

NASA/SP—2006-7039/SUPPL67  
October 2006

# **NASA PATENT ABSTRACTS BIBLIOGRAPHY**

A CONTINUING BIBLIOGRAPHY



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# Introduction

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The *NASA Patent Abstracts Bibliography* is an annual NASA publication containing comprehensive abstracts of NASA-owned inventions covered by U.S. patents. The citations included were originally published in NASA's *Scientific and Technical Aerospace Reports (STAR)* and cover *STAR* announcements made since May 1969.

The citations published in this issue cover the period July 2005 through September 2006. The range of subjects covered includes the *NASA Scope and Subject Category Guide's* 10 broad subject divisions separated further into 76 specific categories. However, not all categories contain citations during the dates covered for this issue; therefore, the Table of Contents does not include all divisions and categories. This scheme was devised in 1975 and last revised in 2005 in lieu of the 34 category divisions which were utilized in supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry consists of a citation accompanied by an abstract and, when appropriate, a key illustration taken from the patent or application for patent. Entries are arranged by subject category in ascending order. When available, citations contain a link to the full-text document online.

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Document citations are grouped by division and then by category, according to the *NASA Scope and Coverage Category Guide*.

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[\*\*Subject Term Index\*\*](#)

[\*\*Personal Author Index\*\*](#)

# NASA PATENT ABSTRACTS BIBLIOGRAPHY

A Continuing Bibliography (Suppl. 67)

OCTOBER 2006

04

## AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes all modes of communication with and between aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also *06 Avionics and Aircraft Instrumentation*, *17 Space Communications, Spacecraft Communications, Command and Tracking*, and *32 Communications and Radar*.

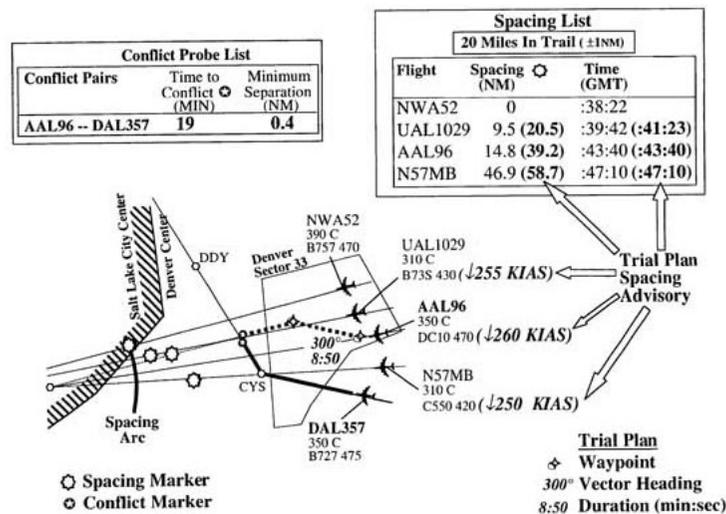
**20050237962** NASA Ames Research Center, Moffett Field, CA, USA

### En Route Spacing System and Method

Erzberger, Heinz, Inventor; Green, Steven M., Inventor; May 21, 2002; 25 pp.; In English  
Patent Info.: Filed 31 Jul. 2000; Patent-6,393,358-B1; US-Patent-Appl-SN-629123; US-Patent-Appl-SN-146502; NASA-Case-ARC-14418-1; No Copyright; Avail: CASI; A03, Hardcopy

A method of and computer software for minimizing aircraft deviations needed to comply with an en route miles-in-trail spacing requirement imposed during air traffic control operations via establishing a spacing reference geometry, predicting spatial locations of a plurality of aircraft at a predicted time of intersection of a path of a first of said plurality of aircraft with the spacing reference geometry, and determining spacing of each of the plurality of aircraft based on the predicted spatial locations.

Official Gazette of the U.S. Patent and Trademark Office  
*Computer Programs; Aircraft Approach Spacing; Routes*



05

## AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes all stages of design of aircraft and aircraft structures and systems. Also includes aircraft testing, performance, and evaluation, and aircraft and flight simulation technology. For related information see also *18 Spacecraft Design, Testing and Performance*; and *39 Structural Mechanics*. For land transportation vehicles see *85 Technology Utilization and Surface Transportation*.

**20050237947** NASA Dryden Flight Research Center, Edwards, CA, USA

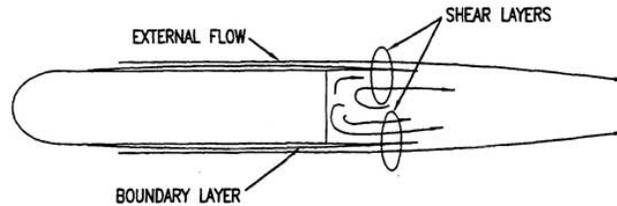
### Method for Reducing the Drag of Increasing Forebody Roughness Blunt-Based Vehicles by Adaptively Increasing Forebody Roughness

Whitmore, Stephen A., Inventor; Saltzman, Edwin J., Inventor; Moes, Timothy R., Inventor; Iliff, Kenneth W., Inventor; May 17, 2005; 7 pp.; In English

Patent Info.: Filed 29 May 2003; US-Patent-6,892,989-B1; US-Patent-Appl-SN-449905; NASA-Case-DRC-099002; No Copyright; Avail: CASI; A02, Hardcopy

A method for reducing drag upon a blunt-based vehicle by adaptively increasing forebody roughness to increase drag at the roughened area of the forebody, which results in a decrease in drag at the base of this vehicle, and in total vehicle drag. Official Gazette of the U.S. Patent and Trademark Office

*Forebodies; Surface Roughness; Blunt Bodies; Adaptive Control*



**20050237956** NASA Ames Research Center, Moffett Field, CA, USA

### Identification of a typical flight patterns

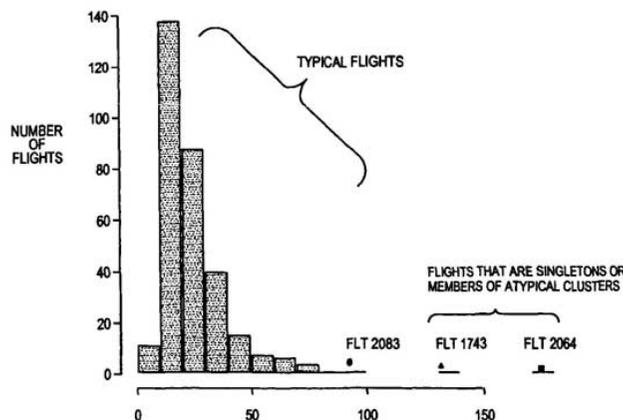
Statler, Irving C., Inventor; Ferryman, Thomas A, Inventor; Amidan, Brett G., Inventor; Whitney, Paul D., Inventor; White, M., Inventor; Willse, Alan R., Inventor; Cooley, Scott K., Inventor; Jay, Joseph Griffith, Inventor; Lawrence, Robert E., Inventor; Mosbrucker, Chris, Inventor, et al.; August 30, 2005; 13 pp.; In English

Patent Info.: Filed 21 May 2004; US-Patent-6,937,924-B1; US-Patent-Appl-SN-857376; NASA-Case-ARC-15041-1; No Copyright; Avail: CASI; A03, Hardcopy

Method and system for analyzing aircraft data, including multiple selected flight parameters for a selected phase of a selected flight, and for determining when the selected phase of the selected flight is atypical, when compared with corresponding data for the same phase for other similar flights. A flight signature is computed using continuous-valued and discrete-valued flight parameters for the selected flight parameters and is optionally compared with a statistical distribution of other observed flight signatures, yielding a typicality scores for the same phase for other similar flights. A cluster analysis is optionally applied to the flight signatures to define an optimal collection of clusters. A level of atypicality for a selected flight is estimated, based upon an index associated with the cluster analysis.

Author

*Flight Characteristics; Numerical Analysis; Cluster Analysis*



## LAUNCH VEHICLES AND LAUNCH OPERATIONS

Includes all classes of launch vehicles, launch/space vehicle systems, and boosters; and launch operations. For related information see also *18 Spacecraft Design, Testing and Performance*; and *20 Spacecraft Propulsion and Power*.

**20060009006** NASA Marshall Space Flight Center, Huntsville, AL, USA

### AXISYMMETRIC, THROTTLEABLE NON-GIMBALLED ROCKET ENGINE

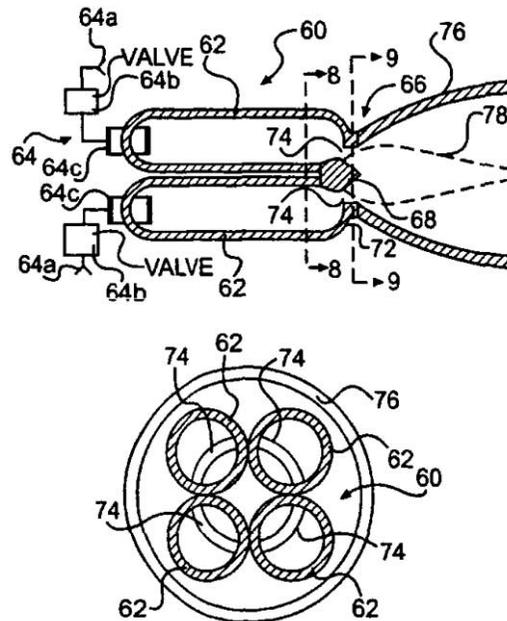
Sackheim, Robert L., Inventor; Hutt, John J., Inventor; Anderson, William E., Inventor; Dressler, Gordon A., Inventor; November 15, 2005; 9 pp.; In English

Patent Info.: Filed 11 Mar. 2003; US-Patent-6,964,154; US-Patent-Appl-390253; NASA-Case-MSF-31689; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009006>; Avail: CASI; A02, Hardcopy

A rocket engine assembly is provided for a vertically launched rocket vehicle. A rocket engine housing of the assembly includes two or more combustion chambers each including an outlet end defining a sonic throat area. A propellant supply for the combustion chambers includes a throttling injector, associated with each of the combustion chambers and located opposite to sonic throat area, which injects the propellant into the associated combustion chamber. A modulator, which may form part of the injector, and which is controlled by a controller, modulates the flow rate of the propellant to the combustion chambers so that the chambers provide a vectorable net thrust. An expansion nozzle or body located downstream of the throat area provides expansion of the combustion gases produced by the combustion chambers so as to increase the net thrust.

Official Gazette of the U.S. Patent and Trademark Office

*Rocket Engines; Throttling; Symmetry*



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## SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and spacecraft control and stability characteristics. For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance*; *39 Structural Mechanics*; and *16 Space Transportation and Safety*.

**20050237933** NASA Marshall Space Flight Center, Huntsville, AL, USA

### Thermal Insulating Coating for Spacecrafts

Kaul, Raj K., Inventor; September 06, 2005; 8 pp.; In English

Patent Info.: Filed 31 Jul. 2002; US-Patent-6,939,610-B1; US-Patent-Appl-SN-212564; NASA-Case-MSF-31593; No Copyright; Avail: CASI; A02, Hardcopy

To protect spacecraft and their contents from excessive heat thermal protection system are essential. For such thermal protection, metal coatings, ceramic materials, ablative materials, and various matrix materials have all been tried, but none have been found entirely satisfactory. The basis for this thermal protection system is the fact that the heat required to melt a substance is 80 to 100 times larger than the heat required to raise its temperature one degree. This led to the use herein of solid-liquid phase change materials. Unlike conventional heat storage materials, when phase change materials reach the temperature at which they change phase they absorb large amounts of heat without getting hotter. By this invention, then, a coating composition is provided for application to substrates subjected to temperatures above 100 F. The coating composition includes a phase change material.

Official Gazette of the U.S. Patent and Trademark Office

*Thermal Protection; Metal Coatings; Heat Storage; Ceramics; Thermal Insulation*

**CHEMISTRY AND MATERIALS (GENERAL)**

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see *categories 25 through 29*. For astrochemistry see category *90 Astrophysics*.

**20060009299** NASA Kennedy Space Center, Cocoa Beach, FL, USA

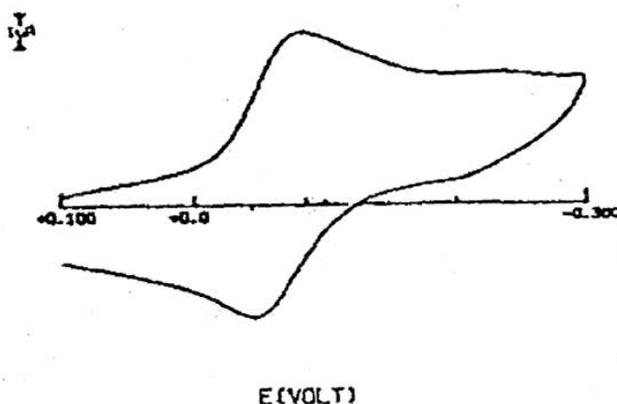
**CORROSION PREVENTION of COLD ROLLED STEEL USING WATER DISPERSIBLE LIGNOSULFONIC ACID DOPED POLYANILINE**

Viswanathan, Tito, Inventor; December 06, 2005; 9 pp.; In English

Patent Info.: Filed 11 Jul. 2001; US-Patent-6,972,098; US-Patent-Appl-SN-903260; US-Patent-Appl-217493; NASA-Case-KSC-122191; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009299>; Avail: CASI; A02, Hardcopy

The invention provides coatings useful for preventing corrosion of metals. The coatings comprise a film-forming resin and conductive polymers comprising linearly conjugated pi-systems and residues of sulfonated lignin or a sulfonated polyflavonoid or derivatives of sulfonated lignin or a sulfonated polyflavonoid. The invention also provides a latex formulation of the coatings, and articles of manufacture comprising a metal substrate and a coating in contact with the metal substrate. Official Gazette of the U.S. Patent and Trademark Office

*Corrosion Prevention; Metal Coatings; Resins; Doped Crystals; Steels; Cold Rolling*



**20060017040** NASA Kennedy Space Center, Cocoa Beach, FL, USA

**Zero-Valent Metal Emulsion for Reductive Dehalogenation of DNAPLs**

Reinhart, Debra R., Inventor; Clausen, Christian, Inventor; Gelger, Cherie L., Inventor; Quinn, Jacqueline, Inventor; Brooks, Kathleen, Inventor; May 02, 2006; 9 pp.; In English

Patent Info.: Filed 31 Oct. 2003; US-Patent-7,037,946; US-Patent-Appl-SN-701412; US-Patent-Appl-SN-972296; US-Patent-Appl-SN-6664298; NASA-Case-KSC-12246-2; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20060017040>; Avail: CASI; A02, Hardcopy

A zero-valent metal emulsion is used to dehalogenate solvents, such as pooled dense non-aqueous phase liquids (DNAPLs), including trichloroethylene (TCE). The zero-valent metal emulsion contains zero-valent metal particles, a surfactant, oil and water. The preferred zero-valent metal particles are nanoscale and microscale zero-valent iron particles. Official Gazette of the U.S. Patent and Trademark Office

*Metal Particles; Solvents; Trichloroethylene; Emulsions; Iron; Surfactants*

**COMPOSITE MATERIALS**

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

**20050237934** NASA Langley Research Center, Hampton, VA, USA

**Liquid Crystalline Thermosets from Ester, Ester-Imide, and Ester-Amide Oligomers**

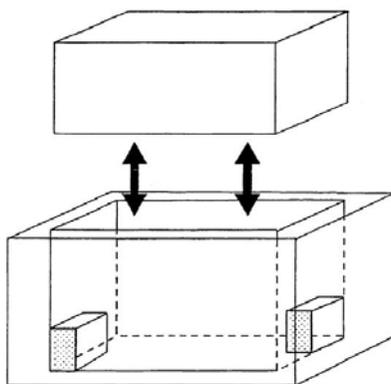
Dingemans, Theodorus J., Inventor; Weiser, Erik S., Inventor; SaintClair, Terry L., Inventor; September 06, 2005; 18 pp.; In English

Patent Info.: Filed 5 Jan. 2001; US-Patent-6,939,940-B2; US-Patent-Appl-SN-757398; US-Patent-Appl-SN-232504; NASA-Case-LAR-16079-1; No Copyright; Avail: CASI; A03, Hardcopy

Main chain thermotropic liquid crystal esters, ester-imides, and ester-amides were prepared from AA, BB, and AB type monomeric materials and were end-capped with phenylacetylene, phenylmaleimide, or nadimide reactive end-groups. The resulting reactive end-capped liquid crystal oligomers exhibit a variety of improved and preferred physical properties. The end-capped liquid crystal oligomers are thermotropic and have, preferably, molecular weights in the range of approximately 1000-15,000 grams per mole. The end-capped liquid crystal oligomers have broad liquid crystalline melting ranges and exhibit high melt stability and very low melt viscosities at accessible temperatures. The end-capped liquid crystal oligomers are stable for up to an hour in the melt phase. These properties make the end-capped liquid crystal oligomers highly processable by a variety of melt process shape forming and blending techniques including film extrusion, fiber spinning, reactive injection molding (RIM), resin transfer molding (RTM), resin film injection (RFI), powder molding, pultrusion, injection molding, blow molding, plasma spraying and thermo-forming. Once processed and shaped, the end-capped liquid crystal oligomers were heated to further polymerize and form liquid crystalline thermosets (LCT). The fully cured products are rubbers above their glass transition temperatures. The resulting thermosets display many properties that are superior to their non-end-capped high molecular weight analogs.

Official Gazette of the U.S. Patent and Trademark Office

*Liquid Crystals; Esters; Glass Transition Temperature; Resin Transfer Molding; Amides; Imides; Forming Techniques; Resins; Oligomers*



**20050237944** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Pressure Vessel with Impact and Fire Resistant Coating and Method of Making Same**

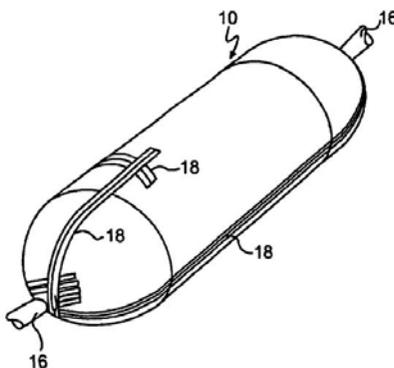
DeLay, Thomas K., Inventor; October 11, 2005; 5 pp.; In English

Patent Info.: Filed 27 Aug. 2002; US-Patent-6,953,129-B2; US-Patent-Appl-SN-231428; NASA-Case-MSF-31727-1; No Copyright; Avail: CASI; A01, Hardcopy

An impact and fire resistant coating laminate is provided which serves as an outer protective coating for a pressure vessel such as a composite overwrapped vessel with a metal lining. The laminate comprises a plurality of fibers (e.g., jute twine or other, stronger fibers) which are wound around the pressure vessel and an epoxy matrix resin for the fibers. The epoxy matrix resin including a plurality of microspheres containing a temperature responsive phase change material which changes phase in response to exposure thereof to a predetermined temperature increase so as to afford increased insulation and heat absorption.

Official Gazette of the U.S. Patent and Trademark Office

*Pressure Vessels; Flammability; Protective Coatings*



**20060017034** NASA Glenn Research Center, Cleveland, OH, USA

**Solvent Free Low-Melt Viscosity Imide Oligomers And Thermosetting Polyimide Composites**

Chuang, CHun-Hua, Inventor; March 21, 2006; 7 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 23 Jul. 2004; US-Patent-7,015,304; US-Patent-Appl-SN-897279; NASA-Case-LEW-17618-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017034>; Avail: CASI; A02, Hardcopy

This invention relates to the composition and a solvent-free process for preparing novel imide oligomers and polymers specifically formulated with effective amounts of a dianhydride such as 2,3,3',4-biphenyltetra carboxylic dianhydride (a-BPDA), at least one aromatic diamine' and an endcapped of 4-phenylethynylphthalic anhydride (PEPA) or nadic anhydride to produce imide oligomers that possess a low-melt viscosity of 1-60 poise at 260-280° C. When the imide oligomer melt is cured at about 371 C. in a press or autoclave under 100-500 psi, the melt resulted in a thermoset polyimide having a glass transition temperature (T(sub g)) equal to and above 310 C. A novel feature of this process is that the monomers; namely the dianhydrides, diamines and the endcaps, are melt processable to form imide oligomers at temperatures ranging between 232-280 C. (450-535 F) without any solvent. These low-melt imide oligomers can be easily processed by resin transfer molding (RTM), vacuum-assisted resin transfer molding (VARTM) or the resin infusion process with fiber preforms e.g. carbon, glass or quartz preforms to produce polyimide matrix composites with 288-343C (550-650 F) high temperature performance capability.

Official Gazette of the U.S. Patent and Trademark Office

*Glass Transition Temperature; Anhydrides; Carboxylic Acids; Viscosity; Resin Transfer Molding; Polyimides; Oligomers; High Temperature*

**25**

**INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY**

Includes the analysis, synthesis, and use of inorganic and organic compounds; combustion theory; electrochemistry; and photochemistry. For related information see category *34 Fluid Dynamics and Thermodynamics*. For astrochemistry see category *90 Astrophysics*.

**20050237942** NASA Glenn Research Center, Cleveland, OH, USA

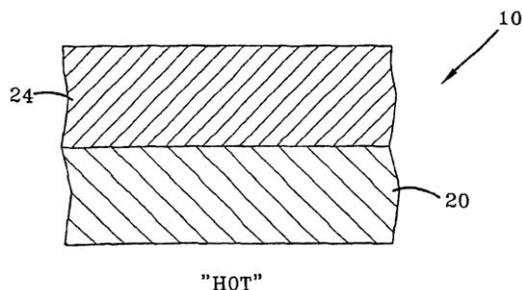
**NiAl-Based Approach For Rocket Combustion Chambers**

Nathal, Michael V., Inventor; Gayda, John, Inventor; Noebe, Ronald D., Inventor; May 03, 2005; 6 pp.; In English  
Patent Info.: Filed 22 Jul. 2003; US-Patent-6,886,327-B1; US-Patent-Appl-SN-627107; US-Patent-Appl-SN-105110; NASA-Case-LEW-17093-2; No Copyright; Avail: CASI; A02, Hardcopy

A multi-layered component, such as a rocket engine combustion chamber, includes NiAl or NiAl-based alloy as a structural layer on the hot side of the component. A second structural layer is formed of material selected from Ni-based superalloys, Co-based alloys, Fe-based alloys, Cu, and Cu-based alloys. The second material is more ductile than the NiAl and imparts increased toughness to the component. The second material is selected to enhance one or more predetermined physical properties of the component. Additional structural layers may be included with the additional material(s) being selected for their impact on physical properties of the component.

Author

*Combustion Chambers; Rocket Engines; Nickel Aluminides*



**20050237952** NASA Kennedy Space Center, Cocoa Beach, FL, USA

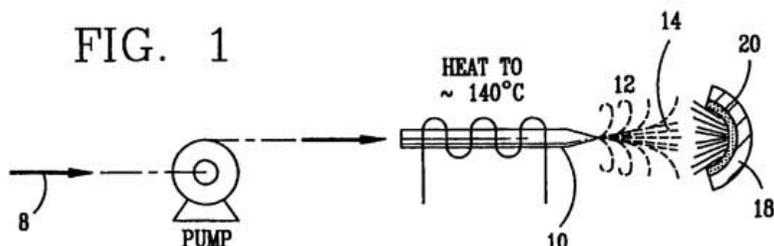
**High temperature decomposition of hydrogen peroxide**

Parrish, Clyde F., Inventor; October 18, 2005; 7 pp.; In English; Provisional US-Patent-Appl-SN-276260, filed 8 Mar. 2001; Continuation-in-part of US-Patent-Appl-SN-014140, filed 6 Dec. 2001  
Patent Info.: Filed 12 Aug. 2004; US-Patent-6,955,799-B1; US-Patent-Appl-SN-923152; US-Patent-Appl-SN-276260; US-Patent-Appl-SN-014140; NASA-Case-KSC-12235-2; No Copyright; Avail: CASI; A02, Hardcopy

Nitric oxide (NO) is oxidized into nitrogen dioxide (NO<sub>2</sub>) by the high temperature decomposition of a hydrogen peroxide solution to produce the oxidative free radicals, hydroxyl and hydroperoxyl. The hydrogen peroxide solution is impinged upon a heated surface in a stream of nitric oxide where it decomposes to produce the oxidative free radicals. Because the decomposition of the hydrogen peroxide solution occurs within the stream of the nitric oxide, rapid gas-phase oxidation of nitric oxide into nitrogen dioxide occurs.

Author

*Vapor Phases; Nitrogen Dioxide; Nitric Oxide; High Temperature Gases*



**20050237953** NASA Ames Research Center, Moffett Field, CA, USA

**Secondary polymer layered impregnated tile**

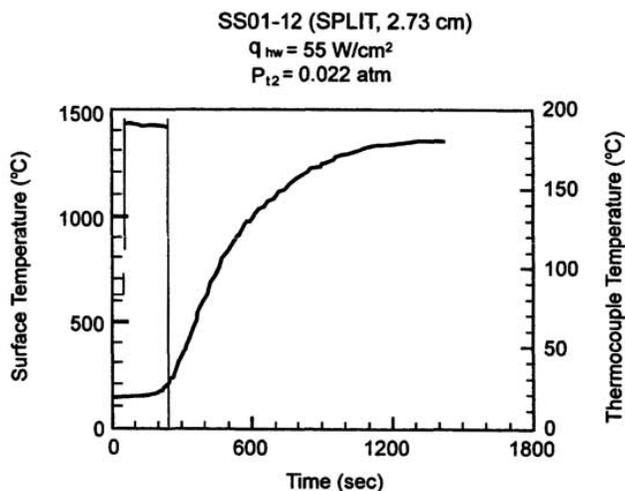
Tran, Huy K., Inventor; Rasky, Daniel J., Inventor; Szalai, Christine E., Inventor; Carroll, Joseph A., Inventor; Hsu, Ming-ta S., Inventor; October 18, 2005; 14 pp.; In English

Patent Info.: Filed 9 Jun. 2004; US-Patent-6,955,853-B1; US-Patent-Appl-SN-868450; NASA-Case-ARC-14165-1; No Copyright; Avail: CASI; A03, Hardcopy

A low density organic polymer impregnated preformed fibrous ceramic article includes a plurality of layers. A front layer includes ceramic fibers or carbon fibers or combinations of ceramic fibers and carbon fibers, and is impregnated with an effective amount of at least one organic polymer. A middle layer includes polymer impregnated ceramic fibers. A back layer includes ceramic fibers or carbon fibers or combinations of ceramic fibers and carbon fibers, and is impregnated with an effective amount of at least one low temperature pyrolyzing organic polymer capable of decomposing without depositing residues.

Author

*Carbon Fibers; Organic Compounds; Ceramic Fibers; Tiles*



**20050237954** NASA Langley Research Center, Hampton, VA, USA

**Polyimide Foams**

Vazquez, Juan M., Inventor; Cano, Roberto J., Inventor; Jensen, Brian J., Inventor; Weiser, Erik S., Inventor; October 18, 2005; 9 pp.; In English

Patent Info.: Filed 11 Feb. 2004; US-Patent-6,956,066-B2; US-Patent-Appl-SN-779552; US-Patent-Appl-SN-446355; NASA-Case-LAR-16115-1; No Copyright; Avail: CASI; A02, Hardcopy

A fully imidized, solvent-free polyimide foam having excellent mechanical, acoustic, thermal, and flame resistant

properties is produced. A first solution is provided, which includes one or more aromatic dianhydrides or derivatives of aromatic dianhydrides, and may include one or more aromatic diamines, dissolved in one or more polar solvents, along with an effective amount of one or more blowing agents. This first solution may also advantageously include effective amounts respectively of one or more catalysts, one or more surfactants, and one or more fire retardants. A second solution is also provided which includes one or more isocyanates. The first and second solutions are rapidly and thoroughly mixed to produce an admixture, which is allowed to foam in an open container, or in a closed mold under ambient conditions to completion produce a foamed product. This foamed product is then cured by high frequency electromagnetic radiation, thermal energy, or a combination thereof. Alternatively, the process is adapted for spraying or extrusion.

Official Gazette of the U.S. Patent and Trademark Office

*Polyimides; Foams; Flame Retardants*

**2006008999** NASA Glenn Research Center, Cleveland, OH, USA

**Polyimides by Photochemical Cyclopolymerization**

Meador, Michael A., Inventor; December 13, 2005; 13 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 8 Jul. 2003; US-Patent-6,974,755; US-Patent-Appl-SN-617447; US-Patent-Appl-SN-827140; NASA-Case-LEW-17133-3; No Copyright; ONLINE: <http://hdl.handle.net/2060/2006008999>; Avail: CASI; A03, Hardcopy

The novel polyimides of this invention are derived from Diels-Alder cyclopolymerization of photochemically generated bisdienes with dienophiles, such as bismaleimides, trismaleimides and mixtures thereof with maleimide endcaps. Irradiation of one or more diketones produces two distinct hydroxy o-quinodimethane (photoenol) intermediates. These intermediates are trapped via Diels-Alder cycloaddition with appropriate dienophiles, e.g., bismaleimide and/or trismaleimides to give the corresponding polyimides in quantitative yields. When bismaleimides, trismaleimides or mixtures thereof with maleimide end-caps are used as the dienophile, the resulting polyimides have glass transition temperatures (T<sub>g</sub>) as high as 300 C. Polyimide films can be prepared by ultraviolet irradiation of high solids content varnishes of the monomers in a small amount of solvent, e.g., cyclohexanone, dimethyl formamide, N-methylpyrrolidone and the like. These novel polyimides are characterized as having high glass transition temperatures, good mechanical properties and improved processing in the manufacture of adhesives, electronic materials and films.

Official Gazette of the U.S. Patent and Trademark Office

*Cyclic Compounds; Polyimides; Polymerization*

**2006009009** NASA Glenn Research Center, Cleveland, OH, USA

**Substituted Cyclohexene Endcaps for Polymers with Thermal-Oxidative Stability**

December 27, 2005; 11 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 23 Oct. 2003; US-Patent-6,979,721; US-Patent-Appl-693852; NASA-Case-LEW-17429-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/2006009009>; Avail: CASI; A03, Hardcopy

This invention relates to polyimides having improved thermal-oxidative stability, to the process of preparing said polyimides, and the use of polyimide prepolymers in the preparation of prepregs and composites. The polyimides are particularly useful in the preparation of fiber-reinforced, high-temperature composites for use in various engine parts including inlets, fan ducts, exit flaps and other parts of high speed aircraft. The polyimides are derived from the polymerization of effective amounts of at least one tetracarboxylic dianhydride, at least one polyamine and a novel dicarboxylic endcap having the formula presented.

Official Gazette of the U.S. Patent and Trademark Office

*Polyimides; Polymerization; Thermal Stability; Hexenes; Cyclic Compounds*

**20060010033** NASA Kennedy Space Center, Cocoa Beach, FL, USA

**Polyimides from 2,3,3',4'-Biphenyltetracarboxylic Dianhydride and Aromatic Diamines**

Hergenrother, Paul M., Inventor; Smith, Joseph G., Inventor; Connell, John W., Inventor; Watson, Kent A., Inventor; October 25, 2005; 18 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 7 Apr. 2003; US-Patent-6,958,192; US-Patent-Appl-SN-414562; US-Patent-Appl-SN-373342; NASA-Case-KSC-12209; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060010033>; Avail: CASI; A03, Hardcopy

The present invention relates generally to polyimides. It relates particularly to novel polyimides prepared from 2,3, 3',4'-biphenyltetracarboxylic dianhydride and aromatic diamines. These novel polyimides have low color, good solubility, high thermal emissivity, low solar absorptivity and high tensile strength.

Official Gazette of the U.S. Patent and Trademark Office

*Anhydrides; Diamines; Polyimides; Aromatic Compounds; Phenyls; Carboxyl Group*

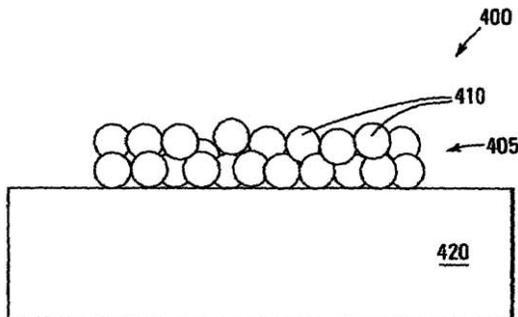
**20060010034** NASA Kennedy Space Center, Cocoa Beach, FL, USA

**High Performance Immobilized Liquid Membrane for Carbon Dioxide Separations**

Parrish, Clyde F., Inventor; October 25, 2005; 9 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 17 Sep. 2003; US-Patent-6,958,085; US-Patent-Appl-666821; US-Patent-Appl-458874;  
NASA-Case-KSC-12540; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060010034>; Avail: CASI; A02, Hardcopy

An immobilized liquid membrane has a substrate. A plurality of capsules is disposed on the substrate. Each of the capsules is permeable to a first gas of a mixture of gases comprising the st gas and a second gas. Each of the capsules is substantially impermeable to the second gas. A liquid is disposed in each of the capsules that is permeable to the first gas and substantially impermeable to the second gas.

Official Gazette of the U.S. Patent and Trademark Office  
*Carbon Dioxide; Gas Mixtures; Membranes*



26

**METALS AND METALLIC MATERIALS**

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

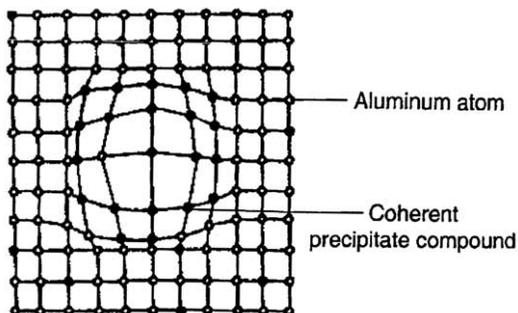
**20050237966** NASA Marshall Space Flight Center, Huntsville, AL, USA

**High Strength Aluminum Alloy For High Temperature Applications**

Lee, Jonathan A., Inventor; Chen, Po-Shou, Inventor; July 19, 2005; 9 pp.; In English  
Patent Info.: Filed 10 Apr. 2002; US-Patent-6,918,970; US-Patent-Appl-SN-120226; NASA-Case-MSF-31858-1; No Copyright; Avail: CASI; A02, Hardcopy

A cast article from an aluminum alloy has improved mechanical properties at elevated temperatures. The cast article has the following composition in weight percent: Silicon 6.0-25.0, Copper 5.0-8.0, Iron 0.05-1.2, Magnesium 0.5-1.5, Nickel 0.05-0.9, Manganese 0.05-1.2, Titanium 0.05-1.2, Zirconium 0.05-1.2, Vanadium 0.05-1.2, Zinc 0.05-0.9, Strontium 0.001-0.1, Phosphorus 0.001-0.1, and the balance is Aluminum, wherein the silicon-to-magnesium ratio is 10-25, and the copper-to-magnesium ratio is 4-15. The aluminum alloy contains a simultaneous dispersion of three types of Al<sub>3</sub>X compound particles (X=Ti, V, Zr) having a LI<sub>2</sub> crystal structure, and their lattice parameters are coherent to the aluminum matrix lattice. A process for producing this cast article is also disclosed, as well as a metal matrix composite, which includes the aluminum alloy serving as a matrix containing up to about 60% by volume of a secondary filler material.

Official Gazette of the U.S. Patent and Trademark Office  
*Aluminum Alloys; High Strength Alloys; High Temperature*



**20060009000** NASA Glenn Research Center, Cleveland, OH, USA

**Nickel Base Superalloy Turbine Disk**

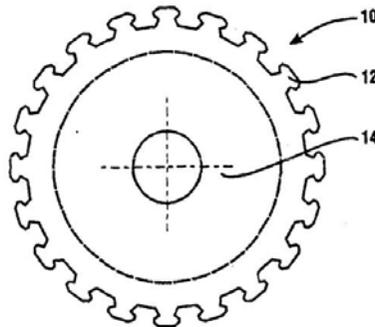
Gabb, Timothy P., Inventor; Gauda, John, Inventor; Telesman, Ignacy, Inventor; Kantzos, Pete T., Inventor; December 13, 2005; 17 pp.; In English

Patent Info.: Filed 29 Oct. 2002; US-Patent-6,974,508; US-Patent-Appl-SN-283220; NASA-Case-LEW-17318-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009000>; Avail: CASI; A03, Hardcopy

A low solvus, high refractory alloy having unusually versatile processing mechanical property capabilities for advanced disks and rotors in gas turbine engines. The nickel base superalloy has a composition consisting essentially of, in weight percent, 3.0-4.0 N, 0.02-0.04 B, 0.02-0.05 C, 12.0-14.0 Cr, 19.0-22.0 Co, 2.0-3.5 Mo, greater than 1.0 to 2.1 Nb, 1.3 to 2.1 Ta, 3.04-4.1 to 5.0 W, 0.03-0.06 Zr, and balance essentially Ni and incidental impurities. The superalloy combines ease of processing with high temperature capabilities to be suitable for use in various turbine engine disk, impeller, and shaft applications. The Co and Cr levels of the superalloy can provide low solvus temperature for high processing versatility. The W, Mo, Ta, and Nb refractory element levels of the superalloy can provide sustained strength, creep, and dwell crack growth resistance at high temperatures.

Official Gazette of the U.S. Patent and Trademark Office

*Heat Resistant Alloys; Refractory Metal Alloys; Nickel Alloys; Rotors; Gas Turbine Engines; Mechanical Properties*



31

**ENGINEERING (GENERAL)**

Includes general research topics related to engineering and applied physics, and particular areas of vacuum technology, industrial engineering, cryogenics, and fire prevention. For specific topics in engineering see *categories 32 through 39*.

**20060017024** NASA Johnson Space Center, Houston, TX, USA

**Sensor And Method For Detecting A Superstrate**

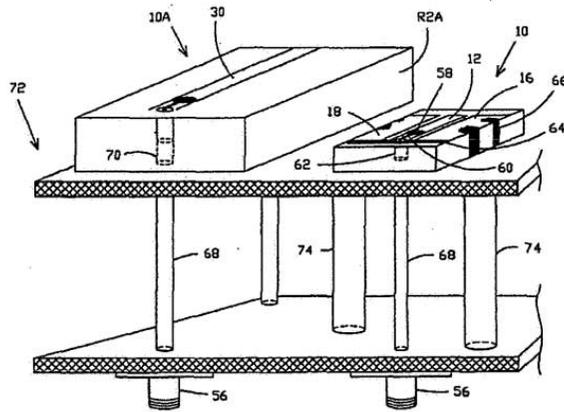
Arndt, G. Dickey, Inventor; Cari, James R., Inventor; Ngo, Phong H., Inventor; Fink, Patrick W., Inventor; Siekierski, James D., Inventor; February 07, 2006; 27 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 5 Mar. 2001; US-Patent-6,995,572; US-Patent-Appl-SN-803613; NASA-Case-MSF-23153-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017024>; Avail: CASI; A03, Hardcopy

Method and apparatus are provided for determining a superstrate on or near a sensor, e.g., for detecting the presence of an ice superstrate on an airplane wing or a road. In one preferred embodiment, multiple measurement cells are disposed along a transmission line. While the present invention is operable with different types of transmission lines, construction details for a presently preferred coplanar waveguide and a microstrip waveguide are disclosed. A computer simulation is provided as part of the invention for predicting results of a simulated superstrate detector system. The measurement cells may be physically partitioned, nonphysically partitioned with software or firmware, or include a combination of different types of partitions. In one embodiment, a plurality of transmission lines are utilized wherein each transmission line includes a plurality of measurement cells. The plurality of transmission lines may be multiplexed with the signal from each transmission line being applied to the same phase detector. In one embodiment, an inverse problem method is applied to determine the superstrate dielectric for a transmission line with multiple measurement cells.

Official Gazette of the U.S. Patent and Trademark Office

*Transmission Lines; Phase Detectors; Planar Structures; Multiplexing; Computerized Simulation; Ice*



### 33

## ELECTRONICS AND ELECTRICAL ENGINEERING

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. for related information see also *60 Computer Operations and Hardware*; and *76 Solid-State Physics*. For communications equipment and devices see *32 Communications and Radar*.

**20050237888** NASA Johnson Space Center, Houston, TX, USA

### Feed Structure For Antennas

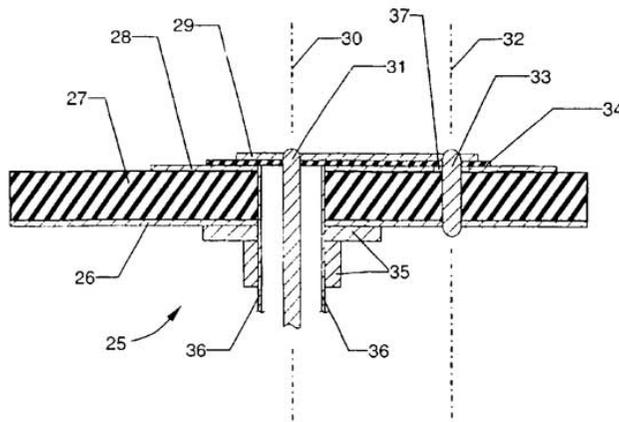
Fink, Patrick W., Inventor; Chu, Andrew W., Inventor; Dobbins, Justin A., Inventor; Lin, Greg Y., Inventor; June 07, 2005; 19 pp.; In English

Patent Info.: Filed 29 May 2003; US-Patent-6,903,687; US-Patent-Appl-SN-449905; NASA-Case-MS-23549-1; No Copyright; Avail: CASI; A03, Hardcopy

A novel feed structure, for an antenna having a resonant electric field structure, comprising a patch element, an integrated circuit attached to the patch element, at least one inner conductor electrically connected to and terminating at the integrated circuit on a first end of the at least one inner conductor, wherein the at least one inner conductor extends through and is not electrically connected to the patch element, and wherein the at least one inner conductor is available for electrical connectivity on a second end of the at least one inner conductor, and an outer conductor electrically connected to and terminating at the patch element on a first end of the outer conductor, wherein the outer conductor is available for electrical connectivity on a second end of the outer conductor, and wherein the outer conductor concentrically surrounds the at least one inner conductor from the second end of the at least one inner conductor available for electrical connectivity to the first end of the outer conductor terminating at the patch element.

Official Gazette of the U.S. Patent and Trademark Office

*Antenna Design; Electric Conductors; Electrical Engineering*



20050237938 NASA Johnson Space Center, Houston, TX, USA

### Wide Bandwidth Phase-Locked Loop Circuit

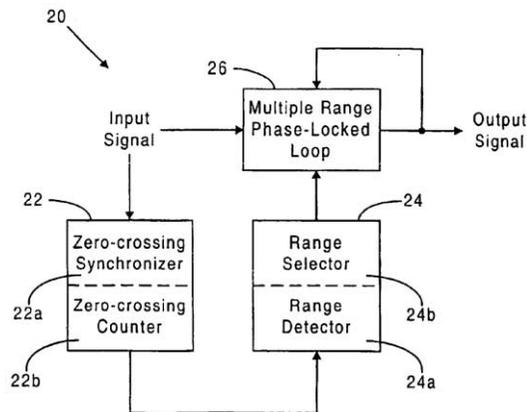
Koudelka, Robert David, Inventor; February 22, 2005; 16 pp.; In English

Patent Info.: Filed 4 Feb. 2000; US-Patent-6,859,509-B1; US-Patent-Appl-SN-500607; NASA-Case-MS-C-22875-1; No Copyright; Avail: CASI; A03, Hardcopy

A PLL circuit uses a multiple frequency range PLL in order to phase lock input signals having a wide range of frequencies. The PLL includes a VCO capable of operating in multiple different frequency ranges and a divider bank independently configurable to divide the output of the VCO. A frequency detector detects a frequency of the input signal and a frequency selector selects an appropriate frequency range for the PLL. The frequency selector automatically switches the PLL to a different frequency range as needed in response to a change in the input signal frequency. Frequency range hysteresis is implemented to avoid operating the PLL near a frequency range boundary.

Official Gazette of the U.S. Patent and Trademark Office

Bandwidth; Circuits; Phase Locked Systems; Electrical Engineering



20050237965 NASA Kennedy Space Center, Cocoa Beach, FL, USA

### Current Signature Sensor

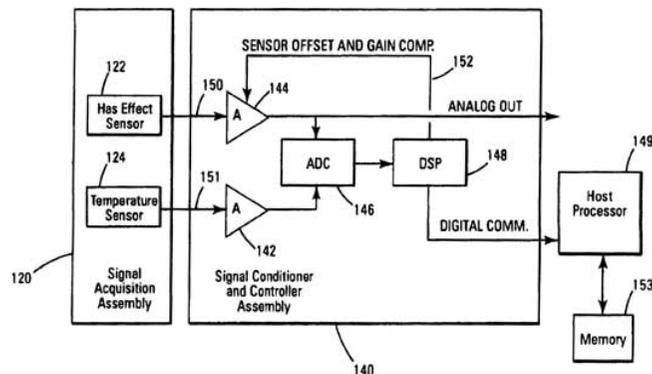
Perotti, Jose M., Inventor; Lucena, Angel, Inventor; Ihlefeld, Curtis, Inventor; Burns, Bradley, Inventor; Bassignani, Mario, Inventor; Bassignani, Karin E., Inventor; July 12, 2005; 13 pp.; In English

Patent Info.: Filed 29 Aug. 2002; US-Patent-6,917,203-B1; US-Patent-Appl-SN-235020; US-Patent-Appl-SN-318095; No Copyright; Avail: CASI; A03, Hardcopy

A solenoid health monitoring system uses a signal conditioner and controller assembly in one embodiment that includes analog circuitry and a DSP controller. The analog circuitry provides signal conditioning to the low-level raw signal coming from a signal acquisition assembly. Software running in a DSP analyzes the incoming data (recorded current signature) and determines the state of the solenoid whether it is energized, de-energized, or in a transitioning state. In one embodiment, the software identifies key features in the current signature during the transition phase and is able to determine the health of the solenoid.

Official Gazette of the U.S. Patent and Trademark Office

Solenoids; Systems Health Monitoring; Signal Processing; Electric Current; Sensors



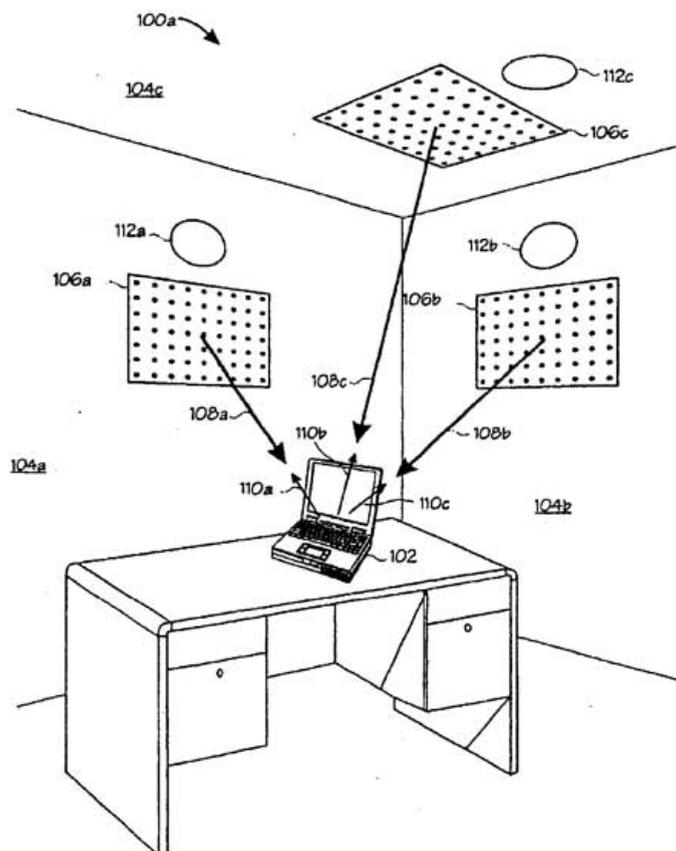
**20060009004** NASA Glenn Research Center, Cleveland, OH, USA  
**CHARGING of DEVICES BY MICROWAVE POWER BEAMING**

Landis, Geoffrey A., Inventor; November 22, 2005; 10 pp.; In English  
Patent Info.: Filed 5 Jun. 2003; US-Patent-6,967,462; US-Patent-Appl-SN-455139; NASA-Case-LEW-17383-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009004>; Avail: CASI; A02, Hardcopy

A system for providing wireless, charging power and/or primary power to electronic/electrical devices is described whereby microwave energy is employed. Microwave energy is focused by a power transmitter comprising one or more adaptively-phased microwave array emitters onto a device to be charged. Rectennas within the device to be charged receive and rectify the microwave energy and use it for battery charging and/or for primary power. A locator signal generated by the device to be charged is analyzed by the system to determine the location of the device to be charged relative to the microwave array emitters, permitting the microwave energy to be directed specifically towards the device to be charged. Backscatter detectors respond to backscatter energy reflected off of any obstacle between the device to be charged and the microwave array emitters. Power to any obstructed microwave array emitter is reduced until the obstruction is removed. Optionally, data can be modulated onto microwave energy beams produced by the array emitter and demodulated by the device, thereby providing means of data communication from the power transmitter to the device. Similarly, data can be modulated onto the locator signal and demodulated in the power transmitter, thereby providing means of data communication from the device to the power transmitter.

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*Microwave Power Beaming; Transmitters; Microwave Transmission; Backscattering; Electric Batteries; Communication Equipment; Emitters*



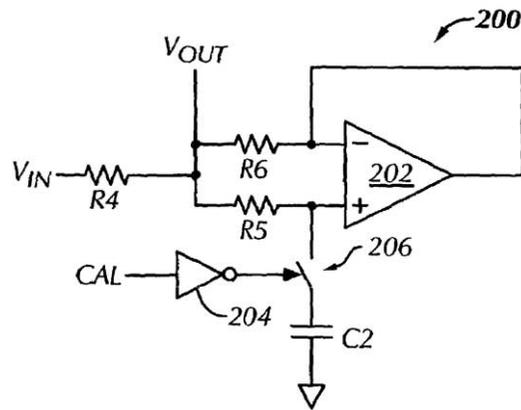
**20060009010** NASA Johnson Space Center, Houston, TX, USA  
**Practical Active Capacitor Filter**

Shuler, Robert L., Jr., Inventor; September 13, 2005; 12 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 21 May 2003; US-Patent-6,943,619; US-Patent-Appl-443233; NASA-Case-MS-C-23538-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009010>; Avail: CASI; A03, Hardcopy

A method and apparatus is described that filters an electrical signal. The filtering uses a capacitor multiplier circuit where

the capacitor multiplier circuit uses at least one amplifier circuit and at least one capacitor. A filtered electrical signal results from a direct connection from an output of the at least one amplifier circuit.

Official Gazette of the U.S. Patent and Trademark Office  
*Capacitors; Circuits; Multipliers; Signal Transmission*



**20060017021** NASA Pasadena Office, CA, USA

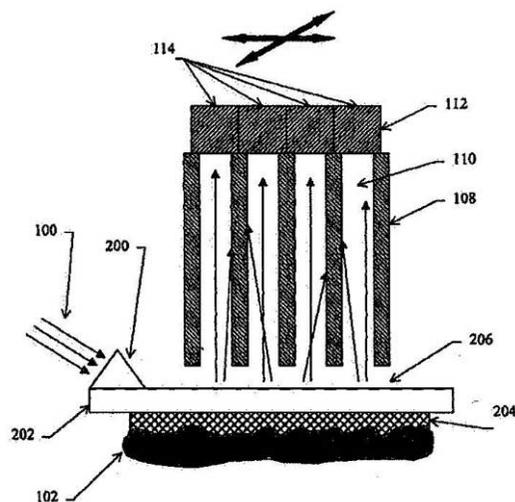
**Multifrequency Ultra-High Resolution Miniature Scanning Microscope Using Microchannel And Solid-State Sensor Technologies And Method For Scanning Samples**

Wang, Yu, Inventor; February 14, 2006; 16 pp.; In English; Original contains black and white illustrations  
 Patent Info.: Filed 30 Jun. 2003; US-Patent-6,998,600; US-Patent-Appl-SN-612442; NASA-Case-NPO-20821; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017021>; Avail: CASI; A03, Hardcopy

A miniature, ultra-high resolution, and color scanning microscope using microchannel and solid-state technology that does not require focus adjustment. One embodiment includes a source of collimated radiant energy for illuminating a sample, a plurality of narrow angle filters comprising a microchannel structure to permit the passage of only unscattered radiant energy through the microchannels with some portion of the radiant energy entering the microchannels from the sample, a solid-state sensor array attached to the microchannel structure, the microchannels being aligned with an element of the solid-state sensor array, that portion of the radiant energy entering the microchannels parallel to the microchannel walls travels to the sensor element generating an electrical signal from which an image is reconstructed by an external device, and a moving element for movement of the microchannel structure relative to the sample. Discloses a method for scanning samples whereby the sensor array elements trace parallel paths that are arbitrarily close to the parallel paths traced by other elements of the array.

Official Gazette of the U.S. Patent and Trademark Office

*Microchannels; Microscopes; Scanning; Radiant Flux Density; Illuminating; High Resolution*



**20060017027** NASA Langley Research Center, Hampton, VA, USA

**Marking Electrical Wiring With Condition Indicators**

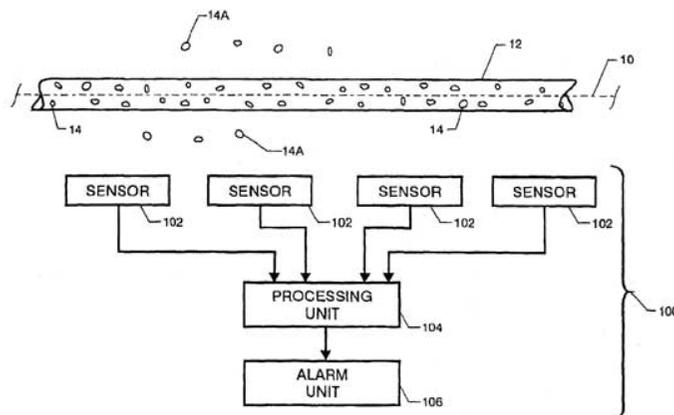
Yost, William T., Inventor; Perey, Daniel F., Inventor; Cramer, K. Elliott, Inventor; January 10, 2006; 10 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 21 Apr. 2003; US-Patent-6,985,083; US-Patent-Appl-SN-419424; US-Patent-Appl-SN-453337; US-Patent-Appl-SN-376364; NASA-Case-LAR-16576-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017027>; Avail: CASI; A02, Hardcopy

A method is provided for marking electrical Wiring with condition indicators. One or more markers are added to one or both of the insulative material and a surface of an electrical conductor such that it bonds thereto. Each marker is capable of emanating into a surrounding atmospheric environment as a gaseous effluent in response to a specific condition experienced by the electrical conductor.

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*Wiring; Markers; Bonding; Conductors*



**20060017033** NASA Langley Research Center, Hampton, VA, USA

**Non-Uniform Thickness Electroactive Device**

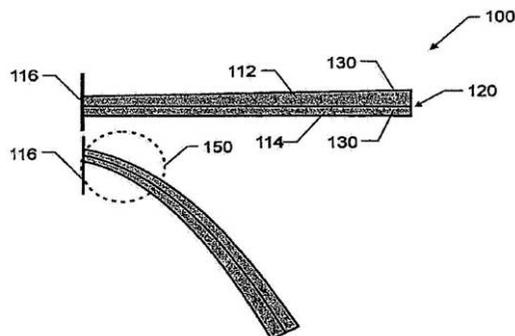
Su, Ji, Inventor; Harrison, Joycelyn S., Inventor; March 21, 2006; 11 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 23 Oct. 2000; US-Patent-7,015,624; US-Patent-Appl-SN-696526; US-Patent-Appl-SN-161113; NASA-Case-LAR-16039-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017033>; Avail: CASI; A03, Hardcopy

An electroactive device comprises at least two layers of material, wherein at least one layer is an electroactive material and wherein at least one layer is of non-uniform thickness. The device can be produced in various sizes, ranging from large structural actuators to microscale or nanoscale devices. The applied voltage to the device in combination with the non-uniform thickness of at least one of the layers (electroactive and/or non-electroactive) controls the contour of the actuated device. The effective electric field is a mathematical function of the local layer thickness. Therefore, the local strain and the local bending/torsion curvature are also a mathematical function of the local thickness. Hence the thinnest portion of the actuator offers the largest bending and/or torsion response. Tailoring of the layer thicknesses can enable complex motions to be achieved.

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*Electric Potential; Actuators; Electric Fields; Insulation; Laminates*



20060017036 NASA Marshall Space Flight Center, Huntsville, AL, USA

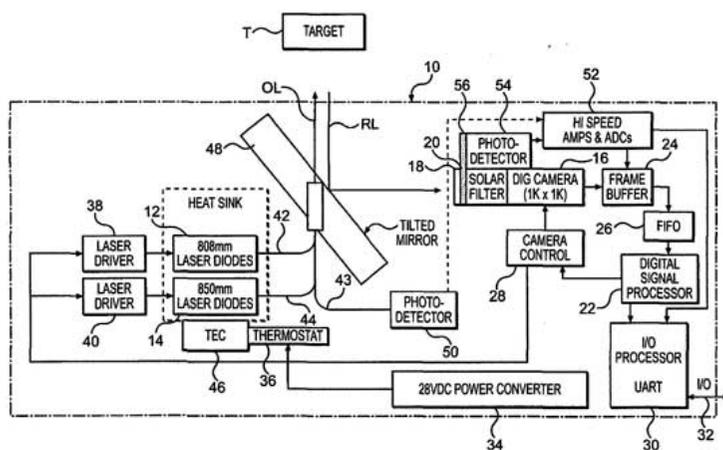
### Video Guidance Sensor System With Integrated Rangefinding

Book, Michael L., Inventor; Bryan, Thomas C., Inventor; Howard, Richard T., Inventor; Roe, Fred Davis, Jr., Inventor; Bell, Joseph L., Inventor; February 28, 2006; 7 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 21 Aug. 2003; US-Patent-7,006,203; US-Patent-Appl-SN-646000; NASA-Case-MSF-31785; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017036>; Avail: CASI; A02, Hardcopy

A video guidance sensor system for use, p.g., in automated docking of a chase vehicle with a target vehicle. The system includes an integrated rangefinder sub-system that uses time of flight measurements to measure range. The rangefinder sub-system includes a pair of matched photodetectors for respectively detecting an output laser beam and return laser beam, a buffer memory for storing the photodetector outputs, and a digitizer connected to the buffer memory and including dual amplifiers and analog-to-digital converters. A digital signal processor processes the digitized output to produce a range measurement.

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Guidance Sensors; Signal Processing; Signal Analyzers; Rangefinding; Analog to Digital Converters; Digital Systems; In-Flight Monitoring



20060017039 NASA Langley Research Center, Hampton, VA, USA

### Electro-Active Transducer Using Radial Electric Field To Produce/Motion Sense Out-Of-Plane Transducer

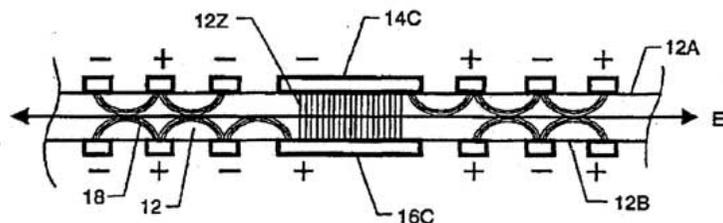
Bryant, Robert G., Inventor; Fox, Robert L., Inventor; May 02, 2006; 16 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 16 Jan. 2003; US-Patent-7,038,358; US-Patent-Appl-SN-347563; US-Patent-Appl-SN-364652; NASA-Case-LAR-16289-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017039>; Avail: CASI; A03, Hardcopy

An electro-active transducer includes a ferroelectric material sandwiched by first and second electrode patterns. When the device is used as an actuator, the first and second electrode patterns are configured to introduce an electric field into the ferroelectric material when voltage is applied to the electrode patterns. When the device is used as a sensor, the first and second electrode patterns are configured to introduce an electric field into the ferroelectric material when the ferroelectric material experiences deflection in a direction substantially perpendicular thereto. In each case, the electrode patterns are designed to cause the electric field to: i) originate at a region of the ferroelectric material between the first and second electrode patterns, and ii) extend radially outward from the region of the ferroelectric material (at which the electric field originates) and substantially parallel to the ferroelectric material's plane.

Official Gazette of the U.S. Patent and Trademark Office

Actuators; Electric Fields; Electric Potential; Transducers; Ferroelectric Materials



### FLUID MECHANICS AND THERMODYNAMICS

Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics*.

**20050237939** NASA Johnson Space Center, Houston, TX, USA

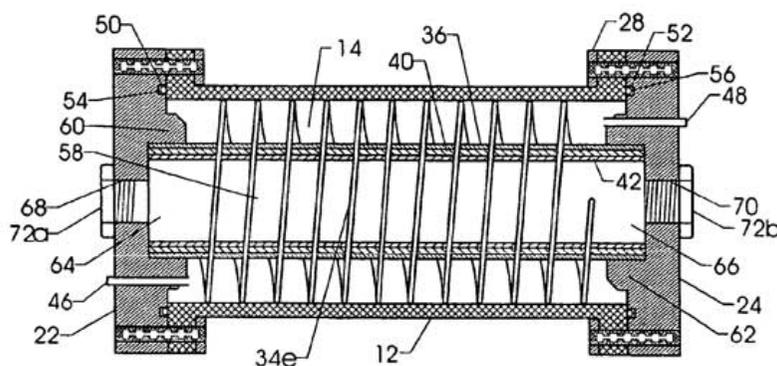
#### Fluid Bubble Eliminator

Gonda, Steve R., Inventor; Tsao, Yow-Min, Inventor; Lee, Wenshan, Inventor; March 08, 2005; 11 pp.; In English; US-Patent-6,863,712-B1; US-Patent-Appl-SN-263284; NASA-Case-MS-C-22996-1; No Copyright; Avail: CASI; A03, Hardcopy

A gas-liquid separator uses a helical passageway to impart a spiral motion to a fluid passing therethrough. The centrifugal force generated by the spiraling motion urges the liquid component of the fluid radially outward which forces the gas component radially inward. The gas component is then filtered through a gas-permeable, liquid-impervious membrane and discharged through a central passageway.

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*Bubbles; Elimination; Fluid Flow*



### INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Avionics and Aircraft Instrumentation*; and *19 Spacecraft Instrumentation and Astrionics*.

**20060017037** NASA Glenn Research Center, Cleveland, OH, USA

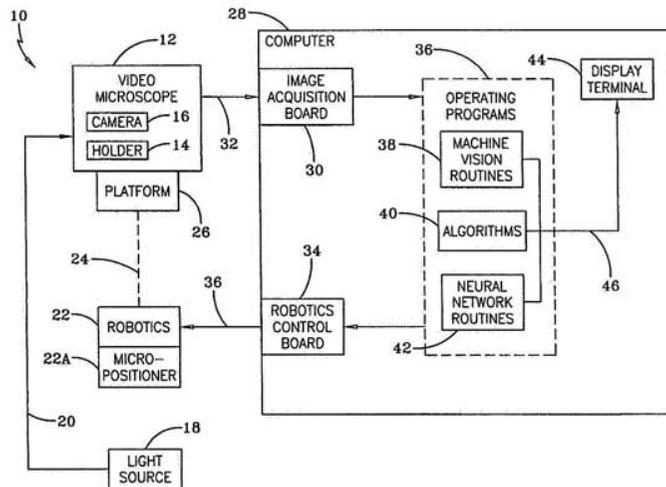
#### Identification Of Cells With A Compact Microscope Imaging System With Intelligent Controls

McDowell, Mark, Inventor; May 09, 2006; 36 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 4 Feb. 2005; US-Patent-7,042,639; US-Patent-Appl-SN-053760; NASA-Case-LEW-17484-3; US-Patent-Appl-SN-645999; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017037>; Avail: CASI; A03, Hardcopy

A Microscope Imaging System (CMIS) with intelligent controls is disclosed that provides techniques for scanning, identifying, detecting and tracking microscopic changes in selected characteristics or features of various surfaces including, but not limited to, cells, spheres, and manufactured products subject to difficult-to-see imperfections. The practice of the present invention provides applications that include colloidal hard spheres experiments, biological cell detection for patch clamping, cell movement and tracking, as well as defect identification in products, such as semiconductor devices, where surface damage can be significant, but difficult to detect. The CMIS system is a machine vision system, which combines intelligent image processing with remote control capabilities and provides the ability to autofocus on a microscope sample, automatically scan an image, and perform machine vision analysis on multiple samples simultaneously.

Author

*Microscopy; Image Processing; Cells (Biology); Spheres; Semiconductor Devices; Detection; Control Systems Design*



37

**MECHANICAL ENGINEERING**

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see 63 *Cybernetics, Artificial Intelligence, and Robotics*; and 54 *Man/System Technology and Life Support*.

**20050237883** NASA Ames Research Center, Moffett Field, CA, USA

**Controlled Patterning and Growth of Single Wall and Multi-wall Carbon Nanotubes**

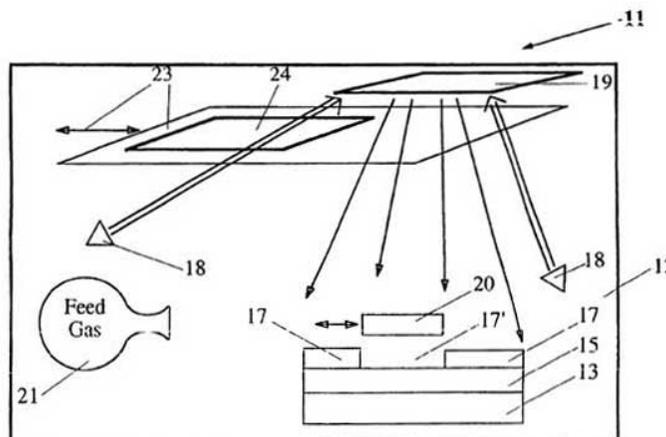
Delzeit, Lance D., Inventor; February 22, 2005; 20 pp.; In English

Patent Info.: Filed 22 Feb. 2005; US-Patent-6,858,197; US-Patent-Appl-SN-099247; NASA-Case-ARC-14613-1; No Copyright; Avail: CASI; A03, Hardcopy

Method and system for producing a selected pattern or array of at least one of a single wall nanotube and/or a multi-wall nanotube containing primarily carbon. A substrate is coated with a first layer (optional) of a first selected metal (e.g., Al and/or Ir) and with a second layer of a catalyst (e.g., Fe, Co, Ni and/or Mo), having selected first and second layer thicknesses provided by ion sputtering, arc discharge, laser ablation, evaporation or CVD. The first layer and/or the second layer may be formed in a desired non-uniform pattern, using a mask with suitable aperture(s), to promote growth of carbon nanotubes in a corresponding pattern. A selected heated feed gas (primarily CH<sub>4</sub> or C<sub>2</sub>H<sub>n</sub> with n=2 and/or 4) is passed over the coated substrate and forms primarily single wall nanotubes or multiple wall nanotubes, depending upon the selected feed gas and its temperature. Nanofibers, as well as single wall and multi-wall nanotubes, are produced using plasma-aided growth from the second (catalyst) layer. An overcoating of a selected metal or alloy can be deposited, over the second layer, to provide a coating for the carbon nanotubes grown in this manner.

Official Gazette of the U.S. Patent and Trademark Office

*Carbon Nanotubes; Nanostructure Growth*



**20050237885** NASA Johnson Space Center, Houston, TX, USA

### Passive Tracking System and Method

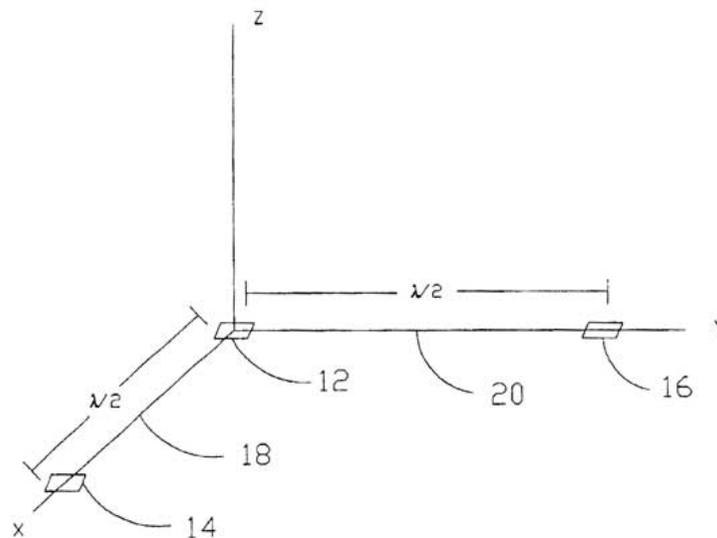
Arndt, G. Dickey, Inventor; Ngo, Phong H., Inventor; Chen, Henry A., Inventor; Phan, Chau T., Inventor; Bourgeois, Brian A., Inventor; Dusl, John, Inventor; Hill, Brent W., Inventor; June 07, 2005; 25 pp.; In English

Patent Info.: Filed 1 Jul. 2003; US-Patent-6,903,685; US-Patent-Appl-SN-612562; US-Patent-Appl-SN-994989; No Copyright; Avail: CASI; A03, Hardcopy

System and methods are disclosed for passively determining the location of a moveable transmitter utilizing a pair of phase shifts at a receiver for extracting a direction vector from a receiver to the transmitter. In a preferred embodiment, a phase difference between the transmitter and receiver is extracted utilizing a noncoherent demodulator in the receiver. The receiver includes antenna array with three antenna elements, which preferably are patch antenna elements placed apart by one-half wavelength. Three receiver channels are preferably utilized for simultaneously processing the received signal from each of the three antenna elements. Multipath transmission paths for each of the three receiver channels are indexed so that comparisons of the same multipath component are made for each of the three receiver channels. The phase difference for each received signal is determined by comparing only the magnitudes of received and stored modulation signals to determine a winning modulation symbol.

Official Gazette of the U.S. Patent and Trademark Office

*Transmitter Receivers; Tracking (Position); Systems Engineering*



**20050237932** NASA Marshall Space Flight Center, Huntsville, AL, USA

### Releasable Locking Mechanisms

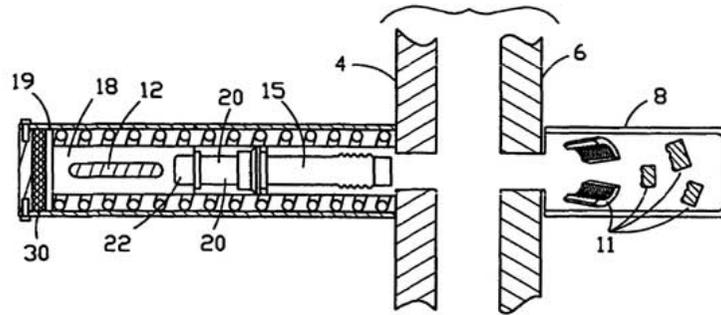
Ahmed, Rafiq, Inventor; Wingate, Robert J., Inventor; September 06, 2005; 8 pp.; In English

Patent Info.: Filed 26 Aug. 2003; US-Patent-6,939,073-B1; US-Patent-Appl-SN-652083; NASA-Case-MSF-31906; No Copyright; Avail: CASI; A02, Hardcopy

In the aerospace field spacecraft components are held together by separation systems until a specific time when they must be separated or deployed. Customarily a threaded joining bolt engages one of the components to be joined, and a threaded nut is placed on that bolt against the other component so they can be drawn together by a releasable locking assembly. The releasable locking assembly herein includes a plunger having one end coupled to one end of a plunger bolt. The other end is flanged to abut and compress a coil spring when the plunger is advanced toward the interface plane between the two components. When the plunger is so advanced toward the interface plane, the end of the plunger bolt can be connected to the joining bolt. Thus during retraction the joining bolt is drawn to one side of the interface plane by the force of the expanding spring.

Official Gazette of the U.S. Patent and Trademark Office

*Locking; Spacecraft Components; Mechanical Engineering; Releasing*



**20050237935** NASA Ames Research Center, Moffett Field, CA, USA

**Method and System For an Automated Tool for En Route Traffic Controllers**

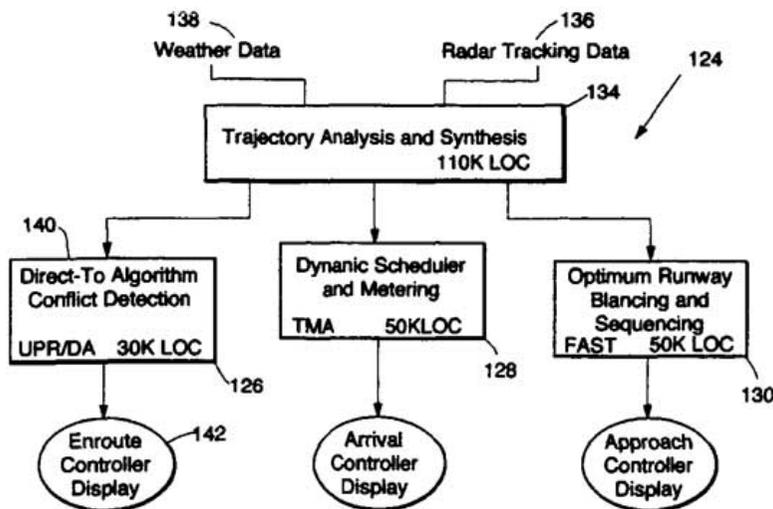
Erzberger, Heinz, Inventor; McNally, B. David, Inventor; November 06, 2001; 14 pp.; In English

Patent Info.: Filed 2 Feb. 2000; US-Patent-6,314,362-B1; US-Patent-Appl-SN-498123; US-Patent-Appl-SN-118401; NASA-Case-ARC-14359-1; No Copyright; Avail: CASI; A03, Hardcopy

A method and system for a new automation tool for en route air traffic controllers first finds all aircraft flying on inefficient routes, then determines whether it is possible to save time by bypassing some route segments, and finally whether the improved route is free of conflicts with other aircraft. The method displays all direct-to eligible aircraft to an air traffic controller in a list sorted by highest time savings. By allowing the air traffic controller to easily identify and work with the highest pay-off aircraft, the method of the present invention contributes to a significant increase in both air traffic controller and aircraft productivity. A graphical computer interface (GUI) is used to enable the air traffic controller to send the aircraft direct to a waypoint or fix closer to the destination airport by a simple point and click action.

Official Gazette of the U.S. Patent and Trademark Office

*Air Traffic Controllers (Personnel); Automatic Control; Systems Engineering*



**20050237936** NASA Johnson Space Center, Houston, TX, USA

**Portable Catapult Launcher For Small Aircraft**

Rosenbaum, Bernard J., Inventor; Petter, George E., Inventor; Gessler, Joseph A., Inventor; Hughes, Michael G., Inventor; February 08, 2005; 23 pp.; In English

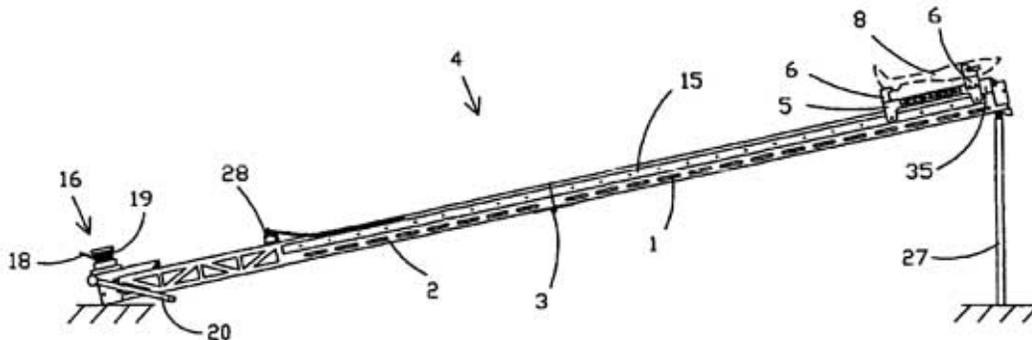
Patent Info.: Filed 3 Apr. 2003; US-Patent-6,851,647-B1; US-Patent-Appl-SN-417377; NASA-Case-MS-C-23510-1; No Copyright; Avail: CASI; A03, Hardcopy

An apparatus for launching an aircraft having a multiplicity of interconnected elongated tracks of rigid material forming a track system and wherein each elongated track has a predetermined elongated track cross-sectional design, a winch system connected to the track system wherein the winch system has a variable mechanical advantage, one or more elongated elastic members wherein one end of each of the one or more elongated elastic members is adjustably connected to the track system,

and a carrier slidably mounted to the track system wherein the carrier is connected to the winch system and to the other end of each of the one or more elongated elastic members.

Official Gazette of the U.S. Patent and Trademark Office

Catapults; Portable Equipment; Mechanical Engineering; Aircraft Launching Devices



**20050237943** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Single Ball Bearing Lubricant and Material Evaluator**

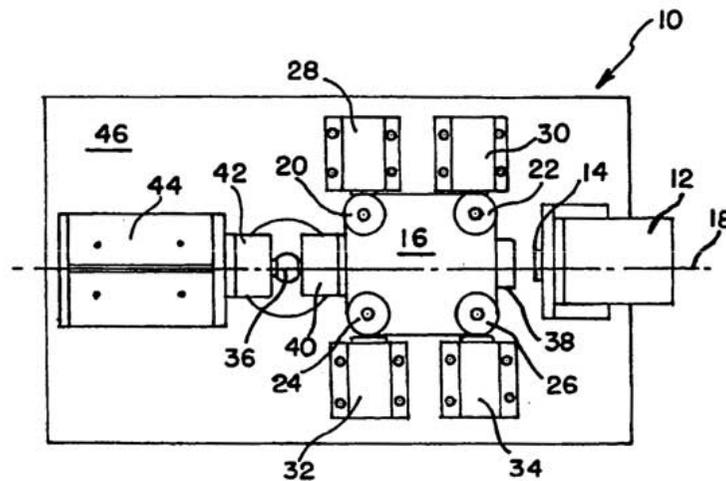
Hall, Philip B., Inventor; Novak, Howard L., Inventor; May 03, 2005; 6 pp.; In English

Patent Info.: Filed 17 Jul. 2003; US-Patent-6,886,392-B1; US-Patent-Appl-SN-622174; NASA-Case-MSF-31706; No Copyright; Avail: CASI; A02, Hardcopy

A test apparatus provides an applied load to a monoball through a trolley which moves along a loading axis. While applying the load to the monoball, the torque meter is in communication with the spherical monoball, and a load cell senses the application of applied force to the monoball. Meanwhile, a rotary actuator imports rotary oscillating motion to the monoball which is sensed by a position sensor and a torque meter. Accordingly, a processor can determine the coefficient of friction in substantially real time along with a cycles per second rate.

Official Gazette of the U.S. Patent and Trademark Office

Ball Bearings; Lubricants; Mechanical Engineering



**20050237945** NASA Langley Research Center, Hampton, VA, USA

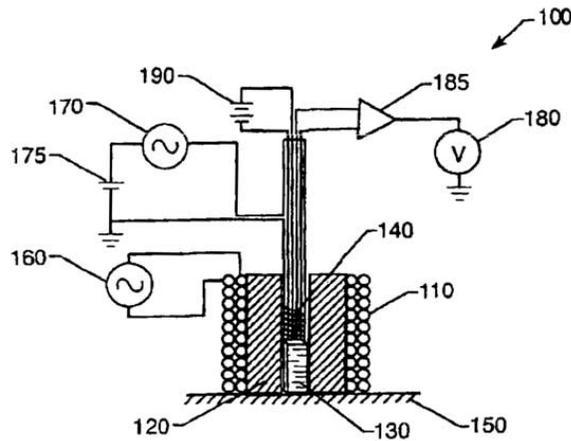
**Magneto-resistive Flux Focusing Eddy Current Flaw Detection**

Wincheski, Russell A., Inventor; Namkung, Min, Inventor; Simpson, John W., Inventor; May 03, 2005; 28 pp.; In English  
 Patent Info.: Filed 28 Nov. 2001; US-Patent-6,888,346-B2; US-Patent-Appl-SN-021683; US-Patent-Appl-SN-253352; No Copyright; Avail: CASI; A03, Hardcopy

A giant magneto-resistive flux focusing eddy current device effectively detects deep flaws in thick multilayer conductive materials. The probe uses an excitation coil to induce eddy currents in conducting material perpendicularly oriented to the coil's longitudinal axis. A giant magneto-resistive (GMR) sensor, surrounded by the excitation coil, is used to detect generated fields. Between the excitation coil and GMR sensor is a highly permeable flux focusing lens which magnetically separates the

GMR sensor and excitation coil and produces high flux density at the outer edge of the GMR sensor. The use of feedback inside the flux focusing lens enables complete cancellation of the leakage fields at the GMR sensor location and biasing of the GMR sensor to a location of high magnetic field sensitivity. In an alternate embodiment, a permanent magnet is positioned adjacent to the GMR sensor to accomplish the biasing. Experimental results have demonstrated identification of flaws up to 1 cm deep in aluminum alloy structures. To detect deep flaws about circular fasteners or inhomogeneities in thick multi-layered conductive materials, the device is mounted in a hand-held rotating probe assembly that is connected to a computer for system control, data acquisition, processing and storage.

Official Gazette of the U.S. Patent and Trademark Office  
*Magnetoresistivity; Eddy Currents; Nondestructive Tests*



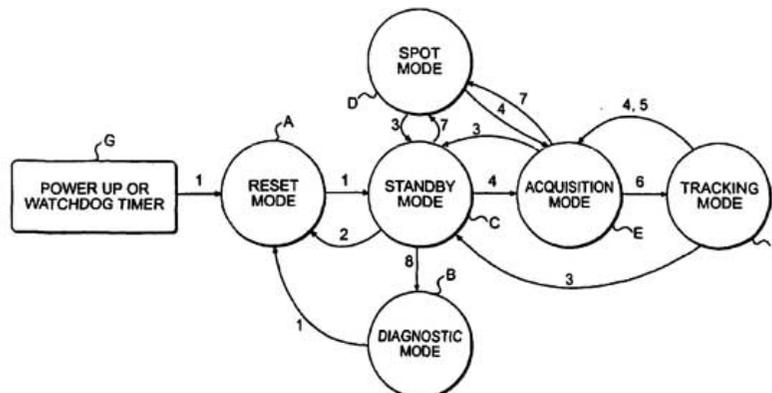
**20050237946** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Control Method for Video Guidance Sensor System**

Howard, Richard T., Inventor; Book, Michael L., Inventor; Bryan, Thomas C., Inventor; May 03, 2005; 8 pp.; In English  
 Patent Info.: Filed 3 Jul. 2003; US-Patent-6,888,476-B1; US-Patent-Appl-SN-615369; NASA-Case-MSF-31865; No  
 Copyright; Avail: CASI; A02, Hardcopy

A method is provided for controlling operations in a video guidance sensor system wherein images of laser output signals transmitted by the system and returned from a target are captured and processed by the system to produce data used in tracking of the target. Six modes of operation are provided as follows: (i) a reset mode; (ii) a diagnostic mode; (iii) a standby mode; (iv) an acquisition mode; (v) a tracking mode; and (vi) a spot mode wherein captured images of returned laser signals are processed to produce data for all spots found in the image. The method provides for automatic transition to the standby mode from the reset mode after integrity checks are performed and from the diagnostic mode to the reset mode after diagnostic operations are commands is permitted only when the system is in the carried out. Further, acceptance of reset and diagnostic standby mode. The method also provides for automatic transition from the acquisition mode to the tracking mode when an acceptable target is found.

Official Gazette of the U.S. Patent and Trademark Office  
*Guidance Sensors; Video Communication; Automatic Control*



20050237955 NASA Glenn Research Center, Cleveland, OH, USA

**High-speed electromechanical chutter for imaging spectrographs**

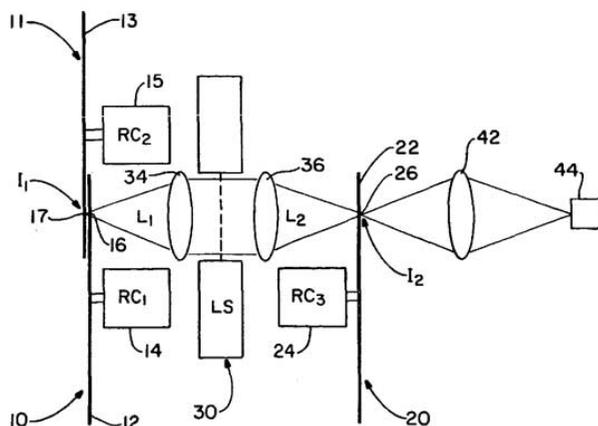
Nguyen, Quang-Viet, Inventor; August 30, 2005; 20 pp.; In English

Patent Info.: Filed 30 Jan. 2003; US-Patent-6,937,331-B1; US-Patent-Appl-SN-356932; NASA-Case-LEW-17175-1; No Copyright; Avail: CASI; A03, Hardcopy

The present invention presents a high-speed electromechanical shutter which has at least two rotary beam choppers that are synchronized using a phase-locked loop electronic control to reduce the duty cycle. These choppers have blade means that can comprise discs or drums, each having about 60 (+/- 15) slots which are from about 0.3 to about 0.8 mm wide and about 5 to about 20 nun long (radially) which are evenly distributed through out 360 deg, and a third rotary chopper which is optically aligned has a small number of slots, such as for example, 1 to 10 slots which are about 1 to about 2 mm wide and about 5 to about 20 mm long (radially). Further the blade means include phase slots that allow the blade means to be phase locked using a closed loop control circuit. In addition, in a preferred embodiment, the system also has a leaf shutter. Thus the invention preferably achieves a gate width of less than about 100 microseconds, using motors that operate at 3000 to 10,000 rpm, and with a phase jitter of less than about 1.5 microseconds, and further using an aperture with more than about 75% optical transmission with a clear aperture of about 0.8 -10 nun. The system can be synchronized to external sources at 0 6 kHz lasers, data acquisition systems, and cameras.

Author

*Electromechanics; Electronic Control; Feedback Control; High Speed; Light Transmission; Phase Locked Systems*



20050237963 NASA Marshall Space Flight Center, Huntsville, AL, USA

**Multiple Layer Identification Label Using Stacked Identification Symbols**

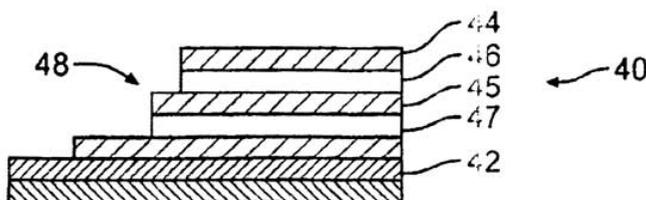
Schramm, Harry F., Inventor; May 31, 2005; 13 pp.; In English

Patent Info.: Filed 18 Apr. 2001; Patent-6,899,275; US-Patent-Appl-SN-837744; NASA-Case-MSF-31464-1; No Copyright; Avail: CASI; A03, Hardcopy

An automatic identification system and method are provided which employ a machine readable multiple layer label. The label has a plurality of machine readable marking layers stacked one upon another. Each of the marking layers encodes an identification symbol detectable using one or more sensing technologies. The various marking layers may comprise the same marking material or each marking layer may comprise a different medium having characteristics detectable by a different sensing technology. These sensing technologies include x-ray, radar, capacitance, thermal, magnetic and ultrasonic. A complete symbol may be encoded within each marking layer or a symbol may be segmented into fragments which are then divided within a single marking layer or encoded across multiple marking layers.

Official Gazette of the U.S. Patent and Trademark Office

*Automatic Control; System Identification*



**20050237964** NASA Langley Research Center, Hampton, VA, USA

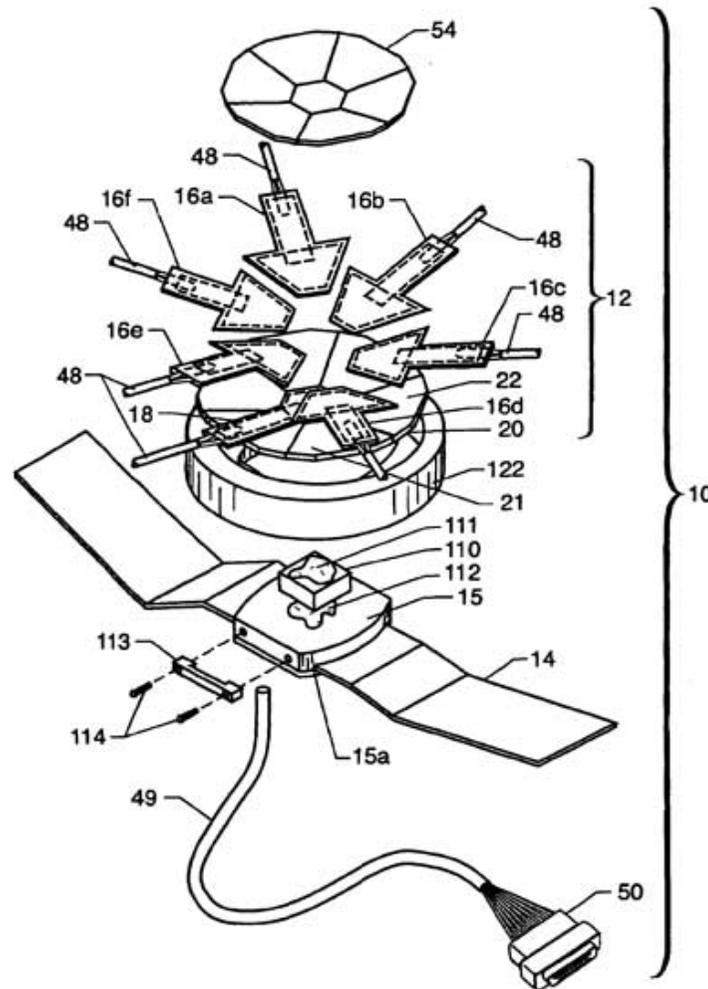
**Method for Simultaneously Making a Plurality of Acoustic Signal Sensor Elements**

Bryant, Timothy D.; Wynkoop, Mark W.; Holloway, Nancy M. H.; Zuckerwar, Allan J.; October 18, 2005; 28 pp.; In English; US-Patent-6,954,971-B1; US-Patent-Appl-SN-267107; US-Patent-Appl-SN-784414; US-Patent-Appl-SN-182344; NASA-Case-LAR-15602-2; No Copyright; Avail: CASI; A03, Hardcopy

A fetal heart monitoring system preferably comprising a backing plate having a generally concave front surface and a generally convex back surface, and at least one sensor element attached to the concave front surface for acquiring acoustic fetal heart signals produced by a fetus within a body. The sensor element has a shape that conforms to the generally concave back surface of the backing plate. In one embodiment, the at least one sensor element comprises an inner sensor, and a plurality of outer sensors surrounding the inner sensor. The fetal heart monitoring system can further comprise a web belt, and a web belt guide movably attached to the web belt. The web belt guide being is to the convex back surface of the backing plate.

Official Gazette of the U.S. Patent and Trademark Office

*Fetuses; Heart; Sound Waves; Mechanical Engineering*



**20060009005** NASA Kennedy Space Center, Cocoa Beach, FL, USA

**THERMAL INSULATION SYSTEMS**

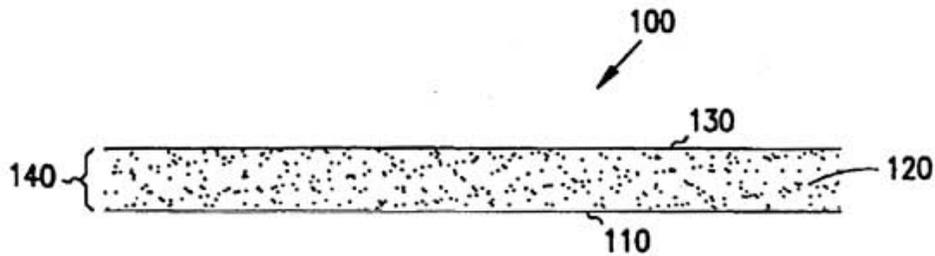
Augustynowicz, Stanislaw D., Inventor; Fesmire, James E., Inventor; November 22, 2005; 15 pp.; In English Patent Info.: Filed 20 Aug. 2001; US-Patent-6,967,051; US-Patent-Appl-939286; US-Patent-Appl-302315; NASA-Case-KSC-1202-2; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009005>; Avail: CASI; A03, Hardcopy

Thermal insulation systems and with methods of their production. The thermal insulation systems incorporate at least one reflection layer and at least one spacer layer in an alternating pattern. Each spacer layer includes a fill layer and a carrier layer.

The fill layer may be separate from the carrier layer, or it may be a part of the carrier layer, i.e., mechanically injected into the carrier layer or chemically formed in the carrier layer. Fill layers contain a powder having a high surface area and low bulk density. Movement of powder within a fill layer is restricted by electrostatic effects with the reflection layer combined with the presence of a carrier layer, or by containing the powder in the carrier layer. The powder in the spacer layer may be compressed from its bulk density. The thermal insulation systems may further contain an outer casing. Thermal insulation systems may further include strips and seams to form a matrix of sections. Such sections serve to limit loss of powder from a fill layer to a single section and reduce heat losses along the reflection layer.

Official Gazette of the U.S. Patent and Trademark Office

*Thermal Insulation; Systems Engineering*



**20060009012** NASA Johnson Space Center, Houston, TX, USA

**Flexible Multi-Shock Shield**

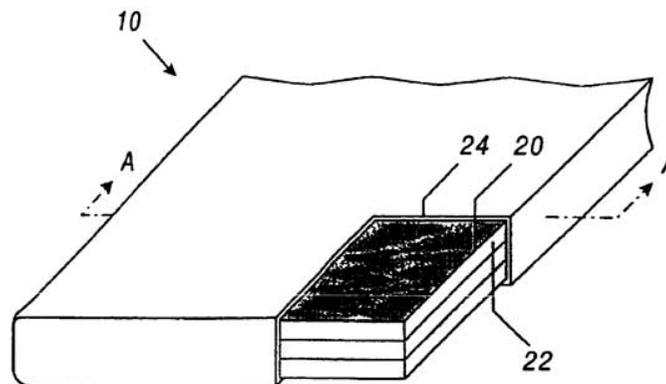
Christiansen, Eric L., Inventor; Crews, Jeanne L., Inventor; May 31, 2005; 11 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 16 Jun. 2001; US-Patent-6,899,009; US-Patent-Appl-892355; NASA-Case-MS-C-23314-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009012>; Avail: CASI; A03, Hardcopy

Flexible multi-shock shield system and method are disclosed for defending against hypervelocity particles. The flexible multi-shock shield system and method may include a number of flexible bumpers or shield layers spaced apart by one or more resilient support layers, all of which may be encapsulated in a protective cover. Fasteners associated with the protective cover allow the flexible multi-shock shield to be secured to the surface of a structure to be protected.

Official Gazette of the U.S. Patent and Trademark Office

*Shock Waves; Flexibility; Shielding*



**20060009014** NASA Johnson Space Center, Houston, TX, USA

**Auto-Routable, Configurable, Daisy Chainable Data Acquisition System**

Shuler, Robert L., Inventor; September 13, 2005; 19 pp.; In English; Original contains black and white illustrations

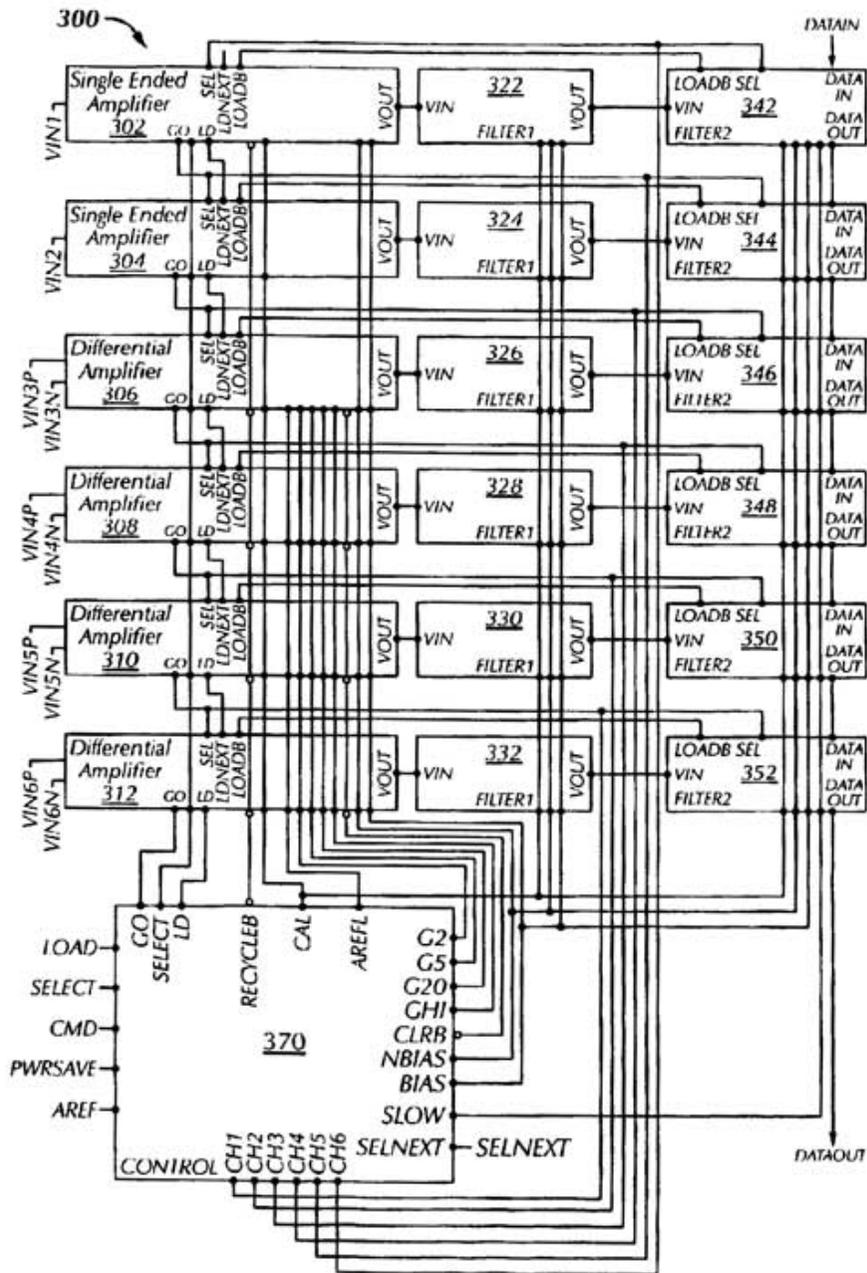
Patent Info.: Filed 21 May 2003; US-Patent-6,943,621; US-Patent-Appl-443234; NASA-Case-MS-C-23539-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009014>; Avail: CASI; A03, Hardcopy

A method and apparatus for an acquisition system includes a plurality of sensor input signal lines. At least one of the

plurality of sensor input signal lines operatively connects to at least one of a plurality of amplifier circuits. At least one of the plurality of amplifier circuits operatively connects to at least one of a plurality of filter circuits.

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Data Acquisition; Sensors; Mechanical Engineering



2006009150 NASA Ames Research Center, Moffett Field, CA, USA

**Carbon Nanotube Purification**

Delzeit, Lance D., Inventor; Delzeit, Clement J., Inventor; December 06, 2005; 11 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 25 Apr. 2002; US-Patent-6,972,056; US-Patent-Appl-SN-135013; NASA-Case-ARC-14733-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/2006009150>; Avail: CASI; A03, Hardcopy

A method for cleaning or otherwise removing amorphous carbon and other residues that arise in growth of a carbon

nanotube (CNT) array. The CNT array is exposed to a plurality of hydroxyls or hydrogen, produced from a selected vapor or liquid source such as H<sub>2</sub>O or H<sub>2</sub>O<sub>2</sub>. and the hydroxyls or hydrogen (neutral or electrically charged) react with the residues to produce partly or fully dissolved or hydrogenated or hydroxylized products that can be removed or separated from the CNT array. The hydroxyls or hydrogen can be produced by heating the CNT array, residue and selected vapor or liquid source or by application of an electromagnetic excitation signal with a selected frequency or range of frequencies to dissociate the selected vapor or liquid. The excitation frequency can be chirped to cover a selected range of frequencies corresponding to dissociation of the selected vapor or liquid. Sonication may be used to supplement dissociation of the H<sub>2</sub>O and/or H<sub>2</sub>O<sub>2</sub>.

Official Gazette of the U.S. Patent and Trademark Office

*Carbon Nanotubes; Purification*

**20060010035** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Resistive Exercise Device**

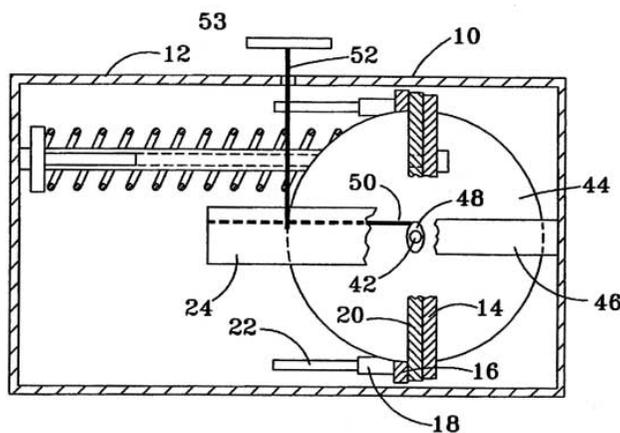
Smith, Damon C., Inventor; October 25, 2005; 21 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 26 Sep. 2002; US-Patent-6,958,032; US-Patent-Appl-263288; NASA-Case-MS-C-23196-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060010035>; Avail: CASI; A03, Hardcopy

An exercise device 10 is particularly well suited for use in low gravity environments, and includes a frame 12 with plurality of resistance elements 30,82 supported in parallel on the frame. A load transfer member 20 is moveable relative to the frame for transferring the applied force to the free end of each captured resistance element. Load selection template 14 is removably secured both to the load transfer member, and a plurality of capture mechanisms engage the free end of corresponding resistance elements. The force applying mechanism 53 may be a handle, harness or other user interface for applying a force to move the load transfer member.

Official Gazette of the U.S. Patent and Trademark Office

*Physical Exercise; Mechanical Engineering; Resistance*



**20060010036** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Microwave Medical Treatment Apparatus and Method**

Arndt, G. Dickey, Inventor; Ngo, Phong H., Inventor; Carl, James R., Inventor; George, W. Rffoul, Inventor; September 13, 2005; 19 pp.; In English; Original contains black and white illustrations

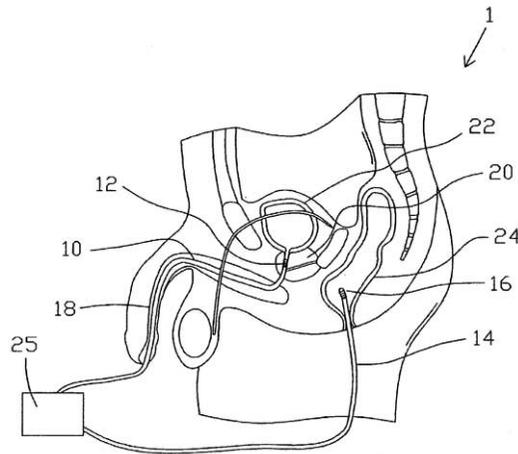
Patent Info.: Filed 29 Nov. 2002; US-Patent-6,944,504; US-Patent-Appl-302323; US-Patent-Appl-746533; US-Patent-6,675,050; US-Patent-Appl-511961; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060010036>; Avail: CASI; A03, Hardcopy

Methods, simulations, and apparatus are provided that may be utilized for medical treatments which are especially suitable for treatment of benign prostatic hyperplasia (BPH). In a preferred embodiment, a plurality of separate microwave antennas are utilized to heat prostatic tissue to promote necrosing of the prostatic tissue that relieves the pressure of the prostatic tissue against the urethra as the body reabsorbs the necrosed or dead tissue. By utilizing constructive and destructive interference of the microwave transmission, the energy can be deposited on the tissues to be necrosed while protecting other tissues such as the urethra. Saline injections to alter the conductivity of the tissues may also be used to further focus the energy deposits. A computer simulation is Provided that can be used to Predict the resulting temperature profile produced in the prostatic tissue. By changing the various control features of one or more catheters and the methods of applying microwave

energy, a temperature profile can be predicted and produced that is similar to the temperature profile desired for the particular patient.

Official Gazette of the U.S. Patent and Trademark Office

*Medical Equipment; Microwave Transmission; Computerized Simulation*



**20060017023** NASA Johnson Space Center, Houston, TX, USA

**Deceleration-Limiting Roadway Barrier**

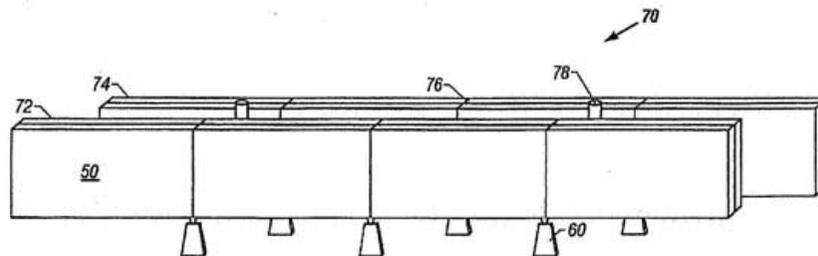
Schneider, William C., Inventor; Locke, P. James, Inventor; February 14, 2006; 17 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 4 Dec. 2001; US-Patent-6,997,637; US-Patent-Appl-005820; NASA-Case-MSF-23178-1; US-Patent-Appl-254285; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017023>; Avail: CASI; A03, Hardcopy

Roadway barrier system and method are disclosed for decelerating a moving vehicle in a controlled manner and for retaining the decelerated vehicle. A net or mesh of the roadway barrier system receives and captures the moving vehicle. The net or mesh is secured to anchors by energy absorbing straps. The energy absorbing straps deploy under a tensional load to decelerate the moving vehicle, the straps providing a controlled resistance to the tensional load over a predefined displacement or stroke to bring the moving vehicle to rest. Additional features include a sacrificial panel or sheet in front of the net that holds up the net or mesh while deflecting vehicles that collide only tangentially with the roadway barrier system.

Official Gazette of the U.S. Patent and Trademark Office

*Deceleration; Loads (Forces); Displacement; Barriers; Deflection; Roads*



**20060017041** NASA Glenn Research Center, Cleveland, OH, USA

**System for Controlling a Magnetically Levitated Rotor**

Morrison, Carlos R., Inventor; April 04, 2006; 17 pp.; In English; Original contains black and white illustrations

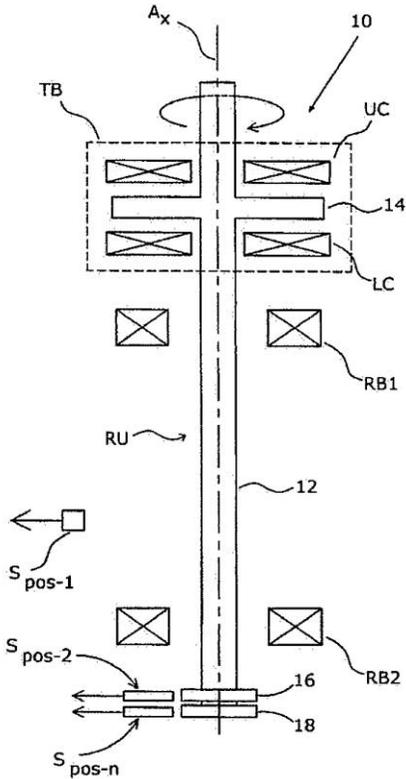
Patent Info.: Filed 12 Mar. 2003; US-Patent-7,023,118; US-Patent-Appl-SN-390256; US-Patent-Appl-SN-364002; NASA-Case-LEW-17293-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017041>; Avail: CASI; A03, Hardcopy

In a rotor assembly having a rotor supported for rotation by magnetic bearings, a processor controlled by software or firmware controls the generation of force vectors that position the rotor relative to its bearings in a 'bounce' mode in which

the rotor axis is displaced from the principal axis defined between the bearings and a 'tilt' mode in which the rotor axis is tilted or inclined relative to the principal axis. Waveform driven perturbations are introduced to generate force vectors that excite the rotor in either the 'bounce' or 'tilt' modes.

Official Gazette of the U.S. Patent and Trademark Office

*Magnetic Suspension; Rotors; Perturbation; Firmware; Magnetic Bearings; Control*



42

## GEOSCIENCES (GENERAL)

Includes general research topics related to the Earth sciences, and the specific areas of petrology, mineralogy, and general geology. For other specific topics in geosciences see *categories 42 through 48*.

**20050237941** NASA Johnson Space Center, Houston, TX, USA

### Method for Controlling a Producing Zone of a Well in a Geological Formation

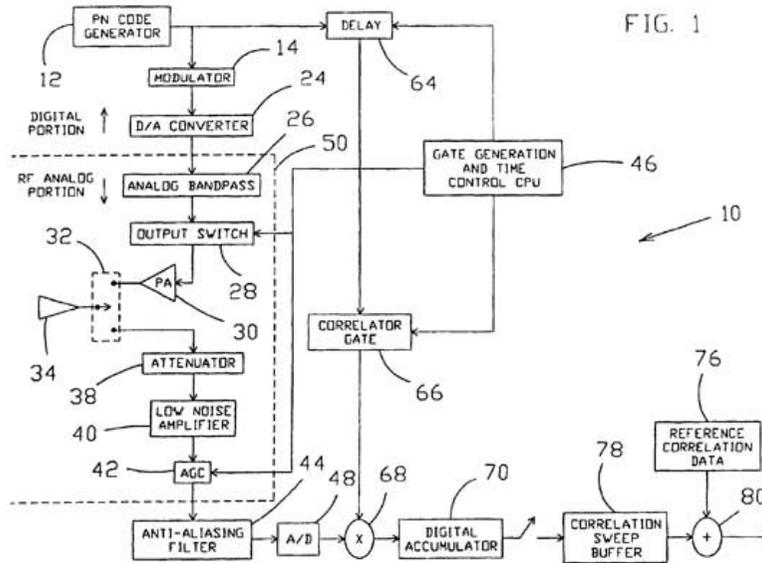
Arndt, G. Dickey, Inventor; Carl, James R., Inventor; Byerly, Kent A., Inventor; Amini, B. Jon, Inventor; March 15, 2005; 18 pp.; In English

Patent Info.: Filed 30 Oct. 2002; US-Patent-6,866,098-B1; US-Patent-Appl-SN-288799; US-Patent-Appl-SN-793817; NASA-Case-MS-C-23029-3; No Copyright; Avail: CASI; A03, Hardcopy

System and methods for transmitting and receiving electromagnetic pulses through a geological formation. A preferably programmable transmitter having an all-digital portion in a preferred embodiment may be operated at frequencies below 1 MHz without loss of target resolution by transmitting and over sampling received long PN codes. A gated and stored portion of the received signal may be correlated with the PN code to determine distances of interfaces within the geological formation, such as the distance of a water interfaces from a wellbore. The received signal is oversampled preferably at rates such as five to fifty times as high as a carrier frequency. In one method of the invention, an oil well with multiple production zones may be kept in production by detecting an approaching water front in one of the production zones and shutting down that particular production zone thereby permitting the remaining production zones to continue operating.

Official Gazette of the U.S. Patent and Trademark Office

*Boreholes; Geology; Wells; Regions*



43

### EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis of remote sensing data and imagery; development of remote sensing products; photogrammetry; and aerial photography. For related instrumentation see *35 Instrumentation and Photography*.

**20060017026** NASA Johnson Space Center, Houston, TX, USA

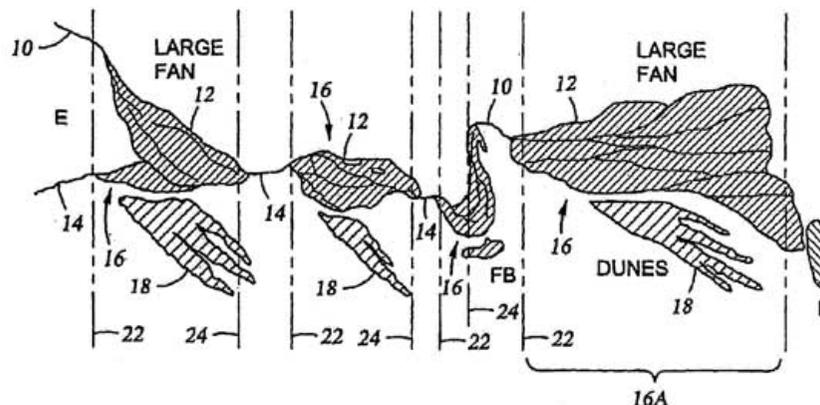
#### Method For Identifying Sedimentary Bodies From Images And Its Application To Mineral Exploration

Wilkinson, Murray Justin, Inventor; January 10, 2006; 16 pp.; In English; Original contains black and white illustrations Patent Info.: Filed 1 Aug. 2002; US-Patent-6,985,606; US-Patent-Appl-SN-212579; NASA-Case-MSF-23424-1; US-Patent-Appl-SN-362670; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017026>; Avail: CASI; A03, Hardcopy

A method is disclosed for identifying a sediment accumulation from an image of a part of the earth's surface. The method includes identifying a topographic discontinuity from the image. A river which crosses the discontinuity is identified from the image. From the image, paleocourses of the river are identified which diverge from a point where the river crosses the discontinuity. The paleocourses are disposed on a topographically low side of the discontinuity. A smooth surface which emanates from the point is identified. The smooth surface is also disposed on the topographically low side of the point.

Official Gazette of the U.S. Patent and Trademark Office

*Rivers; Sediments; Discontinuity; Identifying; Topography; Mineral Exploration*



**20060017035** NASA, Washington, DC, USA

**Contaminant Removal From Natural Resources**

Clausen, Christian A., Inventor; Quinn, Jacqueline W., Inventor; Geiger, Cheri L., Inventor; Reinhart, Debra, Inventor; Fillpek, Laura B., Inventor; Coon, Christina, Inventor; Devor, Robert, Inventor; March 07, 2006; 8 pp.; In English  
Patent Info.: Filed 28 May 2003; US-Patent-7,008,964; US-Patent-Appl-SN-449907; NASA-Case-KSC-12399; US-Patent-Appl-SN-441275; US-Patent-Appl-SN-385435; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017035>;  
Avail: CASI; **A02**, Hardcopy

A zero-valent metal emulsion containing zero-valent metal particles is used to remediate contaminated natural resources, such as groundwater and soil. In a preferred embodiment, the zero-valent metal emulsion removes heavy metals, such as lead (pb), from contaminated natural resources. In another preferred embodiment, the zero-valent metal emulsion is a bimetallic emulsion containing zero-valent metal particles doped with a catalytic metal to remediate halogenated aromatic compounds, such as polychlorinated biphenyls (PCBs), from natural resources.

Official Gazette of the U.S. Patent and Trademark Office

*Contaminants; Ground Water; Metal Particles; Soils; Bimetal; Earth Resources*

**44**

**ENERGY PRODUCTION AND CONVERSION**

Includes specific energy conversion systems, e.g., fuel cells; and solar, geothermal, windpower, and waterwave conversion systems; energy storage; and traditional power generators. For technologies related to nuclear energy production see *73 Nuclear Physics*. For related information see also *07 Aircraft Propulsion and Power*; *20 Spacecraft Propulsion and Power*, and *28 Propellants and Fuels*.

**20060009297** NASA Glenn Research Center, Cleveland, OH, USA

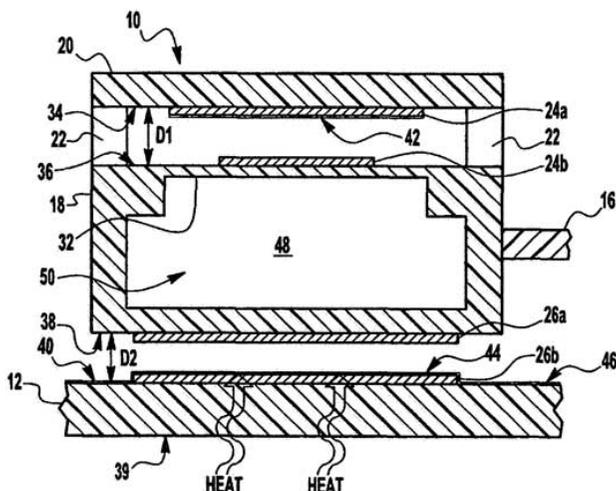
**MEMS CLOSED CHAMBER HEAT ENGINE and ELECTRIC GENERATOR**

Landis, Geoffrey A., Inventor; December 27, 2005; 18 pp.; In English  
Patent Info.: Filed 16 Sep. 2003; US-Patent-6,978,611; US-Patent-Appl-SN-453251; NASA-Case-LEW-17391-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009297>; Avail: CASI; **A03**, Hardcopy

A heat engine, preferably combined with an electric generator, and advantageously implemented using micro-electromechanical system (MEMS) technologies as an array of one or more individual heat engine/generators. The heat engine is based on a closed chamber containing a motive medium, preferably a gas; means for alternately enabling and disabling transfer of thermal energy from a heat source to the motive medium; and at least one movable side of the chamber that moves in response to thermally-induced expansion and contraction of the motive medium, thereby converting thermal energy to oscillating movement. The electrical generator is combined with the heat engine to utilize movement of the movable side to convert mechanical work to electrical energy, preferably using electrostatic interaction in a generator capacitor. Preferably at least one heat transfer side of the chamber is placed alternately into and out of contact with the heat source by a motion capacitor, thereby alternately enabling and disabling conductive transfer of heat to the motive medium.

Official Gazette of the U.S. Patent and Trademark Office

*Microelectromechanical Systems; Heat Engines; Heat Transfer; Electrostatic Generators; Thermal Energy; Temperature Effects*



45  
ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

**20060009002** NASA Kennedy Space Center, Cocoa Beach, FL, USA

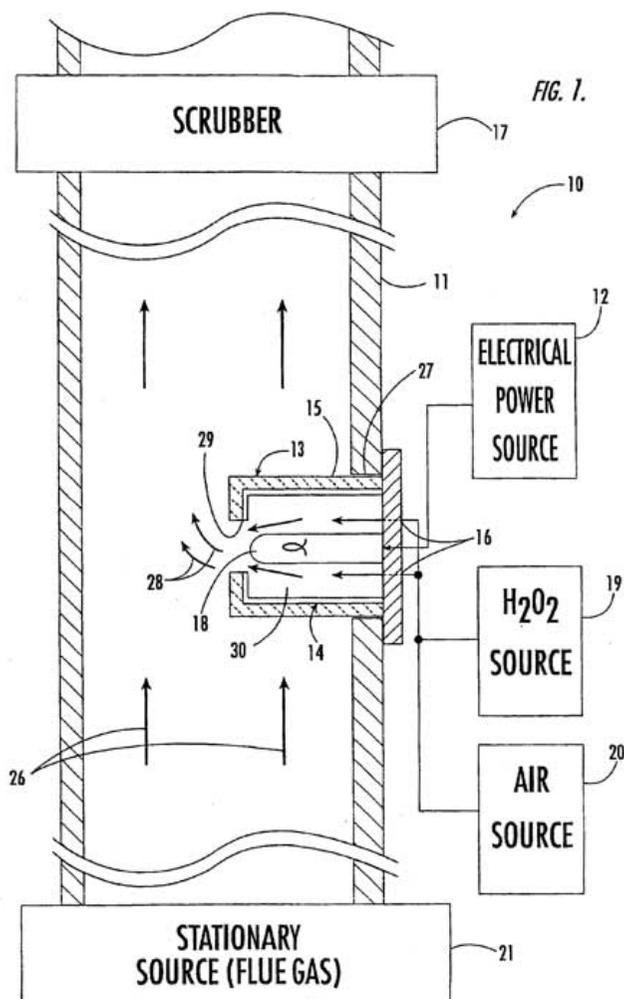
**APPARATUS and METHOD FOR TREATING POLLUTANTS IN A GAS USING HYDROGEN PEROXIDE and UV LIGHT**

Cooper, Charles David, Inventor; Clauseu, christian Anthony, Inventor; November 29, 2005; 9 pp.; In English  
Patent Info.: Filed 18 Jan. 2002; US-Patent-6,9696,486; US-Patent-Appl-SN-056842; NASA-Case-KSC-12209; No  
Copyright; ONLINE: <http://hdl.handle.net/2060/20060009002>; Avail: CASI; A02, Hardcopy

An apparatus for treating pollutants in a gas may include a source of hydrogen peroxide, and a treatment injector for creating and injecting dissociated hydrogen peroxide into the flow of gas. The treatment injector may further include an injector housing having an inlet, an outlet, and a hollow interior extending there between. The inlet may be connected in fluid communication with the source of hydrogen peroxide so that hydrogen peroxide flows through the hollow interior and toward the outlet. At least one ultraviolet (UV) lamp may be positioned within the hollow interior of the injector housing. The at least one UV lamp may dissociate the hydrogen peroxide flowing through the tube. The dissociated hydrogen peroxide may be injected into the flow of gas from the outlet for treating pollutants, such as nitrogen oxides.

Official Gazette of the U.S. Patent and Trademark Office

*Gas Flow; Contaminants; Hydrogen Peroxide; Injectors; Nitrogen Oxides; Ultraviolet Radiation*



**LIFE SCIENCES (GENERAL)**

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance of animals and plants in space and related environmental conditions. For specific topics in life sciences see *categories 52 through 55*.

**20060009008** NASA Marshall Space Flight Center, Huntsville, AL, USA

**ORTHOPEDIC LEG BRACE**

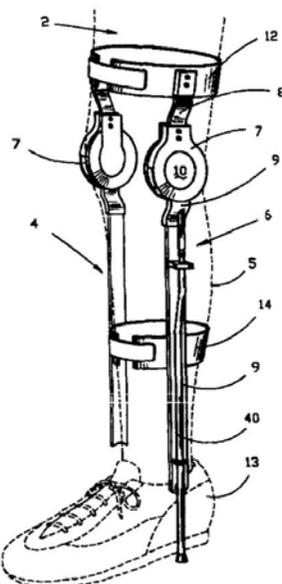
Myers, William Neil, Inventor; November 1, 2005; 8 pp.; In English

Patent Info.: Filed 22 Aug. 2003; US-Patent-6,960,175; US-Patent-Appl-652087; NASA-Case-MSF-31906-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009008>; Avail: CASI; A02, Hardcopy

Knee braces generally have been rigid in both the knee bending direction and in the knee straightening direction unless a manually operated release is incorporated in them to allow the knee to bend. Desirably a braced knee joint should effectively duplicate the compound, complex, actions of a normal knee. The key to knee braces is the knee joint housing. The housing herein carries a number of cam action pawls, with teeth adapted to engage the internal teeth of a ratchet ring mounted in the housing. Cam action return springs and the shape of the cam action pawl teeth allow rotation of the ratchet ring in a leg straightening direction while still supporting a load. The leg can then be extended during walking while at the same time being prevented by the cam action pawls from buckling in the knee bending direction.

Official Gazette of the U.S. Patent and Trademark Office

*Orthopedics; Knee (Anatomy); Bending; Supports; Walking*



**20060010439** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Production of Functional Proteins: Balance of Shear Stress and Gravity**

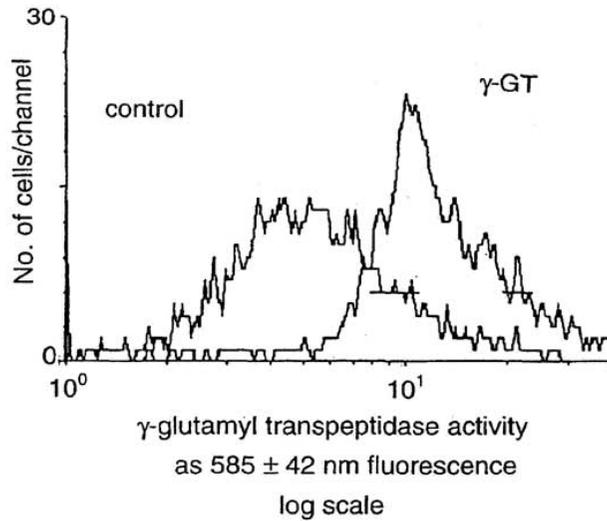
Goodwin, Thomas John, Inventor; Hammond, Timothy Grant, Inventor; Haysen, James Howard, Inventor; September 20, 2005; 28 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 21 Mar. 2000; US-Patent-6,946,246; US-Patent-Appl-532001; US-Patent-Appl-056363; US-Patent-Appl-043205; NASA-Case-MSF-22859-2; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060010439>; Avail: CASI; A03, Hardcopy

The present invention provides for a method of culturing cells and inducing the expression of at least one gene in the cell culture. The method provides for contacting the cell with a transcription factor decoy oligonucleotide sequence directed against a nucleotide sequence encoding a shear stress response element.

Official Gazette of the U.S. Patent and Trademark Office

*Gravitation; Shear Stress; Proteins*



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### MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human factors engineering, bionics, man-machine systems, life support, space suits and protective clothing. For related information see also *16 Space Transportation and Safety* and *52 Aerospace Medicine*.

**20060009298** NASA Ames Research Center, Moffett Field, CA, USA

#### BODY SENSING SYSTEM

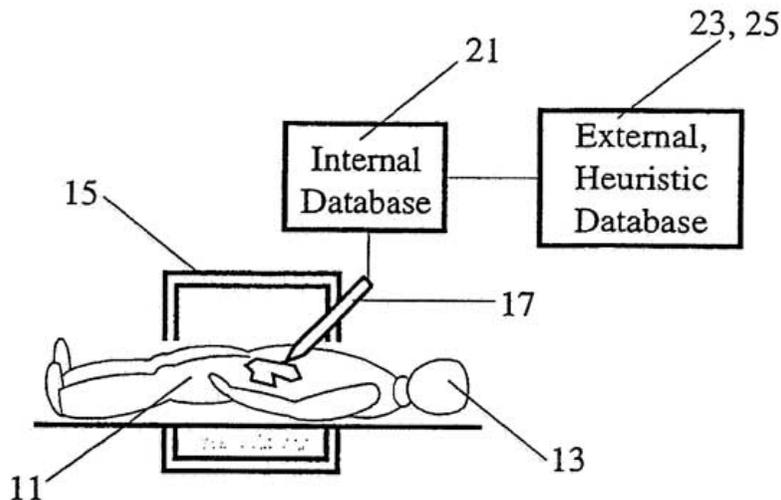
Mah, Robert W., Inventor; December 13, 2005; 15 pp.; In English

Patent Info.: Filed 16 Jan. 2004; US-Patent-6,976,013; US-Patent-Appl-SN-874003; US-Patent-Appl-SN-652,302; NASA-Case-ARC-14231-2; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009298>; Avail: CASI; A03, Hardcopy

System and method for performing one or more relevant measurements at a target site in an animal body, using a probe. One or more of a group of selected internal measurements is performed at the target site, is optionally combined with one or more selected external measurements, and is optionally combined with one or more selected heuristic information items, in order to reduce to a relatively small number the probable medical conditions associated with the target site. One or more of the internal measurements is optionally used to navigate the probe to the target site. Neural net information processing is performed to provide a reduced set of probable medical conditions associated with the target site.

Official Gazette of the U.S. Patent and Trademark Office

*Detection; Targets; Neural Nets; Heuristic Methods*



## COMPUTER PROGRAMMING AND SOFTWARE

Includes software engineering, computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM. For computer software applied to specific applications, see also the associated category.

**20060009003** NASA Ames Research Center, Moffett Field, CA, USA

### Extensible Database Framework for Management of Unstructured and Semi-Structured Documents

Gawdiak, Yuri O., Inventor; La, Tracy T., Inventor; Lin, Shu-Chun Y., Inventor; Malof, David A., Inventor; Tran, Khai Peter B., Inventor; November 22, 2005; 17 pp.; In English

Patent Info.: Filed 29 Aug. 2002; US-Patent-6,968,338; US-Patent-Appl-SN-232975; NASA-Case-ARC-14662-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009003>; Avail: CASI; A03, Hardcopy

Method and system for querying a collection of Unstructured or semi-structured documents to identify presence of, and provide context and/or content for, keywords and/or keyphrases. The documents are analyzed and assigned a node structure, including an ordered sequence of mutually exclusive node segments or strings. Each node has an associated set of at least four, five or six attributes with node information and can represent a format marker or text, with the last node in any node segment usually being a text node. A keyword (or keyphrase) is specified, and the last node in each node segment is searched for a match with the keyword. When a match is found at a query node, or at a node determined with reference to a query node, the system displays the context and/or the content of the query node.

Official Gazette of the U.S. Patent and Trademark Office

*Data Base Management Systems; Unstructured Grids (Mathematics); Display Devices; Strings*

## NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

**20060009007** NASA Ames Research Center, Moffett Field, CA, USA

### HYBRID NEURAL NETWORK and SUPPORT VECTOR MACHINE METHOD FOR OPTIMIZATION

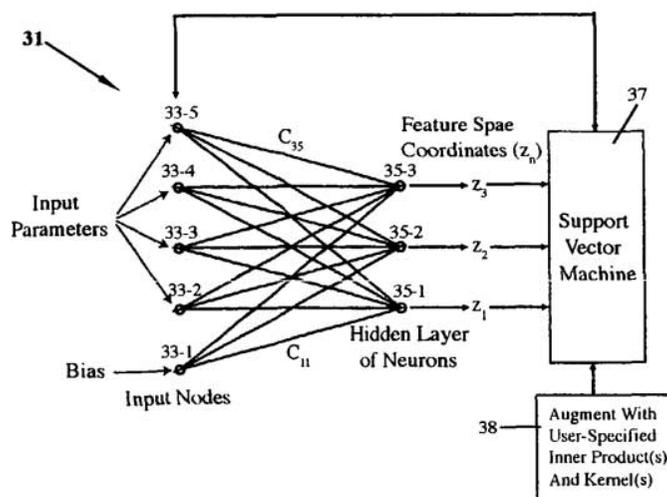
Rai, Man Mohan, Inventor; November 1, 2005; 24 pp.; In English

Patent Info.: Filed 7 Jan. 2002; US-Patent-6,961,719; US-Patent-Appl-043044; NASA-Case-ARC-14586-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009007>; Avail: CASI; A03, Hardcopy

System and method for optimization of a design associated with a response function, using a hybrid neural net and support vector machine (NN/SVM) analysis to minimize or maximize an objective function, optionally subject to one or more constraints. As a first example, the NN/SVM analysis is applied iteratively to design of an aerodynamic component, such as an airfoil shape, where the objective function measures deviation from a target pressure distribution on the perimeter of the aerodynamic component. As a second example, the NN/SVM analysis is applied to data classification of a sequence of data points in a multidimensional space. The NN/SVM analysis is also applied to data regression.

Official Gazette of the U.S. Patent and Trademark Office

*Neural Nets; Optimization; Vectors (Mathematics)*



## 70 PHYSICS (GENERAL)

Includes general research topics related to mechanics, kinetics, magnetism, and electrodynamics. For specific areas of physics see categories 71 through 77. For related instrumentation see 35 *Instrumentation and Photography*; for geophysics, astrophysics, or solar physics see 46 *Geophysics*, 90 *Astrophysics*, or 92 *Solar Physics*.

**20060017025** NASA Pasadena Office, CA, USA

### Ring-Interferometric Sol-Gel Bio-Sensor

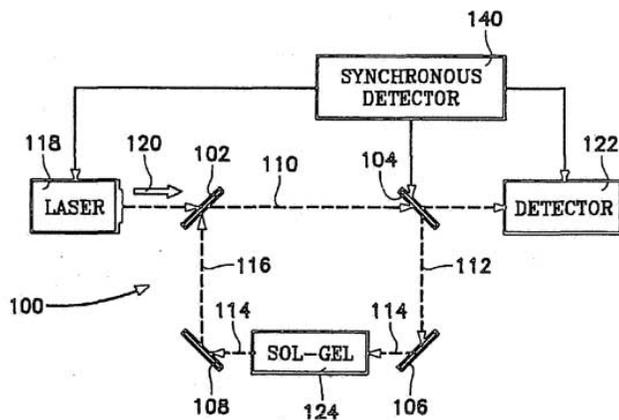
Bearman, Gregory, Inventor; Cohen, David, Inventor; March 28, 2006; 11 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 9 Dec. 2003; US-Patent-7,019,847; US-Patent-Appl-SN-750,574; NASA-Case-NPO-30807-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017025>; Avail: CASI; A03, Hardcopy

A biosensor embodying the invention includes a sensing volume having an array of pores sized for immobilizing a first biological entity tending to bind to a second biological entity in such a manner as to change an index of refraction of the sensing volume. The biosensor further includes a ring interferometer, one volumetric section of the ring interferometer being the sensing volume, a laser for supplying light to the ring interferometer, and a photodetector for receiving light from the interferometer.

Official Gazette of the U.S. Patent and Trademark Office

*Bioinstrumentation; Interferometers; Sol-Gel Processes; Immobilization; Photometers; Refractivity*



## 71 ACOUSTICS

Includes sound generation, transmission, and attenuation. For noise pollution see 45 *Environment Pollution*. For aircraft noise see also 02 *Aerodynamics* and 07 *Aircraft Propulsion and Power*.

**20060017038** NASA Marshall Space Flight Center, Huntsville, AL, USA

### Entertainment and Pacification System For Car Seat

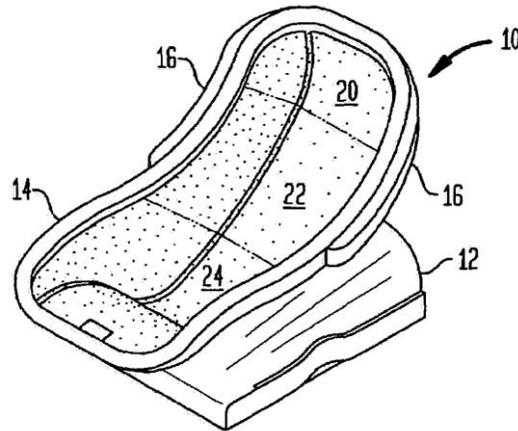
Elrod, Susan Vinz, Inventor; Dabney, Richard W., Inventor; May 02, 2006; 10 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 18 Mar. 2003; US-Patent-7,039,207; US-Patent-Appl-SN-392,488; NASA-Case-MSF-31707-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017038>; Avail: CASI; A02, Hardcopy

An entertainment and pacification system for use with a child car seat has speakers mounted in the child car seat with a plurality of audio sources and an anti-noise audio system coupled to the child car seat. A controllable switching system provides for, at any given time, the selective activation of i) one of the audio sources such that the audio signal generated thereby is coupled to one or more of the speakers, and ii) the anti-noise audio system such that an ambient-noise-canceling audio signal generated thereby is coupled to one or more of the speakers. The controllable switching system can receive commands generated at one of first controls located at the child car seat and second controls located remotely with respect to the child car seat with commands generated by the second controls overriding commands generated by the first controls.

Author

*Seats; Noise (Sound); Sound Waves; Ambience; Auditory Signals*



74  
OPTICS

Includes light phenomena and the theory of optical devices; for specific optical devices see also *35 Instrumentation and Photography*. For lasers see *36 Lasers and Masers*.

**20050237940** NASA Johnson Space Center, Houston, TX, USA

**Dynamic Optical Filtration**

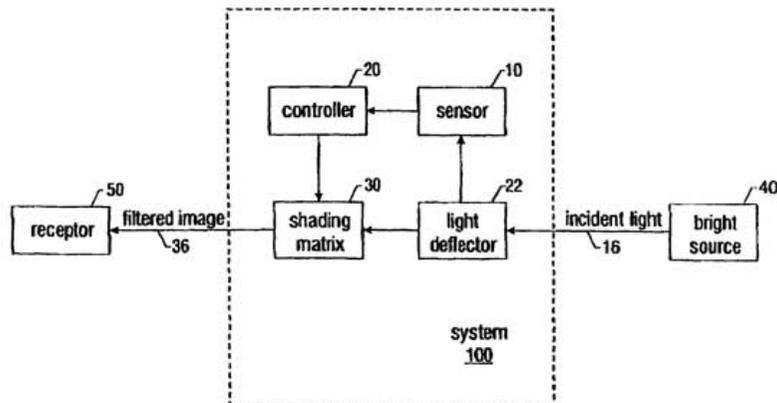
Chretien, Jean-Loup, Inventor; Lu, Edward T., Inventor; March 08, 2005; 34 pp.; In English

Patent Info.: Filed 7 Dec. 2000; US-Patent-6,864,473-B2; US-Patent-Appl-SN-988855; NASA-Case-MS-C-23037-1; No Copyright; Avail: CASI; A03, Hardcopy

A dynamic optical filtration system and method effectively blocks bright light sources without impairing view of the remainder of the scene. A sensor measures light intensity and position so that selected cells of a shading matrix may interrupt the view of the bright light source by a receptor. A beamsplitter may be used so that the sensor may be located away from the receptor. The shading matrix may also be replaced by a digital micromirror device, which selectively sends image data to the receptor.

Official Gazette of the U.S. Patent and Trademark Office

*Filtration; Optical Equipment; Dynamic Control*



**20060009011** NASA Johnson Space Center, Houston, TX, USA

**Motion Sickness Treatment Apparatus and Method**

Reschke, Millard F., Inventor; Somers, Jeffrey T., Inventor; Ford, George A., Inventor; August 23, 2005; 14 pp.; In English; Original contains black and white illustrations

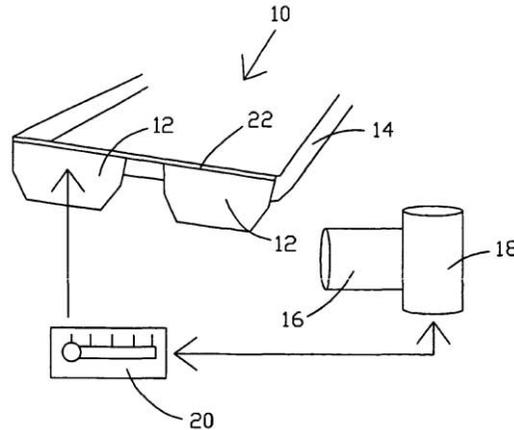
Patent Info.: Filed 6 Feb. 2003; US-Patent-6,932,090; US-Patent-Appl-361046; NASA-Case-MS-C-23444-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009011>; Avail: CASI; A03, Hardcopy

Methods and apparatus are disclosed for treating motion sickness. In a preferred embodiment a method of the invention comprises operating eyewear having shutter lenses to open said shutter lenses at a selected operating frequency ranging from

within about 3 Hz to about 50 Hz. The shutter lenses are opened for a short duration at the selected operating frequency wherein the duration is selected to prevent retinal slip. The shutter lenses may be operated at a relatively slow frequency of about 4 Hz when the user is in passive activity such as riding in a boat or car or in limited motion situations in a spacecraft. The shutter lenses may be operated at faster frequencies related to motion of the user's head when the user is active.

Official Gazette of the U.S. Patent and Trademark Office

*Motion Sickness; Equipment; Eye (Anatomy)*



**20060017032** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Variable Distance Angular Symbology Reader**

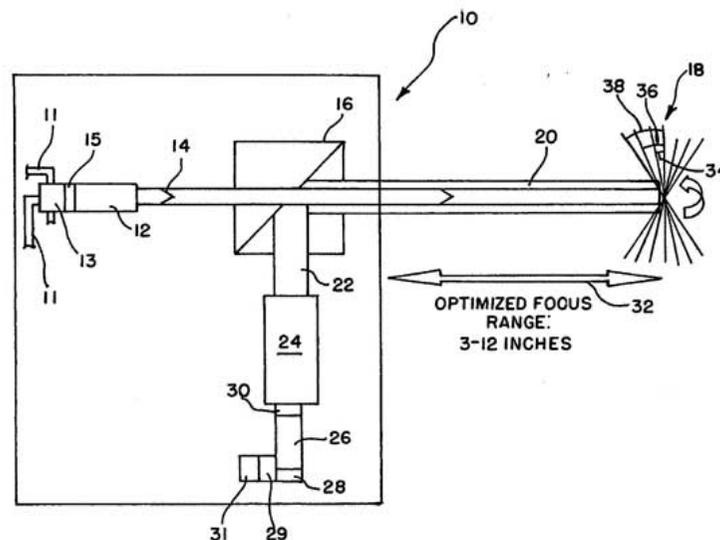
Schramm, Harry F., Jr., Inventor; Corder, Eric L., Inventor; March 28, 2006; 8 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 26 Nov. 2003; US-Patent-7,017,812; US-Patent-Appl-SN-730191; NASA-Case-MSF-31944-1; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060017032>; Avail: CASI; A02, Hardcopy

A variable distance angular symbology, reader utilizes at least one light source to direct light through a beam splitter and onto a target. A target may be angled relative to the impinging light beam up to and maybe even greater than 45deg. A reflected beam from the target passes through the beam splitter and is preferably directed 90deg relative to the light source through a telecentric lens to a scanner which records an image of the target such as a direct part marking code.

Official Gazette of the U.S. Patent and Trademark Office

*Beam Splitters; Light Sources; Targets; Light Beams*



75  
PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see 46 *Geophysics*. For space plasmas see 90 *Astrophysics*.

**20060009300** NASA Glenn Research Center, Cleveland, OH, USA  
**METHOD of PRODUCING and ACCELERATING AN ION BEAM**

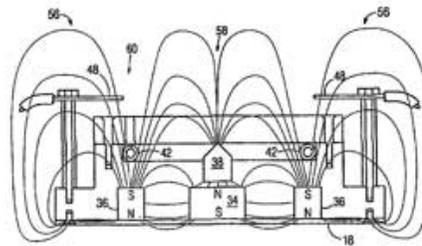
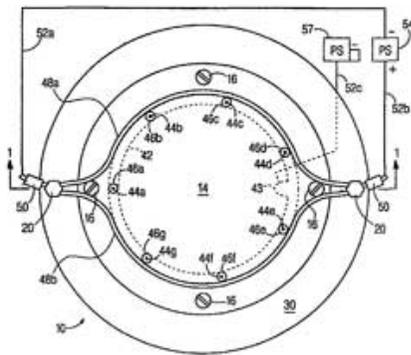
Foster, John E., Inventor; November 2005; 12 pp.; In English

Patent Info.: Filed 5 Jan. 2004; US-Patent-6,960,888; US-Patent-Appl-SN-753183; US-Patent-Appl-SN-215129; NASA-Case-LEW017230.2; No Copyright; ONLINE: <http://hdl.handle.net/2060/20060009300>; Avail: CASI; A03, Hardcopy

A method of producing and accelerating an ion beam comprising the steps of providing a magnetic field with a cusp that opens in an outward direction along a centerline that passes through a vertex of the cusp; providing an ionizing gas that sprays outward through at least one capillary-like orifice in a plenum that is positioned such that the orifice is on the centerline in the cusp, outward of the vortex of the cusp; providing a cathode electron source, and positioning it outward of the orifice and off of the centerline; and positively charging the plenum relative to the cathode electron source such that the plenum functions as an anode. A hot filament may be used as the cathode electron source, and permanent magnets may be used to provide the magnetic field.

Official Gazette of the U.S. Patent and Trademark Office

*Electron Sources; Ion Beams; Cathodes; Anodes; Magnetic Fields*



# Subject Term Index

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