1996	Sept. 29, 1998	Cool Sound Industries Herbert F. Wighard	Double acting pulse tube electroacoustic system
US5901556	Nov 26, 1997	May 11, 1999	The United States Of America As Represented By The Secretary Of The Navy	High-efficiency heat-driven acoustic cooling engine with no moving parts
US5996345	Jan 22, 1999	Dec 7, 1999	The United States Of America As Represented By The Secretary Of The Navy	Heat driven acoustic power source coupled to an electric generator
US6079214	Aug 6, 1998	Jun 27, 2000	Face International Corporation	Standing wave pump
US6145320	Dec 14, 1998	Nov 14, 2000	Daewoo Electronics Co., Ltd.	Automatic ice maker using thermoacoustic refrigeration and refrigerator having the same
US6163077	Jan 12, 1999	Dec 19, 2000	Macrosonix Corporation	RMS energy conversion
US6209328	Jul 23, 1999	Apr 3, 2001	LG Electronics, Inc.	Oil-free compressor-integrated pulse tube refrigerator
US6307287	Mar 8, 2000	Oct 23, 2001	The Penn State Research Foundation	High-efficiency moving-magnet loudspeaker
US6332323	Feb 25, 2000	Dec 25, 2001	586925 B.C. Inc.	Heat transfer apparatus and method employing active regenerative cycle

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US6374617	Jan 19, 2001	Apr 23, 2002	Praxair Technology, Inc.	Cryogenic pulse tube system
US6415611	Feb 22, 2001	Jul 9, 2002	Praxair Technology, Inc.	Cryogenic refrigeration system using magnetic refrigerator forecooling
US6425250	Feb 8, 2001	Jul 30, 2002	Praxair Technology, Inc.	System for providing cryogenic refrigeration using an upstream pulse tube refrigerator
US6574968	Jul 2, 2001	Jun 10, 2003	University Of Utah	High frequency thermoacoustic refrigerator
US6578364	Apr 19, 2002	Jun 17, 2003	Clever Fellows Innovation Consortium, Inc.	Mechanical resonator and method for thermoacoustic systems
US6644038	Nov 22, 2002	Nov 11, 2003	Praxair Technology, Inc.	Multistage pulse tube refrigeration system for high temperature super conductivity
US6700338	May 21, 2001	Mar 2, 2004	Sanyo Electric Co., Ltd.	Tubular acoustic pressure wave generator
US6711905	Apr 4, 2003	Mar 30, 2004	Lockheed Martin Corporation	Acoustically isolated heat exchanger for thermoacoustic engine
US6725670	Apr 9, 2003	Apr 27, 2004	The Penn State Research Foundation	Thermoacoustic device
US6755027	Apr 9, 2003	Jun 29, 2004	The Penn State Research Foundation	Cylindrical spring with integral dynamic gas seal
US6792764	Apr 9, 2003	Sep 21, 2004	The Penn State Research Foundation	Compliant enclosure for thermoacoustic device
US6901755	Nov 19, 2002	Jun 7, 2005	Praxair Technology, Inc.	Piston position drift control for free-piston device
US7043925	Jan 17, 2002	May 16, 2006	Sierra Lobo, Inc.	Densifier for simultaneous conditioning of two cryogenic liquids
US7055332	Sep 16, 2004	Jun 6, 2006	The Penn State Research Foundation	Compliant enclosure for thermoacoustic device
US7143586	Mar 2, 2004	Dec 5, 2006	The Penn State Research Foundation	Thermoacoustic device
US7162877	Dec 30, 2003	Jan 16, 2007	Oxford Magnet Technology Ltd.	Pulse tube refrigerator

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US7240495	Oct 1, 2004	Jul 10, 2007	University Of Utah Research Foundation	High frequency thermoacoustic refrigerator
US7290771	Apr 28, 2005	Nov 6, 2007	The Penn State Research Foundation	Bellows seals for thermoacoustic devices and reciprocating machinery
US7347053	Jun 23, 2005	Mar 25, 2008	Sierra Lobo, Inc.	Densifier for simultaneous conditioning of two cryogenic liquids
US7908856		Mar 22, 2011	Los Alamos National Security, LLC	In-line stirling energy system
US7944118		May 17, 2011	Kimberly Peacock	System and methodology for generating electricity using at least one heat engine and thermoacoustic element to apply cyclic pressure gradients to piezoelectric material
US8004156		Aug 23, 2011	University Of Utah Research Foundation	Compact thermoacoustic array energy converter
US8025297		Sep 27, 2011	The Penn State Research Foundation	Bellows with alternating layers of high and low compliance material for dynamic applications
US8037799		Oct 18, 2011	Lockheed Martin Corporation	Thermal management for electromagnetic coil systems
US8143767	Jul 15, 2011	Mar 27, 2012	University Of Utah Research Foundation	Compact thermoacoustic array energy converter
US9163581	Jun 27, 2012	Oct 20, 2015	The United States Of America As Represented By The Administrator Of National Aeronautics And Space Administration	Alpha-stream convertor
US20020048218	May 21, 2001	Apr 25, 2002	Nobumasa Sugimoto	Pressure wave generator
US20030188541	Apr 4, 2003	Oct 9, 2003	Lockheed Martin Corporation	Acoustically isolated heat exchanger for thermoacoustic engine
US20030192322	Apr 9, 2003	Oct 16, 2003	Garrett Steven L.	Cylindrical spring with integral dynamic gas seal
US20030192323	Apr 9, 2003	Oct 16, 2003	Poese Mathew E.	Compliant enclosure for thermoacoustic device
US20030192324	Apr 9, 2003	Oct 16, 2003	Smith Robert W. M.	Thermoacoustic device

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US20040060303	Jan 17, 2002	Apr 1, 2004	Haberbusch Mark S.	Densifier for simultaneous conditioning of two cryogenic liquids
US20040221586	Dec 30, 2003	Nov 11, 2004	Daniels Peter Derek	Pulse tube refrigerator
US20050028535	Sep 16, 2004	Feb 10, 2005	Poese Matthew E.	Compliant enclosure for thermoacoustic device
US20050109042	Oct 1, 2004	May 26, 2005	Symko Orest G.	High frequency thermoacoustic refrigerator
US20050189727	Apr 28, 2005	Sep 1, 2005	Smith Robert W.	Bellows seals for thermoacoustic devices and reciprocating machinery
US20050274123	Mar 2, 2004	Dec 15, 2005	The Penn State Research Foundation	Thermoacoustic device
US20070186560	Feb 1, 2007	Aug 16, 2007	Bruker Biospin AG	Hybrid heat pump / refrigerator with magnetic cooling stage
US20070193281	Mar 23, 2005	Aug 23, 2007	The Doshiha	Thermoacoustic apparatus and thermoacoustic system
US20080060442	Nov 6, 2007	Mar 13, 2008	Smith Robert W	Bellows with alternating layers of high and low compliance material for dynamic applications
US20080067893	Oct 4, 2007	Mar 20, 2008	Kimberly Peacock	System and Methodology for Generating Electricity Using At Least One Heat Engine and Thermoacoustic Element to Apply Cyclic Pressure Gradients to Piezoelectric Material
US20080072607	Jun 23, 2005	Mar 27, 2008	Sierra Lobo, Inc.	Densifier for simultaneous conditioning of two cryogenic liquids
US20090107138	Oct 24, 2007	Apr 30, 2009	Los Alamos National Security, Llc	In-line stirling energy system
US20090184604		Jul 23, 2009	Symko Orest G	Compact thermoacoustic array energy converter
US20090219697	Feb 29, 2008	Sep 3, 2009	Gaigler Randy L	Thermal management for electromagnetic coil systems

Citing Patent	Filing date	Publication date	Applicant	Title
US20110146302		Jun 23, 2011	Newman Michael D	Cryogenic heat exchanger for thermoacoustic refrigeration system
US20130219879	Jun 27, 2012	Aug 29, 2013	Rodger William Dyson, JR.	Alpha-Stream Convertor
US20130312429	Feb 25, 2011	Nov 28, 2013	Noki Corporation	Method and apparatus for thermoacoustic cooling
EP1367561A1	May 27, 2003	Dec 3, 2003	TECHNICATOME Société Technique pour l'Energie Atomique	Thermo-acoustic wave generator
EP1391136A2	Apr 20, 2002	Feb 25, 2004	Clever Fellows Innovation Consortium, Inc.	Matching an acoustic driver to an acoustic load in an acoustic resonant system
WO2002027175A1	Sep 26, 2001	Apr 4, 2002	Stirling Energy Systems Limited	Improvement in free piston stirling engines
WO2002063221A1	Jan 30, 2002	Aug 15, 2002	Praxair Technology, Inc.	System for providing cryogenic refrigeration
WO2002086445A2	Apr 20, 2002	Oct 31, 2002	Clever Fellows Innovation Consortium	Mechanical resonator and method for thermoacoustic systems
WO2002086445A3	Apr 20, 2002	Feb 13, 2003	Clever Fellows Innovation Cons	Mechanical resonator and method for thermoacoustic systems
WO2002087279A2	Apr 20, 2002	Oct 31, 2002	Clever Fellows Innovation Consortium	Matching an acoustic driver to an acoustic load in an acoustic resonant system
WO2002087279A3	Apr 20, 2002	May 1, 2003	Clever Fellows Innovation Cons	Matching an acoustic driver to an acoustic load in an acoustic resonant system
WO2003087679A1	Apr 10, 2003	Oct 23, 2003	The Penn State Research Foundation	Cylindrical spring with integral dynamic gas seal
WO2011096801A3	Feb 3, 2011	Jan 12, 2012	Stichting Energieonderzoek Centrum Nederland	Heat exchanger
WO2014146118A1	Mar 18, 2014	Sep 18, 2014	Vertech IP, LLC	Electro-acoustic resonance heater